Self-Regulation in the Doctoral Research Context: Exploring Students’ Responses to a Self-Monitoring Process during PhD Candidature

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Statement of Originality

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to the final version of my thesis being made available worldwide when deposited in the University’s Digital Repository, subject to the provisions of the Copyright Act 1968.
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Abstract

In educational psychology, self-regulation is a construct that has been used to explain students’ self-initiated efforts to implement cognitive, emotional, and behavioural strategies to guide direction and sustain motivation during the pursuit of personal educational goals. While the academic and performance outcomes of various aspects of self-regulation have been studied in a range of formal and informal learning domains, there has been a lack of published research regarding self-regulation in the doctoral research context. As the doctoral research context is typically more longitudinal, complex, and individualised than other learning domains, it would be expected to be particularly demanding in terms of self-regulation. How might students at this elite level of education differ in their self-regulatory efforts? Moreover, as a multitude of other factors influence the experience of PhD candidature, is it possible to discern any relationship between self-regulatory efficacy and doctoral research progress?

Using an exploratory mixed-methods design, this study followed over 800 PhD students at various stages of candidature across a year of their doctoral research. Despite the many inherent challenges to the study of self-regulation as a cyclical feedback process in this context, the results of this study showed that differences in PhD students’ self-regulatory efficacy can be identified, and that these can be considered to be an important factor in the management of doctoral research. In particular, implementing effective self-regulatory practices led to greater satisfaction with progress, which was itself motivating, and was associated with continued enrolment and thesis completion. In contrast, ineffective self-regulatory behaviours, if left unchecked, were associated with an increased risk of withdrawal or taking leave from candidature.

Considering the relationship found between students’ feelings about progress and the reported use of self-regulatory behaviours, the persistent dissatisfaction with progress that was experienced by a significant minority of students suggests the value of targeted interventions to assist these students to develop greater self-regulatory efficacy. The Journey Tracking Survey process, developed as a means of student self-monitoring in this study, was utilised successfully by some students in a more systematic manner to improve their self-regulatory functioning and hence their progress. This demonstrated the utility of this simple tool for PhD student use, in addition to further research purposes. However, consistent with prior research, the results of this study also highlighted the importance of the supervisor to students’ self-regulatory efforts, through the provision of regular, frequent, and constructive feedback.
The outcomes of this investigation contribute to the limited literature on self-regulation in doctoral learners in a number of ways. Zimmerman’s (2000) cycle of self-regulation was shown to be relevant to understanding differences in students’ performance at the highest levels of formal education, and a new method for exploring self-regulation in this complex, individualised, and longitudinal context was discussed. The results also offer guidance for the design and evaluation of interventions for students who need assistance in enhancing their self-regulation, by generating a self-monitoring method for this purpose. Encouraging this type of student development, in conjunction with quality supervision and doctoral pedagogy, may contribute to improved rates of timely and successful PhD completions. In the process, PhD students may be better equipped with self-regulatory attributes that are likely to be of use within and beyond academe. The implications of these results thus extend beyond students and supervisors to all stakeholders in doctoral education.
1. BACKGROUND TO THE STUDY

Interviewee (T1_0291): It's my heart that hurts, more than my head. I have wanted to get this done as soon as possible, and at every turn it seems to be taking longer than I anticipated. The actual brain work I don't mind.

Facilitator: So that's not the biggest challenge for you?

Interviewee: Oh, it's a challenge. But it's the emotional side which is more - 'hurting' isn't the right word, but it's like my mood goes up and down depending on what the latest news is. Not the latest news on the television, but the latest news with regard to the PhD. So you know, one week I could be really happy and confident and the next week things seem to be falling into pieces.

Facilitator: What strategies do you put in place to deal with those ups and downs?

Interviewee: I just return to the idea of saying, well, what are my options in this situation, what can I do now? What is a realistic goal for me to do over the next day, over the next week, over the next month, whatever. So far it's worked.

(Source: Telephone interview, Australian Research Council Discovery Project data (DP0987446))
1.1 INTRODUCTION

The Doctor of Philosophy (PhD) degree is generally regarded as the foremost level of formal study throughout the world (Mowbray & Halse, 2010; Powell & Green, 2007; Smith, Maroney, Nelson, Abel, & Abel, 2006), and its timely and successful completion is usually a complex and multifactorial long-term process for students as well as for their supervisors. It is hardly surprising, then, that within the PhD student population there are “those for whom difficulties impede or halt progress, and those who experience difficulties and negotiate them successfully” (Wright, 2003, p. 219). For those who persist to completion, the benefits for both the individual and society are expected to include the generation of intellectual and knowledge capital, as well as personal development (Mowbray & Halse, 2010; Pearson, Cumming, Evans, Macauley, & Ryland, 2011; Wood, 2006). Indeed, completions are “a measurable outcome that rewards the investment of time, resources, and commitment by the student, the supervising staff, and the university as a whole” (Norton, 2011, p. 1).

The completion of doctoral research is of great importance to many aspects of society, extending beyond education to training, management, and professional practice (Bair & Haworth, 2004). Research by doctoral students is a highly significant contributor to our increasingly knowledge-based society (Murtonen & Lehtinen, 2009); when calculated in terms of human resources, over half the higher education research in Australia is conducted by postgraduate research students (Rymer, 2011). Therefore, timely completions are becoming increasingly valued by students, supervisors, institutions, and funding bodies (Jiranek, 2010). However, adverse circumstances or difficulties in dealing with the challenges of undertaking doctoral research may result in prolonged time to completion, or even attrition from candidature. These scenarios carry the risk of significant psychological and financial costs to the individual (Johnson, Green, & Kluever, 2000; Lovitts, 2001) and damage to the institution’s reputation (Green, 1997; Johnson et al., 2000; van de Schoot, Yerkes, Mouw, & Sonneveld, 2013).

Estimates of PhD completion times and attrition rates have varied widely over recent decades, partly depending on the terminology, criteria, and methods used, as well as the programmes and populations studied (Bair & Haworth, 2004; Bourke, Holbrook, Lovat, & Farley, 2004; Norton, 2011). For example, completion times may be calculated in ways that either include or exclude periods of leave (Sheridan & Pyke, 1994), and often do not take into consideration changes in part- or full-time attendance mode (Bourke et al., 2004). Although it may not be meaningful to
generalise from these studies, it appears commonly accepted that attrition rates approach 50% in many PhD programmes across nations (e.g. Johnson et al., 2000; Lovitts & Nelson, 2000). In Australia, studies have reported attrition rates of 33% within the first five years of candidature (Jiranek, 2010) and 47% after seven years (Martin, Maclachlan, & Karmel, 2001), while Bourke et al. (2004) reported that 30% of students had not yet completed after the equivalent of six years of full-time candidature.

Rates of slow or delayed completion of candidature are also difficult to determine. An inconsistent use of terminology means that where candidature is not completed within the time allowed by the institution, or another arbitrarily defined period of time, it might be referred to as ‘prolonged’ (Vekkaila, Pyhältö, & Lonka, 2013), ‘protracted’ or ‘slow’ (Jiranek, 2010), ‘longer-than-normal’ or ‘extended’ (Bourke et al., 2004). Similarly, Cantwell, Scevak, Bourke, and Holbrook (2012a) used the term ‘problematic candidature’ to describe situations where impediments to progress might result in attrition or delayed completion, or in a reduction of the quality of the product. Generally inferred from median ‘time to doctorate’ data from single institutions (e.g., Bourke et al., 2004; Wao & Onwuegbuzie, 2011), a comparison of these results is again confounded by different methods for calculating completion times. Further, there appears to have been little discussion regarding the precise amount of time that constitutes an unacceptable delay. For example, Martin et al.’s (2001) estimation of 40% attrition for Australian candidates allowed 11 years for completion. Similarly, Wright and Cochrane (2000) calculated completion rates after 10 years of candidature. Nevertheless, reports of the median time to completion being 4.4 years in Australia (Bourke et al., 2004) and 5.8 years in the USA (Wao & Onwuegbuzie, 2011) indicate that more than half the doctoral student population is taking longer to complete than the three or four years usually allocated for candidature. There are no obvious advantages in delayed completions: it cannot be assumed that time to completion is related to the quality of either the work produced or the learning that has occurred (Powell & Green, 2007).

Concerns about these attrition and slow completion rates are international and long-standing, particularly given the financial costs incurred by universities and students for any extensions of the allocated candidature time (Bourke et al., 2004; Evans, 2007; van de Schoot et al., 2013). In Australia, attention to PhD completion times increased when the Commonwealth Government introduced the Research Training Scheme (RTS) in 2001, which made the financial support of research higher degrees more contingent on completions (Evans, 2007) and based on stricter timelines (Bourke et al., 2004). The proposed changes to RTS funding policies that were
announced in May 2014 would enable institutions to apply fees to RTS students as partial payment for Higher Degree by Research programmes, while reducing public funding to the institutions from January 2016 (Australian Government Department of Education & Training, 2014). Thus, while there has long been an imperative to assist students to manage the challenges of candidature and to achieve timely and successful completions, these proposed funding changes are likely to increase the pressure on both students and institutions to find ways to optimise the rates of timely PhD completions.

Efforts to identify the salient factors associated with different PhD candidature outcomes are neither new nor rare. The international concerns with high attrition and slow PhD completion rates have generated much research over many years – of the 430 research studies in this area located by Bair and Haworth in 2004, the vast majority had been conducted prior to 1970. Since then, a substantial body of research has scrutinised a range of institutional, departmental, supervisory, and individual factors that may influence the PhD student experience and be associated with candidature outcomes. These studies have used a variety of research methods, from large-scale quantitative studies of university records in Australia (e.g. Bourke et al., 2004; Martin et al., 2001; Rodwell & Neumann, 2008), and internationally (e.g. Lovitts & Nelson, 2000; Nettles & Millett, 2006; Wright & Cochrane, 2000), through to case studies of individual students (e.g. Golde, 2000).

After analysing nearly three decades of research in the area, the overarching conclusion drawn by Bair and Haworth (2004) was that doctoral student persistence and attrition is characterised by complexity. The multiplicity of reasons that might underlie different PhD candidature outcomes can be broadly categorised as 1) institutional or environmental factors, such as field of study, departmental research climate, and available resources, 2) supervision quality, and 3) characteristics of the PhD student, including approaches towards doctoral research as well as demographic and personality factors (van de Schoot et al., 2013). The multifarious interrelationships amongst these factors have been recognised (e.g. Bourke et al, 2004; Golde, 2000; Lovitts & Nelson, 2000; Manathunga, 2005; Powell & Green, 2007), and are reflected in the long-standing debate regarding the relative contributions made by individual versus social or institutional level factors to doctoral research student persistence and attrition (Hockey, 1994; Lovitts, 1996). It is therefore important to acknowledge that doctoral students are ‘diversely different’ (Pearson et al., 2011), working on their research for varying reasons in an individual milieu determined by a unique combination of factors that may change during the course of candidature. Although many students will reap the benefits of exposure to factors that might
facilitate progress, such as high quality supervision (Zhao, Golde, & McCormick, 2007), the effects for some may be tempered by concurrently dealing with impeding factors such as adverse personal circumstances (van de Schoot et al., 2013).

In addition, students differ in their responses to and management of the myriad of personal, social, supervisory, departmental, institutional, and societal challenges associated with knowledge generation and with the contextual features of doctoral research (e.g., Wright, 2003). These individual differences might mediate or moderate the effects of external factors, or more directly influence the success, timeliness, and quality of the doctoral outcome and the well-being of the student during candidature (Bair & Haworth, 2004; Hockey, 1994). There has been an inadequate integration and synthesis of the research regarding the effects on progress of such differences in students’ management and regulation of their cognitions, affect, and behaviour in response to their own individual doctoral research context. This management of the self and the environment can be framed in terms of self-regulation (Bandura, 1986; Zimmerman, 2000), as described in more detail in the next section of this chapter.

1.2 SELF-REGULATION AND THE DOCTORAL RESEARCH STUDENT

Self-regulation has been defined as the “exercise of influence over one’s own motivation, thought processes, emotional states, and patterns of behaviour” (Bandura, 1994, p. 71). Self-regulation has been conceptualised as being central to the understanding of human motivation and action (Bandura, 1991), and described as the fundamental quality underpinning adaptation and success across various domains of human endeavour (Zimmerman, 2000; Baumeister & Tierney, 2011). Dysfunctions in self-regulation can result in a wide range of personal and social problems, such as those associated with managing body weight, time, and finances (e.g., Baumeister & Tierney, 2011; Eisenberg et al., 1997; Tangney, Baumeister, & Boone, 2004). Over recent decades, the importance of self-regulation in human learning and academic achievement has been recognised within the field of educational psychology (Blair, Calkins, & Kopp, 2010; Dembo & Seli, 2013; Schunk, 2008; Schunk & Zimmerman, 2012b; Zimmerman, 2002), and its study has extended beyond the academic domain to other areas of students’ functioning such as music and sport (Zimmerman & Schunk, 2011). In this context, self-regulation has been defined in social cognitive theory terms as the use of cognitive, emotional, and motivational strategies to manage the effort and persistence the individual directs towards

Although self-regulation has received much attention in other educational contexts, there appear to have been no published studies of the use and outcomes of self-regulatory processes during doctoral research. In many other academic domains, self-regulation has provided a useful framework to explain the relationships between students’ management of challenges to learning and academic outcomes, such as the development of academic skills (Zimmerman, 2008). Therefore, as Stracke and Kumar (2010) point out, self-regulation may also be important in explaining how doctoral students develop the ability to undertake independent research. That is, to reach the goal of knowledge contribution, a student is likely to have contended with an array of intellectual, personal, and environmental challenges (e.g., Bair & Haworth, 2004). There is already sufficient evidence that these challenges can slow or terminate progress for some students (Service, 2012; Wright, 2003). Furthermore, other lines of research (e.g., Wright & Lodwick, 1989) have identified initiative and persistence as facilitating successful doctoral research completion; Schunk and Zimmerman (2012a) describe these psychological attributes as behavioural hallmarks of effective self-regulation. Recent research has provided insights into individual differences in the metacognitive and motivational belief systems of doctoral research students that are theorised to feed these behaviours (Cantwell et al., 2012a, 2012b), however there is less understanding of how students’ implementation of the self-regulatory processes described by Zimmerman (2000, 2008) might be associated with doctoral research progress or candidature outcomes.

Perhaps the scant attention to self-regulation and similar psychological constructs reflects the belief that these factors are endogenous to the doctoral research student, and thus beyond the reach of influence of higher education institutions (Bair & Haworth, 2004; Hockey, 1994). Indeed, institutions are not always perceived as having the ability, willingness, or responsibility to effect such psychological changes in students (see e.g., Ecclestone & Hayes, 2009). Moreover, assumptions may be made about the levels and the homogeneity of self-regulatory competence of doctoral research students, given their proven academic track record prior to
admission to doctoral candidature. Another possibility for the lack of attention to self-regulation in this context is the assumption that the psychological factors associated with persistence in doctoral research candidature are immutable, and therefore not worth considering. Accepting any of these premises without question would limit the exploration of different approaches to addressing problematic doctoral research progress in terms of self-regulation.

Contrary to the assumption of immutability, social-cognitive models contend that self-regulation comprises an underlying set of skills, and that these can be learned and developed (Maddux & Volkmann, 2010). More specifically, self-regulatory strategies to improve academic learning and motivation can be learned and developed through systematic interventions, by children (Schunk & Zimmerman, 2007; Zimmerman, 2008) and also by adults (Schmitz & Wiese, 2006). Self-regulatory skills do not appear to be acquired passively, nor to be the inevitable outcome of ordinary maturational processes (Schunk & Zimmerman, 2012b), and individuals may differ in their ability to master self-regulatory strategies (Maddux & Volkmann, 2010). Even after training in self-regulatory strategies, students differ in their recall, generalisation, and application of these strategies across tasks, with those who do continue to practice self-regulation building on these skills (Pressley & McCormick, 1995). It is interesting then to note that interviews with final year doctoral research students have provided some preliminary evidence to suggest that related skills might develop across PhD candidature (Mowbray & Halse, 2010). It appears, therefore, that self-regulation can be regarded as being relatively mutable in comparison with the stability generally associated with a personality trait or disposition (Zimmerman, 2002), that individual differences in the practice of self-regulation occur, and that training in self-regulatory strategies can improve self-regulation for at least some students.

Another possibility for the lack of research attention to self-regulation in doctoral research students is the sheer difficulty of examining the relationships between this construct and academic outcomes in such an individualised, complex, and longitudinal context. Studies investigating self-regulation have usually concentrated on well-circumscribed learning tasks in classrooms or other relatively controlled settings, and have applied relevant outcome measures at the end of the session or lesson, term, or semester. Considering the application of contemporary self-regulation research methods to the doctoral research context raises a number of questions. How might the effects of differences in self-regulation be evaluated in terms of current definitions of PhD candidature outcomes? Is it more pertinent to compare the outcome of withdrawal from candidature with timely and successful PhD completion, or with successful
completion regardless of the timeframe, or with persistence to a certain point of time or candidature? If timely and successful thesis submission occurs within either three or four years, depending on the PhD programme, then is it meaningful to compare this outcome against successful thesis completion that occurs six months later? Or after a year, or two years, or more? Should periods of leave be taken into account, given that some students continue to work on their doctoral research during these times? Given that extenuating circumstances beyond any person’s control can occur, should delays to completion be categorised further by length or by the reason(s) for the delay? A longitudinal study design of at least three or four years would be necessary to address at least some of these outcome issues. However, conducting a longitudinal study raises further questions: how might the assessment of the effects of self-regulatory differences on these outcomes be confounded by any development of self-regulation that might occur during doctoral candidature, and by any self-selection processes regarding both participation in the study and persistence with PhD candidature that might also be at play over this time?

If it is difficult for researchers to determine ways of accurately assessing the outcomes of students’ self-regulatory efforts, then this raises the question of which parameters might be used by students for self-monitoring purposes. As described in later sections of this chapter, self-monitoring of performance during goal pursuit enables an individual to recognise the need to make cognitive, affective, or behavioural changes in order to maintain progress towards their goal (Schunk & Zimmerman, 2012b). When the goal of the self-regulatory behaviours is the successful and timely completion of doctoral research, how might students self-monitor their progress towards this distal goal? If students set individualised proximal goals corresponding to their unique doctoral research project, to what extent might measures of self-regulation and goal pursuit outcomes be comparable across students in this context?

This series of interrelated questions highlights the need to develop an innovative way of exploring the self-regulation of doctoral research students, presumably incorporating general indicators of progress through candidature rather than be dependent on ultimate outcomes. Then, if self-regulation is found to be relevant to making progress through doctoral research, and assuming that it is also sufficiently mutable, further research could be directed towards finding the most effective way of assisting doctoral research students to ensure that their self-regulatory efforts are optimised for timely completion.
As a starting point, two interrelated and fundamental issues need to be addressed and are the focus of this study: i) how to identify differences in students’ self-regulation in the doctoral research context, and ii) how to monitor doctoral research progress. With little published research in this area, this study draws together evidence from different theoretical perspectives about the measurement and the monitoring of aspects of psychological functioning in PhD students that may be relevant to self-regulation and, ultimately, to optimising timely and successful candidature outcomes.

To clarify the scope of this thesis, the next section describes three similar and often overlapping constructs – self-regulation, self-regulated learning, and metacognition – and explains the decision to focus on self-regulation as the organising construct for the current study.

1.3 SELF-REGULATION, SELF-REGULATED LEARNING, AND METACOGNITION

Self-regulation, self-regulated learning, and metacognition are three interrelated constructs, all of which have been inconsistently described, operationalised, and measured in the educational psychology literature (Dinsmore, Alexander, & Loughlin, 2008; Schunk, 2008). To address this issue, Schunk (2008) has called for researchers to be more explicit in their use and operationalisation of this terminology, and therefore the use of the term ‘self-regulation’ in the current context requires explanation.

A number of theoretical models of self-regulation have been proposed in recent decades (for reviews, please see Puustinen & Pulkkinen, 2001; Schunk & Zimmerman, 2012b). The conceptual framework for this study has its foundations in Bandura’s (1991) social cognitive theory, as it uses Zimmerman’s (2000, 2002) model of self-regulatory processes in human functioning. This model of self-regulation has been extensively studied and developed in educational contexts. Similar to operant, information processing, developmental, and social constructivist theories, the social cognitive perspective on self-regulation regards individuals as being self-regulated through the effects of their own metacognitive, motivational, and behavioural activities on their learning and performance (Schunk & Zimmerman, 2012b). However, the social cognitive theory of self-regulation emphasises the cyclical nature of this process, enacted through the use of open feedback loops, and of the reciprocal interactions among other personal, behavioural, and environmental factors (Schunk & Zimmerman, 2012b). It is also noteworthy that while some researchers have used the term self-regulation to include
impulse management (e.g. Baumeister & Vohs, 2007), the term ‘self-control’ is favoured by other researchers for this purpose.

In contrast, metacognition is a construct that appeared in the 1970s in the field of developmental cognitive psychology, and originally concentrated on how learners develop through the awareness, monitoring, and regulation of cognitive processes, with little attention to the effects of environmental interactions (Dinsmore et al., 2008). Early research in this area was largely driven by Flavell’s (e.g., 1979) interest in how the monitoring of cognition develops from the interaction of metacognitive knowledge, metacognitive experience, goals, and the activation of strategies (Dinsmore et al., 2008). Although the majority of metacognition research has focused on ‘thinking about thinking’ (Hofer, 2004), in areas where it expanded into the application of self-regulatory metacognitive processes, as distinct from metacognitive knowledge, the constructs of metacognition and self-regulation began to converge (Dinsmore et al., 2008).

Therefore, compared with the cognitive focus of metacognition, modern interpretations of self-regulation can be seen as taking a broader approach, largely due to Bandura’s influential work commencing in the early 1980s (e.g., Bandura, 1986). That is, in addition to metacognitive knowledge and skill, social cognitive theories of self-regulation also describe personal agency and self-efficacy beliefs interacting with motivational and behavioural processes (Zimmerman, 1995). In essence, theories of self-regulation acknowledge that cognition, emotion, behaviour, and motivation can all act as regulatory components of human behaviour (McCormick, Dimmitt, & Sullivan, 2013).

The term ‘self-regulated learning’ appeared in the 1980s, as interest grew in self-regulation research within academic settings. Led predominantly by Zimmerman (e.g., 1986), self-regulated learning theories have tended to take a more integrated approach to learner monitoring, by drawing on facets of both metacognition and self-regulation (Dinsmore et al., 2008). Recently, a shift towards deliberately using the term ‘self-regulation’ rather than ‘self-regulated learning’ is evident in the work of some authors (e.g. Dembo & Seli, 2013; Schunk & Zimmerman, 2012b). For example, Schunk and Zimmerman (2012b, p. 45) began a chapter entitled “Self-Regulation and Learning” with the words “Self-regulation (or self-regulated learning)…”. Whether termed ‘self-regulated learning’ or simply ‘self-regulation’, self-regulation in this context relates to students initiating, modifying, and sustaining thoughts and behaviours directed towards reaching their learning goals (Zimmerman, 1986, Schunk & Zimmerman, 2012b). That is, current conceptions look beyond metacognitive and motivational
domains to developmental and social domains, and include elements such as efficacy beliefs and environmental supports (Zimmerman & Schunk, 2004, 2011). While being more integrated, the scope of this field is relatively large, and the use of general measures of academic behaviour also indicates a broader focus (Dinsmore et al., 2008).

Whether the relationships among self-regulation, self-regulated learning, and metacognition should be represented as being hierarchical, nested, overlapping, or even subordinate to another metaconstruct, remains contentious. For example, Zimmerman (1995) observed that models of self-regulation often situate metacognitive processes within a larger system of subjective, behavioural, and social-environmental factors. Similarly, McCormick et al. (2013) claim that there is an increasing acceptance that metacognition is a component of self-regulated learning. Assuming that self-regulated learning is a focus area that nests within the domain of self-regulation research, self-regulation can be seen as the theoretical construct overarching both metacognition and self-regulated learning. Other models have been proposed to incorporate related constructs such as executive functioning, but are beyond the scope of this study (see Garner, 2009; McCormick et al., 2013).

The term ‘self-regulation’ best describes the organising construct for this study, and is defined in terms of processes that can be used by learners “to activate and maintain cognitions, emotions, and behaviours to attain personal goals” (Zimmerman & Kitsantas, 2014, p. 145). Here, the term is used in its broader sense, to incorporate both metacognition and self-regulated learning processes as well as more general self-regulatory processes. This is particularly advantageous in exploring the relatively nebulous learning domain of doctoral research, which is substantially different to more controlled learning settings such as a school classroom. As the term is used here, self-regulation draws on Bandura’s (1986, 1991) social cognitive theory of human functioning, and describes the individual’s efforts to manage the wide array of interrelated cognitive, affective, and behavioural factors encountered within the relatively broad educational context of doctoral research. Using the term self-regulation in its most contemporary sense acknowledges that while doctoral research learning is located within an academic context, it is also influenced by the wider context of an individual’s unique environment.

More specifically, Zimmerman’s (2000) model, which was developed from Bandura’s (1986, 1991) theory, is used to guide this study’s exploration of self-regulation in the doctoral research context, and will be discussed in more detail in conjunction with the literature review in
Chapter 2. Prior to considering its application in that context, the general model is introduced next.

1.4 OVERVIEW OF PHASES AND SUBPROCESSES OF SELF-REGULATION

While some type of cyclical feedback loop has typically been included in most models of self-regulation, it is important to note the difference between open and closed feedback loops. Closed feedback loops are based on negative feedback principles, which assume that an individual will try to reduce the discrepancy between their present performance level and their goal state by self-correcting or adapting their strategies and effort, discontinuing when the discrepancy is reduced satisfactorily (Cleary & Zimmerman, 2012). In contrast, social cognitive theories of self-regulation espouse open feedback loops, which allow for an individual seeking to improve their performance level or reset their goals or standards (Cleary & Zimmerman, 2012).

Conceptualising the open cyclical feedback loop in his classical social cognitive theory of self-regulation, Bandura (1986) proposed that three main self-regulatory processes occur during and after engagement in a task, and labelled these self-observation, self-judgement, and self-reaction. These self-regulatory processes are not mutually exclusive, but are interactive with each other and with the environment (Schunk & Zimmerman, 2012b).

Zimmerman (2000) advanced Bandura’s model, making it more comprehensive and descriptive (Cleary & Zimmerman, 2012) as will be described more fully in Chapter 2. Zimmerman (2000) delineated three sequential phases of self-regulation, including a forethought phase which precedes performance, in addition to a performance control and a self-reflection phase, as depicted in Figure 1. By integrating the forethought phase into the model, Zimmerman (2000) highlighted the roles of goal-setting and planning, as well as motivational beliefs, in self-regulation.
As can be seen in Figure 1, the forethought phase precedes performance efforts, and involves goal-setting, planning, and self-efficacy assessments regarding goal pursuit (Schunk & Zimmerman, 2012b). During performance, the performance control phase strategies are implemented to maintain motivation as well as monitor and record performance, while in the self-reflection phase after the performance, goal progress is evaluated, attributions made for outcomes, and decisions are made about strategy use and further goal setting or adjustment (Schunk & Zimmerman, 2012b).

Bandura’s (1986) original processes – self-observation, self-judgement, and self-reaction – appear in the performance and self-reflection phases of Zimmerman’s (2000) model. Self-observation, also referred to as self-monitoring (Schunk & Zimmerman, 2012b), usually occurs during performance and describes the act of paying attention to and recording particular aspects of behaviour, such as its quality, quantity, frequency or intensity (Cleary & Zimmerman, 2012;
Schunk & Zimmerman, 2012b). Self-observation is an integral self-regulatory process, since an individual cannot regulate their future behaviour appropriately without an accurate awareness of their prior behaviour (Bandura, 1986; Cleary & Zimmerman, 2012; Schunk & Zimmerman, 2012b). For example, without truthful self-recording, beliefs about outcomes may be informed by inaccurate or selective recall of successes and failures (Schunk & Zimmerman, 2012b). Effective self-monitoring involves observing behaviours on a regular or continual rather than an intermittent basis, and recordings which are proximal to the occurrence of the behaviour rather than distant in time (Bandura, 1986; Schunk & Zimmerman, 2012b). Like other elements of the self-regulatory cycle, self-observations are consequences of behaviour, and also influence future behavioural responses (Schunk & Zimmerman, 2012b).

*Self-judgement* involves comparing present performance level against a standard or goal (Cleary & Zimmerman, 2012; Schunk & Zimmerman, 2012b). Information about present performance can be derived from self-monitoring, and the results of this judgement can in turn influence self-efficacy and motivation (Zimmerman, 2000). How the individual responds to information about their progress towards a goal is called *self-reaction*. Self-reactions refer to the motivational effects that occur as a result of judgements about progress in goal pursuit (Bandura, 1986). For example, believing that insufficient progress has been made might result in setting a lower goal or in applying increased effort to reaching the original goal, depending on the individual’s motivation and beliefs about their ability (Schunk & Zimmerman, 2012b).

Bandura (1986) also recognised the importance of self-efficacy beliefs in self-regulation, and these appear in the forethought phase of Zimmerman’s (2000) model. Self-efficacy represents an individual’s beliefs about their ability to learn or perform behaviours at particular level (Bandura, 1994), and is an important aspect of self-regulation (Schunk & Zimmerman, 2012b). The reciprocity of interactions among personal, behavioural, and environmental factors on human functioning can be exemplified by self-efficacy (Bandura, 1994). That is, self-efficacy beliefs influence behaviour, such as the choice of a goal, and the effort applied in pursuit of this goal, while the behavioural outcomes of these actions, such as observing progress towards a goal, influence self-efficacy beliefs by providing evidence of the individual’s ability (Schunk & Zimmerman, 2012b). Further discussion of the phases and subprocesses of self-regulation, and their relevance to the management of doctoral research, is provided in Chapter 2.

In summary, self-regulation is conceptualised here as a cyclical process involving interactions among personal, behavioural, and environmental factors (Bandura, 1986; Zimmerman, 2000).
How the use of these self-regulatory processes varies among PhD students requires further investigation, particularly as the acquisition and effective application of these processes may be a developmental process which may benefit from assistance (Zimmerman & Kitsantas, 2002).

1.5 SIGNIFICANCE OF THIS STUDY

The literature on slow completion and attrition rates in doctoral candidature suggests that there is a need to develop and evaluate new ways to assist doctoral research students to timely and successful completion. While a large amount of research has investigated various factors that can influence doctoral research management and progress, only a modest number of these studies have examined the individual differences in psychological functioning in this population that may be associated with candidature outcomes. While these studies appear to hold potential to guide efforts to assist students, the lack of an integrative theoretical framework has limited the interpretation and synthesis of this research.

This thesis proposes that Zimmerman’s (2000) model of self-regulation provides a suitable framework for this purpose, and demonstrates this by reviewing the relevant literature from this perspective. This literature review highlights the need for further exploration of the nature and impact on progress through PhD candidature of individual differences in doctoral research students’ use of self-regulation processes. As existing methods for exploring self-regulation were not appropriate for use in the highly individualised, complex, and longitudinal context of doctoral research candidature, a new approach was developed for this purpose. This approach centred on how students might monitor and make use of feedback about doctoral research management and progress. Self-monitoring of performance during goal pursuit enables the individual to respond to changes in this context cognitively, affectively, and behaviourally to maintain progress towards their goal (Schunk & Zimmerman, 2012b). Thus, the aim of this study was to explore individual differences in students’ self-regulatory behaviours through an analysis of their self-monitoring of doctoral progress.

Furthermore, to address the sampling limitations inherent in many studies, the current study incorporated doctoral research students from a wide range of programmes and universities to capture a diversity of experience regarding self-regulation and progress.

The outcomes of such an investigation are expected to contribute to the currently limited literature on self-regulation in this context, by proposing and evaluating new indicators for use
in exploring self-regulation, providing insights into the factors influencing students’ ratings and management of their progress, offering a new method for enabling doctoral research students to monitor their progress, and potentially guiding efforts to assist more students to timely and successful doctoral research completion.

1.6 Key Terms Used in This Study

The key terms used in this thesis that relate to the doctoral research context are defined below, recognising that variants of these terms may be used outside Australia.

‘Doctor of Philosophy’ or ‘PhD’

In Australia, enrolments in the PhD account for the majority of doctoral enrolments (Evans, 2007). While the PhD may require some “hurdle coursework”, it is regarded as a doctorate by research, meaning that it meets the Commonwealth government’s requirements of comprising at least 66% research (Evans, 2007). The PhD is typified by the requirement to make a contribution of new knowledge to the discipline through the completion of this doctoral research, which is assessed via the examination of the thesis. Examples of other supervised research doctorates include the Doctor of Education (EdD), Doctor of Medicine (MD), Doctor of Juridical Science (SJD), and Doctor of Psychology (DPsych) (Evans, 2007). Professional doctorates vary in their research requirements, but those focusing on coursework and requiring less than 66% research represent a very small minority of the doctoral student population (Evans, 2007). Consequently, references to ‘PhD candidature outcomes’ and ‘doctoral research outcomes’ are made interchangeably in this thesis.

‘Doctoral Research Student’

In this study, doctoral research student is the term used to describe a student enrolled either full-time or part-time in a Doctor of Philosophy programme at a higher education institution, and engaged in the research component of the programme. That is, a PhD student was eligible to participate in this study only if they were currently working on their doctoral research.
‘Thesis’ or ‘dissertation’

In Australia, the term *thesis* is generally used to refer to the written product of the research, although the term *exegesis* is used for this purpose in the creative arts. The term *dissertation* is more commonly used in the United States. The need for an oral defence of the thesis or dissertation varies across programmes, disciplines, and institutions.

‘Postgraduate’ or ‘graduate’

In Australia, the term *postgraduate* is generally used to describe students and programmes at the higher degree level within universities, including Masters and doctoral degrees. In much of the international literature, the term *graduate* is preferred.

‘Students’ or ‘candidates’

The term PhD (or doctoral) ‘*candidate*’ is used in some universities to denote that a PhD *student* has fulfilled preliminary coursework or confirmation of candidature requirements. Due to the inconsistencies and overlap in the use of the terms, they are used interchangeably in this thesis.

‘Supervisor’ or ‘advisor’

The terms *supervisor* and *advisor* are considered to be interchangeable in this thesis. In Australia, the term *supervisor* is generally used to describe an academic advisor for the PhD.

‘University’ or ‘institution’

In this thesis, the term *institution* refers to tertiary institutions, and is used interchangeably with the term *university*.

1.7 OVERVIEW OF THESIS STRUCTURE

This thesis is organised into nine chapters covering five main areas: introduction (Chapter 1), literature review (Chapters 2 and 3), methodology (Chapter 4), results (Chapters 5, 6, 7, and 8), and discussion and conclusions (Chapter 9).

This first chapter has introduced the thesis, the theoretical framework of self-regulation on which it is based, and the significance of the study within the doctoral education domain. Chapter 2 uses the theoretical framework of self-regulation to review and synthesise the
literature regarding individual differences in doctoral research students, and identifies the ways in which further exploration of doctoral research students’ self-regulation could assist the development of interventions to facilitate progress through candidature.

Chapter 3 then describes the methodological challenges that face the study of self-regulation in the doctoral research context, and explains the decision to explore self-regulation via students’ self-monitoring of their doctoral research management and progress. The three constructs on which this self-monitoring method is based – feelings about doctoral progress, mental health, and state hope – are then described.

Chapter 4 describes the research methodology, including the design of the Journey Tracking Survey process as a self-monitoring method for doctoral research students. Also contained in this chapter are the preliminary descriptive statistics regarding the participants.

Chapter 5 presents the quantitative data analyses regarding the relationships among demographic, candidature, and methodological factors and the Journey Tracking Survey data in the first month of the monitoring period. Chapter 6 presents the qualitative data analyses regarding the relationships among selected Month 1 Journey Tracking Survey responses and the use of self-regulatory strategies. The analyses pertaining to the Journey Tracking Survey responses across the year of the monitoring process are presented in Chapter 7. Chapter 8 then presents the findings of a qualitative data analysis regarding participants’ use of the Journey Tracking Survey process for self-regulatory purposes.

Chapter 9 collates and discusses the findings from Chapters 5, 6, 7, and 8, outlines the limitations, draws conclusions, and points to future research possibilities.
2. THE SELF-REGULATORY DIMENSIONS OF DOCTORAL RESEARCH

2.1 INTRODUCTION

Doctoral research students can be described as sophisticated learners (Cantwell et al., 2012a, 2012b), and together form a highly academically skilled and select group (Pyhältö, Toom, Stubb, & Lonka, 2012; Vekkaila et al., 2013). As Johnson et al. (2000, p. 269) point out, students who reach the dissertation stage of US doctoral programs “should have the ability to understand and produce research, but for whatever reasons, many give up after several years of struggle and a considerable investment of time and money”. Of course, withdrawal from candidature may be regarded as the desirable option for some PhD students for a number of reasons, and could be deemed ‘appropriate’ or necessary (Gardner, 2008; Golde, 2005). For example, some of these students may choose to discontinue their doctoral studies due to more attractive career or lifestyle options, or to transfer to a Masters degree. Some will recognise a mismatch between their perceptions of themselves and the personal requirements for a research career in their chosen field (Budd, Scevak, & Cantwell, 2010; Golde, 2005). However, others will need to withdraw or experience prolonged candidature due to reasons that may be beyond their control or influence. To illustrate, dealing with personal illness, the lack of family or social support, family care or employment responsibilities, financial difficulties, or changing location for a partner’s employment may take priority and interrupt or terminate candidature.

Of more concern are preventable delays to thesis completion, and the substantial amount of avoidable or unnecessary attrition that occurs (Golde, 2005). Of course, it may be difficult to classify outcomes in this way, as the interaction of student, supervisor, departmental, or research factors over time may result in a lack of clarity regarding the most salient reasons for such delays or attrition. In some cases, the reasons may even be misreported in audits: students who attribute slow progress or attrition to personal inadequacy may experience academic shame (Turner, Husman, & Schallert, 2002; Turner & Husman, 2008), and might provide alternate or more palatable explanations in candidature progress reports or exit interviews. In addition, for a number of personal or political reasons students may also feel unwilling or unable to discuss or report supervisory factors that have contributed to slow progress or attrition, particularly within
university systems perceived as being protective of faculty or resistant to change (Cotterall, 2013; Lovitts, 1996).

Whatever the cause, prolonged candidature is likely to be reciprocally associated with diminishing enthusiasm and increasing boredom, and an increased risk of various factors intervening to slow or halt the research (Hockey, 1991). With the majority of students taking longer than the expected four years to complete the PhD (Bourke et al., 2004; Evans, 2007), it appears that many students would benefit with assistance to more timely completion. As discussed in the previous chapter, a higher rate of timely and successful completions would profit all stakeholders in doctoral education.

While there are numerous potential reasons for problems in doctoral research progress that are beyond the control of the student, this thesis focuses on what the individual student can do to increase the likelihood of successfully completing the PhD. Therefore, this chapter examines Zimmerman’s (2000, 2008) model of self-regulation as a framework for understanding students’ management of doctoral research. It then introduces the possibility of exploring self-regulation in this context via students’ responses to a self-monitoring process. Finding relevant and reliable indicators and methods for students to observe and monitor their own progress could also guide the development of interventions to assist more doctoral research students to successful and timely thesis completion.

2.2 SELF-REGULATION AS A CONCEPTUAL FRAMEWORK

By definition, self-regulation is a factor over which the individual student has more direct control than many of the other factors that might be associated with doctoral research outcomes, such as the quality of supervision received (Zhao et al., 2007). In a range of academic domains other than doctoral study, self-regulation research has shown that students who demonstrate superior goal-setting, deliberate self-monitoring of their learning, effective strategy use, and adaptive responses to feedback are able to maintain motivation and master learning goals more quickly (Zimmerman, 2013). While these self-regulatory strategies are relevant to PhD candidature, there appears to be no published research specifically examining the nature or extent of individual differences in the self-regulation of doctoral research students, and the influence of these differences on doctoral research progress or candidature outcomes. As the doctoral research process is more complex than the other educational contexts in which self-regulation has been explored, the same effects of these strategies on persistence and goal
achievement cannot be assumed. Moreover, there appear to be far fewer studies of self-regulation in adults as compared with children and adolescents. However, the following review of the literature considers how the findings of research related to individual differences among doctoral research students might be integrated and explained using Zimmerman’s (2000) model of self-regulation as a conceptual framework.

Self-regulation involves a complex interplay among its interrelated components (Maddux & Volkmann, 2010). As Bandura (2008, p. 35) has explained, “The same event can change from an agentic influence to a behavioural expression, and to an environmental outcome, depending arbitrarily on different entry points in the ongoing transaction”. For example, according to the cycle of self-regulatory processes theorised by Zimmerman (2000), emotional responses to difficulties in doctoral research would at some points be considered as outcomes of previous learning or performance efforts, while from the perspective of other points within the cycle they can function as sources of feedback that may influence the student’s future behaviour.

Structuring this review around Zimmerman’s (2000) cyclical feedback model of self-regulation thus illustrates the potential interrelationships among various personal and psychological factors that have been investigated in the doctoral education literature. The following sections of this chapter present this literature review and a discussion of associated issues, and are arranged in terms of the three phases of Zimmerman’s (2000) model of self-regulation outlined in Chapter 1 (please see Figure 1.1): forethought, performance, and self-reflection.

2.3 FORETHOUGHT PHASE

The ‘forethought’ phase of Zimmerman’s (2000) model of self-regulation describes how motivational beliefs influence planning for learning and subsequent efforts to improve learning, and comprises two main components: task analysis and self-motivation beliefs.

2.3.1 Task analysis

Task analysis describes the student’s efforts to analyse and understand the requirements of the learning task, as required for goal setting and strategic planning. According to Zimmerman (2013), superior task analysis results in setting goals which are specific, proximal, and challenging, whereas a less insightful level of task analysis leads to vague, distal, or unchallenging goal-setting. Appropriate goal-setting is contingent on understanding the nature of the task. Therefore, if students are unclear about the realities of the knowledge creation
process in doctoral research, the quality of task analysis with respect to goal-setting is likely to suffer.

The efficacy of task analysis is also central to the choice of strategies used to facilitate and manage thought, affect, and behaviour during learning (Zimmerman, 2013). That is, a superficial analysis of the task requirements can result in the use of ineffective or inefficient strategies for learning (Zimmerman, 2013), such as simply spending more time on a task without using a more focussed strategy. To address these issues and facilitate student progress, Bair and Haworth (2004) suggested that universities provide students with assistance in topic selection and planning. Indeed, Haynes et al. (2012) found that when realistic short- and long-term goal-setting was facilitated by supervisors, doctoral research students were enabled to select appropriate goal-pursuit strategies. In addition to this, the students’ well-being was enhanced by an increased sense of purpose (Haynes et al., 2012).

In Zimmerman’s (2000) model, goal-setting is therefore a fundamental element of self-regulation. The efficacy of self-regulation has typically been studied with individuals seeking to achieve a common or specific goal. In a complex and longitudinal context such as doctoral research, goal-setting can occur at many different levels. However, while doctoral research students may bring to their PhD candidature a diversity of expectations and goals (Pearson et al., 2011), all are expected to be striving towards the primary goal of doctoral research: contributing to disciplinary knowledge. Given the centrality of this particular goal to the PhD, and thus to the study of self-regulation in this context, the following sections of this chapter consider in more depth the historical origins of this goal, features of the situation in which goal pursuit may occur, and the intellectual, personal, social, and environmental challenges that may influence students’ progress towards this goal.

2.3.1.1 The Doctor of Philosophy degree

The nature, purpose, and requirements of the contemporary Doctor of Philosophy degree are reflected in various ways throughout its history. Scholarly investigations of the early history of the PhD are surprisingly scant, however the term “doctor” (from the Latin docere, ‘to teach’), was used during the mid-12th century in universities in Paris and Bologna as one of the unofficial titles for a teacher of higher learning (Lash, 1987; Cullen, Pearson, Saha, & Spear, 1994). With respect to the ‘philosophy’ component of the degree’s title, Lash (1987) explains that the study of philosophy had historically embraced all types of inquiry, from speculative
The modern form of the Doctor of Philosophy, as one requiring a defensible written thesis or dissertation, emerged in the early 19th century in Germany (Cullen et al., 1994; Nelson, 1993). In this social and academic context, with the growing appreciation of learning by enquiry, the PhD evolved into a demonstration of the student’s ability to develop and conduct an original investigation, in addition to their disciplinary knowledge (Lash, 1987). Observing the success of the German PhD in attracting international scholars, Yale University established the first PhD in the United States in the 1860s (Nelson, 1993), as the ultimate award signifying the demonstration of knowledge creation and transmission (Lash, 1987). It was another half century before the United Kingdom adopted the North American model (Nelson, 1993). Drawing on the developments made in the UK, the first Australian PhD was awarded at the University of Melbourne in 1949 (Cullen et al., 1994).

Examining doctoral education across the globe, Powell and Green (2007) observed that notable differences persist among and within institutions and nations regarding perspectives on, and approaches to, doctoral training and research. This lack of consensus is long-standing (Wright & Lodwick, 1989), and related sources of dispute include the perceived relative importance of personal development, social factors, the generalisability or specificity of research training, and the focus on either product or process (Hockey, 1991). Within Australia, for example, specific practices of doctoral education can occur within different disciplines (Brew & Boud, 2009), while at the institutional level, the instructions that universities provide to thesis examiners also reflect different emphases on the expectations of doctoral research (Nelson, 1993; Wellington, 2013). Not surprisingly, then, the need to critically evaluate the role and purpose of the PhD is regularly raised either as a national issue (e.g., in Australia, Nelson, 1993; Rymer, 2011; in the USA, Nyquist & Woodford, 2000) or as an international issue (e.g., Powell & Green, 2007).

Yet within this context of difference and development there is still consistency about the most essential criterion of the PhD. That is, true to its origins in learning by enquiry rather than from authority, there is general international agreement that the award of the Doctor of Philosophy
degree signifies the ability to make an original contribution to disciplinary knowledge (Denicolo & Park, 2010; Hockey, 1994; Holbrook, Bourke, Lovat, & Dally, 2004; Lash, 1987; Powell & Green, 2007). Other personal, intellectual, research, workplace, project management, and communication skills might develop to varying degrees throughout candidature and may be considered desirable outcomes by students, employers, and policy makers (Mowbray & Halse, 2010). However knowledge creation can be viewed as the fundamental goal of doctoral research, and a task common to all PhD students. Since the efficacy of self-regulation is dependent on the quality of the task analysis (Zimmerman, 2000), effective self-regulation in the doctoral research context requires an accurate understanding of the nature of knowledge creation.

2.3.1.2 The process of knowledge creation in doctoral research

Doctoral research is a complex endeavour, and students may be unable to anticipate fully the challenges of PhD candidature (Holbrook, Simmons, Scevak, & Budd, 2013; Kandiko & Kinchin, 2012), as they are unprepared by previous educational experiences for the nature of thinking and creativity required for independent research (Lovitts, 2005). For example, Juniper, Walsh, Richardson, & Morley (2012) found that PhD students demonstrated low awareness of the inherently challenging, unpredictable, and non-linear nature of research. Progress can also be hindered if the student is uncertain about the methods to be used to organise and undertake the research, particularly in the case of arts and social science rather than science students (Wright & Lodwick, 1989).

Therefore, the PhD student will probably be under “considerable personal pressure to produce creative ideas and new knowledge” (Wright & Lodwick, 1989, p. 24), but at the same time may lack an adequate understanding of the process of knowledge creation (Juniper et al., 2012). Moreover, it cannot be assumed that students will enrol in a PhD having already developed the requisite cognitive skills for doctoral research (Baxter Magolda, 1998; Cantwell et al., 2012b). Lacking the adequate skills for, and understanding of, the process of knowledge creation, the student may struggle with other aspects of self-regulation, such as setting goals and implementing strategies to achieve these goals. To explore individual differences in the self-regulation of doctoral research students thus requires an understanding of the process of knowledge creation, and the challenges that may be encountered during this process.
The ability to create and communicate new knowledge appears to be associated with higher levels of intellectual development (Sinnott, 1998; King & Kitchener, 2004), defined by Sinnott (1998) as ‘postformal thinking’. From a constructive developmental perspective, and expanding on Inhelder and Piaget (1958) by recognising the potential for adult cognitive development, Sinnott’s (1998) theory of postformal thought explains how, at the level of postformal thinking, an individual can see beyond possible paradoxes to accept that multiple realities or logics can co-exist (Griffin et al., 2009). Defining learning as “the process of acquisition of information or skills through practice or experience” (p. 196), Sinnott (1998) asserts that learning must be involved if an adult’s cognitive development continues to the point of achieving postformal abilities. Reaching this stage of cognitive development requires a change in an individual’s “adaptive style, search for meaning, intelligence, choices and processes change to accommodate a more complex way of perceiving ‘truth’ and ‘meaning’” (Griffin et al., 2009).

Changes in assumptions about knowledge can also be considered to result from shifts occurring in the meaning-making structures and processes used by humans to construct and explain reality (Baxter Magolda, Abes, & Torres, 2009). According to Kegan (1994), these meaning-making structures contain elements that can be controlled by the individual (objects), and elements that can control the individual (subject), in that the individual feels tied to or fused with them. The ‘growth of mind’ that results from transformational learning processes occurs by “liberating ourselves from that in which we were embedded, making what was subject into object so that we can ‘have it’ rather than ‘be had’ by it” (Kegan, 1994, p. 34).

Similarly, transformational learning, as expounded by Mezirow (2000, p. 7), provides another explanation for a learning process through which these accepted perspectives or mindsets can be transformed to be “more inclusive, discriminating, open, emotionally capable of change, and reflective so that they may generate beliefs and opinions that will prove more true or justified to guide action”. Through transformational learning, individuals become more able “to negotiate and act on our own purposes, values, feelings, and meanings rather than those we have uncritically assimilated from others” (Mezirow, 2000, p. 8).

Not surprisingly, as Baxter Magolda (2006) points out, abandoning old ways of thinking and learning new ways of thinking is more challenging than simply learning a new set of skills. Thus, the transformational nature of higher levels of intellectual development means it is potentially accompanied by other psychological, educational, or social changes (Wisker, Robinson, Trafford, Creighton, & Warnes, 2003). Learning to set aside the acceptance of
knowledge as ‘truth’ and to critically create one’s own perspective involves epistemological development that has been described by Baxter Magolda (2006, p. 50) as:

“a transformation in how we think – a change in our assumptions about the certainty, sources, and limits of knowledge. The evolution from viewing knowledge as certain and possessed by authorities to seeing it as context-dependent judgment based on relevant evidence”.

Although agreeing that higher levels of intellectual development reflect changes that occur in students’ assumptions about knowledge, theorists differ as to whether these changes occur within an integrated developmental progression or independently, or appear as a cognitive response to a situation (Baxter Magolda, 2006). Different potential factors in this process have received the attention of different theorists. A detailed review of these factors is outside the focus of this study, however as an example, King and Baxter Magolda (2005) regard intercultural experiences and maturity as contributing to the development of assumptions of knowledge, as well as to the development of identity.

If assumptions about knowledge form the basis of future learning and knowledge generation (King & Baxter Magolda, 1996), then this freedom of thought enabled by transformational learning appears helpful, if not essential, to creativity in the process of new knowledge production required in doctoral research. Indeed, the importance of this creativity in the training of researchers for independent and original work as well as for PhD thesis completion has been recognised (Enright & Gitomer, 1989; Hockey, 1991; Lovitts, 2008; Montuori & Donnelly, 2013), but inadequately studied (Montuori & Donnelly, 2013).

However, while these changes in assumptions about the state or status of knowledge, and also about the self, can have positive outcomes in terms of knowledge generation, the developmental process itself may hold challenges for the individual. That is, during this process the epistemological and ontological changes can produce a ‘liminal’ state within the individual - a stage of cognitive development in which prior perceptions of knowledge are no longer adequate but other knowledge has not yet emerged (Kiley, 2009). During this developmental process, doctoral research students may experience liminal states as brief or prolonged, and associated with feeling challenged, confused, stuck or unable to continue, demotivated and even depressed (Kiley & Wisker, 2009). These challenging affective experiences have the potential to draw the
individual’s attention to a learning or conceptual challenge that needs to be addressed (Hawley, 2003; Kiley, 2009).

Indeed, common to the doctoral research process are a number of learning challenges, according to the results of an international multi-disciplinary study by Kiley and Wisker (2009), any of which may provoke a sense of liminality for PhD students. Experienced supervisors identified six possible generic research concepts to be achieved by doctoral students: i) developing, supporting, and sustaining an argument or thesis; ii) theorising from the research; iii) using a conceptual framework; iv) contributing to disciplinary knowledge; v) critically analysing and interpreting research; and vi) working with paradigms (Kiley & Wisker, 2009). The potentially challenging nature of these concepts, both intellectually and emotionally, was revealed by differences in the quality of expression of these concepts in students’ work at different stages (Kiley & Wisker, 2009). This, Kiley and Wisker (2009) argue, provides further evidence for their attainment being a developmental process that may occur with doctoral study.

Manathunga (2011) has also used the term ‘liminality’ to describe the ‘in-between’ stages of a doctoral student’s transformation in identity from a novice to an independent researcher. In a similar vein, Deegan and Hill (1991) describe liminality during the sociology dissertation process as “a passage characterised by ambiguity, uncertainty, and crisis in which the student self is abandoned and a new professional self claims a world of power, authority, maturity, and responsibility”. Experiencing cross-cultural differences in epistemologies and ontologies, and finding ways in which to engage with or resist this knowledge, are other potential sources of liminality for students studying in other cultures (Manathunga, 2009).

Regardless of the theoretical explanations for the source of these affective experiences, Kiley and Wisker (2009, p. 433) warn that “it is damaging for research students to remain stuck to the extent that they lose confidence and seriously question their identity as researchers”. Indeed, such a threat to confidence or identity can even contribute to the decision to withdraw from candidature (Kiley & Wisker, 2009). Since experiences of liminality may result from a range of sources inherent in doctoral research, it is likely that it is a common occurrence, although not necessarily well-communicated to, or understood by, students.

Unfortunately, if the student is not expecting this type of affective experience, or indeed, the intellectual, epistemological, and ontological challenges of doctoral research that it may accompany, liminality may be construed as indicating personal inadequacy for the task rather
than as a normal response to a common doctoral research challenge. As will be discussed further, this may influence the effectiveness of the student’s self-regulatory efforts through its impact on motivational beliefs, such as self-efficacy. In a similar way, the success of self-regulatory efforts may also be contingent on the student being prepared for other challenges that are commonly encountered in the doctoral research context, as will be discussed in the next section.

2.3.1.3 Contextual challenges of doctoral research

As described in the previous section, making a significant contribution to disciplinary knowledge through doctoral research involves a number of challenges, including those involved with gaining familiarity with the knowledge in the field, research design, data analysis, and writing (Hopwood, Alexander, Harris-Huemmert, McAlpine, & Wagstaff, 2011). Moreover, the challenges that may occur in the process of knowledge generation do not occur in a vacuum. In addition to the intellectual and personal challenges described, there is a wealth of evidence that students are likely to encounter challenges to their candidature from a range of other institutional, departmental, social, and personal domains (e.g., Bair & Haworth, 2004; Gardner, 2009; Golde, 2005; Lovitts, 1996, 2001; Nyquist & Woodford, 2000; Smith et al., 2006; Stubb, Pyhältö, & Lonka, 2011; Wright & Lodwick, 1989). Indeed, the potential challenges and stressors of doctoral study have long been recognised (e.g., Mechanic, 1962).

Challenges frequently include difficulties in accessing funding or resources (Mowbray & Halse, 2010), with these and other departmental issues, such as managing administrative and teaching duties, reported to form the largest proportion of factors that hinder students (Sakurai, Pyhältö, & Lindblom-Ylänne, 2012). Student-supervisor relationships are another frequent source of distress, for reasons such as students experiencing their supervisor as unsupportive, disengaged, or inaccessible (Mowbray & Halse, 2010), having conflicting styles of work (Golde, 2005; Manathunga, 2009) or holding mismatched expectations of the other person or conceptions of research (Ahern & Manathunga, 2004).

Time issues, in terms of inadequacy, conflict, and pressure, are a major source of concern for doctoral research students (Pychyl & Little, 1998). Inadequate recognition is often given by departments to the effects on progress of demands stemming from the student’s personal life outside the institution (Hopwood et al., 2011; McAlpine, Paulson, Gonsalves, & Jazvac-Martek, 2012; Neumann & Rodwell, 2009), including the impact of financial difficulties (Paulson,
Hopwood, McAlpine, & Mills, 2010). Also, the pressure to be productive with inadequate time due to other demands or through decreasing length of remaining candidature can cause uncertainty and anxiety (Hockey, 1994). The enormity of a doctoral research project can be particularly daunting for part-time students (Wisker et al., 2003), and the need to juggle the demands of employment and family may also create stress (Mowbray & Halse, 2010). This role conflict is often expressed by female PhD students (Aitchison & Mowbray, 2013; Haynes et al., 2012). Students in the laboratory and field sciences may also experience disappointment and frustration as they encounter the slow, unpredictable, and often inconclusive, nature of more advanced practical research (Delamont & Atkinson, 2001; Golde, 2005). Other periods of time can be stressful for doctoral research students simply by being so tedious and monotonous (Delamont & Atkinson, 2001; Parsloe, 1993; Wright & Lodwick, 1989).

In addition to the issues associated with intellectual development discussed in the previous section, PhD candidature is likely to involve other psychological adjustments, transitions, or transformations. For example, compared to most undergraduate and Masters’ level programmes, PhD study requires a more autonomous approach to learning in addition to dealing with greater conceptual complexity (Wisker et al., 2003), and students may feel academically underprepared (Golde, 2005). Even undertaking qualitative or mixed methods research can be philosophically challenging and emotionally demanding (Service, 2012). In addition, the student may need to relinquish old role identities while committing to new ones (Jazvac-Martek, 2009), and juggle competing responsibilities (Beauchamp, Jazvac-Martek, & McAlpine, 2009). The student may also experience the need to adjust to different social situations associated with doctoral research. For example, the majority of PhD students in Stubb et al.’s (2011) study found the academic community itself contributed to feelings of exclusion and exhaustion rather than empowerment. In contrast, final year students reported that the scholarly community had had a positive impact on the development of their personal resourcefulness (Mowbray & Halse, 2010), and this was a factor in promoting the studies of international students (Sakurai et al., 2012).

Many students find the intellectual and social isolation or solitariness of doctoral research to be challenging (Conrad, 2003; Golde, 2005; Hockey, 1991; Nyquist et al., 1999), although this might in itself be essential to the originality required for the PhD (Hockey, 1994) through its inherent opportunities for reflection (Jazvac-Martek, 2009). However, Hopwood et al. (2011) warn that sustained isolation can be detrimental to progress, as the social context itself is important for learning. Thus social or academic isolation may be of particular concern regarding completion times in the non-science disciplines (Hockey, 1991). Being able to interpret when
these feelings indicate the potential for problems with progress is likely to be an issue for the doctoral research student.

Whether or not particular stages of PhD candidature or doctoral tasks are more challenging than others has received relatively little investigation, particularly in terms of longitudinal monitoring research. This is partly due to the fact that the timing of different stages of research is dependent on a number of factors, including the student’s topic, field, methodology, research experience, and supervisor style (Wright & Lodwick, 1989). Although limited by their research focus on the first year of doctoral research, both Wright and Lodwick (1989) and Hockey (1994) postulated that the intellectual, personal and social adjustments required in the early stages make this the most difficult time, due to the uncertainties, ambiguities, and isolation involved in commencing the role of a PhD student. Hockey (1991, p. 324) maintains that the loneliness and social isolation, plus the “sense of amorphousness and drift” associated with early candidature, and the “need to achieve a new intellectual direction”, can result in disorientation and a sharp decline in enthusiasm for research in the first year. Due in part to changing academic foci and responsibilities, this is also a time when relationships with supervisors, as well as other staff and students, are likely to change from those experienced when the student was an undergraduate (Hockey, 1994).

Most Australian PhD programmes contain little or no coursework (Evans, 2007; Kiley, 2011). However, in the USA the prospect of qualifying examinations or departmental requirements for the advancement of a PhD student to candidacy has been perceived as challenging, and this is associated with students questioning their motivation for persistence and therefore results in some attrition (Golde, 2005). In fact, Bair and Haworth (2004) found that up to two-thirds of attrition occurs during the coursework stage rather than the research stage. In Australia, many universities require that doctoral research students pass a ‘confirmation of candidature’ process, typically at the end of the equivalent of first year of full-time candidature. Bourke et al. (2004) also found that two-thirds of Australian doctoral research students who withdrew from candidature did so within the first 18 months, but this study was undertaken prior to the widespread implementation of the confirmation of candidature requirement. Together these studies provide support for the idea that the early stages of doctoral study may be difficult for a variety of reasons; however the fact that attrition continues to occur after this point bears witness to the ongoing challenges of doctoral research, even for those who successfully manage the hurdle requirements for candidacy.
Mid-candidature has been considered to be a high-risk time for students losing motivation with progress (Parsloe, 1993; Ahern & Manathunga, 2004). While the difficulties of the ‘writing up stage’ are often associated with later candidature (e.g., Juniper et al., 2012), writing ideally should continue across candidature (Wellington, 2010). Writing is a high-stakes activity for doctoral research students (Aitchison & Mowbray, 2013), and is often a source of tension (Cotterall, 2013; Wright & Lodwick, 1989). Wellington’s (2010) work highlights the emotional challenges of awaiting and receiving critical feedback on doctoral writing. Therefore, throughout the entire doctoral research process, PhD students may be vulnerable to anxiety and concerns about the ultimate appraisal of their contribution (Phillips & Pugh, 2000), as the value of the creative output of doctoral research is ultimately assessed via examination of the thesis. Perhaps it is in the later stages of candidature that Cantwell et al.’s (2012a, p. 69) words resonate most strongly: “Stepping into the academic unknown of doctoral study implies a preparedness to place one’s private and public ‘neck’ on the line”.

Turning from the academic domain to the individual’s broader life context, there are also the issues of financial sacrifices as careers are put on hold, and personal sacrifices, such as those experienced by international students who may be separated from families and friends in their home countries for long periods of time (Hockey, 1994; Ingleton & Cadman, 2002; Phillips & Pugh, 2010). Cultural differences may impact both academic and personal lives (Hockey, 1994; Ingleton & Cadman, 2002). Indeed, an Australian study by Ingleton and Cadman (2002) found that the shift into a foreign postgraduate research culture caused international students to question their self-identities as successful learners. Moreover, these students may be missing the social support networks that can assist in managing the challenges.

Despite the long-recognised potential stressors (e.g., Mechanic, 1962), the times of insecurity and uncertainty (Batchelor & DiNapoli, 2006, p. 13), and the sense of being a ‘perilous passage’ (Hadjioannou, Shelton, Fu, & Dhanarattigannon, 2007), doctoral research certainly has the potential to be a source of ‘passion and excitement, happiness and well-being’ (Batchelor & DiNapoli, 2006), and in John and Denicolo’s (2013, p. 41) words “stimulating and uplifting, albeit challenging”. However it is the inherent unpredictability and lack of control in the onset, intensity, and duration of the challenges which precipitate these emotions that has led to the depiction of the PhD experience as ‘an emotional roller-coaster’ (Carson, 2007; Morrison-Saunders, Moore, Hughes, & Newsome, 2010). That is, dealing with the unpredictability of doctoral research challenges can become a challenge in itself.
Thus far, this review of this literature has highlighted three important issues relevant to the task analysis component in the study of self-regulation in doctoral research students. Firstly, knowledge creation is inherently challenging and multifaceted. Secondly, a student may encounter numerous other contextual challenges when engaged in the process of doctoral research. Thirdly, the student is likely to experience a variety of emotions in response to the challenges encountered while undertaking doctoral research. Therefore, a more complete understanding of the nature of knowledge generation requires awareness that engagement in this process might influence various aspects of well-being.

In summary, one source of difference in doctoral research students’ self-regulatory functioning may be the quality of task understanding and analysis. That is, the extent to which doctoral research students are expecting and prepared for the nature and challenges of knowledge generation, within the context of all facets of the individual’s life, may impact the effectiveness of their self-regulatory efforts, and their well-being and progress during the course of goal-pursuit. How well the student is prepared or able to pursue the goal of knowledge creation will also be affected by self-motivation beliefs – the second component of the forethought phase of Zimmerman’s (2000) model of self-regulation – and this will be discussed in the next section of this chapter.

### 2.3.2 Self-motivation beliefs

The second component of the forethought phase of this self-regulation model comprises self-motivation beliefs, including **self-efficacy beliefs, outcome expectancies, goal orientation,** and **task interest and valuing** (Zimmerman, 2013). These beliefs about an individual’s abilities, and expectancies regarding future outcomes, stem from the student’s knowledge and prior experience, and are central to self-regulatory success (Maddux & Volkmann, 2010). In addition to the student’s level of understanding of the task requirements, the nature and quality of the student’s self-motivation beliefs and value systems also influence the quality of the goal-setting and strategic planning that takes place during task analysis processes (Zimmerman, 2013). Therefore, for example, a student with a mastery goal orientation and high self-efficacy is likely to display high levels of initiative and persistence in task analysis, goal-setting, and strategy planning (Zimmerman, 2013).

Studies grouped under the heading of doctoral student ‘motivation’ accounted for nearly one quarter of the studies in Bair and Haworth’s (2004) metasynthesis. Based on this work, Bair and
Haworth (2004) concluded that there is a strong relationship between motivation and PhD candidature outcomes. Research relevant to an understanding of doctoral students’ self-motivation beliefs is reviewed below, along with further explanations of these elements of the forethought phase of self-regulation.

2.3.2.1 Self-efficacy

Self-efficacy represents individuals’ beliefs about their ability to learn or perform behaviours at a particular level, that is, to control how they function, as well as the extent of their perceived control over how events affect them (Bandura, 1994). Therefore, self-efficacy plays an important role in self-regulation (Bandura, 1986, 1994; Maddux & Volkmann, 2010; Schunk & Zimmerman, 2012b). Self-efficacy beliefs influence behaviour, including the choice of a goal, and the effort applied in pursuit of this goal, while the behavioural outcomes of these actions, such as observing progress towards a goal, influence self-efficacy beliefs by providing evidence of the individual’s ability (Schunk & Zimmerman, 2012b). Self-efficacy beliefs are therefore related to resilience, and susceptibility to depression and stress (Bandura, 1994). Thus, when challenged by difficulties, students with weaker rather than stronger self-efficacy beliefs are more likely to doubt their ability to successfully complete the task, and therefore discontinue their efforts (Maddux & Volkmann, 2010). While some unpublished research has explored constructs that may be related to doctoral research student self-efficacy, such as self-image or self-concept, it remains unclear whether different perspectives of the self are associated with the timeliness or success of candidature (Bair & Haworth, 2004).

2.3.2.2 Task interest and valuing

Another element of the self-motivational beliefs component of Zimmerman’s (2000) model of self-regulation is the value placed on, or interest taken in, the task. Regarding the value of doctoral research, Bair and Haworth (2004) concluded from their metasynthesis that students’ persistence to completion was associated with the importance of the PhD to achieving their career goals. Interestingly, while this source of motivation might facilitate completion, completing a PhD for vocational reasons was associated with later ambivalence about the value of candidature in Leonard, Becker, and Coate’s (2005) study of doctoral graduates. According to Lovitts (2005), the student’s interest and enthusiasm for their research is an important source of motivation that can be a determining factor in the quality and success of doctoral research.
This claim was borne out in Sakurai et al.’s (2012) study, in which international doctoral students reported that interest in the task, as well as motivation more generally, were beneficial to engagement and progress in candidature. More specifically, the final year students in Mowbray and Halse’s (2010) study described how the commitment to, and sense of ownership of, their doctoral research had increased with both the intellectual risk-taking and emotional investment involved. Certainly, for graduates who had completed a PhD in Education up to 12 years prior, the lasting benefits of the doctorate were perceived to be equally or more in terms of intrinsic interest and personal development than continuing professional development (Leonard et al., 2005).

### 2.3.2.3 Other self-motivational and metacognitive beliefs

The role of metacognitive ability in learning has been explored in the education literature for some decades, using a variety of models of metacognition (e.g. Efklides, 2011; Flavell, 1979). Much of this work is underpinned by Schraw’s (1998, p. 89) definition of metacognition as “a multidimensional array of self-constructed, regulatory skills that span a variety of diverse cognitive domains”. As discussed in Chapter 1, Zimmerman’s (2000) model of self-regulation is perceived to subsume metacognitive beliefs and skills. Thus, these beliefs and skills are considered here as part of the forethought phase.

In what appears to be the only published investigation focused on the metacognitive functioning of PhD students, Cantwell et al. (2012a) used a battery of instruments to develop learning profiles for 263 current PhD students across two Australian universities. Cantwell et al. (2012a) examined the relationships among a range of self-reported beliefs about coping, self-efficacy, metacognitive awareness, epistemological awareness, need for cognition, doctoral responsibility, volitional control, and procrastination. The results suggested that a higher level of metacognitive functioning occurs in this population than in ‘less elite’ educational cohorts. In addition, evidence of two different clusters of metacognitive profiles appeared, based on a measure of epistemological awareness.

Moreover, Cantwell et al.’s (2012a) results provide preliminary evidence that students’ intellectual and motivational beliefs are positively associated with the ability to cope with candidature. If interpreted in terms of Zimmerman’s (2000) model, Cantwell et al.’s (2012a) results explain how naïve beliefs about the intellectual demands of doctoral research – forming part of the motivational belief system of the forethought phase – negatively influence the
selection and implementation of volitional strategies in the performance phase of self-
regulation. Less adaptive responses to the demands of candidature, such as procrastination,
would be expected under these circumstances (Cantwell et al., 2012a). Further, students who
expressed reluctance to engage with intellectual challenges appeared less willing to take
responsibility for their progress (Cantwell et al., 2012a). Abrogating this responsibility would
negatively influence the reliability of self-judgements about progress, and consequently impact
the choice of self-regulatory strategies required to maintain satisfactory progress through
candidature. These initial findings suggest that further development of such profiling is
warranted to assist in the identification of metacognitive strengths and weaknesses in this
population. Longitudinal research is also required to determine if and how these profiles change
across stages of candidature, and if they predict doctoral research student attrition and
persistence. Feeding this information back to students might then assist them, where necessary,
to see where they need to develop their abilities to manage candidature.

Schraw (1998) concluded that metacognitive knowledge and regulation are constructed
incrementally over time at least into early adulthood, as a result of direct learning through
instruction, peer-regulated learning via peer modelling or co-operative problem-solving, or the
autonomous learning and construction of strategies and knowledge with limited external
support. Similarly, Cantwell (2004) has drawn attention to the potential for additional
development of metacognitive abilities throughout higher education, pointing to the need for
this to continue to occur at the doctoral level.

Indeed, there is some evidence to suggest that beliefs and skills related to self-regulation may
develop during PhD candidature, at least for those who persist to the final stages and beyond.
That is, for the 20 final year Australian PhD students in Mowbray and Halse’s (2010) study, the
most valued skills developed during candidature were what these researchers called “personal
resourcefulness”, a group of skills that included confidence, assertiveness, resilience,
persistence, discipline, intrinsic motivation, and interpersonal skills. These skills were identified
as important for guiding and facilitating doctoral research progress while enabling the balancing
of responsibilities in other life and work domains (Mowbray & Halse, 2010). Mowbray and
Halse (2010) described these skills in terms of perceptual, reflexive, emotional, and contextual
capacities, all of which are required for self-regulation. However, although these skills appear to
be important in persisting and progressing through doctoral research, neither individual
differences in skill level nor their association with candidature outcomes appear to have been
assessed yet.
In describing their management of candidature, the female doctoral students in Haynes et al.’s (2012) study referred to a number of self-regulatory components that can be found in the forethought phase of Zimmerman’s (2000) model. That is, these students explained that the motivation to persist was reliant on recognising the tumultuous nature of candidature, framing candidature as a challenge to conquer, developing coping strategies such as flexibility and adaptability to change, or drawing on spiritual beliefs for support. These responses provide further evidence for the perceived importance of task analysis quality and self-motivational beliefs to persistence in doctoral research.

To summarise, a review of the literature regarding self-motivation beliefs in doctoral students has highlighted the potential influence of doctoral research students’ prior academic and personal experience on performance during candidature. Self-efficacy beliefs, outcome expectancies, goal orientation, and the interest and value the student places on the PhD, would all be expected to influence goal-setting and strategy choices, which in turn influence how the student responds to challenges, and may ultimately have an impact on candidature outcomes. There is some evidence in the literature that doctoral research students may differ in their levels or application of the various self-regulatory skills relevant to the forethought phase of Zimmerman’s (2000) model, and also some evidence that such skills may develop during candidature.

Having considered how the components of the forethought phase of Zimmerman’s (2000) model of self-regulation are relevant to the study of doctoral students’ progress through candidature, the performance phase will be discussed in the next section.

### 2.4 PERFORMANCE PHASE


#### 2.4.1 Self-control

Self-control processes involve particular strategies employed to assist learning and performance (Zimmerman, 2013). Assumedly reflecting the overlap evident among some of these strategies, and the flexibility of this model to suit different learning and performance situations, Zimmerman has varied the types of self-control processes included in different explications of
his theory. For example, some have incorporated self-instruction, imagery, attention focusing, and task strategies (e.g., Zimmerman, 2000, 2008), while others have replaced attention focusing with environmental structuring and help-seeking (e.g., Zimmerman, 2006; Zimmerman, 2013). While this may be relevant to finer-grained analyses of self-regulatory processes in more controlled settings, such distinctions are of less concern at the level of analysis possible in the doctoral research context. However, as the experience of doctoral research encompasses a wide range of settings in which self-control strategies might be applied, a brief description is provided of each of the above strategies.

Zimmerman (2006) has described **self-instruction** as using task-specific vocal or sub-vocal self-talk designed to guide goal-directed performance, while **imagery** involves the creation or recollection of mental images to aid learning and performance goal pursuit. **Attention focusing** describes efforts to assist concentration, and includes ignoring or screening out internal and external distractions (Zimmerman & Campillo, 2003). Examples of attention focusing are withstanding the temptation to ruminate about previous failures, focusing on the motor processes of executing a task in slow motion, and avoiding external distractions through environmental structuring (Zimmerman & Campillo, 2003). **Task strategies** are methods used to enhance the learning or performance of specific tasks, and in the academic domain might include processes such as summarising and memory techniques (Zimmerman, 2006). Self-instruction, imagery, attention focusing, and task strategies are all self-control processes that students might apply to learning tasks within doctoral candidature. However, while all of these self-control processes have demonstrated effectiveness in a variety of other learning and performance domains (Zimmerman, 2006), there appears to be no published evidence that they have been empirically examined in doctoral research students’ learning or candidature outcomes.

The other three self-control processes in Zimmerman’s (2006) model – time management, help-seeking, and environmental structuring – are widely endorsed and appear frequently in the ‘how to’ literature as helpful strategies for doctoral research students to employ. **Time management** is a self-control process involving the regulation of the quality and quantity of time used in practice and performance, while **environmental structuring** involves choosing or developing environments conducive to optimal learning or performance (Zimmerman, 2006). While the need for effective time management and environmental structuring in doctoral research appears well-accepted, the extent of student differences in these factors and how these impact on
progress have not yet been established. Further, the relationships among these specific self-control processes do not appear to have been studied in the doctoral research context.

**Help-seeking** is seen as an adaptive self-control process involving the planned, self-initiated recruitment of human or other resources to assist in the learning process (Zimmerman, 2006). Therefore, students with more effective self-regulation demonstrate help-seeking behaviours, while those with less effective levels of self-regulation might not seek help due to a lack of planning or a fear of receiving negative feedback (Zimmerman, 2002).

Help-seeking is clearly an important self-regulatory strategy for doctoral research students. Indeed, from interviews with graduates in the UK, most of whom had completed the PhD within 4 years, Wright (2003) concluded that the ability to develop support mechanisms and help-seeking skills was essential to doctoral research completion. Wright (2003) explained that these capabilities developed through negotiating life transitions and associated developmental stages successfully. Help-seeking behaviour relies on being aware that help is required, as well as being prepared and able to seek it. As Zimmerman (2002) pointed out, a self-regulated approach to learning depends not solely on solitary learning techniques, but on being resourceful and adapting learning methods for success in different contexts.

How do doctoral research students assess when they need help? Following Zimmerman’s (2000) cyclical feedback model, the awareness that help is required might arise from evaluating previous performance by using a range of self-monitored indicators. Section 2.4.2 discusses this process of reflection and evaluation in more detail; however help-seeking might be prompted by the student feeling inadequately equipped to manage specific problems that he or she encounters, or perhaps a more general sense of unsatisfactory progress without a discernible cause. Doctoral students might also consult external sources for indicators against which to gauge the effects – and indeed the normalcy – of their thoughts, feelings, and behaviours on their research progress.

Apart from advice and feedback from supervisors and peers, a wealth of material exists to assist students to recognise the self-regulatory strategies that might facilitate progress through doctoral research, particularly in terms of strategies that fall within Zimmerman’s (2000) definition of self-control strategies, such as time management and help-seeking. Indeed, strategies for managing the requirements and challenges of PhD candidature have been well-documented and circulate in many forms, from information on websites, student blogs, online forums, and even
comic strips, to the many published ‘how-to’ doctoral study guides written to assist students (e.g., Phillips & Pugh, 1987, 1994, 2000, 2010; Kearns & Gardiner, 2006; Denholm & Evans, 2006). Much of this information and advice is based on a substantial collection of anecdotal evidence gleaned from students’ and authors’ own doctoral or supervisory experiences. Together, these resources address most of the difficulties associated with doctoral candidature, from choosing supervisors and topics, to finding funding, to time management and increasing physical fitness.

The need for doctoral research students to apply self-regulatory strategies and processes, although rarely framed in these terms, is certainly made clear within these resources. For example, students are reminded of the need to use their initiative and take responsibility for their candidature, in that they are ‘under their own management’ (Phillips & Pugh, 2000). They are urged to develop ‘desirable work habits and attitudes of mind’ such as goal-setting for writing (Lawton, 1997), and to implement strategies for managing their time efficiently (e.g. May, 1997; Phillips & Pugh, 1994) and for avoiding procrastination (Lawton, 1997). Reflecting the importance of the student-supervisor relationship to doctoral student persistence observed by Bair and Haworth (2004) in their meta-analysis, these resources often provide strategies to assist the establishment and maintenance of a healthy working relationship and working routine (e.g., Lawton, 1997). The supervisory relationship, in turn, can ideally provide an ongoing source of feedback about progress. Indeed, it is generally accepted that reviewing and providing ample feedback on the student’s progress, whether formally or informally, is a feature of good supervision and is essential to advancing the student’s work (Francis, 1997).

Yet there is sufficient evidence in the literature that a multitude of reasons might prevent students from receiving this feedback in either a timely or adequate manner, possibly because supervisors are not sufficiently available or accessible (Mowbray & Halse, 2010), or due to a mismatch or ‘clash’ in expectations or ways of communicating or relating (Golde, 2005; Martinsuo & Turkulainen, 2011). In addition, Clegg, Bradley, and Smith (2006) have observed that help-seeking in higher education is a complex phenomenon. While institutions might believe that they are offering appropriate forms of support, students may not use these as expected, instead seeking to preserve their self-esteem and their self-presentation by trying to conceal their lack of knowledge or understanding of how to approach research tasks (Ahern & Manathunga, 2004), or by drawing on their own resourcefulness and using informal support mechanisms (Clegg et al., 2006). Of course, while help-seeking can be an appropriate response to detecting a problem during self-monitoring, it requires accurate information about the nature
and severity of the problem. Furthermore, considering together the idiosyncratic nature of doctoral study, the rates of attrition and slow completion, and from the questions and responses posted on PhD student internet forums, it appears that it is not always easy for a student to tailor and apply advice to their individual situation (Budd et al., 2010). It is also possible, extrapolating from Turner and Husman (2008), that even if students have the requisite metacognitive knowledge and skills, using these effectively for self-regulation purposes is likely to be more difficult when faced with the challenges that may arise in the doctoral research context.

Help-seeking thus appears important for doctoral research students in terms of addressing immediate issues, as well as through establishing viable sources of feedback to assist with ongoing progress monitoring and other self-regulatory behaviours. However, more analysis of the efficacy of the available resources and the patterns of their usage by doctoral research students is required. This might also reveal self-regulatory differences in the doctoral research student population, as well as the potential influences on candidature outcomes.

2.4.1.1 Self-control, self-discipline, and self-regulation

‘Self-control’ and ‘self-discipline’ have been defined and operationalised in similar ways (Steel, 2007; Tangney et al., 2004). However, self-discipline has also been conceptualised more specifically as focusing on the deliberate control of negative performance processes that might otherwise impact academic outcomes, such as anxiety-related procrastination (Duckworth & Seligman, 2005; Zimmerman & Kitsantas, 2014). Thus, during goal pursuit, self-discipline involves the conscious and effortful suppression of responses that are not goal-directed, as well as the control of the environment (Duckworth & Seligman, 2005; Zimmerman & Kitsantas, 2014). For example, in the context of completing academic work, self-discipline might involve focusing attention, controlling emotions, and tolerating frustration and boredom (Duckworth & Seligman, 2005).

Moreover, as Zimmerman and Kitsantas (2014) have observed, how students control their behaviour and their environment in order to overcome obstacles to learning has also been described as self-control or self-regulation. Zimmerman and Kitsantas (2014) have suggested that self-discipline is associated with facilitating performance processes that optimise task completion, while self-regulation is more concerned with the learning processes involved in developing and improving academic skills. Discriminating between these constructs in this way,
Zimmerman and Kitsantas (2014) found that high school students’ and teachers’ rating of student self-regulation was a stronger predictor than self-discipline of students’ academic achievement. While such a distinction is more easily testable in academic settings involving shorter-term learning tasks, a PhD student’s focus on learning rather than performance outcomes might also be found to influence doctoral research progress.

Interview studies of doctoral students and supervisors have identified ‘self-discipline’ as being important to progress through candidature (Gardner, 2009; Mowbray & Halse, 2010; Sakurai et al., 2012). Again, where self-discipline has been further examined in these studies, definitions of this construct have varied. In Mowbray and Halse’s (2010) study, self-discipline was described in terms of taking responsibility for goal achievement and managing priorities, workload, competing demands, and time. In contrast to Duckworth and Seligman’s (2005) conceptualisation of self-discipline as a personality trait, or a ‘non-intellectual strength’, doctoral students in Mowbray and Halse’s (2010) study perceived self-discipline as an important skill to be developed during candidature. In a similar vein, Wright and Lodwick (1989) grouped the ‘prompt production of reports/completion of thesis’ and ‘regular meetings’ as evidence of self-discipline. Interestingly, Wright and Lodwick (1989) found that students perceived these two aspects of self-discipline as being the ‘expectations of students’ that are least important to their supervisors. Instead, students rated interest and enthusiasm, independence and initiative, and hard work as being most important, slightly above originality and creativity, and all as more important than self-discipline.

Thus, further work is required to operationalise self-discipline in a way that is both consistent with contemporary conceptualisations and relevant to the doctoral research context, and to differentiate among any effects of similar constructs on successful completion. Until then, it also remains unclear whether individual differences in self-control, self-discipline, or self-regulation more generally, influence the likelihood of successful and timely doctoral research completion. Moreover, it is also unknown how students recognise when their levels of functioning in these areas become problematic, how they respond to this information, and the extent to which self-discipline can be improved within the doctoral research context.

2.4.1.2 Self-control and procrastination

Procrastination research provides another source of evidence for the importance of studying doctoral research candidature in terms of self-regulation. In the academic context,
procrastination involves the purposeful delay in completing work to the extent that performance is impaired (Ellis & Knaus, 1977, in Alexander & Onwuegbuzie, 2007). Although procrastination is not yet thoroughly understood, Steel (2007) has described it as a common form of self-regulatory failure, finding that measures of procrastination and self-control are strongly and inversely correlated. Conversely, Spada, Hiou, and Nikcevic (2006) argue that procrastination can be perceived as a metacognitive control strategy, in the sense that it is intended to regulate negative cognition and affect. According to Steel (2007), procrastinators may lack self-efficacy regarding their ability to manage the situation. That is, having predicted that engaging with the work would produce anxiety, procrastinators try to manage their affect by avoiding the work (Alexander & Onwuegbuzie, 2007). Thus, procrastination is also inversely related to self-efficacy, conscientiousness, organisation and planning (Johnson et al., 2000; Steel, 2007; van Eerde, 2003), and has been associated with anxiety, depression, and worry (Spada et al., 2006).

Given the extent of procrastination in other higher education students (Alexander & Onwuegbuzie, 2007), it is hardly surprising that it has also been identified as a problem for many doctoral research students (Ahern & Manathunga, 2004; Kearns, Forbes, Gardiner, & Marshall, 2008; Kearns, Gardiner, & Marshall, 2008; Wright, 2006). More specifically, procrastination has been associated with poor candidature outcomes. For example, Muszynski and Akamatsu (1991) found higher levels of procrastination in clinical psychology ‘ABD’s (an acronym denoting that the student has finished the coursework only, so has completed ‘all but dissertation’) and noncompleters when compared with graduate students. Similarly, Johnson et al. (2000) found that doctoral students who had displayed slow progress in completing the doctoral dissertation, had higher levels of procrastination and perfectionism than did those who had graduated on time. Johnson et al.’s (2000) results also suggested that doctoral students who self-reported less procrastination might be more skilled in managing time and other challenges. Johnson et al. (2000) found that procrastination was negatively related to emotional support, but unrelated to financial support. Interpreted using Zimmerman’s (2000) model of self-regulation, emotional support could reduce procrastination through its influence on self-efficacy.

Procrastination has also been positively associated with self-handicapping (van Eerde, 2003) and perfectionism (Johnson et al., 2000). Self-handicapping, or self-sabotage, occurs when an individual creates obstacles to impede their own performance (Steel, 2007). Indeed, Kearns, Gardiner, et al. (2008) have argued that these behaviours are associated with delays in doctoral research completion. In one of the few reported psychological interventions designed to assist
PhD students, Kearns, Gardiner et al. (2008) conducted and evaluated a cognitive-behavioural coaching program to reduce self-handicapping, or self-sabotaging, behaviours. Follow-up data was available for 26 group participants. Although longer term candidature outcomes were not measured, Kearns, Gardiner, et al. (2008) concluded that students’ ability to complete was increased through improving time management and writing behaviours and reducing stress levels. Again, these results can be explained with respect to Zimmerman’s (2000) self-regulation model.

2.4.2 Self-observation

“To be successful in graduate study, as in many areas of life, one must be making progress” (Pychyl & Little, 1998, p. 460). Making effective progress towards a goal depends on accurate feedback (Locke & Latham, 1990, in Maddux & Volkmann, 2010), as the optimal use of any self-control strategy is dependent on its accurate monitoring (Zimmerman, 2006). Feedback is acquired and used through the process of self-observation, a systematic self-monitoring of the student’s performance that varies in its form and level of formality, and can support self-control efforts (Zimmerman, 2013). Self-observation processes draw on information obtained from the individual student, or from the social or physical environment (Maddux & Volkmann, 2010), and provide feedback for use during the ‘self-reflection’ phase of self-regulation (Schunk & Zimmerman, 2012b). This forms the basis for judgements about whether current performance is in the direction of the individual’s goal, and thus for determining the extent of progress made (Maddux & Volkmann, 2010; Schunk & Zimmerman, 2012b). Zimmerman’s (2000) model originally differentiated between two forms of systematic self-observation: self-recording and self-experimentation, with metacognitive monitoring later replacing self-experimentation (e.g., Zimmerman, 2008, 2013). Self-experimentation referred to systematically varying facets of functioning and observing effects on performance (Zimmerman & Campillo, 2003).

Self-recording describes relatively formal self-monitoring methods, such as plotting indicators of progress towards a goal on charts or tables (Zimmerman, 2013). This recording process can provide a structured reminder to the student about the outcomes of previous learning efforts, and evidence of progress towards learning goals (Zimmerman & Campillo, 2003). Metacognitive monitoring, sometimes referred to as self-monitoring (Cleary, Callan, & Zimmerman, 2012), is a less formal method of observing performance that involves the mental tracking of processes and outcomes (Zimmerman, 2013).
However, Zimmerman and Schunk (2004) have noted that finding ways and means to self-monitor may not be a simple process. As Zimmerman and Campillo (2003) observed, complex problem-solving situations can generate large amounts of information for monitoring and recalling. While domain experts are able to be more discriminatory in their use of this information, less experienced students may find this difficult, leading to poor quality self-monitoring and hence ineffective self-regulation (Zimmerman & Campillo, 2003). Perhaps it is for this reason that, according to doctoral research students, one of the most important functions of their supervisors is to check on their progress, and to provide feedback about whether they are advancing, and if the standard, speed, and direction are appropriate (Wright & Lodwick, 1989). As Graves (1997, p. 83) has explained:

“The student needs feedback. There is nothing more disheartening than to be working hard at one’s research and not to know whether one is making satisfactory progress nor be sure whether the standard of the work produced is appropriate for the standard of a PhD”.

Indeed, Zimmerman and Campillo (2003) asserted that delaying feedback during self-regulatory efforts prevents a timely remedial response. Ingleton and Cadman’s (2002) findings supported this assertion, by revealing the extent of the distress felt by international postgraduate research students due to uncertainty about their progress during their first year of candidature. Without the regular indicators of success provided by undergraduate marking systems, and in the absence of any other feedback about their performance, some of these students lacked any sense of success even after a full semester (Ingleton & Cadman, 2002). As a result, students began to doubt their academic ability and identity (Ingleton & Cadman, 2002).

Furthermore, feedback can have a negative effect on performance if it results in the individual self-monitoring with self-doubt or anxiety (Kluger & DeNisi, 1996). In an exploratory study of doctoral research students engaged in online discussions about withdrawing from candidature, Budd et al. (2010) found that students used evidence from personal, behavioural, and environmental sources as feedback to identify discrepancies in their functioning. These sources ranged from supervisor feedback about performance, to depressive symptomatology, to procrastinatory behaviours. Unfortunately, as was discussed earlier in this chapter, an inadequate understanding of the intellectual demands of knowledge generation, or of the developmental and transformational processes that may be involved, may amplify the risk that
feedback is misinterpreted and that candidature continues problematically, or is even terminated unnecessarily.

Conversely, receiving confirmation about making progress can boost self-efficacy and motivation (Schunk & Zimmerman, 2012b). Indeed, from an in-depth study of ‘knowledge workers’ involved in complex and creative problem-solving, Amabile and Kramer (2011) concluded that making real progress results in a sense of accomplishment and self-worth, and in positive emotions such as satisfaction and happiness. These positive thoughts and feelings about the self, the work, and even the organisation, produce further creative and productive behaviours, along with the motivation and commitment to achieving quality performance (Amabile & Kramer, 2011). To illustrate, the sense of achievement and confidence that results from making satisfactory progress in the first year of doctoral research bodes well for the remainder of candidature (Wright & Lodwick, 1989). Amabile and Kramer (2011, p. 231) frame this process as a ‘progress loop’, whereby making progress and ‘inner work life’ are reciprocally reinforcing. This is aligned with Zimmerman’s (2000) model of self-regulation, in which self-judgements of observed performance influence the self-motivational beliefs which drive further goal-setting and strategy choice.

Also of interest here is that motivation increased when even small increments in progress were facilitated and noticed (Amabile & Kramer, 2011). Indeed, this was the most effective motivator for the knowledge workers in their study. Examining student-supervisor relationships emphasises the importance of the supervisor’s role in providing feedback about progress in the doctoral research domain (Barnes & Austin, 2009). Similarly, Ahern and Manathunga (2004) reported that experienced supervisors were aware of the value of students leaving supervisory meetings feeling that they had made even a little progress. Such positive supervisory practices can contribute to doctoral students’ satisfaction with progress and engagement, while students can be hindered by a supervisor’s skill deficits (Sakurai et al., 2012). Helpful and meaningful student-supervisor relationships are those that enable the student to discuss expectations and ideas, and to receive frequent guidance and clarification from the supervisor regarding the thesis scope, requirements, and progress (Bair & Haworth, 2004). Supervisors can supplement this process by providing academic and moral support, encouragement, practical help, and advice (Wright & Lodwick, 1989).

Based on Amabile and Kramer’s (2011) work, it can be assumed that doctoral supervisors who schedule and use regular and frequent supervisory meetings to provide feedback about even
small indicators of progress would be more likely to see the student continue to make satisfactory progress. Conversely, supervisors who meet with students infrequently, or who are described by students as ‘lacking in skills’, may be those who do not recognise the importance of providing regular feedback about progress. In fact, ‘supporting progress’ was perceived as the least important motivator by the managers in Amabile and Kramer’s (2011) study. These findings illustrate the need to develop and employ measures for self-monitoring that are sufficiently sensitive to even small increments in doctoral progress, given the potential impact on doctoral students’ motivation.

Regularity and frequency of contact appear important to progress, and thus to successful candidature (Bair & Haworth, 2004; Latona & Browne, 2001). A supervisor’s availability to demonstrate organisational and self-regulatory skills by meeting frequently for such activities as goal-setting and planning, topic selection, and monitoring and addressing motivational issues can expedite the research process (Wright & Lodwick, 1989), and may also reduce attrition during the dissertation stage of candidature (Bair & Haworth, 2004). Wright and Lodwick (1989) found that students who met with their supervisor six or more times per term made more advanced progress in the first year of doctoral research than those with less contact. Similarly, in other studies an inadequate frequency of supervisor meetings has been associated with impaired doctoral student progress (Appel & Dahlgren, 2003), and with students considering withdrawal from candidature (Sakurai et al., 2012). Recalling that lower completion rates are often evident for PhD students in the arts compared to the sciences (Wright & Cochrane, 2000), it is noteworthy that non-science students also appear to be at higher risk of receiving inadequate supervision (Wright & Lodwick, 1989).

To address the widespread student discontent reported regarding inadequate supervisor feedback about progress, Barnes and Austin (2009) assert that students should request, and supervisors should provide, timely feedback that includes helping students to find their direction, to avoid the disorientation and frustration that might otherwise lead to withdrawal. However, requesting or receiving supervisor feedback may be difficult for a number of reasons. For example, as discussed earlier in this chapter, students with an inadequate understanding of the challenges inherent in the knowledge creation process might be reluctant to admit their difficulties to the supervisor, especially if they attribute their difficulties to personal inadequacy. Furthermore, supervisors are not always sufficiently accessible to the student for a variety of reasons (Mowbray & Halse, 2010), or may be unwilling or unable to provide the type or regularity of feedback that is necessary for the student to sustain satisfactory progress.
Apart from directly self-monitoring or requesting a supervisor’s observations about their progress, individuals might also use observations of other doctoral research students’ progress for monitoring purposes. Interactions with other PhD students provide academic and social support and appear important in timely completion (Bair & Haworth, 2004; Wright & Lodwick, 1989), and this may be due in part to the fact that these interactions provide a source of feedback for self-monitoring. Of course, such observations are subject to the student’s perceptual biases and errors. However, if parallels can be drawn with other student experiences described by Schunk and Zimmerman (2012b), then knowing other doctoral students who have successfully dealt with the challenges and completed their degree would be expected to have a positive effect on motivation. Although it is also possible that seeing similar doctoral research students make faster progress can have a negative impact on the individual’s self-efficacy, Schunk and Zimmerman (2012b) maintain that similar situations are not discouraging to students who have sufficient self-efficacy for success and plan to employ different strategies to improve their own rate of progress.

In summary, while self-control strategies are generally assumed to be helpful in the doctoral research context, to date there appears to have been little empirical testing of these assumptions. Moreover, the published research has often sought to identify relevant factors retrospectively rather than taking a prospective approach. More work is required to evaluate and integrate the effects of these factors on doctoral research progress and longer term candidature outcomes, and Zimmerman’s (2000) model of self-regulation has potential as a framework from which to proceed.

The research findings relating to self-observation processes point to the need for doctoral research supervisors to be well-equipped to provide the type of feedback from which doctoral research students benefit, and for students to be discerning about the type of feedback they use and how they interpret it. For this to occur effectively, further research is required into appropriate types of feedback regarding the management of doctoral research, and of individual differences in doctoral research students’ self-observational processes. The final phase of Zimmerman’s (2000) model, the self-reflection phase, is described in the next section.

### 2.5 SELF-REFLECTION PHASE

Self-reflection phase processes are initiated after the student’s learning efforts (Zimmerman, 2000). In the cycle of self-regulation, self-reflections on previous behaviour then influence
future forethought processes including beliefs about the student’s learning (Zimmerman, 2000). The two main forms of self-reflection phase processes are self-judgements and self-reactions.

2.5.1 Self-judgements

Self-judgements have two foci: one is the **self-evaluation** of learning performance outcomes, and the second focus is on the **causal attributions** for these outcomes (Zimmerman, 2013).

2.5.1.1 Self-evaluation

The self-evaluation of performance outcomes can be based on the perception of a discrepancy between goals and current performance, and the interpretation of this feedback is affected by self-efficacy beliefs (Maddux & Volkmann, 2010). Perceiving that a discrepancy exists is a more straightforward process when the criteria regarding the individual’s performance and goal are both well-defined. Successful completion of the thesis is a well-defined but relatively distal goal for much of candidature. Therefore, until the later stages of candidature, thesis completion is not likely to be an appropriate or useful goal against which to judge doctoral research progress. For this reason, setting proximal goals is particularly important in enabling effective self-regulatory functioning in doctoral research. However, being able to set appropriate proximal goals is reliant on accurate task analysis, and the extent of students’ uncertainties about the nature of knowledge generation and doctoral research has been discussed in previous sections. Thus, students may still struggle to evaluate current doctoral research performance accurately against such goals.

Some students might consider using indicators of psychological functioning when evaluating their progress. Indeed, an important component of maintaining progress through candidature is the management of emotional responses to the intellectual and contextual demands of doctoral research, as discussed earlier in this chapter. It is well-recognised that beyond the excitement and satisfaction that a student may feel in being able to pursue doctoral research in their chosen area (Nyquist & Woodford, 2000), a wide range of affective and other psychological experiences is likely to accompany the PhD process (Aitchison & Mowbray, 2013; Morrison-Saunders et al., 2010; Morrison-Saunders, Moore, Newsome, & Newsome, 2005; Styles & Radloff, 2000).

According to Zimmerman’s (2000) model of self-regulation, these cognitions, emotions, and behaviours may be both responses to what has been experienced during candidature, and
influences on future responses to candidature. Thus, in using this information as feedback about performance, it may also influence the self-motivational beliefs that guide future goal-directed behaviours. Yet these cognitions, emotions, and behaviours may be neither accurate nor helpful indicators of an individual’s ability to manage doctoral research. That is, unless clear about the typical challenges of, and possible responses to, doctoral research, PhD students are at risk of misinterpreting unpleasant emotional responses as indicating a lack of personal ability or suitability for the PhD process (Budd et al., 2010).

These issues were evident in Budd et al.’s (2010) study examining the online forum discussions of PhD students contemplating withdrawal from candidature. The study revealed that the main indicator for most was a sense of dissonance between their expectations and their actual experience of themselves in how they functioned as PhD candidates (Budd et al., 2010). Consistent with previous research, the findings of Budd et al.’s (2010) study suggested that this self-determined ‘lack of fit’ was not associated with any particular demographic variables, or with self-reports of inadequate academic ability or previous academic performance, or with mode of study. What is particularly noteworthy about these findings, however, is that rather than being a simple, clear-cut decision-making process, the awareness of the dissonance and the uncertainty it aroused was described as being intensely distressing (Budd et al., 2010). In combination with perceived family or cultural expectations on the student, this situation could even evoke suicidal ideation (Budd et al., 2010). As Lovitts (2001) warned, PhD student attrition can ‘ruin individuals’ lives’.

### 2.5.1.2 Causal attributions

A causal attribution is the student’s explanation of the determinants of their performance and its outcomes, and this can affect decisions regarding the amount of effort to expend in future learning situations (Maddux & Volkmann, 2010). Attributions regarding success and failure can also influence or be influenced by the student’s self-efficacy (Maddux & Volkmann, 2010). That is, a student with a strong sense of competency for a task is more likely to attribute success on that task to factors associated with their personal ability or under their control, rather than to external or uncontrollable factors (Bandura, 1989). Then, according to the cyclical model of self-regulation, the attribution of success to personal ability results in a greater sense of satisfaction (Zimmerman, 2013), and an increased likelihood of continued persistence with self-regulatory behaviours than if success is attributed to external factors (Maddux & Volkmann, 2010).
As this thesis is concerned with the self-regulatory behaviours of doctoral research students, much of the literature reviewed has been drawn from studies in which attributions of differences in progress or candidature outcomes have been made to individual differences that relate to aspects of self-regulation. Of course, as has been mentioned earlier, there are many other factors that might influence students’ progress and likelihood of successful completion, and thus there are many other potential causal attributions that can be made for doctoral research outcomes. Reiterating from Chapter 1, these can be categorised as: 1) institutional or environmental factors, such as field of study, departmental research climate, and available resources; 2) supervision quality; and 3) characteristics of the PhD student, including approaches towards doctoral research as well as demographic and personality factors (van de Schoot et al., 2013).

Research investigating causal attributions for doctoral student attrition has found that supervisors and other faculty are likely to regard students as being responsible for this candidature outcome, describing them as “lacking in ability, drive, focus, motivation, or initiative” (Gardner, 2009) or unprepared for the demands of doctoral study and research (Lovitts, 2001; Gardner, 2009). Students are also likely to take responsibility for the decision to withdraw from doctoral candidature, citing personal reasons such as those relating to family responsibilities (Lovitts, 2001; Gardner, 2009) and academic reasons (Lovitts, 2001), but also referring to departmental reasons for attrition including poor supervision and lack of financial support (Gardner, 2009). Indeed, PhD students interviewed in studies in the USA have expressed the recognition that only after enrolment did they develop a more accurate understanding of the academic demands, the commitment required, and other realities of doctoral research (e.g. Gardner, 2009; Golde, 1998, 2000, 2005). As Gardner (2009, p. 108) explains:

“While faculty felt that many of these students should not have entered the graduate program in the first place, the students looked at this issue rather as one where these students could only discover the lack of fit between themselves and graduate school by experiencing it. It was almost as if the students interviewed felt this was a natural part of the process of realising one’s life aspirations”.

Although this can be considered a reasonable and appropriate cause of attrition, as discussed at the beginning of this chapter, the supervisors’ attribution of attrition to student factors only – and to the neglect of institutional factors – deserves further discussion. The lack of ability presumed by the supervisors does not correspond with the literature on academic ability. In fact,
academic ability – as assessed by traditional academic achievement measures such as Grade Point Average (GPA) and standardised test scores – is not a useful predictor of doctoral persistence (Bair & Howarth, 2004; Lovitts, 1996; Lovitts & Nelson, 2000), although adequate intellectual ability is of course presumed (Hockey, 1991). Indeed, in her summary of thirty-five years of research into graduate student attrition, Lovitts (1996, pp. 1 – 2) is emphatic that, in terms of academic indicators such as undergraduate grade point average (GPA), “at the time of admission, students who complete their degrees are virtually indistinguishable from those who do not, and that non-completers may, in fact, have more of the characteristics thought to predict success than do completers”. As Girves and Wemmerus (1988) observed, the variance in GPA among doctoral students is approximately half that of Masters’ students, and it would therefore be difficult to find a significant relationship with either candidature progress or outcomes on this basis.

Contending that attrition is rarely due to inadequate academic ability, Lovitts (1996, p. 1) stated that ‘attrition has less to do with what students bring to the university than with what happens to them after they have been admitted’. From this social-structural standpoint, Lovitts (1996) argued that the standard rates of attrition across time and situations, such as within disciplines, indicated that they are maintained by the existence of social structures and social forces, independent of the psychological dispositions of the individuals involved. More succinctly, Lovitts and Nelson (2000, p. 45) stated that attrition is due to “bad programs, not bad students”.

Some support for this argument has been drawn from evidence that the doctoral student’s field of study is related to the likelihood of attrition as well as time to completion. Using data from as far back as 1950, studies have repeatedly shown that the laboratory-based sciences have the lowest attrition rates and shortest completion times, while the humanities have the highest attrition rates and longest completion times (Bair & Haworth, 2004; Kim & Otts, 2010; Lovitts, 1996). More specifically, in a large scale study of records of students who had completed a PhD at one English university, Wright and Cochrane (2000) concluded that the only reliable predictor of successful completion within either a four year or a ten year period was the student’s discipline: science-based study augured better than arts and humanities-based study. Yet there are exceptions to this conclusion. For example, Vassil and Solvak (2012) found no differences in either risk of attrition or time to completion for students by field of study.

At the departmental level, some researchers have argued that doctoral attrition results from the institution failing to enable the successful social integration (Lovitts, 2001; Wright & Lodwick,
or academic integration (Lovitts & Nelson, 2000) of PhD students into the department. For example, from her study of PhD students’ undergraduate socialisation experiences, Lovitts (1996) concluded that non-completers might have been disillusioned when they did not experience the expected level of academic integration as a graduate student. This socialisation theory has been well-accepted in explaining doctoral student persistence and attrition. However, contrary to this argument is the fact that even doctoral students in laboratory-based settings have reported a sense of isolation (Delamont, Atkinson, & Parry, 1997), despite such environments being generally regarded as more collaborative and collegial. Also, as part-time students are less likely to experience the same degree of either social or academic integration as full-time students, it would seem that this explanation fails to explain the outcomes of those studies where part-time students were far more likely to complete quickly than full-time students (e.g., Rodwell & Neumann, 2008). Nevertheless, it does appear important to ensure departmental environments are conducive to timely completion (Girves & Wemmerus, 1988).

The quality of the relationship between the student and the supervisor is more consistently considered critical to the outcomes of doctoral research (Girves & Wemmerus, 1988; Lovitts & Nelson, 2000; Styles & Radloff, 2000, 2001; Zhao et al., 2007). As Lee (2008, p. 267) stated “We know that the supervisor can make or break a PhD student”. Ideally, the doctoral research supervisor would be an active researcher with expertise in the student’s field of study, who is trained or experienced in supervision, and willing and able to provide the time and resources the student needs (Evans, 2007). Previous research has identified a number of ways in which supervisors might be expected to support their doctoral research students, including taking an interest in the student’s research, providing guidance, encouraging and providing opportunities for the student’s development and involvement in the academic community, active promoting the student’s researcher identity and career, and being a good role model as a researcher (Golde, 2000; Manathunga, 2005; Martinsuo & Turkulainen, 2011; Zhao et al., 2007).

However it is also clear that the quality of supervision alone cannot explain candidature outcomes; rather it is the quality of the interaction that occurs between the supervisor and the student (e.g., Ives & Rowley, 2005; Li & Seale, 2007; Martinsuo & Turkulainen, 2011). At least in part, successful doctoral research progress occurs as a function of the student’s continued and significant time commitment to the work, along with maintaining communication with the supervisor (Martinsuo & Turkulainen, 2011), and through the management of feedback (Li & Seale, 2007). The supervisor’s causal attributions for the doctoral research student’s
performance would be expected to affect the supervisor’s behaviour towards the student, for example in terms of how the performance is evaluated and the resulting future expectations, but also the supervisor’s own self-regulatory efficacy is anticipated to have a bearing on these same evaluations and expectations. Hence, the self-regulatory behaviours of both the doctoral research student and the supervisor might independently and interactively affect the quality of this relationship.

2.5.2 Self-reactions

Self-judgements can be followed by two types of self-reactions: self-satisfaction and adaptive or defensive inferences (Zimmerman, 2013).

2.5.2.1 Self-satisfaction

Self-satisfaction reactions describe the level of satisfaction with which the student perceives his or her performance, with associated emotions ranging from “elation to depression” (Zimmerman, 2013, p. 143). A range of emotional responses to various aspects of doctoral research were discussed previously, particularly with regards to the process of knowledge creation (Section 2.3.1.2) and the contextual challenges of doctoral research (Section 2.3.1.3).

Students feel efficacious and motivated to persist if they consider their progress to be satisfactory, whereas dissatisfaction and negative affect can result in avoidance (Bandura, 1991; Schunk & Zimmerman, 2012b). Furthermore, the level of self-satisfaction is associated with the intrinsic importance or value of the task (Zimmerman & Campillo, 2003).

A negative self-evaluation of performance can diminish motivation if the student doubts their ability to improve or succeed (Schunk & Zimmerman, 2012b). Unfortunately, as Miller (2009, p. 20) explains in her ‘how to’ book for PhD students, “One of the cruellest aspects of doing a dissertation is that in the academic world there is rarely a candid dialogue about just how common it is to have negative, self-doubting beliefs and thoughts, unpleasant emotions, and self-defeating behaviour”. Moreover, the potential extent and impact of these emotional responses are often poorly communicated to students who are considering or already undertaking doctoral candidature (Carson, 2007; Nyquist et al., 1999).

Demonstrating this relationship in a more positive way, Wright and Lodwick (1989) found that doctoral research students who were satisfied with their progress in the first year of candidature felt a sense of achievement, and this appeared to be important to motivation for the remainder of
candidature. These researchers assessed progress across seven stages of work, and found that students who had more frequent supervision tended to be ahead with several of the stages of work in the first year, were quicker as measured by their time score for all the stages, had completed what they had planned to do in the first year, and felt it would be very or quite easy to complete on time. Wright and Lodwick (1989) concluded that supervisors who worked closely with students to provide moral support and encouragement contributed to this sense of confidence and thus to faster research progress.

Similarly, Amabile and Kramer (2011) found that knowledge workers who considered themselves to be making progress towards their goals reported positive emotions and a sense of well-being, which enhanced motivation to make further progress. This ‘progress loop’ effect is consistent with the predictions of Zimmerman’s (2000) model of self-regulation, and suggests that positive emotions regarding doctoral research progress might be an indicator of the student’s actual progress towards the goal of successful thesis completion.

Of course, while successfully regulating emotions might be required for progress, the regulation of emotion does not necessarily indicate that progress is being made. To illustrate, efforts to regulate anxiety caused by difficulties with understanding a new theory might lead, for example, to procrastination to avoid the source of the unpleasant emotions. In this case, while the student may feel more comfortable when not engaged in the effort needed to deal with the new learning required, and report feeling more positive, these emotions do not equate with progress towards the academic goal.

2.5.2.2 Adaptive or defensive inferences

Adaptive or defensive inferences are self-reactions associated with decisions about the need to adjust future learning attempts (Zimmerman, 2013). Adaptive inferences result in seeking more effective strategies, whereas defensive inferences are reactions designed to protect the individual from further discouragement and negative affect, and include helplessness, procrastination, task avoidance, cognitive disengagement, and apathy (Zimmerman & Campillo, 2003).

Hawley (2003) points out that a ‘negative’ emotional reaction can be of value in the doctoral research process if it stimulates the individual to seek more information or to consider new perspectives or to seek help. However, this outcome is clearly dependent on how the individual interprets this emotional reaction. That is, the student’s interpretation of these emotions will
depend on their understanding of the process of knowledge creation and its affective counterparts. Indeed, Hawley (2003) has observed that skilled learners persevere through difficulties in anticipation of the sense of satisfaction and emotional reward which accompany the mastery of challenging intellectual tasks. Unfortunately, it seems that many doctoral students lack sufficient awareness of the extent of these demands (Juniper et al., 2012, Lovitts, 2005), and there remains scant systematic exploration of the management of the affective, or emotional, experiences involved in PhD candidature (Cotterall, 2013). It has been argued that the supervisor has a role in assisting students to recognise this relationship (Hawley, 2003).

Even so, students might not choose an appropriate course of behaviour, even at higher levels of education. For example, Cao and Nietfield (2007) found that although college students were aware that they were experiencing difficulties in learning course content, they did not alter their study strategies accordingly. One explanation, as Maddux and Volkmann (2010) point out, is that different individuals might have different self-judgements and self-reactions regarding the same or similar feedback due to different levels of self-efficacy. For example, when experiencing a challenge, having weaker self-efficacy may cause students to doubt their ability and discontinue goal pursuit, while those with stronger self-efficacy persist with their efforts (Maddux & Volkmann, 2010). Further, students with stronger self-efficacy tend to be ‘task-diagnostic’ and continue with problem-solving behaviour when feeling challenged, whereas those with weaker self-efficacy tend towards being ‘self-diagnostic’, concentrating on their inadequacies rather than the task (Maddux & Volkmann, 2010). According to Maddux and Volkmann (2010), a self-diagnostic response is generally distressing, and can impair further self-regulation.

Despite what might seem to be extensive support opportunities that could be used to facilitate an adaptive response, Juniper et al. (2012) found widespread stress and self-doubt amongst PhD students, associated with basic concerns about their progress, which revealed a lack of awareness about the highly challenging and unpredictable nature of research. The sense of stigma attached to this experience was expressed in the findings of Paulson et al. (2010, p. 5):

“many students felt unsure of where to turn in the face of difficulty. They were uncertain as to whether their problems would be perceived as legitimate and as to whether they would be jeopardising their own reputations by discussing difficulty….In some cases it seemed that the problem lay not in an institution not having a mechanism to support students, but in students feeling unable or unwilling to discuss their problems
because they believed they were highly unusual or pariah-like in having particular difficulties.”

These unspoken or ‘untold’ experiences can contribute further to students’ uncertainty about how well they are managing their own unique doctoral experience (Budd et al., 2010; Ingleton & Cadman, 2002; Paulson et al., 2010). For example, depending on their interpretation of these experiences, PhD students can be left doubting the adequacy of their intellectual ability (Budd et al., 2010; Hockey, 1994). This can be manifested as the imposter phenomenon: “an intense, subjective self-perception of phoniness and a secret belief that they are actually less competent or intelligent than their peers. They concomitantly fear eventual discovery and unmasking by professionally significant others” (Lovitts, 1996, p. 14). Assessing oneself as not coping with the demands of candidature, external factors, or the interaction of both, are just a few of the reasons that might lead to the decision to take a leave of absence. Bourke et al. (2004) found that 23% of their sample of Australian PhD students had taken between one and six semesters of leave, although the reasons for taking the leave were not specified. While this time might be used to progress the doctoral research, Vassil and Solvak (2012) found that taking one year’s leave of absence increased the risk of attrition by seven per cent compared to students who did not take leave, and this doubled when more than one year’s leave was taken.

To summarise, the self-reflection phase of Zimmerman’s (2000) model of self-regulation explains the importance of accurately observing, monitoring, and interpreting appropriate indicators of doctoral research performance in effective self-regulatory functioning. In particular, this section of the literature review drew attention to the potentially negative impact of using flawed feedback on subsequent decision-making regarding the student’s doctoral research. Yet despite the importance of feedback to making progress, there appears to be a lack of investigation into the feedback that students might choose to use in self-observation processes, and further research is needed to assist students to observe and monitor their performance meaningfully, and evaluate it accurately.

2.6 CHAPTER SUMMARY

Zimmerman’s (2000) model of self-regulation provides a comprehensive and satisfactory explanation of much human behaviour pertaining to learning, and this may well be extrapolated to include the differences in how students manage the demands of doctoral research. In this context, for example, the self-regulatory cycle explains how doctoral students need to be
cognisant of the nature of the challenges inherent in the development of post formal thinking posited to underlie knowledge creation, and the possible emotional responses associated with this. With increased awareness of what doctoral research might involve, evaluations of discrepancies between goals and performance are likely to be more accurate, as are attributions for performance outcomes. Engaging with the process of knowledge creation in a positive and informed way might lead to sustained motivation and persistence to completion.

Self-regulation thus appears to be one of many factors that contribute to the likelihood of timely and successful completion of PhD candidature. In contrast to self-regulation, many of these other factors are beyond the control of the student, such as the experience and skill of the supervisor, or a family member’s serious illness. Yet an adaptive response to feedback about performance – as will be discussed in the next section – depends on learners being able to exert some degree of control over their cognitions, emotions, and environment (Zimmerman & Kitsantas, 2014). Recognising the existence of these limitations, the literature review still highlighted the advantages of further exploring self-regulation in this population; The optimisation of self-regulatory processes is likely to benefit their doctoral research management and progress through candidature, and as there is evidence that students vary in their self-regulatory efficacy, it is important to discern ways to assist these students.

There appears to have been no published systematic study of students’ self-regulation as a cyclical process during doctoral research, so that much remains unknown about the relative influence of different self-regulatory processes or the effects of their interrelationships on progress or candidature outcomes. For effective self-regulation, it is essential that students use accurate and reliable indicators to judge their performance and to make decisions about future behaviour. As a starting point, then, it seems important to explore ways in which students might observe, rate, and monitor their progress. It is unknown, for example, whether particular background demographic or current candidature factors influence students’ perceptions and ratings of their doctoral research progress, how students might use these self-observations for self-regulatory purposes, and how these self-observations might be related to later candidature outcomes. Without this knowledge, how can doctoral research students be assured that their self-observations are focused on appropriate indicators of management and progress, and that their interpretation of this information is accurate?

Furthermore, the literature reviewed suggested that the nature of the information that the student chooses to use in self-monitoring to assess their progress, and to self-evaluate when making
inferences about their ability, may be critical to their subsequent approach to doctoral research. Developing confidence in one’s ability as a researcher has been found to be crucial to persisting with an academic profession (Åkerlind, 2008). Therefore, being able to optimise self-regulation may not only influence a student’s persistence to successful completion, but may even affect their future employment choices regarding academia.

While further research into doctoral research students’ self-regulation is required, the reciprocity among the phases of Zimmerman’s (2000) model creates methodological challenges to accessing and categorising particular self-regulatory behaviours and their effects on doctoral research progress. Given the longitudinal and individualised nature of doctoral research, the assessment of students’ self-regulation across different tasks during the pursuit of knowledge creation becomes a particularly challenging notion. How these challenges might be addressed in order to explore self-regulation during doctoral research is the subject of Chapter 3.
3. SELF-MONITORING AS A WINDOW INTO DOCTORAL SELF-REGULATION

3.1 INTRODUCTION

The literature review in Chapter 2 showed that Zimmerman’s (2000) model of self-regulation provides a useful framework for integrating existing research regarding the influence of individual differences in psychological factors on doctoral research progress and longer-term candidature outcomes. Further research in this area is required to test systematically the utility of this model within the wider temporal scope of the doctoral research context. However, appropriate means of assessing relevant self-regulatory differences and their outcomes have been lacking.

This chapter proposes a means of investigating self-regulation in the doctoral research context based on the examination of students’ self-monitoring during candidature. The literature reviewed in the previous chapter identified the importance of this self-observation process to effective self-regulation, and the issues associated with choosing and receiving feedback to monitor that may be faced by doctoral research students. Also of interest to this thesis is how the student evaluates their doctoral research management and progress, as Zimmerman’s (2000) model shows how this is integral to the maintenance of motivation and the selection of appropriate self-regulatory strategies that are required not only for persistence, but for the timely and successful completion of candidature. Hence self-observation can be considered as an important entry point for further study of the self-regulatory cycle in this context.

Self-observation involves attending to and recording the quantity, quality, frequency, or intensity of certain aspects of behaviour during performance (Cleary & Zimmerman, 2012; Schunk & Zimmerman, 2012b). To be effective, observations need to be regular or continual rather than intermittent, and carried out in close proximity to the occurrence of the behaviour of interest (Bandura, 1986; Schunk & Zimmerman, 2012b). More formal self-observation is often referred to as self-recording, while less formal self-observation is known as metacognitive monitoring or self-monitoring. In the current setting, self-monitoring is considered to be the more appropriate term to describe the range of relatively informal, irregular, and repeated processes of self-observation in which students might engage to assess their doctoral research progress. Although it can vary in its form, the systematic self-monitoring of the student’s
performance can assist and support self-control efforts, and can provide feedback for use during the self-reflection phase.

As will be discussed in this chapter, more focused efforts to explore how any aspect of self-regulation influences students’ doctoral research management face significant methodological challenges due to the individuality, complexity, and longitudinal nature of doctoral research. A fundamental challenge is the identification of an appropriate proximal indicator of doctoral research performance. That is, to examine the influence of self-regulatory efficacy on doctoral research outcomes, a direct indicator of doctoral research progress is ideally required. However, the absence of a formal and standardised indicator of progress suitable for all students to use in self-monitoring means that an indirect approach must be taken to exploring the effects of self-regulatory efforts on doctoral research progress. Instead, an alternative indicator that is expected to be responsive to self-regulatory efforts needs to be discerned. If this alternative indicator is found to function as an indicator of self-regulatory differences, then the relationship between this indicator and later candidature outcomes could represent the relationship between self-regulatory efficacy and candidature outcomes.

This chapter commences with a discussion of the issues and challenges involved in exploring self-regulation processes in the doctoral research context, and how these might be addressed. The chapter then identifies and examines three constructs which might function as suitable foci for doctoral research students’ self-observation and monitoring purposes: feelings about doctoral research progress, mental health, and state hope. Following this, the chapter concludes with an articulation of the specific research questions for the study.

### 3.2 CHALLENGES TO EXPLORING SELF-REGULATION

As discussed in Chapter 2, individual differences in functioning are theorised to occur across all of the components of Zimmerman’s (2000) model of self-regulation. Considering the inherent interrelatedness of these self-regulatory components and cyclical processes, trying to isolate the effects of differences in specific components or processes on academic outcomes is a challenging notion, even in a relatively controlled learning setting. Assessing the effects of individual differences in self-regulation on progress and longer-term candidature outcomes is a particularly challenging endeavour in the longitudinal, complex, and individualised doctoral research context.
Based on the relationships found between aspects of self-regulation and academic achievement in previous educational studies and discussed in Chapter 2, doctoral research students would be expected to have relatively high levels of self-regulatory functioning, considering that they have successfully negotiated previous levels of higher education. Yet the literature reviewed in Chapter 2 suggested that individual differences in the use of self-regulatory processes are still likely to exist. How might these differences in self-regulatory functioning be discerned and their effects assessed in the doctoral research context?

In other academic domains, self-regulation has been investigated using a diverse range of methods (Zimmerman & Schunk, 2011), usually based on self-reports of self-regulatory aptitudes or knowledge, or on the individual’s self-reported use of self-regulatory strategies during or following learning or performance. Self-regulation has often been operationalised using aptitude scales, which have viewed self-regulation as involving relatively stable dispositions that predict behaviour (Winne & Perry, 2000). Examples of widely used aptitude scales are the Learning and Study Strategies Inventory (LASSI; Weinstein & Palmer, 2002), the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich, Smith, Garcia, & McKeachie, 1993), and the Self-Regulated Learning Interview Scale (SRLIS; Zimmerman & Martinez-Pons, 1986, 1988). These aptitude measures typically assess self-regulation in terms of time management and planning, attention and concentration, motivation and self-efficacy, and volitional and learning strategies. Yet by not providing evidence of students’ real-time use of these self-regulatory processes in learning situations, such questionnaires are limited in what they can reveal about causality among self-regulatory processes and academic performance outcomes (Zimmerman, 2008).

Alternative evaluation methods involve appraising self-regulation as a time-limited event (Zimmerman, 2008). Appraising self-regulation as an event means that self-regulatory efforts taking place before, during, and after learning can be mapped sequentially, to determine the results of online changes in self-regulation (Zimmerman, 2008). Examples of online measures include computer traces, think-aloud protocols, structured diaries, direct observation, and microanalytic measures (Zimmerman, 2008). To illustrate, microanalysis involves observing and interviewing the individual at key points during performance to enquire about their use of specific and well-established psychological processes at those times, and using qualitative and quantitative analyses to develop context-specific information about the use of self-regulatory processes in the performance (e.g., Cleary & Zimmerman, 2001). Unlike aptitude measures, online approaches to the assessment of self-regulation in learning contexts focus on students’
actual use of strategies in these settings, rather than on their self-reported self-regulatory abilities or knowledge. This is important because, as Zimmerman (1995) observed, fatigue, stressors, and other factors can compromise the use of metacognitive knowledge and skill. Therefore, self-reports of self-regulatory knowledge or abilities may not be an accurate indication of actual performance in academic or other situations, although they might provide insights into how the individual interprets their performance.

While existing assessment methods might be useful in identifying individual differences in self-regulatory functioning in other situations, there are significant limitations to the application of these methods for assessing the effects of self-regulatory differences in the doctoral research context, including those relating to differences in self-monitoring. Perhaps the most important limitations relate to the difficulties in defining doctoral research in terms of quantifiable and assessable proximal learning tasks, apart from the longitudinal goal of thesis completion.

Delineating learning or performance tasks on which to focus investigations of self-regulatory differences is not as straightforward in the doctoral research context as it is in many other learning and performance situations. In a primary or secondary school classroom situation, a learning task set for a lesson may be relatively discrete and time-limited, with clear criteria to assess the academic outcome correlates at a later stage. As an example, Zimmerman and Kitsantas (1999) trained high school girls in self-regulatory strategies, then asked them to record either the strategy steps they had missed while working on a series of writing problems, or the number of words used in each problem, which were the criteria for success. The use of self-recording was then evaluated in terms of its influence on self-reflection phase attributions and self-satisfaction, as well as writing skill. The influence of self-reflection processes was also examined in terms of subsequent task interest and self-efficacy beliefs regarding future learning efforts.

To illustrate further, in studies of self-regulation in sports-related learning and performance, the results of training individuals in self-regulatory processes can be measured using objective dependent measures such as batting and bowling scores in cricket (e.g., Thelwell & Maynard, 2003), in just one match or across a full season. Subjective dependent measures might include coaches’ or players’ ratings of various aspects of match performance. Furthermore, frequency of practice, playing experience, game knowledge, and skill levels can also be assessed and controlled for in subsequent analyses. As with the previous example, this enables insights into
the outcomes for which the forethought processes have prepared, and which the performance processes have enabled and monitored, and on which self-reflection processes are based.

In contrast, as discussed in Chapter 2, knowledge creation potentially involves the accomplishment of a multitude of learning tasks for the doctoral research student, and these may overlap in time and content. Furthermore, since doctoral research students vary in their learning needs due to diversity in goals and expectations, as well as in academic, employment, personal and developmental experiences (Pearson et al., 2011), the learning tasks in which individual students engage are also likely to differ in nature and timing. Thus, it would be difficult to circumscribe and set a particular learning task suitable for a study of individual differences in doctoral students’ self-regulation across candidature.

The complexity of the broad learning context in which doctoral research occurs must also be considered. The literature reviewed in Chapter 2 highlighted the fact that a range of personal and environmental factors, some of which may be unrelated to the research itself, might influence and be influenced by the student’s experience of doctoral research. From a social-cognitive perspective, self-regulatory strategies and processes are fundamental to how the individual manages their behaviour within the environment in which they are functioning, as was discussed in Chapter 1. Recognising the interrelatedness of all these factors, an investigation of doctoral research students’ self-regulation also needs to consider students’ long-term management of personal, behavioural, and environmental factors in addition to the academic factors.

Moreover, while the common goal of doctoral research has been clearly delineated – a contribution to disciplinary knowledge – this academic outcome may take four or more years to be decided. For studies of undergraduate students’ academic performance, grade point average (GPA) - the weighted mean mark calculated across courses - is the most extensively used outcome measure (Richardson, Abraham, & Bond, 2012). While this numerical score may be relevant to achieving enrolment in PhD candidature, beyond this point the most meaningful academic outcome measure common to doctoral research students is a categorical one: whether or not the thesis is completed successfully.

It is also important to recognise that not all candidature outcomes can be classified as academic outcomes in the doctoral research context. To explain, successful thesis completion is a candidature outcome that is also an academic outcome, as it signifies the contribution of new
disciplinary knowledge by the student. However, withdrawing from candidature is not necessarily due to academic ‘failure’, as discussed in Chapter 2, and therefore may not represent an academic outcome. Taking a leave of absence may be required for a multitude of reasons, and may be followed by withdrawal from candidature or successful completion. Similarly, while maintaining enrolment or persistence with candidature has been considered as a candidature outcome in some of the literature, not all students will persist to thesis completion, so this cannot be classified as a true academic outcome either.

Since, by definition, effective self-regulation relies on accurate feedback about current performance, being able to access sources of frequent and accurate feedback for performance monitoring during candidature is of paramount importance to doctoral research students aiming to optimise their self-regulatory behaviours. A single feedback point based on the results of the thesis examination is inadequate for this purpose. Therefore, in the absence of formal formative outcome measures, what proximal surrogate indicators might be appropriate for doctoral research students to use to monitor their doctoral research management and progress during candidature?

The extended timeframe of candidature, and the lack of proximal academic outcomes, are undoubtedly major reasons for the use of retrospective methods in much of the existing research into doctoral research student persistence and attrition. A retrospective approach comparing the self-reported use of self-regulatory strategies of students who had completed or withdrawn from doctoral research during candidature might be possible. However, the typical length of doctoral candidature is likely to produce responses biased by recall. In other academic domains, it has been found that self-reports of strategy use immediately after task completion do not appear to be reliable indicators of students’ actual strategy use when compared to those recorded in online measures (Zimmerman, 2008). A prospective study could track a cohort of students across four or more years of candidature to examine the relationship between individual differences in self-regulation and candidature outcomes. Although potentially providing a more comprehensive insight into self-regulation in this population, this approach would also be particularly time and resource intensive. Again, the length and individuality of doctoral candidature mean that an innovative approach to the exploration of self-regulation is required.

In summary, the doctoral research context is more complex, prolonged, and individualised than most other student settings. A broader perspective on the extent of the role of self-regulation also appears warranted, to recognise self-regulation as underpinning the management of the
multitude of personal, institutional, and social factors contributing to successful thesis completion. These issues, along with the delayed nature of outcome evaluation, mean that an exploration of self-regulation in the doctoral research context does not appear open to the same methods of studying self-regulation that have been used elsewhere. In the absence of sufficiently frequent and standardised proximal learning or performance goals and assessment criteria, a novel approach to studying self-regulation is required.

The next section of this chapter proposes an approach to dealing with these methodological and substantive issues: exploring how doctoral research students monitor and evaluate their doctoral research management and progress might provide insights into other self-regulatory processes.

3.3 EXPLORING SELF-REGULATION VIA SELF-MONITORING DURING DOCTORAL RESEARCH

To explore self-regulation in the doctoral research context requires an innovative approach that takes into account the unique combination of factors that influence the learner in this learning environment. The literature review suggests that exploring how students observe, monitor, and evaluate their doctoral research management and progress offers an appropriate focus for such a method. An underlying assumption is that the components of self-regulation on which the method focuses are malleable, as a primary purpose is to identify areas of self-regulation which could be improved or optimised.

Effective self-regulation depends, at least in part, on the monitoring of appropriate feedback about performance, as this informs the individual about goal pursuit performance. Recalling Zimmerman’s (2000) model of self-regulation, the monitoring and interpretation of feedback about performance occur during the performance and self-reflection phases of self-regulation, and inform the future motivational beliefs, goal setting, and strategy choices that form the forethought phase of self-regulation. It should be noted here that aspects of the forethought phase, such as the metacognitive beliefs that influence how students approach doctoral candidature, provide another potential avenue for the study of self-regulation in this population, although subject to the same constraints as discussed. Indeed, examining the metacognitive beliefs of doctoral research students was the focus of the larger project with which this study was associated, and the preliminary findings are reported elsewhere (Cantwell, Bourke, Seevak, Holbrook, & Budd, 2015). While individual differences in these beliefs were found in this population, and reflect differences in how students might approach doctoral candidature
(Cantwell et al., 2015), this thesis was concerned instead with investigating what self-monitoring might reveal about other aspects of self-regulatory functioning.

To explore self-monitoring in doctoral research students in this study required a means of accessing students’ self-observations about their progress over time in a standardised way. Repeated self-observations about doctoral research management and progress could function as a form of self-monitoring. Several key aspects regarding the nature and method of self-monitoring need to be considered in the study of doctoral research management and progress: what to monitor, how to monitor it, and when to monitor it. The remainder of this chapter considers the nature of the information that might be useful for students to monitor as feedback regarding their doctoral research management and progress. How and when such feedback might be monitored is discussed in the ‘Study Design’ section in the next chapter (Section 4.2).

What information is useful or meaningful for doctoral research students to self-monitor? According to Zimmerman’s (2000) model of self-regulation, feedback needs to be an accurate indicator of whether the individual’s performance is in the direction of their goal. The types of feedback that could be used in self-observation activities in other academic settings, such as weekly class quiz scores or the extent to which course content has been learnt in preparation for an examination, are not directly transferable to the doctoral research context. Doctoral research students might use feedback from a variety of sources to monitor their performance, ranging from the individual’s own perceptions to an institution’s checklist. Students might monitor the amount they have written in a given time, or how they are feeling, or what their supervisor conveys to them about their progress. Yet are any or all of these types of information sufficiently accurate and useful indicators of progress to inform future self-regulatory efforts?

Apart from varying by source, feedback varies in a number of other ways, including its specificity, frequency, formality, comprehensiveness, and relevance. Submitting work for peer review via conferences or journals can provide useful feedback on an occasional basis about the direction and clarity of the student’s thinking and the interpretation of results, but may be less helpful in assessing the amount of progress made towards thesis completion. Other feedback may be in a form that includes more specific interpretation or judgement about the performance in relation to goal pursuit. For example, a supervisor’s approval of a chapter does not necessarily constitute evidence for being ‘on track’ for timely thesis completion, whereas more meaningful feedback would also include an evaluation of whether the completion of that chapter signals satisfactory progress on a given timeline. This can be facilitated by supervisors who
have skills in project management. Ideally, this feedback would specify whether the student has met the deadline set in a predetermined timeline for the research that would ensure timely completion. In this case, an outcome measure could be the percentage of work completed by a certain date. This interpretation of the feedback may be critically important for some doctoral students, as estimating the amount of work completed to a doctoral standard can be difficult for novice researchers. That is, to assess the adequacy of the progress the performance needs to be measured and judged accurately and compared against meaningful standards.

Thus, the doctoral research context is the type of complex scenario where the lack of clarity about what to observe and regularly monitor can confuse the student, ultimately leading to ineffective self-regulation (Zimmerman & Campillo, 2003). Students with unavailable, disengaged, incompetent, or inexperienced supervisors are likely to be at a further disadvantage when depending on external sources of feedback about progress, or needing assistance with interpretation of this feedback for their self-regulatory efforts. In any case, is there a form of feedback that the student can access and interpret independently, which can function as an accurate proximal performance measure regarding progress through candidature, and thus be used for self-regulatory purposes? This is discussed further in the following section.

### 3.4 Potential Sources of Feedback for Self-Monitoring

For doctoral research students, independently observing, evaluating, and monitoring their research progress requires a rating scale that is appropriate across all stages of candidature and is applicable to a wide range of research situations, and against which students can gauge and interpret their performance on an ongoing basis.

The development of tools to assist students to assess their own doctoral research progress appears to be a relatively recent phenomenon. To illustrate, Phillips and Pugh authored a seminal self-help text in 1987 that was entitled “How to Get a PhD”, and although regularly revised and reprinted, it was only in the 2005 edition that they introduced a “Self-evaluation questionnaire on research student progress”. This questionnaire was included essentially unchanged in the latest edition of the book in 2010. Phillips and Pugh (2005, p. 207 - 210) describe the questionnaire as a diagnostic tool “to allow you to consider realistically your own personal situation as a PhD student”, and to determine where improvements can be made.
Students are asked to rate ‘my progress’ (nine items), ‘support from my supervisor’ (ten items), and ‘support from my department’ (eight items) (Phillips & Pugh, 2005).

The ‘my progress’ items are of particular relevance to the questions being raised in this thesis. These items relate to assessments of one’s commitment to completing regardless of setbacks, refusing to take a new job prior to completion, understanding the standards to be achieved in the thesis, being confident of being able to make an original contribution to knowledge, planning, goal-setting, maintaining an argument/thesis, regular writing, and overall satisfaction with progress towards the PhD. All items in the questionnaire are worded positively, and the authors explain that any items that are not fully endorsed by the student indicate room for improvement. These questions are helpful in drawing the student’s attention to the requirements of doctoral research. Again, the student is required to interpret and address incompletely endorsed items, which clearly involves self-regulatory processes. Phillips and Pugh (2005) encourage students to discuss their scores with other PhD students, and to problem-solve collaboratively to address areas of need. It is noteworthy that the questionnaire is limited in its acknowledgement of the potential emotional responses to candidature, referring only to ‘confidence in the ability to make an original contribution to knowledge’, and ‘overall satisfaction with PhD progress’. If the management of emotions associated with doctoral learning is as important to persistence with candidature as the literature suggests (e.g., Stevens-Long & Barner, 2006; Styles & Radloff, 2000), then it may be useful to regularly monitor how students are feeling about the progress of their doctoral research. However, does self-monitoring the responses to such questions provide useful and adequate information for doctoral research students’ self-regulatory efforts?

As there is no published evidence that this questionnaire has been used for research purposes, the outcomes associated with students completing the questionnaire, considering the results, discussing this feedback with others, and implementing any changes required are unknown. Furthermore, Phillips and Pugh (2005, 2010) do not explicitly suggest the repeated or regular use of the questionnaire, although regular monitoring appears beneficial to making progress in goal pursuit (Amabile & Kramer, 2011; Zimmerman, 2000). Information about doctoral students’ use of such a questionnaire could provide insights into self-regulation in this population.

Despite their potential value, systematic and formalised methods to guide doctoral research students’ self-monitoring remain surprisingly rare, at least according to internet searches conducted in recent years. One example found of an external standard developed for a student’s
personal use is “The PhD Calendar” (Clark & James, 2002), which was created for the University of Melbourne. In contrast to the personal evaluation in Phillip and Pugh’s (2005) questionnaire that could be completed at any time during candidature, the PhD Calendar mapped out the expected completion times for various aspects of candidature, such as confirmation and chapter writing, along a path of 36 months. The calendar was helpful in showing students the rate of progress necessary for completing on time, as well as a visual guide to the proportions of time to spend on data collection and writing. This could assist more realistic project designs and goal-setting, enabling an increased likelihood of timely thesis submission. However, the fact that the calendar spanned only 36 months denied the reality of student completion data, where the majority of PhD students take more than 48 months from enrolment until thesis submission (Bourke et al., 2004). Therefore, plotting progress on this calendar might be demoralising for many students. Interestingly, although updated in 2008, by 2012 the PhD Calendar seemed to have disappeared from the university’s website. To assist with a revision planned for 2013, an online survey appears to have been undertaken in 2012 requesting feedback from students who recalled using the calendar. However, by mid-2014 the PhD calendar still could not be found on the University of Melbourne website. Thus, it remains unknown how the calendar was actually perceived or used by students.

It is of concern that there appears to be no research regarding the relative accuracy or utility of any standards against which students can evaluate different forms of feedback. How, then, do students know if the feedback they are monitoring is a reliable indicator of progress towards their goal of successful thesis completion? Addressing these issues is of importance to doctoral research students and all other stakeholders in doctoral education, given the potential ultimate impact on completion times and success rates of using inaccurate or misleading feedback about progress.

Three different potential forms of feedback for use in exploring self-regulation are considered in the remainder of this chapter: the student’s feelings about their doctoral research progress, mental health, and state hope.

3.5 FEELINGS ABOUT DOCTORAL RESEARCH PROGRESS

The use of terms in the following discussion about feelings and emotions during the doctoral research process is guided by definitions offered in the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; American Psychiatric Association [APA],
Emotion is defined here as “a subjectively experienced feeling state”, and affect as “a pattern of observable behaviours that is the expression of [an emotion]”, such as sadness, elation, and anger (APA, 2013, p. 817). Thus, affect is considered to be an outwardly observable, as well as inwardly experienced, emotional response. Mood is defined as “a pervasive and sustained emotion that colours the perception of the world”, such as depression and anxiety (APA, 2013, p. 824). To illustrate the differences, the DSM-5 (APA, 2013, p. 824) analogises affect as the “fluctuating changes in emotional weather”, and mood as “a pervasive and sustained emotional climate”. Therefore, in this discussion, feelings and emotions are considered to be the internal subjective responses to various aspects of the doctoral research experience, may range from being fleeting or more sustained in duration, can be evidenced via self-report, and are not necessarily observable in terms of affective responses. Thus, the terms emotions and feelings are used interchangeably in this thesis.

The nature and management of emotional responses to doctoral research have received inadequate empirical attention. However, the concern of this thesis is not with a fine-grained analysis of the more direct associations between particular emotions and learning in a relatively controlled academic context, such as those conducted by Pekrun (e.g., 2006). Rather, a broader perspective is taken, driven by enquiries pertaining to how more sustained emotional responses might be associated with students’ perceptions of their doctoral research progress, and reflect differences in self-regulatory functioning. That is, given the intensity, uncertainty, and longevity of the PhD experience, and its ability to “trigger anxiety, stress and self-doubt” (Mowbray & Halse, 2010, p. 658), what might be the impact on how PhD students manage and rate their recent doctoral research progress? Furthermore, how might these outcomes influence subsequent doctoral research progress, and does this depend on the efficacy of self-regulatory functioning? Thus, the focus of this study is on what students’ ratings of their feelings about their doctoral research progress might reveal about other aspects of their self-regulatory functioning in this context.

As explained in Chapter 2, periods of stability and times of change in the doctoral research process are predicted by the processes of higher intellectual development and transformational learning that might precede or accompany knowledge generation. As learning and knowledge generation are both inherent and interwoven in the doctoral research process, discerning and managing the sources of unsettling periods of change is likely to be challenging and to threaten an individual’s mental health and well-being (Haynes et al., 2012). Yet while the potential emotional impact of the transformational nature of higher intellectual development in doctoral
learning has been recognised (Kiley, 2009), students’ management of the emotional experiences accompanying intellectual development in higher education has been largely ignored in the literature (Stevens-Long & Barner, 2006; Stevens-Long, Schapiro, & McClintock, 2012). Although it is acknowledged that the management of emotion may influence academic performance in postgraduate study (Hyun, Quinn, Madon, & Lustig, 2006, 2007; Morrison-Saunders et al., 2005; Styles & Radloff, 2000), the interplay between emotions and doctoral learning in general has received little attention (Wisker & McAlpine, 2009). While much remains to be learnt about the role of emotion management in higher intellectual development in the doctoral research student population, some authors have made observations about its role in maintaining progress. For example, after workshopping these issues with three doctoral candidates and three academic staff, Morrison-Saunders et al. (2010, p. 212) concluded that:

“Managing negative emotions during this [middle] phase [of the PhD] appears essential for maintaining motivation, avoiding a slump in productivity, and ensuring progress towards long-term goals. It may even be important for more fundamental reasons concerning health and well-being.”

Yet the management of emotions might ultimately be facilitated by intellectual development. According to Sinnott (2002), reaching higher levels of cognitive development is also associated with the greatest ability to maintain balance, since using postformal logic to underpin an individual’s construction of reality enables a balanced way of epistemologically interacting with the world. Therefore, while the final result of this personal transformation can be positive and personally satisfying (Mowbray & Halse, 2010; Service, 2012), and advantageous in terms of managing challenges, there are risks to mental health and well-being, to progress, and to persistence with candidature during the process of reaching this stage. In related work, Sinnott (2002) has acknowledged the importance of dealing with instability and being able to adapt to change, by noting the dynamic homeostasis involved in maintaining balance in adult life.

There has been much conjecture about, but little systematic investigation of, individual differences in how students respond to particular challenges or different stages of candidature, and the relationship between these responses and longer term candidature outcomes. Students may be surprised or dismayed by their emotional responses to different aspects of doctoral research, and uncertain about how to interpret them. In the absence of external benchmarks or gauges, it may be difficult for students to assess whether or not their emotional responses are indicative of problems with their progress or fall within a ‘normal’ range. As discussed in
Chapter 2, the misinterpretation of these responses during the course of self-monitoring may delay progress unnecessarily, and even lead to withdrawal from candidature. It may also lead to the inappropriate prolongation of irreparably problematic candidature. It is therefore important to learn more about the emotional responses of students to the doctoral research process. This information could be used to assist students to more accurately assess whether these emotional responses are likely to be indicative of problems with candidature or not. Strategies for addressing problems might then be identified and implemented more quickly and efficiently.

How might the emotional responses to doctoral research be investigated and differentiated from the emotional responses to other aspects of life? As a starting point, the ‘emotional rollercoaster’ description of candidature discussed in Chapter 2 suggests that the use of a construct which accounts for a range of emotional responses is required. While some emotional responses to candidature might be termed positive, and indicate that the student is finding enjoyment and pleasure in undertaking particular doctoral tasks, of more concern is where students respond to doctoral research tasks with signs of psychological distress, such as anxiety or depression. Therefore, an objective indicator of problematic levels of such distress is particularly necessary.

Might a measure of students’ feelings about their doctoral research progress provide an adequate surrogate measure of actual progress that could be used for self-monitoring? Certainly, the work of Amabile and Kramer (2011) suggested that self-rated feelings about making goal-directed progress could be used for self-monitoring purposes such as this. Indeed, a reciprocal relationship between making progress and how the individual is feeling about the progress would be expected due to the cyclical nature of self-regulation. For example, the self-judgement of satisfactory progress is more likely to result in positive than negative emotions, which may be motivating for further engagement in goal pursuit, and the maintenance of effective strategy implementation. The result is likely to be further progress. In contrast, negative emotions may follow the self-judgement of unsatisfactory progress, and lead to a reluctance to continue with goal pursuit. However, while being reciprocal in nature, it appears that the sense of making progress towards valued goals might have more impact on emotions, as indicated by ‘well-being’, compared to the impact of emotions on satisfaction with progress (Snyder, 1994). Therefore, a measure based on emotions might function as a short-term indicator of goal-directed progress.
The advantages of using an emotion-based construct such as ‘feelings about doctoral research progress’ is that it is quickly and easily accessible and observable by the individual student, can be evaluated relative to the individual’s prior experiences, and can be monitored as frequently as the individual desires across candidature. However there are a number of disadvantages of basing a self-monitoring task on this construct. As outlined in Chapter 2, there is currently insufficient understanding about either the role or the management of emotions in doctoral learning and progress through candidature. For example, students are often uncertain about the nature and challenges of knowledge generation, and may therefore have difficulty in interpreting their emotional responses to these in terms of being an indicator of progress.

Of course, the accuracy of self-rated feelings about progress as an indicator of progress still depends on the student’s observation and evaluation of their progress. Students may differ in their ability to assess progress by estimating output, such as the proportion of each chapter completed, especially in the early and middle stages of candidature. Overestimating progress, for example, might lead to more positive emotions than are warranted. Although potentially motivating, the misinterpretation of more advanced progress could also lead to subsequent complacency. Assigning particular tasks to a timeline would seem to be a clearer gauge against which to judge progress, as in the University of Melbourne’s PhD calendar described previously, however the task delineations and time allocations may not prove to be applicable to all research projects. As a result, this assessment may then have limited predictive utility regarding future academic outcomes. Moreover, whether self-judgements relating to feelings about progress are comparable with those of other students is unknown. Limitations in this comparability are certainly inherent in other efforts to provide progress assessment measures for students. Indeed, given the constraints described, there is unlikely to be a system of assessing doctoral research students’ progress that is flawless. Indeed, in the absence of other empirically-tested alternative sources of feedback, and as students may look to their emotional responses if other feedback is not available, it is important to examine the factors associated with students’ observations and evaluations of their feelings about their doctoral research progress.

Considering similar constructs might provide further insights into the appropriateness of monitoring feelings about progress. For example, is it possible that how an individual is feeling about their doctoral research progress is simply a reflection of how they are feeling about life in general? Zimmerman’s (2000) model of self-regulation acknowledges the reciprocal relationships among motivational beliefs, emotions, and goal progress. That is, students might
be aware of, and monitor, indicators such as how they are feeling about their progress or how they are feeling about life more generally. Might it be equally meaningful, then, for individuals to gauge their progress based on a measure of their mental health or psychological well-being? Similarly, if the individual’s sense of agency and problem-solving ability is influenced by previous progress-related success, is the extent to which they feel able to persevere towards the goal of thesis completion also an indicator of making progress? Indeed, it has been argued in Chapter 2 that these are all factors that need to be self-regulated in order to support the learning that is required for successful and timely thesis completion.

Thus, to explore the utility of students’ monitoring of their feelings about their doctoral research progress as feedback for self-regulatory processes, it is important to consider how specific these are to doctoral research, and whether monitoring feelings about life in general would be equally or more informative. Whether feelings about doctoral research progress are influenced by, or influence, emotional responses to other factors in the student’s life can be explored by looking to other indicators of the management of emotions, such as mental health and well-being. Framing the study of the emotional responses to doctoral research in terms of the concept of mental health provides the potential to explore students’ functioning in terms of both well-being and distress, as will be discussed in the next section.

3.6 MENTAL HEALTH, PSYCHOLOGICAL DISTRESS, AND WELL-BEING

3.6.1 The study of mental health and psychological distress in doctoral research students

Conceptions of mental health have evolved across recent decades, with contemporary models emphasising the difference between positive psychological functioning and the absence of disease (Cowen, 1994, 1998; Manderscheid et al., 2010). For example, the World Health Organization (WHO; Herrman, Saxena, & Moodie, 2005, p. xviii) has described mental health as “a state of well-being in which every individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community”. Thus, mental health in this positive sense is fundamental to the understanding of well-being across many cultures (Herrman et al., 2005). According to the WHO (Herrman et al., 2005, p. xviii), mental health then contributes to a state of general
health, where “health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity”.

These definitions illustrate how a wellness model of mental health regards health and disease as separate but related dimensions. When mental health is considered as having these two dimensions, the dimension of positive mental health is usually described in terms of well-being (e.g., Lehtinen, Ozamiz, Underwood, & Weiss, 2005; Veit & Ware, 1983), although the degree of ambiguity and overlap in the use of these and related terms in the literature is noteworthy, and will be discussed further in the following section of this chapter. The other dimension of mental health can be referred to as mental ill-health, and is generally described in terms of psychological symptoms, problems, and disorders (Lehtinen et al., 2005). The term psychological distress is often used to indicate the presence of psychological symptoms above a particular threshold (e.g. Korkeila, Kovess, Dalgard, Madians, Salize, & Lehtinen, 2007; Verger et al., 2009). In the general population, anxiety and depression are the most common mental health problems associated with psychological distress (Veit & Ware, 1983). In contrast to the perception of well-being as a resource (Lehtinen et al., 2005), psychological distress represents a major public health burden (Kelly, Dunstan, Lloyd, & Fone, 2008).

While some studies of mental health focus on levels of well-being, others have been concerned with measuring the frequency or intensity of psychological distress, and this is reflected in the different measures of mental health that have been developed. The measure of mental health chosen for this study was the five item Mental Health Inventory (MHI-5; Berwick et al., 1991), and this is discussed in more detail in the Section 4.4.2.1. Unlike many other mental health measures, the MHI-5 can be used to assess levels of both psychological well-being and psychological distress, was designed to screen for common mental health disorders, and has been used extensively in mental health research (McHorney & Ware, 1995). As this study was concerned with examining the full range of functioning incorporated by a broad view of mental health, the MHI-5 (Berwick et al., 1991) appeared well-suited for this study.

The mental health of doctoral research students has had little direct research attention. Yet more generally, as the student population has increased, university student mental health has become an issue of concern internationally (Stallman, 2010; Verger et al., 2009). In Australia, at least, these concerns are exacerbated by an expected concomitant increase in the number of undergraduate students from low socioeconomic groups who may need additional support from university counselling services (Stallman, 2012). Already, the levels of psychological distress
recorded attest to the importance of investigating intervention options for the at-risk university student population both in Australia (Stallman, 2010) and internationally (Houghton, Keane, Murphy, Houghton, & Dunne, 2010; Stewart-Brown, et al., 2000; Verger, et al., 2009). Psychological distress in the general university population certainly warrants further attention for individual and public health related reasons.

However, for the purposes of this study, the assessment of mental health in the doctoral student population was to provide an enhanced understanding of the extent to which mental health indicators might be useful for self-monitoring purposes. Unfortunately, while there have been some empirical analyses of the mental health of PhD students, most studies of postgraduate student mental health have incorporated PhD students into a generic postgraduate group, or used small disciplinary groups (Hyun et al., 2006). Also, studies investigating student mental health have often been primarily concerned with rates of psychological distress, as this has been associated with lower academic achievement in undergraduates as measured by GPA (Stallman, 2010). Such studies offer some insights into students’ responses to postgraduate education more generally. However, specific studies of doctoral research students are necessary in order to explore their responses to, and management of, the challenges of working towards the goal of contributing to disciplinary knowledge.

This is not to assume that psychological distress is greater in doctoral research students than other university students. A large-scale Australian study by Stallman (2010) found that rates of self-reported psychological distress measured by the K10 (Kessler et al., 2002) were actually significantly lower for postgraduate than undergraduate students, although the rates of psychological distress were not specified. These findings might suggest that coping skills develop with further education, or perhaps it is the result of a self-selection process, whereby it is the students who perceive they have the requisite coping skills who enrol in postgraduate study (Stallman 2010).

The fact that Stallman (2010) found that older students reported lower levels of distress may provide support for coping skills developing through life experience rather than through formal education processes per se. Similarly, Stratton, Mielke, Kirshenbaum, Goodrich, and McRae (2006) posit that older graduate students may have a stronger sense of personal values against which to assess their postgraduate academic experiences. Thus it is also important to consider what studies of well-being might reveal about mental health in this population.
3.6.2 The study of well-being in doctoral research students

A decade ago, Bair and Haworth (2004) drew attention to the potential for the study of well-being to assist in the understanding of doctoral persistence or attrition. While there have been some efforts to explore this area, any synthesis of this work is limited by two main issues: the “terminological anarchy” to which Cummins (2012, p. 89) refers, and the sampling methods used in this research. As Fraillon (2004, p. 16) pointed out, in the education sector there is “unequivocal consent that it is essential to consider, monitor and respond to student well-being and yet there is little sector-wide consensus on what student well-being actually is”.

Firstly, there is a lack of conceptual clarity in the study of well-being. The term ‘well-being’ often has been used to refer to positive affect (McDowell, 2006), or as an umbrella term for many positive aspects of human functioning and health, despite the lack of evidence for using this term to represent a singular organising principle in this manner (Ong & Zautra, 2009). To clarify the use of the term well-being in this study, a brief discussion of other uses of the term is provided.

In the social sciences, quality of life is most often considered in terms of subjective well-being (SWB), in contrast to the more objective dimensions of quality of life measured by financial or physical health indicators as often used in economic and medical disciplines (Cummins, 2013). Recent work by Cummins (2010, 2013) and Diener (2012) has used the term SWB to include both emotional and cognitive components, and to represent an individual’s appraisal of their own life in terms of their thoughts and feelings about how desirable and rewarding their life is at present as measured in terms of ‘satisfaction’.

Often using a positive psychology framework, definitions of SWB have tended to highlight either the ‘hedonic’ elements, such as the emotions associated with happiness (e.g. Diener, 2000), or the ‘eudaimonic’ elements concerned with the perception of having meaning and purpose in life (e.g. Seligman, 2011). SWB is regarded as a powerful indicator of the quality of an individual’s life (Efklides & Moraitou, 2013), as it draws on self-reported cognitive and emotional indicators of well-being such as emotional state, life satisfaction, and the fulfilments of expectations about life (Diener, 2012; Efklides & Moraitou, 2013).

In this study, the use of the term ‘psychological well-being’ is consistent with the use of the term by Veit and Ware (1983) as referring to higher levels of mental health. In addition to highlighting the mental health perspective taken, it provides more specificity than the more
generic term ‘well-being’, and appropriately differentiates it from the term SWB, as a sense of satisfaction is not explicitly included in the measure of psychological well-being to be used in this study. However, it is important to note that the use of this term in the current context is not synonymous with the construct of psychological well-being (PWB) developed by Ryff and Keyes (1995), which describes a relatively stable sense of self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery, and autonomy.

Although the numerous scales claiming to measure SWB often ask about the individual’s satisfaction with particular areas of life (Davern, Cummins, & Stokes, 2007), the inconsistent or inexplicit use of terminology endemic in the study of well-being (Cummins, 2013) is mirrored in the wide variety of approaches that have been taken to the definition and operationalisation of doctoral research student well-being. For example, in their autobiographical account of doctoral research, Batchelor and DiNapoli (2006, p. 13) associated well-being with a PhD student’s experience of “a more harmonious blend of epistemology and ontology”. In contrast, in their large-scale empirical study, Stubb et al (2011) took an occupational health perspective and defined ‘socio-psychological well-being’ in terms of how PhD students experience well-being within their scholarly community. When eight female PhD students were invited by Haynes et al. (2012) to discuss their perceptions of well-being, their descriptions revealed a dynamic concept of doctoral student well-being, which extended across physical and psychological health domains, and was seen as being developed and maintained in response to an individual’s circumstances. Noting the lack of well-being research conducted with PhD students, Juniper et al. (2012, p. 565) adapted a clinical well-being scale and described doctoral researcher well-being as “that part of a researcher’s overall well-being that is primarily influenced by their PhD role and can be influenced by university-based interventions”.

Although these studies lack direct comparability and reveal little about possible relationships between psychological well-being and candidature outcomes, they do offer insights into the issues associated with the study of well-being in doctoral research students. Two main issues are evident in this research. The first is how to assess whether, or how, well-being is actually associated with ultimate candidature outcomes such as timely or delayed completion, or attrition. The second issue is the question of determining the stability of well-being, and the elements and processes associated with it, and whether it can play a useful role in the self-monitoring of doctoral research students.
Regarding the first issue, the assumption of a causal link between well-being and academic outcomes in graduate students has been articulated and has driven some of this research (e.g., Stratton et al., 2006; Stubb et al., 2011). To illustrate, Stratton et al. (2006) proposed that the perception of well-being, associated with life satisfaction and a sense of meaning derived from their educational pursuits, might influence graduate student progress and possibly even candidature outcomes. Similarly, drawing on findings from other student groups, Stubb et al. (2011) suggest that well-being during doctoral study might influence engagement with candidature, completion time, later well-being and employment prospects. On such bases, institutions have been urged to support postgraduate students’ personal growth and goal attainment (e.g., Stratton et al., 2006). Therefore, claims about the importance of well-being require testing in longitudinal empirical studies, especially as doctoral research students may make decisions about persistence with candidature based on similar assumptions about the predictive power of well-being. Indeed, the PhD students in Haynes et al.’s (2012) study reported using their sense of well-being to monitor how they were managing candidature.

Testing the assumption that doctoral student well-being is associated with either doctoral research progress or longer term candidature outcomes holds its own challenges. Hardly surprisingly, given the typical length of PhD candidature, most studies of mental health and well-being which have included PhD students have been cross-sectional. This is also usual in other SWB research, despite the limitations of this design (Diener, 2012). One effort to explore the relationship between well-being and candidature outcomes was made by Stubb et al. (2011) with Finnish doctoral students in medicine, humanities, and the behavioural sciences. ‘Socio-psychological’ well-being was operationalised here using measures expressed in psychological distress terms: stress, exhaustion, anxiety and lack of interest. Although limited by being a cross-sectional study with enrolled students, this mixed-methods approach found that doctoral students who experienced the scholarly community as empowering also reported higher levels of socio-psychological well-being, and were less likely to have considered interrupting their studies, compared with the students who perceived it to be a burden (Stubb et al., 2011). While this study provides preliminary evidence that thoughts of withdrawing from doctoral candidature are associated with levels of well-being, no conclusions can be drawn about ultimate candidature outcomes, as all students were still enrolled at the time of the survey.

The evaluation of SWB is, by definition, subjective and unique to the individual (Diener, Sapyta, & Suh, 1998). Whether a measure of well-being can act as predictor of progress or longer term candidature outcomes, and therefore have a role in self-monitoring for doctoral
research students, might depend on its stability. Certainly, SWB has been found to be stable for both individuals and populations (Davern et al., 2007). For example, a German study found that SWB was stable across 5 years in 75% of individuals (Fujita & Diener, 2005), while the mean SWB of the Australian population varied by only 3.1% in 14 surveys over 5 years (Cummins, 2006). More specifically, Davern et al. (2007) assert that if SWB is assessed on a scale ranging from 0 (complete dissatisfaction) to 100 (complete satisfaction), then homeostatic processes work to maintain SWB at an average score of approximately 75.

While these studies have shown that for most populations SWB is normally above neutral and quite stable, reflecting a mildly positive emotional state (Cummins, 2012; Diener & Diener, 1996), maintaining SWB appears to be a dynamic process. Cummins’ (2010) model of subjective well-being describes these efforts to maintain homeostasis. As Cummins (2013) explains, if challenges exceed coping efforts, homeostasis cannot be maintained, and the level of well-being slumps below the individual’s normal functioning range. Beyond this point, the individual may experience psychological distress or depression (Cummins, 2013).

Davern et al. (2007) found that emotion and cognition, rather than personality, play the fundamental role in maintaining an individual’s SWB ‘set-point’ within a particular range. These processes require personal agency and effort (Cummins, 2013), highlighting the importance of self-monitoring in the maintenance of well-being. Indeed, in Haynes et al.’s (2012) study, PhD students expressed the recognition of their own role in maintaining their well-being, while being aware of the impact of external influences. However, there remains limited understanding of how the various elements of SWB might differ in stability over time or in terms of their contribution to how SWB acts as an outcome or antecedent (Diener, 2012; Pychyl & Little, 1998).

While the nature of the challenges faced by PhD students has been well-documented, there has been little investigation into how particular challenges impact student well-being (Stubb et al., 2011), and even less attention paid to the relationships between well-being and individual differences in the management of these challenges. Moreover, the PhD students in Haynes et al.’s (2012) study, who were in their second year of candidature or beyond, believed that their development of coping skills was ongoing. If this is the case, might this be reflected in the well-being scores of either more experienced or older PhD students?
Feeling able to manage challenges and to continue to make goal-directed progress contributes to SWB (Diener, Sapyta, & Suh, 1998, p. 34), and can be described in terms of the sense of agency and problem-solving ability in goal pursuit that Snyder, Harris, et al. (1991, p. 570) defined as ‘hope’. Taking responsibility for making progress and feeling efficacious about problem-solving are aspects of hope that appear essential to making doctoral research progress, according to the literature review in Chapter 2. Therefore, it is possible that doctoral research students engaging in self-regulation will self-monitor, informally, indicators of both their mental health or psychological well-being and their hope levels. Yet to date there appears to have been no study of whether this information is related to longer-term outcomes, that is, whether measures of mental health or hope predict academic or any other outcomes. Hence, it is currently unknown whether this information is helpful to the self-regulatory efforts of doctoral research students. Examining mental health and hope in parallel with feelings about doctoral progress could provide further information about the specificity and relevance of these constructs for self-monitoring purposes during doctoral candidature.

3.7 STATE HOPE

The third construct to be considered for use as a focus for doctoral research students’ self-monitoring was the state measure of the hope construct, as described by Snyder and colleagues (Snyder, Harris, et al., 1991; Snyder et al., 1996). In contrast with the conceptualisation and measurement issues regarding emotional responses to doctoral research, Snyder’s (2002) hope construct provides some consistency. However, there appears to have been no published research regarding hope in doctoral research students.

Hope is a construct that is not usually considered within the self-regulation literature. However, as self-regulation can pertain to any goal-directed activity, Snyder’s (2002) hope theory has been described as “closely related to self-regulation, with its emphasis on goal structures, motivational mechanisms, and strategies used to meet standards and obtain goals” (Vohs & Schmeichel, 2002, p. 318). Notably, these models of hope (Snyder, 2002) and self-regulation (Zimmerman & Schunk, 2013) both highlight the importance of cyclical feedback processes in their explanations of human functioning during goal pursuit. This relationship of hope with self-regulation means, by definition, that state hope could assumedly function as an outcome measure relating to previous goal pursuit efforts, indicating how the outcomes of these efforts have influenced the student’s efficacy and beliefs about agency and pathway finding abilities.
The next section of this chapter provides an introduction to this conceptualisation of hope, as developed by the late C. R. Snyder and his colleagues over the past 25 years. In examining the relationship between self-regulation and hope, the conceptual overlaps among hope, optimism, and self-efficacy will also be considered. Current knowledge of the relationships between hope and demographic variables, as well as how this concept has been applied to the study of individual differences in academic performance and mental health, will then be assessed.

### 3.7.1 The study of hope

Human efforts to understand and explain hope are not new, however during the 20th century a more consistent theme in the scholarly literature emerged: that hope involves the individual’s perception that they have the ability to achieve their goals (Rand & Cheavens, 2009; Snyder, 1994), as opposed to earlier views of hope as the assumption that goals would somehow be met (Snyder, Harris, et al., 1991). Not surprisingly, then, hope as a field of study has attracted the research attention of the burgeoning ‘positive psychology’ movement in the past few decades, with its interest in well-being and optimal functioning (Duckworth, Steen, & Seligman, 2005).

While at least 26 different conceptualisations of hope have been identified (Lopez, Snyder, & Pedrotti, 2003), few have been operationalised into validated measures (Lopez et al., 2003; Magaletta & Oliver, 1999). Therefore, the vast majority of research in the hope literature in the past few decades has been based on the hope theory and dispositional hope scale developed by Snyder and his colleagues (Bryant & Cvengros, 2004; Feldman & Dreher, 2012; Gilman, Dooley, & Florell, 2006). Operationalised as the Adult Hope Scale, no other measure of dispositional hope has accumulated more evidence to support its construct and external validity (Bryant & Cvengros, 2004), and this strength-based perspective on hope is becoming established in positive psychology as a meaningful and useful construct in understanding human functioning (Hellman, Pittman, & Munoz, 2012; Tennen, Affleck, & Tennen, 2002).

Of particular relevance to this study, Snyder, Shorey et al. (2002) noted the utility of this “dynamic cognitive motivational system” to the educational research community. As other researchers have identified (e.g., Feldman & Dreher, 2012), the goal-directed nature of hope theory is well-suited to research in higher education. As the next section explains, this study asserts that hope theory’s focus on setting goals, dealing with obstacles, and maintaining motivation is a particularly appropriate perspective for the study of PhD students across
candidature. Despite the relevance of this theory to this population, there is a dearth of published work in this area.

3.7.2 Overview of Snyder’s hope theory

In the theory of hope proposed by Snyder and his colleagues, hope is conceptualised as a goal-directed thinking process comprising two related components: pathways and agency thoughts (Snyder, Harris, et al., 1991). Therefore, hope is described in terms of an individual’s perceived ability to generate one or more pathways towards desired goals (pathways thinking), and to initiate and maintain motivation to use these pathways to achieve these goals (agency thinking) (Snyder, Harris, et al., 1991; Snyder, 1999; Snyder, 2002). Further, this theory assumes a social-cognitive stance in explaining that these ways of thinking are influenced by an individual’s experiences (Snyder, 2000; Shorey, Snyder, Rand, Hockemeyer, & Feldman, 2002; Snyder, Harris, et al., 1991). Yet while being subject to experiential and developmental influences (Heaven & Ciarrochi, 2008), hope has been theorised to be a relatively stable disposition across time and situation (Snyder, Harris, et al., 1991). This has recently received support in Hellman et al.’s (2012) reliability generalisation examination of the dispositional Adult Hope Scale (Snyder, Harris, et al., 1991), which found that both internal consistency and temporal stability are evident in the measurement of dispositional hope across samples differing by age, gender, and race. That is, as Snyder (2002) claimed, the general beliefs and self-referential thoughts held by individuals about their capacity to generate pathways to goals, and the motivation to pursue these goals, appear to endure across time and context. Indeed, some authors have described hope as a central personality construct (Bryant & Cvengros, 2004).

Snyder’s hope theory is underpinned by the assumption that human behaviour, across time and cultures, is usually guided by a desire to achieve goals (Snyder, 1994; Rand & Cheavens, 2009). In line with other contemporary thinking about the construct of hope, the starting point for this model is an emphasis on hope being goal-directed, or as Snyder (1994, p.3) put it, the importance of “anchoring hope to a concrete goal”. These goals are assumed to be personally valued (Snyder, Harris, et al., 1991; Snyder et al., 1996). Then, Snyder (1994, p. 3) claimed, “It is how we think about reaching those goals that provides the key to understanding hope”. Of note here is that although Snyder, Harris, et al.’s (1991) theory of hope was first proposed as a cognitive theory, it evolved to recognise the role of emotions (Snyder, 2002). This is similar to most theories or models of hope, which can be categorised as either cognition- or emotion-based, but incorporate both cognitive and emotional elements to reflect a merging of
perspectives (Lopez et al., 2003). Nevertheless, most theories of hope can be categorised as being cognitive-based (Snyder, Cheavens, & Michael, 2005).

Hope has been conceptualised as being stable, yet malleable. In one of the earliest propositions of hope theory, Snyder, Harris, et al. (1991) explained that hope is assumed to be consistent across time and situation. However, the responsiveness of hope to change was acknowledged with the publication of the State Hope Scale, with Snyder et al. (1996, p. 321) asserting that “in contrast to the more enduring type of motivational set, there should be a temporal state that is related to the ongoing events in people’s lives”. State hope, these authors asserted, “provides a snapshot of a person’s current goal-directed thinking” (p. 321). Thus, using the state hope level of the construct offers the potential to gain a more nuanced understanding of how and why hope may fluctuate in the doctoral research context. Unfortunately, to date there has been relatively little research published using the State Hope Scale. Therefore, although state hope is of primary interest to this study, the remainder of this chapter takes a broader perspective in examining hope theory and its applications.

The main components of hope theory – goals, pathways thinking, and agency thinking - will be explained in the following sections, along with an explanation of the temporal sequence of the goal-directed thought process.

3.7.2.1 Goals

In Snyder and colleagues’ theory of hope, the goals which guide behaviour may range in timeframe from short-term to long-term, may be approach-oriented where a positive outcome is desired, or preventative where a negative outcome is to be avoided, and may differ in their specificity, value, and importance (Lopez et al., 2003; Rand & Cheavens, 2009; Snyder, 2002). These goals may be sub-goals of larger or more complex goals (Snyder et al., 2000). In addition, in exploring the notion of ‘false hope’, Snyder, Rand, King, Feldman and Woodward (2002) concluded that goals should neither be criticised nor excluded on the basis of their nature, as even apparently insurmountable goals are sometimes achieved via planning and effort.

3.7.2.2 Pathways

It is the understanding of time - in terms of past, present, and future - that enables humans to engage in intentional behaviour to reach their goals (Rand & Cheavens, 2009; Snyder, 1994,
This behaviour includes the ability to think of one or multiple ways to achieve goals in the future, and to generate alternate ways if impeded. In hope theory, an individual’s perceived ability to do this, and the positive self-talk about this ability, is referred to as pathways thinking (Snyder, Harris, et al., 1991; Snyder, LaPointe, Crowson, & Early, 1998). Although hope theory concentrates on perceived pathway-finding ability, some studies have reported that individuals with high hope also display competence in finding alternate pathways (Irving, Snyder, & Crowson, 1998; Snyder, Harris, et al., 1991).

### 3.7.2.3 Agency

In hope theory, agency thinking is considered to be the motivational component (Lopez et al., 2003). It relates to an individual’s perception of their ability to initiate and sustain movement towards their goal along the pathway they have chosen, and incorporates self-affirming statements about this ability, such as ‘I know I can do this’ and ‘I won’t give up’ (Snyder et al., 1998). Agency thinking is of critical importance when an individual encounters an obstacle, as it provides the motivation to change pathways if necessary (Snyder, 1994).

The perception of successfully moving towards or achieving a goal is assumed to be helpful in maintaining agency (Wrobleski & Snyder, 2005). This is echoed by the findings of Amabile and Kramer (2011) regarding the motivational effects of making progress during goal pursuit. Similarly, and reflecting the cyclical nature of this phenomenon, Feldman and Dreher (2012) found that individuals with who had experienced a brief hope training intervention reported greater goal progress over the following month. In addition, physiological factors such as adequate nutrition, exercise, and sleep (Snyder, Irving, & Anderson, 1991), and social support provided by family and friends (Snyder, Cheavens, & Sympson, 1997), have been proposed as being important to the maintenance of agency.

### 3.7.2.4 Hope as a goal-directed thought process

Three phases associated with the goal-directed thinking that occurs in the course of goal pursuit have been delineated (Rand & Cheavens, 2009). This is represented by the following schematic of model of hope theory (Snyder, Lehman, Kluck, & Monsson, 2006) and reproduced with permission in Figure 3.1.
The first phase is the individual’s learning history, as pathways and agency thinking patterns are assumed to develop in childhood, and to benefit from secure and supportive adult attachments (Rand & Cheavens, 2009; Shorey, Snyder, Yang, & Lewin, 2003; Snyder, 1994, 2002). The second phase is the pre-event phase, where the expected outcome value of pursuing a particular goal is assessed (Rand & Cheavens, 2009). If the goal is considered to be important or valued, the event sequence phase begins. This third phase involves a repeated interaction of goal-specific pathways and agency thinking, as well as monitoring of the expected outcome value of goal pursuit, via the available pathways and the required agency.

An important feature of the hope process is that it is self-correcting (Snyder, 2002), meaning that the individual responds to the monitoring feedback and adjusts his or her behaviour accordingly. For example, goal pursuit can cease if the expected outcome value of goal pursuit is no longer worthy of the effort required to achieve it. That is, the goal can be “reconstructed or jettisoned if it is no longer valued by the individual” (Wrobleski & Snyder, 2005, p. 218). Snyder (2002) notes the particular importance of this monitoring in situations where it is difficult to assess the value of goal achievement until goal pursuit has begun. Similarly, an

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**Figure 2.** Schematic of the hope theory model showing the role of feedback on agency and pathways components. Reproduced from “Hope for Rehabilitation and Vice Versa,” by C. R. Snyder et al., 2006, Rehabilitation Psychology, 51(2), p. 91. Copyright 2006 by the American Psychological Association. Reproduced with permission.
alternative pathway is likely to be identified and taken if the original pathway chosen is not functioning as expected in terms of enabling movement towards the goal (Wrobleski & Snyder, 2005).

Measures derived from hope theory would thus appear to be well-suited to exploring self-regulation in doctoral research students. In particular, hope theory highlights the importance of self-regulation to decision-making about continuing with goal pursuit. It provides a way of explaining the findings that doctoral students were only able to assess the ‘fit’ between themselves and candidature once enrolled, as well as how students might respond to the uncertainty they experience about the personal value of the PhD to themselves, or whether their progress towards it is satisfactory.

While Snyder’s hope theory originally emphasised cognitive rather than emotional processes (Rand & Cheavens, 2009), emotions are regarded as playing an important role in how an individual approaches and responds to goal pursuit (Snyder, 2002). Firstly, the iterative processes of pathways thinking and agency thinking are associated with ‘emotional sets’ relating to an individual’s history of goal pursuits (Snyder, 2002). An individual with a history of successful problem-solving and goal achievements would therefore be expected to have high hope, and to experience a positive emotional set during goal pursuit which included confidence, interest and curiosity, whereas individuals with low hope are likely to experience passive and negative emotions (Snyder, Cheavens, & Michael, 1999; Snyder, Harris, et al., 1991). Therefore, this iterative and summative process of goal-specific pathways and agency thoughts, as well as their accompanying emotions, will have a feed-forward effect on how an individual is thinking and feeling about his or her progress (Snyder, Rand, & Sigmon, 2002).

Secondly, emotions are postulated to be responses to goal-directed thoughts and activities (Snyder, Rand, & Sigmon, 2002). As Rand and Cheavens (2009) explain, goal attainment, or making progress towards a goal by effectively overcoming obstacles, is expected to result in positive emotions, whereas the lack of progress or encountering setbacks would result in negative emotions. Therefore, while emotions are seen as outcomes, they are also believed to provide feedback about the progress during goal pursuit.

In support of this argument, Snyder et al. (1996) provided experimental evidence that subjects blocked during goal pursuit experienced negative emotions, while those who were successful or overcame obstacles experienced positive emotions. Wrobleski and Snyder (2005) also showed
that when goal pursuit is complete, the ways in which an individual thinks about the process and its outcome, and the emotional response to this, will go on to influence future self-assessments regarding pathways and agency for both domain-specific and more general goals. This explains how the experience of repeated failures can lead to a decline in hope, such as in academic endeavours (Snyder, 2002).

Also included in the model are two forms of unexpected contingencies which are likely to cause an emotional response, and either may occur at any stage of goal pursuit. The first form is referred to as a stressor or obstacle, and is defined as a potential impediment to goal pursuit (Snyder, 2002). Stressors may be encountered at any time during goal pursuit, and the emotional response to this will influence pathways and agency thinking. However, the nature of the emotional response will depend on how the stressor is appraised. While most people will initially have a negative response to a stressor, high-hope individuals are more likely to perceive stressors as challenges to be overcome rather than threats, and thus also experience positive emotions (Snyder, Harris, et al., 1991).

The second form of contingency is the occurrence of a surprise event outside the ongoing goal pursuit context (Snyder, 2002). This event may be positive or negative, and may invoke new situation-specific goals requiring pathways and agency thinking. Snyder (2002) drew attention to how the individual’s emotional response to the surprise event can also influence agency and pathways thinking regarding the ongoing goal-pursuit, usually by altering motivation levels, and that this may in turn influence the outcome of the ongoing goal pursuit.

3.7.3 The measurement of hope

Based on the assumption that hope is a reflection of an individual’s thinking process, hope can be operationalised and measured (Cheavens, Michael, & Snyder, 2005). The hope construct of Snyder has been operationalised by Snyder, Harris, et al. (1991) as the Adult Hope Scale, also referred to as the (Adult) Dispositional Hope Scale or the Future Scale. Factor analyses across independent samples have confirmed its two factor structure consisting of the Pathways and Agency subscales, and that the Adult Hope Scale has both convergent and discriminant validity (Snyder, Harris, et al., 1991). More recently, Hellman et al. (2012) confirmed the score reliabilities of this instrument in their reliability generalisation study.

While total Adult Hope Scale scores are often reported, some researchers (e.g. Bryant & Cvengros, 2004; Gilman et al., 2006; Magaletta & Oliver, 1999) have argued that this treats
hope as a monolithic construct, and instead advocate using the two distinct but positively correlated Agency and Pathways subscales to better reflect Snyder et al.’s (1991) model. In fact, Bryant and Cvengros (2004) found that Pathways and Agency share almost half (46%) of their variance.

3.7.4 Hope, optimism, and self-efficacy

The hope construct defined by Snyder and colleagues (Snyder, Harris, et al., 1991; Snyder, 1994, 2002) is clearly similar to a number of pre-existing constructs, hence there has been much speculation about exactly how these constructs overlap (e.g. Aspinwall & Leaf, 2002). Those most often compared with hope have been optimism, as defined and operationalised by Scheier and Carver (1985) in the Life Orientation Test (LOT) or its revision (LOT-R; Scheier, Carver, & Bridges, 1994), and self-efficacy as defined by Bandura (1977, 2006, 2008). While a more detailed analysis is beyond both the scope and the purpose of this study, a brief overview of these constructs and their relationships with hope is provided.

Scheier and Carver (1985) defined optimism as an individual’s relatively stable perception that future outcomes, across life situations, are more likely to be positive than negative. That is, optimists “expect good things to happen to them” (Carver & Scheier, 1999, p. 182). Carver and Scheier (1999) assert that these expectations about the future are an important influence on both outward behaviour and inner subjective experiences. Further, Carver and Scheier (1999) allow for the possibility of optimism to be either genetically influenced or develop from early experiences in life.

Self-efficacy has been defined by Bandura (1994, 2008) as an individual’s situation-specific beliefs about their ability to produce a particular level of performance or to reach a particular goal, and thus influence their functioning and life circumstances. Through its impact on cognitive, motivational, emotional, and decision-making processes, self-efficacy is central to success in realising goals, and thus makes a significant contribution to motivation levels, emotional well-being, and performance accomplishments (Bandura, 2008). Therefore, self-efficacy is associated with personal development, and with successful adaptation and change (Bandura, 2006, 2008). It is consistent with other agentic theories, including Snyder, Harris, et al.’s (1991) hope theory, in emphasising the individual’s approach to goal pursuit, and how this reflects the individual’s efficacy expectancy, that is, their beliefs about their capability of attaining the goal (Bandura, 1977, 2008; Snyder, Harris, et al., 1991). However, the agency
component of hope extends beyond efficacy expectancies, and includes the willingness to keep moving towards the goal (Snyder, 1994).

In summary, comparing these constructs reveals that hope and optimism have both been conceptualised as general cognitive sets that are applied across settings (Magaletta & Oliver, 1999; Snyder et al., 1996), whereas assessments of self-efficacy are situation-specific (Bandura, 1977; Snyder, Harris, et al., 1991). That is, Snyder (2002) described hope as an individual’s more enduring and global perception of the intention to take the steps required to achieve a diversity of goals. Conversely, Bandura (1994, 2008) maintained that self-efficacy is not a trait or a disposition, but a system of situation-specific self-beliefs about an individual’s ability to take the steps required to achieve particular goals within distinct domains of functioning.

Empirical investigations using the Adult Hope Scale have provided support for hope, optimism, and self-efficacy being related but not identical constructs (Magaletta & Oliver, 1999). That is, while hope overlaps with optimism (Bryant & Cvengros, 2004), particularly via the Pathways factor of the Hope Scale (Magaletta & Oliver, 1999), hope is more closely related to general self-efficacy than is optimism, but through the Agency factor rather than the Pathways factor (Bryant & Cvengros, 2004; Magaletta & Oliver, 1999).

Also, in contrast with the focus of hope and self-efficacy on the individual’s attainment of specific goals, optimism has been shown to have a broader focus on the expected quality of future outcomes, or outcome expectancy (Bryant & Cvengros, 2004; Snyder, Harris, et al., 1991). Indeed, Snyder, Harris, et al. (1991) posit that hope involves a reciprocal relationship between both efficacy expectancy and outcome expectancy, claiming that this improves the explanatory and predictive power of this construct over self-efficacy and optimism.

In addition, in a series of studies by Snyder, Harris, et al. (1991), hope has been shown to be distinct from expectations of success, the wish to exert personal control, self-esteem, problem-solving ability, coping ability, mental health including depression, and both positive and negative emotions associated with state and trait anxiety.

Having considered the similarities and differences with other constructs, from both theoretical and empirical perspectives, it seems that the hope construct proposed by Snyder and his colleagues has the potential to contribute unique and useful information to the understanding of PhD students’ management of candidature. In particular, Snyder’s (2002) hope theory provides an explanation of the process by which individuals are able to deal with difficulties and persist
to achieve either short- or long-term goals, and the relatively stable cognitive set involved. Therefore, the focus of this literature review now turns to relevant research using the operationalisations of this hope theory.

3.7.5 Correlates of hope

The hope theory proposed by Snyder and his colleagues (Snyder, Harris, et al., 1991; Snyder et al., 1996; Snyder, 2002) has attracted the attention of clinical and social psychologists, allied health professionals, and other social scientists (Rand & Cheavens, 2009; Tennen et al., 2002). It has garnered the interest of those seeking to better understand the role of hope in theoretical and applied settings, in education as well as clinical and counselling psychology. Given that the vast majority of the published research into hope has utilised the Adult Hope Scale (Snyder, Harris, et al., 1991), the following studies can be assumed to have used this measure unless otherwise specified.

Looking first at the relationships between hope and demographic variables, there appear to be no significant gender differences in hope levels (Snyder, 2002; Rand & Cheavens, 2009), and this finding is consistent across student populations (e.g. Feldman & Dreher, 2012; Jarden, 2009), and the community (e.g. Bailey & Snyder, 2007). Regarding age, hope was considered to be a developmental process, changing across the lifespan in response to the different goals and pathways required of the individual as they assume and relinquish various social roles (Snyder, 1994). Later, Wrobleski and Snyder (2005) postulated that the hopeful thinking process per se would not be expected to change as the individual ages, but that hope must become more important in maintaining well-being in older adults, due to the need to negotiate increasingly frequent and serious ageing-related physical and social losses.

One of the few studies on hope in different age groups was conducted by Bailey and Snyder (2007). In their community sample of 215 people, Hope Scale scores were higher in the younger cohorts aged over 25 years than in the cohort aged 55 to 64 years. However, this difference in scores was less than 3 points on a scale of zero to 32. Whether this difference in hope levels reflects actual differences in hope-related processes and outcomes requires further investigation. In an effort to explore such correlates of different levels of hope in older adults, Wrobleski and Snyder (2005) studied a sample of 100 community-dwelling adults representing an unspecified age range with a mean age of 76. The adults with higher levels of hope were more positive about goal pursuit progress and goal attainment than were the participants with lower levels of
hope (Wrobleski & Snyder, 2005). These researchers also found a positive relationship between hope and life satisfaction and better perceived physical health, although hope did not relate to number of illnesses or functional disability.

Therefore, with respect to the doctoral research context of interest to this study, while a decline in hope levels may occur in adults aged in their fifties, the possible impacts of this decline on academic goal pursuit and attainment are as yet unknown.

### 3.7.6 Hope as a predictor variable

Across a range of research contexts, higher hope is consistently related to more positive outcomes in academic and athletic performances (Curry, Snyder, Cook, Ruby, & Rehm, 1997), and in physical and psychological functioning, including interpersonal relationships (Cheavens, et al., 2005; Rand & Cheavens, 2009; Snyder, 2002).

As explained by Shorey, Little, Snyder, Kluck, and Robitschek (2007), this superior performance of high-hope individuals in different situations is due to: 1) generating clearly defined goals, 2) identifying multiple pathways to goals which provides a contingency plan if necessary (Snyder, 2002), 3) lower levels of performance anxiety and test-taking anxiety (Onwuegbuzie & Snyder, 2000; Snyder, 1999), and 4) the retention of more positive affect after failure compared to individuals with lower hope (Shorey et al., 2003). The ability to retain positive affect promotes a sense of agency, the maintenance of which manifests as “remaining cognitively and behaviourally engaged in the goal-pursuit process” (Shorey et al., 2007, p. 1919). Therefore, since maintaining a sense of agency enables persistence, it is also associated with an increased likelihood of achieving success via pursuing the chosen pathways. For example, in a psychotherapy context, clients’ levels of hope were associated with their perceived ability to change and grow, and thus provided an insight into success of the psychotherapeutic process (Snyder, Parenteau, Shorey, Kahle, & Berg, 2002). Achieving success results in positive emotions, and this acts as feedback which is conducive to sustained goal-pursuit (Snyder, 2002). Positive expectancies about the future then increase psychological well-being and reduce psychological distress, by decreasing levels of anxiety and depression (Shorey et al., 2003).

In the educational domain, academic performance can be influenced by the ability to set and meet short-term goals, including those required for assignment completion or examination preparation, and longer-term goals, such as passing a course for vocational reasons. According
to hope theory, meeting these goals requires the use of pathways and agency thinking processes. Therefore, hope theory predicts that more hopeful students would display higher academic outcomes than less hopeful students (Cheavens et al., 2005).

Studies in the United States have shown that high hope is associated with stronger academic performance from school children through to undergraduates. For example, initial research with the Children’s Hope Scale found that hope was significantly related to subsequent achievement test scores in children aged from 9 to 14 years (Snyder, Hoza, et al., 1997). Using grade point average as a measure, higher levels of hope have been found to be related to stronger academic performance in children aged 12 years and over at different levels of secondary schooling (Gilman et al., 2006; Snyder, Harris, et al., 1991).

For college students, a number of studies have found that higher semester and overall grade point averages were related to higher hope scores (Chang, 1998; Curry et al., 1997). Even after removing the variance associated with previous class performance, hope scores predicted students’ final grades in an introductory psychology class (Snyder, Harris, et al., 1991), and in the first semester of a law degree (Rand, Martin, & Shea, 2011). In a more specific study of the mechanisms underlying these relationships, Rand (2009) found that undergraduate psychology students’ hope levels were related to their predictions of final semester grade, which were in turn related to academic performance. In a prospective longitudinal study of college students, higher levels of hope measured at college commencement predicted higher cumulative grade point averages, higher graduation rates, and lower dropout rates over the next six years, and this relationship remained after statistically controlling for intelligence, previous academic performance, self-esteem, and college-entrance exam scores (Snyder, Shorey, et al., 2002).

These findings lend support to Snyder’s hope theory, which predicts that students with higher levels of hope would demonstrate superior academic performance compared to students with lower levels of hope (Snyder, 2002; Snyder et al., 1999). That is, through hopeful thinking students should have more confidence in their problem-solving abilities regarding finding goal-pursuit pathways, as well as the motivation to pursue these pathways to their goals (Snyder, Rand, & Sigmon, 2002), and also be able to stay focused, and not be distracted or stalled by self-deprecating thoughts or negative emotions (Snyder et al., 1999). This may be due in part to the tendency for high-hope undergraduate students to engage in more rational problem-solving and positive problem orientation than low-hope students (Chang, 1998).
To date there appears to be no published research on hope during the doctoral research process. However, the limited amount of research into the nature and role of hope in other academic pursuits at the postgraduate level of education, as well as the strong relationship between hope and academic performance at other levels of education, suggests that levels of hope would be expected to have a role in goal pursuit in doctoral research. More specifically, whether or not the self-monitoring of levels of hope is a useful enterprise during doctoral research is a topic for investigation in the present study.

3.8 CHAPTER SUMMARY

This chapter discussed a means of investigating how individual differences in doctoral research students’ self-regulatory efforts may be related to making progress through candidature. Self-monitoring was identified as an important focus for the study of self-regulation in the doctoral research context. Therefore, a method of exploring self-regulatory behaviours by examining students’ self-monitoring was proposed; this would be easily accessible and relevant across all stages of candidature. Effective self-regulation depends, at least in part, on the frequent and regular monitoring and evaluation of appropriate feedback about goal pursuit performance. In the absence of a suitable direct indicator of doctoral research performance, three alternative sources of information on which self-monitoring could focus were identified: feelings about doctoral progress, mental health, and state hope. All three constructs have theoretical associations with self-regulation, and would therefore be expected to function to some degree as indicators of differences in self-regulatory efforts. By including three measures in a self-monitoring process, the specificity and relevance of these constructs for this purpose could be compared. To be a useful source of feedback for further self-regulation, the feedback must also be somehow related to actual doctoral research progress. If individual differences in self-regulatory efforts were evident from the responses to these measures, then examining the relationship between students’ responses to these measures and later candidature outcomes could provide insights into the longer term effects of self-regulation during doctoral research. Such research is also required to provide more information about the nature of PhD students’ affective experiences of their doctoral research, and to assist students to determine whether emotional responses should be normalised or interpreted as signals of problems with candidature.

The specific research questions that have been generated are articulated as follows.
3.9 RESEARCH QUESTIONS

The following research questions were articulated to guide this exploration of individual differences in self-regulation in the doctoral research context. The first three questions related primarily to the methodological issue of determining whether a measure of feelings about doctoral research progress could operate as an appropriate indicator of functioning for use in this exploration of self-regulation. Scores on this measure were considered to represent students’ self-evaluations of functioning, which occur within the self-reflection phase of the self-regulation cycle (see Section 2.5.1.1). The self-monitoring of functioning is the performance phase process on which such self-evaluations are based (see Section 2.4.2). The success of this measure in exploring self-regulatory differences thus depended on its ability to discriminate sufficiently among the self-evaluations of doctoral research students that were generated via a systematic self-monitoring process.

1) Do students differ in their self-evaluations of recent doctoral research progress?

The utility of this measure would be enhanced if it was independent of common demographic and candidature factors, for consistency and ease of interpretation across all students at all stages of candidature.

2) Are students’ self-evaluations of recent doctoral research progress associated with:
   a) background demographic factors?
   b) current candidature factors?

A preliminary way of examining the construct validity of this measure – as a measure relating to feelings about recent doctoral research progress rather than feelings about life or motivation and problem-solving ability in general – could be undertaken by comparing patterns of scores on this measure with patterns of scores on mental health and state hope measures.

3) How do doctoral research students’ self-evaluations of recent doctoral research progress relate to their self-evaluations of mental health and state hope?

The next research question pertained to the use of the self-evaluation of recent doctoral research progress (or either the mental health or the state hope measure if deemed more appropriate) to explore students’ self-regulatory efforts.
4) **Is there an association between students’ ratings of their recent doctoral progress and self-reported self-regulatory efforts?**

To further investigate the utility of students’ self-evaluations of recent doctoral research progress as a means of exploring self-regulation, it was necessary to examine the changes in these self-evaluations over time, as well as the factors with which any changes might be associated.

5) **Do students’ self-evaluations of recent doctoral research progress differ over time in association with:**
   
   a) background demographic factors?
   b) current candidature factors?
   c) receiving visual feedback about Doctoral Progress scores?
   d) Month 1 Doctoral Progress scores?

If self-evaluations of recent doctoral research progress can function as indicators of self-reported self-regulatory efforts, and if self-regulatory efforts are associated with persistence in doctoral candidature, then candidature status might be associated with self-evaluations of doctoral research progress over the previous 12 months.

6) **Are students’ self-evaluations of doctoral research progress associated with later candidature status?**

Going beyond the self-evaluations as scores to the process of recording them could provide another source of insight into self-regulation in this context.

7) **How do doctoral research students respond to a self-monitoring process during PhD candidature?**

The exploratory design of this study also allowed for further research questions to be generated and responded to during the data analysis process. The final research question was developed from the findings of the qualitative analyses that were conducted to address Research Question 7, as will be described in Chapter 8.

8) **Is there a relationship between the reported use of the JTS for self-regulatory purposes and changes in students’ self-evaluations of recent doctoral research progress?**
4. METHOD

4.1 INTRODUCTION

The aim of the current study was to explore individual differences in students’ self-regulatory behaviours through an analysis of their self-monitoring of doctoral research progress. The self-monitoring task was based on students’ self-ratings on three measures, which were the operationalisations of three constructs identified in the literature review as potential indicators of doctoral research management and progress – feelings about doctoral research progress, mental health, and state hope. Baseline responses to this self-monitoring task could provide insights into factors students perceived to be associated with their management of, and recent progress through, doctoral research. Longitudinal mapping of patterns of responses could then provide insights into the role of self-regulation in doctoral research management and progress.

This chapter presents an explication of the methodology and study design used in this research. The chapter also shows how the current study was located within a larger project investigating the metacognitive beliefs of doctoral research students (Australian Research Council Discovery Project (DP0987446)). As participants were self-selected from the larger project, a description of the participants is included in this chapter, along with details of the data collection and analysis techniques used in the current study.

4.2 STUDY DESIGN

Conducting an exploratory study on self-regulation in the highly multivariate and longitudinal doctoral research context required a pragmatic approach to designing the study. A pragmatic approach places the focus on the research questions when selecting the most appropriate research methods (Todd & Nerlich, 2004), and reflects a practice-oriented perspective (Creswell & Plano Clark, 2007).

The focus of the study was on how students’ self-monitoring of their doctoral research management and progress might provide insights into individual differences in self-regulation. Therefore, the first step in designing this study was to create a self-monitoring system for students to use. Regularly asking participants to answer standard questions about specific indicators of their doctoral research-related functioning can operate as a form of self-
monitoring, even if externally imposed. That is, by responding to these questions participants are required to reflect on and evaluate their recent performance. Whether they then use this information to guide further self-regulatory efforts will depend on the individual. Indeed, this procedure bears some similarities with online assessments of self-regulation during learning.

A mixed methods design was selected, as a combination of quantitative and qualitative data can offer a more enhanced understanding of a research problem compared to the use of either type of data in isolation (Creswell & Plano Clark, 2007; Creswell & Garrett, 2008). The study incorporated three quantitative measures of functioning recorded in parallel on a monthly basis across a 12-month period. From the literature review, students’ ‘feelings about doctoral research progress’ was identified as a potential indicator of the perceived success of recent goal pursuit efforts, and therefore could function as useful feedback for students to monitor. Two other sources of feedback – mental health and state hope – were included as comparators to provide further insights into the performance and utility of ‘feelings about doctoral research progress’ as a source of feedback for self-monitoring. In addition, to procure information about participants’ self-regulatory efforts, comments about recent doctoral research progress were sought from participants via an open-ended question. These qualitative data were obtained by inviting participants to provide written comments to supplement the quantitative measures of functioning each month. At the end of the 12 months, participants were invited to provide written feedback on their experience of participating in the self-monitoring process, in an effort to gain insights into whether they engaged with or used this process for self-regulatory purposes.

To compare the utility of the three quantitative measures for self-monitoring purposes, it was important to know whether students’ scores were associated with background demographic and current candidature factors, and with candidature status at the end of the self-monitoring period. Information about these background and current factors was available from the Initial Survey (described in Section 4.4.1), and candidature status in the final month of the self-monitoring period was obtained from the Follow-up Survey (described in Section 4.4.3), both of which formed part of the larger project with which this study was associated.

This study was designed to incorporate both cross-sectional and longitudinal analyses to investigate self-regulation in this group. Firstly, an initial exploration of possible differences in previous self-regulatory efforts was based on the cross-sectional data obtained from the first month of the self-monitoring process. As a cross-sectional design would not have enabled
students to adjust their behaviours on the basis of the feedback they generated during the study, a prospective longitudinal design was implemented that enabled the tracking of students’ responses over time. Thus, by providing students with a means of self-monitoring their feelings about their doctoral research progress, mental health, and hope across a twelve-month period, students could choose to use this information as feedback to guide self-regulatory efforts. Thus, while this self-monitoring process could be seen to essentially generate or at least record feedback, students might not have used it, or might have continued to use one or more additional forms of feedback for their own self-regulatory purposes. The reported use of this self-monitoring process could therefore potentially provide more information about students’ self-regulatory efforts.

It was also anticipated that due to participants completing, taking leave, or withdrawing from candidature, that complete datasets could not be expected for all participants for the year of the self-monitoring process. By using both cross-sectional and longitudinal perspectives in the study design, the study was not reliant on the extent to which participants engaged in the longitudinal component of the self-monitoring process.

It was considered important to enable participants to remain anonymous to encourage open and honest responding about their experiences of doctoral research and of participating in the self-observation method being explored in this study. Furthermore, to address the sampling limitations observed in many studies of doctoral students, a large and diverse sample of doctoral research students was sought for this study. For these reasons, a web-based survey method was chosen as an effective means of providing relatively easy and repeated access to the study for a wide range of both local and overseas doctoral research students.

Thus, a cross-sectional and longitudinal, web-based, mixed methods study was designed to enable the collection, analysis, and interpretation of both quantitative and qualitative data across a 12-month period. Using Leech and Onwuegbuzie’s (2009) three dimensional typology of mixed methods, the design can best be described as being fully mixed, as giving equal status to quantitative and qualitative data, and as including both consecutive and sequential elements of time orientation due to its repeated measures component. The study design was established prior to data collection, with qualitative data collection techniques embedded within quantitative methods. Data analysis was undertaken after all data collection had been completed. The results of the cross-sectional quantitative analyses which examine the relative utility of the three potential self-monitoring measures are contained in Chapter 5. Chapter 6 presents the cross-
sectional qualitative analyses regarding the alignment of self-monitoring scores and comments representing self-regulatory efforts. The longitudinal quantitative analyses that examine the self-monitoring scores over time appear in Chapter 7. The analyses of participants’ comments about their experience of participating in the self-monitoring process are presented in Chapter 8, along with further quantitative analyses associated with these comments. All the results are integrated and discussed in Chapter 9.

As previously mentioned, this study was itself one of the components of a longitudinal, multi-component, mixed methods design project examining students’ metacognitive profiles and their experience of doctoral candidature. Although this study differs by looking at self-regulation more broadly, understanding the current study requires a description of how it was situated within the larger project. It is also important to note that while the data collection for the current study occurred under the auspices of the larger project, this thesis represents the individual and original work of the author, who was also the project manager for the larger project.

The next section of this chapter describes how participants were recruited first to the larger project, and then to the current study. Following that, the demographic and candidature details of the participants in the current study are provided.

4.3 PARTICIPANTS

4.3.1 Recruitment process

After obtaining Ethics clearance from the University of Newcastle (UoN) Human Research Ethics Committee in November 2009, recruitment to the larger project commenced when invitations were emailed in February 2010 from the UoN Dean of Graduate Studies to all UoN students currently enrolled in a PhD. Due to the structure of the PhD degree varying across disciplines at UoN, the invitation to participate was extended to Master of Philosophy students in Engineering who were intending to upgrade to the PhD.

In April 2010, having ensured the recruitment process functioned satisfactorily, invitations to participate were extended to all 38 publicly-funded Australian universities and to several overseas universities offering an English-speaking PhD programme. The invitations were emailed by the Chief Investigator of the project, Professor Sid Bourke (please note: not a Supervisor of this thesis), to the Office of Graduate Studies (or equivalent) of each of these universities (please see Appendices 11.2 and 11.3). This process was repeated in March 2011.
with 22 overseas universities in Great Britain, Canada, New Zealand, and South Africa, which were selected for inclusion as due to offering English-speaking PhD programmes in the ‘dissertation only’ format.

Attached to the Office of Graduate Studies’ email was an invitation which could be disseminated to all current PhD students within the body of an email or as an email attachment if desired (please see Appendices 11.4 and 11.5). Where PhD programmes involved a mandatory coursework component prior to the commencement of the thesis, only those in the thesis stage of candidature were eligible to participate. Student invitations generally appeared to have been distributed via student email addresses, or by inclusion of the project website hyperlink in an online postgraduate student newsletter. Recruitment to the whole project was staggered, being dependent on when the invitations were sent out to students by the participating universities, and when individual students received and responded to the invitation, and thus data collection continued for almost three years, finishing in December 2012.

Regardless of the format in which it was distributed, the student invitation contained a hyperlink to the Participant Information Statement and Consent Form for the first component of the study on the project website. These forms are reproduced in Appendices 11.6 and 11.7 respectively. This first component of the project was comprised of the Initial Survey, a 185 item online questionnaire, and the Follow-up Survey which was a 158 item online questionnaire completed 12 months later. Consent to participate in the Initial and Follow-up Surveys component was indicated by clicking the ‘yes’ button. This opened a registration page which required the input of an email address for a username, and a participant-chosen password. After registering, the Survey Menu and instruction page opened and the student was able to complete the Initial Survey in one or more sessions as desired. When completing the Initial Survey, participants were asked to nominate the institution in which they were enrolled. From this, it appears that 33 of the 39 invited Australian universities distributed the email invitations to their students. The response rate was impossible to determine as estimates of the number of invitations distributed to students were provided by only three universities. It is also not known how many universities sent the reminder email two weeks after the first invitation. Of the invitations despatched, it is not known how many were actually received, opened and read by the students. Anecdotal evidence received was that for unknown reasons not all students at participating universities received the invitation; in other cases the email invitations was forwarded to spam or deleted without reading. Therefore, the response rate could not be calculated in terms of a percentage of the total PhD student population of the responding universities. While the response rate is
clearly low, this has not been unusual for online surveys over the past decade (Dillman, Reips, & Matzat, 2010; Frippiat, Marquis, & Wiles-Portier, 2010; Sánchez-Fernández, Muñoz-Leiva, & Montoro-Ríos, 2012). Given the exploratory nature of the current study, a low response rate was not considered problematic, and the representativeness of the sample was considered to be a higher priority.

After completing the Initial Survey, a webpage opened which contained the Participant Information Statement and Consent Form for the second longitudinal component in the project, the Journey Tracking Survey component. These forms are reproduced in Appendices 11.8 and 11.9 respectively. Again, consent was indicated by clicking the ‘Yes’ button. The Journey Tracking Survey is the subject of the current study, and will be described in more detail later in this chapter.

Details of the participants in the Journey Tracking Survey process are presented in the next section. Throughout the remainder of this thesis, the Journey Tracking Survey is usually referred to in an abbreviated form: the ‘JTS’.

4.3.2 Participation rates

The differing participation rates across the JTS are explained first, and then presented in a diagram at the end of this section. Of the 1685 participants who completed the Initial Survey of the project, 75% (n = 1257) subsequently agreed to participate in the JTS component. Considering that participants were required to complete a short online questionnaire every month for 12 months in the JTS component, in addition to completion of the Initial and Follow-up Surveys, this was regarded as a very acceptable response rate by this population for this component of the project.

Of the 1257 of the Initial Survey participants who agreed to take part in the JTS process, 93% of participants (n = 1167) completed at least one month of the JTS, and 74% of participants (n = 922) completed at least 6 months. Seven per cent of the participants (n = 90) who agreed to participate did not complete any surveys. Incomplete survey sets were expected due to participants permanently ceasing participation upon submission of the thesis, or to withdrawal from PhD candidature or this study. In other cases, surveys were missed due to participants lacking internet access during fieldwork, not receiving the reminders due to email or internet related problems, being on leave or a suspension of studies, or choosing not to complete the
survey for other reasons. Participation in the JTS can be broken down into the four broad groups that appear below in Table 1.

Table 1

<table>
<thead>
<tr>
<th>JTS Process Participation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total JTS Months Completed</strong></td>
</tr>
<tr>
<td>All 12</td>
</tr>
<tr>
<td>6 – 11</td>
</tr>
<tr>
<td>1 – 5</td>
</tr>
<tr>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

Further, there was a wide range of response patterns within these groups. For example, six surveys can be completed across 12 months in a multitude of ways. Due to this variability, a subset of this group of participants was chosen as the focus of the quantitative analyses to address the first three research questions: the survey responses from the 1056 participants who completed at least the first month (‘Month 1’) of the JTS (reported in Chapter 5).

Of this group of 1056 participants, 151 provided written comments within their Month 1 survey response, and this data was used in the qualitative analysis to address Research Question 4 (reported in Chapter 6).

The quantitative analyses addressing Research Questions 5 and 6 were based on the data of the 800 Month 1 participants who had also completed at least six other months’ surveys (reported in Chapter 7).

For the qualitative analyses relating to Research Question 7, data in the form of feedback about experiences of the JTS process was provided by 181 participants who formed part of the group of 1167 participants who had completed at least one JTS (reported in Chapter 8). However, 172 of these participants had completed Month 1 and at least six other monthly surveys, and this group of participants provided the data for the quantitative analysis pertaining to Research Question 8 (also reported in Chapter 8).

A summary of the sampling source and number of participants for the analyses reported in Chapters 5 through 8 is provided in Figure 3.
At the time of consenting to participate in the current study, all participants had just completed the Initial Survey of the larger project. The Initial Survey collected demographic and candidature information, and also metacognitive profiling information, although participants did not receive any feedback regarding these results. The demographic and candidature information of relevance to the current study is presented next.
4.3.3 Background demographic factors

4.3.3.1 Gender

The majority (72%) of the 1056 participants were female \( n = 765 \). The higher ratio of females to males in this sample is consistent with the changing enrolment patterns for doctorate by research courses in Australia in recent decades (Edwards, Radloff, & Coates, 2009; Edwards, 2010). However, while the enrolment data for 2007 showed that females (50.4%) outnumbered males (Department of Education, Employment & Workplace Relations [DEEWR], 2008), the even higher proportion seen in this sample may reflect the generally higher response rate to surveys by females, certainly in higher education student samples (Sax, Gilmartin, & Bryant, 2003; Sax, Gilmartin, Lee, & Hagedorn, 2008).

4.3.3.2 Age

The participants ranged in age from 21 years to 75 years of age. As expected for the PhD student population, the distribution of ages in the sample was positively skewed, with a median age of 34 years. Therefore, participants were divided into four age groups for data analysis purposes. Participants aged 21 to 29 years were allocated to the ‘In 20s’ group, participants aged 30 to 39 years were allocated to the ‘In 30s’ group, and participants aged from 40 to 49 were allocated to the ‘In 40s’ group. Grouping the remainder of the sample as evenly as possible meant allocating all participants aged 50 and over to the ‘50s plus’ group. The distribution of participants across these age groups is presented in Table 2. The proportion of participants in each age group closely resembles those reported for all doctoral research students enrolled in Australian institutions in 2010 (DEEWR, 2010).

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Number (%) of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>In 20s</td>
<td>433 (41%)</td>
</tr>
<tr>
<td>In 30s</td>
<td>252 (24%)</td>
</tr>
<tr>
<td>In 40s</td>
<td>207 (20%)</td>
</tr>
<tr>
<td>50s plus</td>
<td>164 (15%)</td>
</tr>
<tr>
<td>Total</td>
<td>1056 (100)</td>
</tr>
</tbody>
</table>

Table 2

Distribution of Participants by Age Group
4.3.4 Current candidature factors

4.3.4.1 Stage of candidature

Each participant’s years of PhD candidature was computed into a full-time equivalent (FTE) period, taking into account the reported proportion of full-time and part-time enrolment as recommended by Bourke et al. (2004). This is consistent with the full-time equivalence measures of enrolment time used for student funding by the Australian Commonwealth Government’s Research Training Scheme (Bourke et al., 2004).

Years of candidature ranged from less than a month to 8.6 years FTE, and the distribution was significantly positively skewed with a median of 1.7 years. Therefore, participants were divided into three ‘Stage of Candidature’ groups for analysis purposes. The term ‘Early Candidature’ was used to define the first FTE year of candidature, ‘Mid Candidature’ referred to the 18-month period from the beginning of the second year through to 2.5 FTE years of candidature, and ‘Late Candidature’ was used to refer to all candidacy times beyond 2.5 FTE years. Table 3 presents the distribution of participants across the stage of candidature groups.

Table 3
Distribution of Participants by Stage of Candidature

<table>
<thead>
<tr>
<th>Stage of Candidature</th>
<th>Number (%) of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early (&lt; 12 months)</td>
<td>355 (33.6)</td>
</tr>
<tr>
<td>Mid (12 to 30 months)</td>
<td>410 (38.8)</td>
</tr>
<tr>
<td>Late (&gt; 30 months)</td>
<td>291 (27.6)</td>
</tr>
<tr>
<td>Total</td>
<td>1056 (100)</td>
</tr>
</tbody>
</table>

4.3.4.2 Enrolment load

At the time of the Initial Survey, 71% (n = 746) of the sample were enrolled on a full-time basis. While it is difficult to ascertain the actual proportion of full-time students in this population, Evans (2007) estimated that 61% of doctoral students, including professional doctorates, were enrolled full-time in Australian institutions. Excluding professional doctorate students from this estimate is likely to reveal that PhD students have an even higher full-time enrolment rate.
4.3.4.3 Broad field of study

The participants represented a diverse range of disciplines. However, to explore a common division in the literature, participants were divided into two broad fields of study. The ‘Arts’ field of study incorporated the 49% of participants ($n = 517$) who were in Arts, Humanities, Social Sciences, Education, Business, and Law disciplines, while the ‘Science’ field of study included the 51% ($n = 539$) of participants in Science, Health, Engineering, and Architecture disciplines.

4.3.4.4 University location

Eighty one per cent ($n = 859$) of the 1056 participants were from Australian universities, with the other 19% ($n = 197$) of participants were enrolled in universities in Great Britain, Canada, New Zealand, and South Africa. Participation details of specific institutions are not provided for confidentiality reasons.

The survey measures used in the current study are described in the next section of this chapter.

4.4 INSTRUMENTS

Data for this study was drawn from three sources – the Initial Survey, the JTS, and the Follow-up Survey – as explained next. While the JTS data were the focus of this exploratory study, classificatory demographic and candidature variable data were obtained from the Initial and Follow-up Surveys.

4.4.1 Initial Survey

Background demographic and current candidature information was collected in the Initial Survey, a 185 item online questionnaire, which each participant completed prior to electing to participate in the JTS process. Further details about the contents of the Initial Survey are included in Appendix 11.10. The data used in this study pertained to the background demographic factors of age and gender, as well as the current candidature factors of stage of candidature, enrolment load, broad field of study, and university location at the time of completing the Initial Survey.
4.4.2 Journey Tracking Survey (JTS)

The Journey Tracking Survey is an online questionnaire developed for this study as a means of exploring students’ responses to a self-monitoring task during the doctoral research process. Three self-rating measures were embedded in this survey for use in self-monitoring, as described in more detail in Section 4.5. Although all three measures were administered in parallel over the course of one year, a one-item scale referred to as the ‘Doctoral Progress’ measure was used to provide visual feedback via a graph to one half of the participants, a procedure described in Section 4.5.2.

The JTS thus comprises a total of 24 items divided into 3 sections. The first section is entitled ‘Well-being’ and contains six mental health items, and the second section is entitled ‘Goals Scale for the Present’ and contains the six item State Hope scale. The third section is entitled ‘Doctoral Journey’, and contains 11 doctoral research activity items in addition to the single item Doctoral Progress measure used in this study. These sections and their contents are described below, in the order in which they were presented in the survey.

4.4.2.1 Section 1. “Well-being” - Mental Health

As discussed in Chapter 3, it was considered important to use a sufficiently broad measure of mental health that was able to detect individual differences in functioning across the spectrum, from psychological well-being to psychological distress. The five item Mental Health Inventory (MHI-5; Berwick et al., 1991) was derived from the 38-item Mental Health Inventory (MHI-38; Veit & Ware, 1983), and has been found to be a brief, valid, and reliable indicator of mental health (McCabe, Thomas, Brazier, & Coleman, 1996). The MHI-5 score is underpinned by a single mental health factor, representing a bipolar psychological distress versus psychological well-being dimension (McHorney & Ware, 1995; Stewart, Hays, & Ware, 1988; Veit & Ware, 1983). Therefore, the MHI-5 can be scored and interpreted in terms of levels of psychological well-being or of psychological distress. Assessing levels of anxiety and depression over the previous month, the MHI-5 can be used as a screening tool for common mental disorders (Rumpf, Meyer, Hapke, & John, 2001), and it has been used extensively in Australia and internationally in clinical and community research (McHorney & Ware, 1995; Pirkis, Burgess, Kirk, Dodson, & Coombs, 2005). It has been translated into a number of other major languages, for use in Europe (e.g. Korkeila et al., 2007) and Japan (Yamazaki, Fukuhara, & Green, 2005). Although short, it has sound psychometric properties, with reliability and validity similar to
those of the 18-item Mental Health Inventory (MHI-18; Berwick et al., 1991) and the 12 item General Health Questionnaire (Hoeymans, Garssen, Westert, & Verhaak, 2004).

It is also important for self-monitoring purposes that a measure is adequately stable yet sufficiently sensitive to change, so that individuals can assess themselves against their own standards or against relevant population norms. The UK version of the MHI-5 (Brazier et al., 1992) was found to be relatively stable across a four week period according to test-retest reliability scores with a small sample of university students in Ireland (Houghton et al., 2010). While significant, this correlation coefficient of .403 could also be interpreted as indicating the scale is sufficiently sensitive to change for the purposes of a self-monitoring measure.

Although normative data for the original version of the MHI-5 (Berwick et al., 1991) is available from 1995 for the Australian general population (Australian Bureau of Statistics, 1997), this is not necessarily relevant for this international study of students. Moreover, for the purposes of this longitudinal exploratory study, retention of participants was ultimately a higher priority than comparability of MHI-5 scores with other studies. Previous studies have observed difficulties in the comprehension of certain MHI items for respondents from a non-English speaking background (NESB; Pirkis et al., 2005; Queensland Transcultural Mental Health Centre (QTMHC), 2005). Since this study was targeting a broad range of students, it was decided to pilot the scale with a small convenience sample of international PhD students and colleagues. This pilot indicated that the colloquial US wording of two items was potentially problematic for the diverse range of international students attending either Australian or overseas universities who might have participated in the study. Similarly, these particular idioms were not understood by NESB community members in Australia (QTMHC, 2005).

One of these items, “have you felt downhearted and blue”, has been identified as the most discriminating item on the scale (Berwick et al., 1991), and has been used as a single-item measure to screen for depression (Pomeroy, Clark, & Philp, 2001). In the three decades since this item appeared in the original 38-item Mental Health Inventory (MHI; Veit & Ware, 1983) from which it was extracted, a number of alternatives to the US wording have been used. For example, the term “down” has been used in an Australian version (Sanson-Fisher & Perkins, 1998), “downhearted and low” in a UK version (Brazier et al., 1992), and “downhearted and sad” in other studies (e.g. Atchison et al., 2006; Ponce, Hays, & Cunningham, 2006; Sentell & Shumway, 2004). The latter version was chosen as the most comprehensible for participants whose first language was not English.
The second item of concern to colleagues and international students was “have you felt so down in the dumps that nothing could cheer you up?”. The Macquarie Dictionary (Delbridge, 2001) describes the word ‘down’ as a colloquialism synonymous with ‘depressed’ or ‘unhappy’, and ‘down in the dumps’ as another colloquialism meaning ‘dull, gloomy, state of mind’. Similarly, a review of online dictionary definitions showed that ‘down in the dumps’ is typically described in terms of being sad or depressed. Consequently, to provide more clarity for international students, the item was reworded as “have you felt so down or depressed that nothing could cheer you up?”. Finally, while MHI-5 item ordering varies in the literature, the current study follows the order used or suggested by a number of Australian and overseas sources (e.g., Department of Health & Ageing, 2003; Houghton et al., 2010; Ware & Gandek, 1994).

For each item in the MHI-5, participants were asked to select one of six response categories that best described how they had been feeling during the past month. The response scale, with scores shown in brackets, was: None of the time (100), A little of the time (80), Some of the time (60), A good bit of the time (40), Most of the time (20), and All of the time (0). The scoring was reversed for the third and fifth items as they refer to positive feelings. The score was calculated from an average of the scores for all five items. Thus, the highest score of 100 on the MHI-5 represents feelings of peace, happiness, and calm all of the time, while the lowest score of zero represents constant feelings of nervousness and depression (Ware & Gandek, 1998).

As the MHI-5 was modified to suit the purposes of this international study, comparisons with results from other studies do need to be undertaken with caution. However it should be noted that McHorney & Ware (1995) found that five alternate forms of the MHI-5 performed similarly. These researchers also demonstrated that any discrepancies between scores are more likely to be problematic when considered at the individual level, and that differences tend to disappear when averaged across groups. When compared with the alternate forms tested by McHorney & Ware (1995), the modifications in this study are minor. Therefore, while it may still be possible to compare group scores with this modified version of the MHI-5, it may be less meaningful to assess an individual’s scores in relation to population norms. This is not problematic for the current study: there do not appear to be any published norms appropriate for this purpose for an international study of doctoral research students. Instead, scores will be compared only with other scores using this same measure.

The MHI-5 is a public domain instrument and is reproduced in Table 4, along with the minor modifications used in this study.
Table 4
The 5 Item Mental Health Inventory (MHI-5; Berwick et al., 1991)

1. (1) How much of the time, during the past month, have you been a very nervous person?
2. (5) How often, during the past month, have you felt so down *or* depressed (in the dumps) that nothing could cheer you up?
3. (2) How much of the time, during the past month, have you felt calm and peaceful?
4. (3) How much of the time, during the past month, have you felt downhearted *and* sad (blue)?
5. (4) During the past month, how much of the time were you a happy person?

*Note.* Italics = modification; (parentheses) = original US wording and numbering.

In this study, the internal reliability estimate of the MHI-5 for Month 1 as measured by Cronbach’s alpha was .881. Nunnally (1978) suggested that self-report indices with internal reliabilities above .70 are acceptable for research purposes. The internal reliability estimates for the remaining months of the JTS process were similarly high, and are listed in Appendix 11.11.

A sixth question, also from the MHI-38 (Veit & Ware, 1983), is included as the first item in the “Well-being” scale of the JTS: “How happy, satisfied, or pleased have you been with your personal life during the past month?”, and rated on a six point response scale from ‘Extremely happy, could not have been more satisfied or pleased’ to ‘Very dissatisfied, unhappy most of the time’. This question was included to allow research questions regarding subjective well-being to be addressed in future analyses, but was not included in the analyses for the present study as the choice was made to focus instead on the narrower measure of mental health.

4.4.2.2 Section 2. “Goals Scale for the Present” – State Hope Scale

The State Hope Scale (Snyder et al., 1996) is a self-report instrument containing six multiple choice items. Three of these items measure ‘agency’ which, according to Snyder et al. (1996), is “the sense of successful determination in regard to goals”, while the three ‘pathways’ items relate to “cognitive appraisals of their ability to overcome goal-related obstacles and reach those goals”. The ‘Goals Scale for the Present’ is an alternative name for the State Hope Scale (Snyder et al., 1996), and was used as recommended as the title for this section of the online survey.
Following an Australian study by Venning, Eliott, Kettler, and Wilson (2009), the first item was slightly re-worded to replace the North American colloquialism ‘in a jam’ with a more widely understood phrase, ‘in a difficult situation’. Participants were instructed to read each item, and to select the response that best described how they were thinking about themselves at the present time. The eight response categories were labelled “Definitely false”, “Mostly false”, “Somewhat false”, “Slightly false”, “Slightly true”, “Somewhat true”, “Mostly true”, and “Definitely true”. These were scored from 1 to 8 respectively, and summed to provide a scale score. Higher scores on the State Hope Scale represent higher levels of hopeful thinking.

While Agency and Pathways subscale scores are often analysed separately in addition to the full scale score of the Adult Dispositional Hope Scale, or Trait Hope Scale (Snyder, Harris, et al., 1991), this analytic approach is less commonly conducted for the State Hope Scale, and the full six-item scale score was used in this study. Indeed, Snyder, Harris, et al. (1991) contended that together the Pathways and Agency subscales reflect a higher-order latent construct of hope.

In their original study reporting the development of the State Hope Scale, Snyder et al. (1996) stated that correlations across any two days within a four week period varied from .48 to .93, indicating the sensitivity of the scale to changes in hope.

The internal reliability estimate of the State Hope Scale for Month 1 was high, with a Cronbach’s alpha of .903. The internal reliability estimates for all months of the State Hope Scale were similarly high, and are listed in Appendix 11.11.

4.4.2.3 Section 3. “Doctoral Journey” – Doctoral Progress

A 12-item scale regarding students’ doctoral research activities was designed for this study, and was labelled “Doctoral Journey” (please see Figure 4). The first 11 items asked students to consider and evaluate their involvement in a range of common doctoral activities over the previous month. As discussed in previous chapters, the nature of doctoral research means that students would not be expected to engage in all of these activities each month, so it was not anticipated that generating a summated score based on these 11 items would be either feasible or meaningful. Instead, the first 11 items functioned to orientate the student to the types of activities on which to reflect when answering the twelfth item in the scale. In contrast to the previous items, this final item was concerned with the global construct of feelings about doctoral research progress, and as such could be assumed to be applicable at any time during
candidature. This item was used as a single-item measure in this study and asked “Overall, how have you felt about your doctoral progress over the past month?”. It is important to recall that participants were eligible to participate in this study if they were engaged in the doctoral research component, rather than any coursework component, of their PhD programme. Therefore, the terms ‘doctoral progress’ and ‘doctoral research progress’ can be used interchangeably in this study, but for brevity the title ‘Doctoral Progress’ was given to this JTS measure.

Although the reliability of single-item measures for psychological constructs can be questioned, these measures can be considered acceptable and even preferable for constructs that can be readily understood by the respondent (e.g., Bowling, 2005; Wanous, Reichers, & Hudy, 1997). It is noteworthy here that the decision to use the single-item Doctoral Progress measure later received support from investigations which showed that only 26 of a possible 1056 participants completed all items in this scale in Month 1, and this increased to only 69 when the less specific Item 11 (‘Other’) was excluded. Furthermore, Spearman’s rank correlation coefficients found strong and significant relationships between the Doctoral Progress measure and all other items in the Doctoral Journey scale (please see Appendix 11).

The Doctoral Progress measure was scored on a nine-point discrete visual analogue scale. To allow sufficient sensitivity to changes in students’ responses over time, this scale comprised four positive and four negative response options as well as a neutral or ambivalent scale midpoint. Three of the response options were anchored with verbal descriptions: the extremes of the scale were labelled as “As unhappy as I could feel about it” (later scored as ‘-4’) and “As happy as I could feel about it” (later scored as ‘4’) respectively, and the midpoint was labelled “Feel neither happy nor unhappy about it” (later scored as ‘zero’). A similar response scale was used for the first 11 items on the Doctoral Journey scale, but for the reasons outlined earlier in this section an additional option to choose ‘Not currently applicable’ was available for these items.

Like all the Doctoral Journey items, the Doctoral Progress measure focuses on the student’s affective response to their doctoral research progress. Affect can be defined in terms of an individual’s subjective experience of feelings and moods – rather than thoughts – at any point in time (Russell & Carroll, 1999), although neurobiological evidence suggests that the differences between affect and cognition are phenomenological rather than ontological (Duncan & Barrett,
The term “core affect” refers to a basic state that can be described by two psychological properties: hedonic valence (feeling good or bad) and, to a lesser extent, arousal (feeling energised or enervated) (Duncan & Barrett, 2007; Russell, 2003). Core affect is influenced by many factors, and influences many aspects of human behaviour (Russell, 2003), including those associated with attention and cognitive processing, language, and memory (Duncan & Barrett, 2007). Indeed, Duncan and Barrett (2007, p. 1185) have likened core affect to a “neurophysiologic barometer of the individual’s relationship to an environment at a given point in time”, with self-reported feelings being akin to the barometer readings. Therefore, for all the Doctoral Journey items regarding participants’ feelings about working on doctoral tasks and about their doctoral research progress, a bipolar response scale based on the hedonic valence of pleasure versus displeasure was considered an appropriate and parsimonious choice. Furthermore, regarding positive and negative affect as polar opposites has received ample support in the research literature (Russell & Carroll, 1999).

The final section of the Doctoral Journey was a ‘Comments’ text box, in which participants could respond to the following: “If you wish, please write a short paragraph about any significant events relating to your candidature, or about how you have been feeling about your doctoral progress over the past month.” This item was included in the present study.
A screenshot of a completed Doctoral Journey section of the JTS appears below in Figure 4. The ‘Switch to Follow-up Survey’ link in the top left corner was included in Month 12, to enable easy access to the Follow-up Survey, with which it coincided.

**Figure 4.** Screenshot of Section 3 of the JTS.
4.4.2.4 JTS Process Feedback

After completing the final JTS in Month 12, participants were invited to provide feedback about their experience of the JTS process, by writing within a text box in response to the open-ended request: “We’d appreciate any feedback about your experience of the Journey Tracking Survey process”.

4.4.3 Follow-up Survey

An email request to complete the Follow-up Survey was sent in Month 12, at the same time as the monthly email reminder for participants to complete their JTS. The Follow-up Survey was an abbreviated version of the Initial Survey, and provided the information about each participant’s candidature status that was required for this study. That is, participants were asked if they were still enrolled, had withdrawn from candidature, were on leave, had submitted their thesis, or had graduated. Unless the participant was still enrolled, dates and other details of these events were requested. All items in the Follow-up Survey were completed by 855 (81%) of the participants in this study.

4.5 PROCEDURE

4.5.1 Journey Tracking Survey process

Commencing one month after completion of the Initial Survey, participants who had consented to participate in the JTS component were sent an email each month asking them to access the website to complete the JTS online. This email was automatically generated by the website software, and contained a hyperlink to the website along with the participant’s username and password to facilitate login. Participants were then asked to complete and submit the JTS. If the JTS was not completed and submitted within one week after the email was sent, then a reminder email was automatically generated requesting the participant to complete and submit the survey within the following week. This procedure was repeated until the Month 12 survey had been lodged.

4.5.2 Graph Feedback groups

At the time of consenting to participate in the JTS process, participants were randomly allocated into one of two groups. Participants in the ‘Graph’ group were able to view an individualised
graph generated from their previous Doctoral Progress scores (as described in Section 4.4.2.3) when they logged in to do the JTS each month. This was intended to provide visual feedback for self-monitoring purposes, and to facilitate the participant responding relative to previous entries. In contrast, participants in the ‘No Graph’ group viewed their graph for the first time, in its entirety, after completing the final (Month 12) JTS. An example of a feedback graph that was completed across a year of self-monitoring is provided below in Figure 5.

Figure 5. Screenshot of a completed feedback graph in Month 12.

In addition, to enable a comparison of this research methodology with a previous study by a colleague of the author’s research group (Shaw, 2009), which involved retrospective plotting of Honours students’ journeys, participants in the Feedback group had the option of changing previous responses on the graph each month if desired, and all participants were able to do so after the Month 12 JTS had been completed. All graph data points (original and altered) were saved for data analysis. For this study, however, only the data point originally entered for each month was used. Further, this study controlled for possible effects of this option by analysing Month 1 data in isolation, as this was collected prior to any participants being able to view graphs generated from previous scores. Of the 1056 participants who completed the Month 1 JTS survey, 553 (52%) were in the ‘No Graph’ group, and 503 (48%) were in the ‘Graph’ group.
4.5.3 Journey Tracking Survey process feedback invitation

After participants had submitted their final JTS in Month 12, a new webpage appeared, inviting participants to comment on their experience of the survey process (as described in 4.4.2.4). Participants were able to type their feedback into an accompanying text box. Participants were able to respond anonymously to this invitation due to the online data collection procedures explained earlier in this chapter.

4.6 WEBSITE MANAGEMENT

All website management and online data collection processes were conducted by an external software engineering company with experience in conducting confidential medical research surveys. Therefore, there was no need for contact between the participant and the researcher during the JTS process. Where desired, participants were able to contact the research team for enquiries via the email address provided on the website.

4.7 DATA ANALYSIS

Research Questions 1, 2, 3, 5, and 6 were addressed using quantitative analysis techniques alone, while Research Question 7 was addressed via qualitative analysis.

Research Question 4 was addressed by creating two groups of participants based on their Doctoral Progress scores, then conducting a qualitative analysis to compare participants’ comments about their recent doctoral research progress. Conversely, Research Question 8 was addressed by creating four groups of participants based on the qualitative analyses conducted for Research Question 7, and then conducting a quantitative analysis regarding their Doctoral Progress scores.

4.7.1 Quantitative analyses

All online survey data were retrieved electronically from the database of the website management company. Data files were inspected, cleaned, and prepared for analysis. Statistical analyses of quantitative survey data were conducted using IBM SPSS Statistics for Windows (Version 21) software.
For Research Questions 1, 2, and 3, statistical analyses were conducted to examine the cross-sectional relationships between Month 1 Doctoral Progress scores and:

- background demographic factors (age and gender),
- current candidature factors (stage of candidature, enrolment load, broad field of study, and university location), and
- MHI-5 and State Hope scores.

Following this, the MHI-5 and State Hope scores were each subjected to the analyses regarding the abovementioned demographic and candidature variables.

As will be explained in Chapter 5, it was necessary to use non-parametric methods to analyse the quantitative data in this study. The Mann-Whitney U test is based on the differences in the ranked positions of scores in different groups, and was used as a non-parametric equivalent of the independent \( t \)-test for the analyses involving two groups (that is, gender, enrolment load, broad field of study, and university location). The Kruskal-Wallis H test, which is also rank-based, was used as a non-parametric alternative to the one-way analysis of variance to allow the comparison of more than two independent groups (here this included age group and stage of candidature). As the Kruskal-Wallis H test generates an omnibus test statistic, significant results were followed by post-hoc pairwise comparisons generated by SPSS to explore the nature of the differences between sub-groups on the independent variable.

A similar set of analyses was conducted to address Research Questions 5, 6, and 8, this time taking a longitudinal perspective to investigate the stability of Doctoral Progress scores. Averaged Doctoral Progress scores were generated by pooling and averaging an individual’s scores collected across the remaining months of the self-observation process. The relationships within and between groups on these averaged Doctoral Progress scores along with the changes from Month 1 scores were examined on the following variables:

- background demographic factors (age and gender),
- current candidature factors (enrolment load, broad field of study, and university location),
- graph feedback group,
- Month 1 Doctoral Progress scores,
- candidature status in Month 12 of the JTS process, and
- JTS feedback group.
Month 1 stage of candidature was not included as a factor in the analyses with the averaged Doctoral Progress scores, as most participants changed stage during the course of the 12 months of the JTS process.

Again, Mann-Whitney U tests and Kruskal-Wallis H tests were used for between group analyses. The Related-Samples Wilcoxon Signed Rank test was used for all the repeated-measures analyses, as it is a non-parametric equivalent to the dependent $t$-test.

In further analyses relating to Research Questions 5, 6, and 8, Pearson’s chi-square tests were used to investigate the relationships between categorical variables.

An alpha level of .05 was employed for all statistical analyses. Two-tailed $p$-values should be assumed, and exact $p$-values have been reported for all statistical analyses except for $p$-values lower than .001 which have been denoted as $p < .001$, and where $p$-values exceed .05 and are designated as $p > .05$. More information about all these tests is available in, for example, Field (2011).

4.7.2 Qualitative analyses

Research questions 4 and 7 were approached qualitatively. The JTS Comments data collected in Month 1 were used in the analyses pertaining to Research Question 4, while the JTS Feedback data collected at the conclusion of the Month 12 survey were used to address Research Question 7.

For both of these datasets, participants had typed their responses into text boxes in the online survey, and little data cleaning was required. Where comments have been reproduced in the findings, any spelling or grammatical errors were corrected only when deemed necessary for ease of reading.

Thematic analysis (Braun & Clarke, 2006) was the qualitative analytic method used to identify, analyse, and report themes from these data. While thematic analysis can be perceived as a coding process common to the predominant analytic methods, such as grounded theory, it is also widely used in psychology research as an independent method, offering flexibility in terms of theoretical freedom and hence compatibility with a range of interpretive paradigms (Braun & Clarke, 2006). Addressing these research questions required taking a theoretical, rather than an inductive, approach to thematic analysis (Braun & Clarke, 2006), as will be discussed in more detail in the next two sections relating to the research questions involved.
4.7.2.1 Research Question 4 (Chapter 6)

Responding to Research Question 4 involved identifying whether there was any evidence in the Month 1 JTS Comments of participants’ use of self-regulation, and if so, whether this was associated with participants’ Month 1 Doctoral Progress scores. Zimmerman’s (2000) model provided the theoretical framework for identifying instances of participants’ descriptions of self-regulatory processes.

The decision on how the Month 1 Doctoral Progress scores might be used to divide participants into groups for this analysis was made on the basis of the quantitative analyses presented in Chapter 5. As will be described in Chapter 6, the distribution of scores suggested that this research question could be approached by comparing the Month 1 JTS Comments of participants who scored at either end of the range of Doctoral Progress scores. Thus, this analysis used the comments of participants drawn from two groups of Month 1 Doctoral Progress scores: one group containing those who scored either -4 or -3, and another group who scored either 3 or 4. Comments about progress were not provided by all participants who completed Month 1 of the JTS. The proportions of participants who commented, expressed as percentages of the relevant group, and their Doctoral Progress scores appear in Table 5.

Table 5
Number of Commenting Participants by Doctoral Progress Score Group

<table>
<thead>
<tr>
<th>Month 1 Doctoral Progress score</th>
<th>Number of participants in study with this score</th>
<th>Number of participants who commented (% of total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4 or -3 (“Low”)</td>
<td>117 (11.1% of 1056)</td>
<td>68 (58.1% of 117)</td>
</tr>
<tr>
<td>3 or 4 (“High”)</td>
<td>255 (24.1% of 1056)</td>
<td>83 (32.5% of 255)</td>
</tr>
<tr>
<td>Total</td>
<td>372 (35.2% of total 1056)</td>
<td>151 (40.6% of total 372)</td>
</tr>
</tbody>
</table>

Those participants who chose to comment were fairly representative of the larger sample of Month 1 JTS participants in terms of gender, enrolment load, and university location, however in both groups there was a higher percentage of comments made by participants in Arts-based rather than Science-based fields of study. In addition, the low scoring group was comprised of a higher proportion of participants aged 50 and older than was the high scoring group, as well as a lower proportion of participants aged in their 20s than was seen in the Month 1 group. In the high scoring group, a larger proportion of participants were in the ‘Late’ stage of candidature.
than were in the full Month 1 group. More detail about this breakdown is provided in Appendix 11.13, and further discussion of the implications of these differences is provided in Chapter 6.

Participants’ comments ranged in size from four to 358 words. The size of the data extract to be coded was generally at the level of a meaningful phrase or sentence that remained representative of the context. To explore these data in terms of what it revealed about individual differences in doctoral research students’ self-regulation, all comments were pooled and studied for indications of students’ knowledge or application of self-regulatory strategies or processes. Using NVivo10 qualitative analysis software to assist coding, the data were read repeatedly looking for instances of text that were relevant to each self-regulatory process in Zimmerman’s (2000) model. Concurrent note-taking was undertaken regarding observed patterns and anomalies. Each self-regulatory process was considered separately, and each data extract was assigned only once to each process code. However, the open-ended nature of the ‘comments’ question, the interrelationships among processes in this cyclical model of self-regulation, and the succinct nature of the comments, together meant that each data extract could be assigned to more than one self-regulatory process code. An iterative process of coding and reading continued until there was satisfactory delineation of the coding addressing each of the self-regulatory processes, as well as a sense of coherence among the data extracts collated within each of these codes.

Next, the comments associated with high and low Doctoral Progress scores in each coding category were compared to see if there were differences in the nature or frequency of the content regarding self-regulation. These findings are reported in Chapter 6.

4.7.2.2 Research Question 7 (Chapter 8)

This analysis drew on the written feedback received from the 181 participants who responded to the invitation to comment on their experience of taking part in the JTS process. Of the 903 participants who completed the Month 12 JTS, and thus viewed the invitation to provide feedback, 181 (20%) provided feedback regarding their experience of the process via this online option. The majority of these participants had completed the Month 1 survey, and almost all (96%) had completed at least six JTS.

Eighty per cent \( (n = 146) \) of the participants were female. The distributions of participants by gender, age, stage of candidature, enrolment status, broad field of study, and university location were similar to those of the full sample of 1056 participants described earlier in this chapter.
To address this final research question regarding participants’ responses to the self-monitoring method, three specific issues identified in the literature review as being central to the success of a self-monitoring method for doctoral research students guided coding development for the JTS Feedback data. The first issue related to the ‘logistics’ of participating in the JTS process, in order to determine whether the surveys were accessible and appropriate in terms of the time and effort required to complete them. The purpose of exploring the data in this way was to determine if any features of the survey format might encourage retention and engagement in the survey process, or might explain participant attrition from the study, and therefore could guide appropriate adjustments to the survey for future use.

The second issue related to the ‘relevance’ of the JTS content, and whether the survey questions bore a satisfactory relationship to participants’ experience of candidature. That is, to inform further refinement of the survey content and format if necessary, insights were required into doctoral research students’ perceptions of whether measures of feelings about recent doctoral research progress, mental health, and hope were useful measures to incorporate in a self-monitoring method.

The third issue related to participants’ ‘application’ of the JTS process, which was the extent to which participants reported using the survey process for self-monitoring purposes. Findings from this analysis may have the potential to increase the understanding of doctoral research students’ perceptions and use of self-observation processes during candidature.

With these issues in mind, and using NVivo10 qualitative analysis software to assist coding, the data were read repeatedly looking for instances of text that were relevant to each issue. Concurrent note-taking was undertaken regarding patterns observed and about content requiring further coding within or beyond each of the three issues. Each issue was considered separately, so that while each data extract was assigned to only one code within each issue, a data extract could also be assigned to codes within the two other issues. The size of the data extract coded was generally at the level of a meaningful phrase or sentence. An iterative process of coding and reading continued until there was satisfactory delineation of the coding addressing each of the three issues, that is, ‘logistics’, ‘relevance’, and ‘application’, as well as a sense of coherence among the data extracts collated within the codes for each issue. These codes were then collated into more general categories for reporting purposes, with the original three issues providing an organising framework for reporting the results of this analysis. Further quantitative analyses were then conducted on the basis of the ‘application’ issue findings, as described in Chapter 8.
In this analysis, identifying the range and content of the categories was considered more important and meaningful than estimating the prevalence of categories. There were two main reasons for this approach. Firstly, the open-ended nature of the invitation to provide feedback about the JTS process meant that each participant’s feedback did not necessarily answer all three issues. Secondly, the participants who provided feedback may not have been a representative sample of all the JTS participants. That is, participants who submitted their thesis, commenced a leave of absence, withdrew from candidature, or ceased responding to the surveys before Month 12 of the JTS process, were less likely to have completed the final survey or, therefore, to have responded to the feedback invitation. For these reasons, the prevalence of a particular response or category has usually been expressed in general terms, to convey that the nature of these is relative rather than absolute.

4.8 CHAPTER SUMMARY

This chapter described this cross-sectional and longitudinal, web-based, mixed methods study and how it was designed to explore students’ responses to a self-monitoring task based on measures regarding feelings about doctoral research progress, mental health, and state hope during PhD candidature. This study design addressed McCormack’s (2005) observation of the need for journeying with students to discern the factors associated with withdrawal from candidature, and Stubb et al.’s (2011) call for the use of longitudinal methods in doctoral education research, particularly in relation to the study of factors associated with doctoral research student well-being. More specifically, the study was designed to explore how students’ self-monitoring during the doctoral research process might reveal self-regulatory differences.

The results of the data analyses are presented in the following four chapters, commencing in Chapter 5 with the cross-sectional quantitative data analyses addressing Research Questions 1, 2, and 3.
5. A GLOBAL PROFILE: FINDINGS AND LIMITATIONS

5.1 INTRODUCTION

The prime purpose of this study was to explore the individual differences in doctoral students’ self-regulatory behaviours through an analysis of their self-monitoring of doctoral research progress. This chapter presents the results of the analyses addressing the first three specific research questions of this study:

1) Do students differ in their self-evaluations of recent doctoral research progress?
2) Are students’ self-evaluations of recent doctoral research progress associated with
   a) background demographic factors?
   b) current candidature factors?
3) How do students’ self-evaluations of recent doctoral research progress relate to their self-evaluations of mental health and state hope?

Using the cross-sectional quantitative data generated by participants’ responses to the first month of the JTS process, the first two research questions were addressed by examining the distribution of scores on the Doctoral Progress measure, and the associations of these scores with background demographic and current candidature factors.

To address the third research question, the Month 1 MHI-5 and State Hope Scale scores were examined in conjunction with the Doctoral Progress scores. Then, the Month 1 MHI-5 and State Hope Scale scores were each subjected separately to the same set of analyses undertaken with the Doctoral Progress scores.

Chapter 6 continues this exploration with a qualitative analysis of the data, examining whether participants’ evaluations of their recent doctoral research progress are associated with evidence of differences in self-reported self-regulatory efforts. Together with the results of this chapter, these analyses demonstrate how doctoral research students differ in their assessment of their doctoral research progress, and how they perceive the relationship of these with their self-regulatory efforts.
Chapter 7 then addresses the next set of research questions regarding the stability of the Doctoral Progress scores in the longer term, and what this reveals about doctoral research students’ self-regulatory efforts: Chapter 8 presents the findings relating to participants’ experiences of participating in the Journey Tracking Survey process, and what these reveal about self-regulation in the doctoral research context.

The chapter begins by considering the distribution of the Month 1 Doctoral Progress scores, followed by statistical analyses of the associations between these scores and background demographic factors (gender and age) and current candidature factors (stage of candidature, enrolment load, broad field of study, and university location). A similar series of analyses is repeated with the MHI-5 and State Hope Scale scores.

5.2 DOCTORAL PROGRESS – MONTH 1

*Research Question 1: Do students differ in their self-evaluations of recent doctoral research progress?*

5.2.1 Distribution of scores

The distribution of scores on the Doctoral Progress measure was inspected prior to performing further analyses. Doctoral Progress scores for the first month of the JTS were plotted as a frequency histogram in Figure 6. This histogram shows that the Doctoral Progress scores were negatively skewed, and made almost bimodal by the relatively lower responding to the ‘0’ at the centre of the response scale, which was a neutral position labelled “Neither happy nor unhappy”.

The normal distribution curve shown in red in Figure 6 was generated from the mean of 0.72 and the standard deviation of 2.23. The ceiling and floor effects evident in this sample suggest that the ordinal response scale for the Doctoral Progress scale could be extended, or more finely graduated, to allow a wider range of more nuanced responses.

As this scale was developed for the purposes of this study, there are no comparable data for other populations. However, while there was a wide variation in scores, the median of 1.0 suggests that at the time of the Month 1 JTS the majority of the participants were feeling relatively positive with their doctoral research progress over the previous month. Yet it is important to note that a large proportion of the participants (39%) scored zero or less, indicating
that they were feeling neutral or ambivalent (‘neither happy nor unhappy’) through to decidedly negative (‘as unhappy as I could feel’) about their recent doctoral research progress.

![Figure 6. Frequency histogram of Month 1 Doctoral Progress scores, n = 1056.](image)

Visual inspection of the Month 1 Doctoral Progress scores suggested that assumptions of normality were violated. While skewness and kurtosis statistics are less meaningful in large sample sizes, both deviated substantially from the zero expected in a normal distribution. The skewness (-0.450) was six times the size of its standard error (.075), and the kurtosis (-0.863) was almost six times the size of its standard error (.150). A one-sample Kolmogorov-Smirnov test confirmed that this degree of deviation from the normal distribution was significant \( (D = .176, p < .001) \).

Transforming this non-normal data was considered, however to explore the relationship between Doctoral Progress scores and self-regulatory efforts it was important to be able to map original scale scores against qualitative data from the participants’ JTS Comments. It is also important to note, as will be discussed in Sections 5.3.1 and 5.4.1, that neither the MHI-5 nor the State Hope Scale scores were normally distributed. Furthermore, the continuous variables of age and years of candidature were not normally distributed in this sample, as was described in Chapter 4, and preliminary analyses revealed that linear relationships between any of the three
JTS scale scores and these variables could not be assumed, as will be discussed subsequently. Indeed, heterogeneity of variance and large sample size differences occurred among most of the groups to be compared in this study. Therefore, in keeping with the exploratory nature of this study, a conservative approach was taken and non-parametric techniques using SPSS (Version 21) statistical analysis software were employed for all statistical analyses. This was certainly the most appropriate approach for the Doctoral Progress scale, as this was a single item measure using an ordinal scale, which was better suited to non-parametric analyses.

In response to Research Question 1, it was determined that participants differed in their evaluations of their recent doctoral research progress, with the majority of participants feeling relatively positive about their progress, and a sizeable minority feeling relatively negative about their progress. The next questions were concerned with examining the potential influences of demographic and candidature factors on these evaluations.

**Research Question 2a: Are students’ self-evaluations of recent doctoral research progress associated with background demographic factors?**

### 5.2.2 Background demographic factors

A set of analyses was conducted to determine whether the Month 1 Doctoral Progress scores varied with the background demographic factors of participants’ gender or age.

#### 5.2.2.1 Gender

The descriptive statistics for Month 1 Doctoral Progress scores for male and female participants appear in Table 6. A Mann-Whitney U test showed there was no significant difference between genders on these scores ($U = 106,230, p > .05$).

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
<th>Doctoral Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
</tr>
<tr>
<td>Male</td>
<td>291</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>Female</td>
<td>765</td>
<td>72</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 6

*Median Month 1 Doctoral Progress Scores by Gender*
5.2.2.2 Age

The median Month 1 Doctoral Progress scores for each age group are shown in Table 7. An independent-samples Kruskal-Wallis H test, for use with three or more unmatched groups, showed there were no significant differences among the Month 1 Doctoral Progress scores of the four age groups ($H(3) = 4.62, p > .05$).

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>%</th>
<th>Doctoral Progress</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>433</td>
<td>41</td>
<td>1</td>
<td>-4 to 4</td>
<td></td>
</tr>
<tr>
<td>30s</td>
<td>252</td>
<td>24</td>
<td>1</td>
<td>-4 to 4</td>
<td></td>
</tr>
<tr>
<td>40s</td>
<td>207</td>
<td>20</td>
<td>2</td>
<td>-4 to 4</td>
<td></td>
</tr>
<tr>
<td>50s+</td>
<td>164</td>
<td>16</td>
<td>1</td>
<td>-4 to 4</td>
<td></td>
</tr>
</tbody>
</table>

Thus, evaluations of recent doctoral research progress appeared to be independent of the influences of the participant’s gender or age.

Research Question 2b: Are students’ self-evaluations of recent doctoral research progress associated with current candidature factors?

5.2.3 Current Candidature Factors

The following analyses investigated the associations between Month 1 Doctoral Progress scores and current candidature factors including participants’ stage of candidature in Month 1, enrolment load, broad field of study, and university location.

5.2.3.1 Stage of candidature

The median Month 1 Doctoral Progress scores for participants at different stages of candidature are presented in Table 8. An independent-samples Kruskal-Wallis test showed that there were no significant differences in Doctoral Progress scores among participants in the Early, Mid, and Late stages of candidature ($H(2) = 2.66, p > .05$).
Table 8  
Median Month 1 Doctoral Progress Scores by Stage of Candidature

<table>
<thead>
<tr>
<th>Stage of Candidature</th>
<th>n</th>
<th>%</th>
<th>Doctoral Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early</td>
<td>355</td>
<td>34</td>
<td>1 (-4) to (+4)</td>
</tr>
<tr>
<td>Mid</td>
<td>410</td>
<td>39</td>
<td>1 (-4) to (+4)</td>
</tr>
<tr>
<td>Late</td>
<td>291</td>
<td>27</td>
<td>1 (-4) to (+4)</td>
</tr>
</tbody>
</table>

5.2.3.2 Enrolment load

Table 9 shows the median Month 1 Doctoral Progress scores for participants who were enrolled full-time and part-time. An independent-samples Mann-Whitney U Test showed there was no significant difference ($U = 113339, p > .05$) between these scores.

Table 9  
Median Month 1 Doctoral Progress Scores by Enrolment Load

<table>
<thead>
<tr>
<th>Enrolment Load</th>
<th>n</th>
<th>%</th>
<th>Doctoral Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>746</td>
<td>71</td>
<td>1 (-4) to (+4)</td>
</tr>
<tr>
<td>Part-time</td>
<td>310</td>
<td>29</td>
<td>1 (-4) to (+4)</td>
</tr>
</tbody>
</table>

5.2.3.3 Broad field of study

The median Month 1 Doctoral Progress scores for participants enrolled in arts-based and science-based PhD programmes are found in Table 10. An independent-samples Mann-Whitney U Test showed that there was no significant difference ($U = 138014, p > .05$) between these scores.

Table 10  
Median Month 1 Doctoral Progress Scores by Broad Field of Study

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>n</th>
<th>%</th>
<th>Doctoral Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts-based</td>
<td>517</td>
<td>49</td>
<td>1 (-4) to (+4)</td>
</tr>
<tr>
<td>Science-based</td>
<td>539</td>
<td>51</td>
<td>1 (-4) to (+4)</td>
</tr>
</tbody>
</table>
5.2.3.4 University location

The median Month 1 Doctoral Progress scores for participants enrolled in universities in Australia and overseas are presented in Table 11. An independent-samples Mann-Whitney U Test showed there was no significant difference ($U = 83,602, p > .05$) between these scores.

Table 11
Median Month 1 Doctoral Progress Scores by University Location

<table>
<thead>
<tr>
<th>University Location</th>
<th>n</th>
<th>%</th>
<th>Doctoral Progress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>858</td>
<td>81</td>
<td>1</td>
</tr>
<tr>
<td>Overseas</td>
<td>198</td>
<td>19</td>
<td>1</td>
</tr>
</tbody>
</table>

In summary, participants’ evaluations of their recent doctoral research progress appeared to be independent of a variety of current candidature factors.

The next research question was addressed in the following section.

Research Question 3: How do doctoral research students’ self-evaluations of recent doctoral research progress relate to their self-evaluations of mental health and state hope?

5.2.4 Relationships among Month 1 JTS scores

As mentioned in the introduction to this chapter, there were two main reasons for including measures of mental health and state hope in this study. The first was to provide information on the specificity of the Doctoral Progress scale as an indicator of participants’ feelings about their doctoral research progress rather than as an indicator of their feelings about life more generally, or of their feelings about their problem-solving abilities and agency.

The second reason for the inclusion of these measures was associated with this overlap in constructs related to self-regulation. That is, if the Doctoral Progress scale proved unacceptable for use as a means of exploring self-regulatory differences – if it failed to differentiate among participants, for example – then mental health and state hope could be investigated as alternate measures for use in exploring self-regulation via this self-monitoring method. In addressing Research Questions 1 and 2, the Doctoral Progress scale was found to differentiate among participants, and proved to be independent of the influences of key demographic and candidature factors that might have compromised its interpretation. At this point in the analyses,
then, the Doctoral Progress scale appeared to be appropriate for use in the next stage of exploring self-regulatory functioning, although this could only be confirmed after conducting the qualitative analyses that are reported in Chapter 6.

Nevertheless, the mental health and state hope scores were expected to provide further information about the specificity of the Doctoral Progress measure, and to identify if there were any advantages in considering either of these scales as alternate measures for use in the self-monitoring process.

Therefore, as a first step in exploring the relationships among the measures, the Month 1 group medians were plotted against each other, as shown in Figure 7.

**Figure 7.** Group median scores for Month 1 MHI-5 and State Hope Scale scores by Doctoral Progress scores.

Spearman’s rank correlation coefficients were then calculated to assess these relationships. Correlations among the Month 1 scores on the three measures were all significant, as shown in Table 12. Based on Cohen (1988), the correlation between mental health and feelings about
doctoral progress can be considered moderate at $\rho = .48$, while stronger correlations were observed between state hope and mental health at $\rho = .64$, and state hope and feelings about doctoral progress at $\rho = .65$.

Table 12

*Correlations Among Month 1 Doctoral Progress, MHI-5, and State Hope Scale Scores*

<table>
<thead>
<tr>
<th>Month 1 Measure</th>
<th>Doctoral Progress</th>
<th>MHI-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>MHI-5</td>
<td>.477**</td>
<td></td>
</tr>
<tr>
<td>State Hope Scale</td>
<td>.652**</td>
<td>.640**</td>
</tr>
</tbody>
</table>

** Correlation is significant at $p < .001$.

5.2.5 Section Summary

The range of Doctoral Progress scores indicated that participants varied in their evaluations of their recent doctoral research progress, with most participants feeling relatively positive but many feeling relatively negative about their doctoral research progress over the previous month. These evaluations did not appear to be associated with the participants’ gender, age, stage of candidature, enrolment load, broad field of study, or university location.

The strength of the correlations observed among the Doctoral Progress, MHI-5, and State Hope Scale scores highlighted the value of investigating the latter two measures further, to provide more insight into the relative utility of the Doctoral Progress measure for self-monitoring purposes. These more advanced investigations were thus still driven by Research Question 3, and involved a series of analyses similar to those conducted with the Doctoral Progress scores. The purpose of these was to examine participants’ responses to the MHI-5 and to the State Hope Scale, and to ascertain whether scores were associated with any background demographic or current candidature factors.
5.3 MENTAL HEALTH – MONTH 1

5.3.1 Distribution of scores

To reiterate, the Month 1 data of all 1056 participants was used to eliminate any possible effects on participants’ scores of the grouping by JTS Feedback Graph visibility.

Figure 5.3 depicts the frequency histogram of the MHI-5 scores for Month 1. This histogram reveals that these MHI-5 scores were negatively skewed rather than normally distributed, and that the median score was 72. A normal distribution curve (shown in red on the histogram in Figure 5.3) was generated from the sample mean of 66.33 and standard deviation of 18.97, and highlights the ceiling effect evident in this sample of scores. To illustrate, a normal distribution with this mean and standard deviation would require the upper range of the scale to extend well beyond the scale endpoint of 100.

A cut-point of 52 on the MHI-5 has often been used to identify the occurrence of significant psychological distress (e.g., Houghton et al., 2010; Kelly et al., 2008; Verger et al., 2009; Yamazaki et al., 2005). The distribution of MHI-5 scores in this sample shows that the majority of participants (76.3%) scored over 52, reporting adequate to high levels of mental health, which can be expressed in a more positive sense as ‘psychological well-being’. The remaining 23.7% of participants scored 52 or below, indicating a level of psychological distress typical of that found in common mental health problems such as anxiety and depressive disorders (Kelly et al., 2008).
Inspections of the Month 1 MHI-5 scores suggested that assumptions of normality were violated. Again, while acknowledging that skewness and kurtosis statistics are less meaningful in large sample sizes, the skewness (-.773) was large at ten times the size of its standard error (.075). A One-sample Kolmogorov-Smirnov test confirmed that this was a significant deviation from the normal distribution ($D = .137, p < .001$). As explained in the section on Doctoral Progress scores, rather than transforming the data, a conservative approach was adopted and non-parametric analyses were undertaken.

### 5.3.2 Background demographic factors

The next analyses were conducted to determine whether the Month 1 MHI-5 scores varied with the background demographic factors of participants’ gender or age.

#### 5.3.2.1 Gender

The median Month 1 MHI-5 scores for male and female participants are shown in Table 13. A Mann-Whitney U test showed there was no significant difference ($U = 110 176, p > .05$) between these scores.
Table 13

*Median Month 1 MHI-5 Scores by Gender*

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
<th>MHI-5 Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>291</td>
<td>28</td>
<td>72</td>
<td>12 to 100</td>
</tr>
<tr>
<td>Females</td>
<td>765</td>
<td>72</td>
<td>72</td>
<td>4 to 100</td>
</tr>
</tbody>
</table>

5.3.2.2 Age

The median Month 1 MHI-5 scores for participants in different age groups are presented in Table 14. An independent-samples Kruskal-Wallis H test showed that participants in the four age groups differed significantly on Month 1 MHI-5 scores ($H(3) = 21.97, p < .001$).

Table 14

*Median Month 1 MHI-5 Scores by Age Group*

<table>
<thead>
<tr>
<th>Age Group</th>
<th>n</th>
<th>%</th>
<th>MHI-5 Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>433</td>
<td>41</td>
<td>68</td>
<td>4 to 100</td>
</tr>
<tr>
<td>30s</td>
<td>252</td>
<td>24</td>
<td>68</td>
<td>12 to 100</td>
</tr>
<tr>
<td>40s</td>
<td>207</td>
<td>20</td>
<td>72</td>
<td>16 to 100</td>
</tr>
<tr>
<td>50s+</td>
<td>164</td>
<td>16</td>
<td>76</td>
<td>16 to 100</td>
</tr>
</tbody>
</table>

Further investigations revealed small but significant effects of age on Month 1 MHI-5 scores. Post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons revealed that participants in their 20s scored significantly lower on the MHI-5 than participants in their 40s ($z = -3.39, p = .004, r = -.13$), and those aged 50 and over ($z = -3.96, p < .001, r = -.16$). In addition, participants in their 30s scored significantly lower than those aged in their 50s and over ($z = -2.84, p = .027, r = -.14$). There were no significant differences between the scores of the 20s and 30s ($z = -.99, p > .05$); the 30s and 40s ($z = -2.22, p > .05$) or the 40s and 50s ($z = -.73, p > .05$). These results are illustrated in Figure 9.
5.3.3 Current candidature factors

5.3.3.1 Stage of candidature

The median Month 1 MHI-5 scores of participants at three different stages of candidature are presented in Table 15. An independent-samples Kruskal-Wallis H test showed that participants did not differ significantly in Month 1 MHI-5 scores by stage of candidature ($H(2) = 5.87$, $p > .05$).

Table 15
Median Month 1 MHI-5 Scores by Stage of Candidature

<table>
<thead>
<tr>
<th>Stage of Candidature</th>
<th>n</th>
<th>%</th>
<th>MHI-5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
</tr>
<tr>
<td>Early</td>
<td>355</td>
<td>34</td>
<td>72</td>
</tr>
<tr>
<td>Mid</td>
<td>410</td>
<td>39</td>
<td>68</td>
</tr>
<tr>
<td>Late</td>
<td>291</td>
<td>27</td>
<td>68</td>
</tr>
</tbody>
</table>
5.3.3.2 Enrolment load

The median Month 1 MHI-5 scores of participants who were enrolled full-time or part-time appear in Table 16. An independent-samples Mann-Whitney U Test found that there was no significant difference between these scores. ($U = 121 \, 339, p > .05$).

Table 16
Median Month 1 MHI-5 Scores by Enrolment Load

<table>
<thead>
<tr>
<th>Enrolment Load</th>
<th>n</th>
<th>%</th>
<th>MHI-5 Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>746</td>
<td>71</td>
<td>72</td>
<td>4 to 100</td>
</tr>
<tr>
<td>Part-time</td>
<td>310</td>
<td>29</td>
<td>72</td>
<td>12 to 100</td>
</tr>
</tbody>
</table>

5.3.3.3 Broad field of study

Table 17 contains the median Month 1 MHI-5 scores of participants enrolled in either Arts-based or Science-based PhD programmes. An independent-samples Mann-Whitney U Test showed that there was no significant difference between these scores ($U = 138 \, 495, p > .05$).

Table 17
Median Month 1 MHI-5 Scores by Broad Field of Study

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>n</th>
<th>%</th>
<th>MHI-5 Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts-based</td>
<td>517</td>
<td>49</td>
<td>72</td>
<td>4 to 100</td>
</tr>
<tr>
<td>Science-based</td>
<td>539</td>
<td>51</td>
<td>72</td>
<td>4 to 100</td>
</tr>
</tbody>
</table>

5.3.3.4 University location

Table 18 presents the median Month 1 MHI-5 scores of participants enrolled in either Australian or overseas universities. An independent-samples Mann-Whitney U Test showed that participants at Australian universities scored significantly higher on the Month 1 MHI-5 than did participants who were enrolled in overseas universities, although the effect size was minimal ($U = 76 \, 375, p = .026, r = .068$).
Table 18
*Median Month 1 MHI-5 Scores by University Location*

<table>
<thead>
<tr>
<th>University Location</th>
<th>n</th>
<th>%</th>
<th>MHI-5</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>858</td>
<td>81</td>
<td>72</td>
<td>4 to 100</td>
<td></td>
</tr>
<tr>
<td>Overseas</td>
<td>198</td>
<td>19</td>
<td>68</td>
<td>4 to 96</td>
<td></td>
</tr>
</tbody>
</table>

5.3.4 Section Summary

Scores on the MHI-5 showed that while the mental health of the majority of the participants was in the positive range, almost one quarter of participants were experiencing a significant level of psychological distress. MHI-5 scores appeared to be associated with age, with higher scores evident in the older age groups. The MHI-5 scores of participants at Australian universities were also found to be higher than those at universities overseas. The relationships between mental health and these demographic and candidature factors need to be examined more fully prior to considering the use of this measure for doctoral research students’ self-monitoring.

Continuing to address Research Question 3, the next section of this chapter examines scores on the State Hope Scale, again for comparison with the performance of the Doctoral Progress measure.

5.4 STATE HOPE – MONTH 1

5.4.1 Distribution of scores

As with the Doctoral Progress and MHI-5 scores, using the Month 1 data of all 1056 participants eliminated any possible effects on participants’ scores of the grouping by JTS Feedback Graph visibility.

A frequency histogram of the Month 1 State Hope Scale scores is shown in Figure 10. This histogram reveals that the State Hope scores were negatively skewed rather than normally distributed, with a median of 36, and a ceiling effect evident in the relatively high frequency of scores towards the scale endpoint of 48. The normal distribution curve, generated from the sample mean of 35.11 and standard deviation of 7.87 and shown in red in Figure 10, further illustrates the skewness of this distribution.
There is limited use of the State Hope Scale in the literature, and no appropriate samples against which to compare scores. However the distribution of scores here certainly suggests this sample was relatively high functioning in State Hope.

Figure 10. Frequency histogram of Month 1 State Hope Scale scores, n = 1056.

Visual inspection of the Month 1 State Hope Scale scores suggested that assumptions of normality were violated. Although skewness and kurtosis statistics may be less meaningful in large sample sizes such as this one, the skewness (-.681) was nine times the size of its standard error (.075). A one-sample Kolmogorov-Smirnov test confirmed that this degree of deviation from the normal distribution was significant ($D = .084, p < .001$).

For the reasons previously outlined for the Doctoral Progress measure and the MHI-5, these data were not transformed, and non-parametric analyses were employed.

5.4.2 Background demographic factors

The next analyses were conducted to determine whether Month 1 State Hope scores varied with participants’ gender or age.
5.4.2.1 Gender

Table 19 presents the median Month 1 State Hope Scale scores by gender. A Mann-Whitney U test found there was no significant difference ($U = 109212, p > .05$) between the scores of male and female participants. This lack of gender differences in State Hope Scale scores was consistent with the majority of previous research using Snyder’s hope construct (e.g., Snyder, Harris, et al., 1991; Snyder et al., 1996).

Table 19

Median Month 1 State Hope Scale Scores by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
<th>State Hope</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>Males</td>
<td>291</td>
<td>28</td>
<td>36</td>
<td>10 to 48</td>
</tr>
<tr>
<td>Females</td>
<td>765</td>
<td>72</td>
<td>36</td>
<td>8 to 48</td>
</tr>
</tbody>
</table>

5.4.2.2 Age

The median Month 1 State Hope Scale scores of participants in the four age groups appear in Table 20. An independent-samples Kruskal-Wallis H test showed that the scores of participants in these groups differed significantly ($H(3) = 43.94, p < .001$). To determine how the age groups differed on State Hope, post-hoc Dunn’s multiple comparisons tests were used to compare the actual difference and the expected average difference in the sum of ranks between groups. These post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons revealed that participants in their 20s scored significantly lower on the State Hope Scale than participants in every other age group. More specifically, participants in their 20s scored significant lower than those in their 30s ($z = -2.70, p = .042, r = -.10$), in their 40s ($z = -5.69, p < .001, r = -.22$), and those aged 50

Table 20

Median Month 1 State Hope Scale Scores by Age Group

<table>
<thead>
<tr>
<th>Age Group</th>
<th>n</th>
<th>%</th>
<th>State Hope</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
<td>Range</td>
</tr>
<tr>
<td>20s</td>
<td>433</td>
<td>41</td>
<td>35</td>
<td>8 to 48</td>
</tr>
<tr>
<td>30s</td>
<td>252</td>
<td>24</td>
<td>36</td>
<td>14 to 48</td>
</tr>
<tr>
<td>40s</td>
<td>207</td>
<td>20</td>
<td>40</td>
<td>15 to 48</td>
</tr>
<tr>
<td>50s+</td>
<td>164</td>
<td>15</td>
<td>38</td>
<td>9 to 48</td>
</tr>
</tbody>
</table>
and over ($z = -4.95, p < .001, r = -.20$). In addition, participants in their 30s scored significantly lower on the State Hope Scale than those in their 40s ($z = -2.85, p = .027, r = -.13$). However, in all cases the effect size of age on State Hope Scale scores was small, according to Cohen’s (1988) criteria.

There were no significant differences between the State Hope Scale scores of participants aged in their 30s and 50s ($z = -2.39, p > .05$) or between participants aged in their 40s and 50s ($z = -2.58, p > .05$).

These results are depicted in Figure 11.

![Figure 11](image-url)

*Figure 11.* Median Month 1 State Hope Scale scores by age group. Error bars show the 95% confidence interval for each median.

5.4.3 Current candidature factors

5.4.3.1 Stage of candidature

The median Month 1 State Hope Scale scores are presented in Table 21 by participants’ stage of candidature. Independent-samples Kruskal-Wallis H tests showed that participants in the three stages of candidature differed significantly on Month 1 State Hope Scale scores ($H(3) = 12.49, p = .002$).
Table 21

<table>
<thead>
<tr>
<th>Stage of Candidature</th>
<th>n</th>
<th>%</th>
<th>State Hope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
</tr>
<tr>
<td>Early</td>
<td>355</td>
<td>34</td>
<td>38</td>
</tr>
<tr>
<td>Mid</td>
<td>410</td>
<td>39</td>
<td>36</td>
</tr>
<tr>
<td>Late</td>
<td>291</td>
<td>27</td>
<td>35</td>
</tr>
</tbody>
</table>

Post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons showed that there was a small but significant effect of stage of candidature on State Hope Scale scores, with participants in the Early stage of candidature scoring significantly higher on the State Hope Scale than participants in the Late stage of candidature ($z = -3.45$, $p = .002$, $r = .14$). There were no significant differences between participants in Early and Mid-candidature ($z = -2.36$, $p > .05$) or between participants in Mid and Late candidature ($z = -1.329$, $p > .05$). These results are displayed in Figure 12.

Figure 12. Median Month 1 State Hope Scale scores by stage of candidature. Error bars show the 95% confidence interval for each median.
5.4.4 Interactions between stage of candidature and age

To determine whether there was any interaction between the effects of age group and stage of candidature on State Hope scores, the analyses for stage of candidature scores were repeated for each age group. Independent-samples Kruskal-Wallis H tests showed no significant differences in State Hope scores among participants in different stages of candidature who were aged in their 20s ($H(2) = 2.32, p > .05$), in their 40s ($H(2) = 2.78, p > .05$), or in their 50s or over ($H(2) = 4.08, p > .05$).

For participants in their 30s however, State Hope scores differed significantly across candidature ($H(2) = 8.83, p = .012$). More specifically, Post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons showed that participants in their 30s who were in the Early stage of candidature ($Mdn = 39$) scored significantly higher on the State Hope scale ($z = 2.92, p = .010, r = .18$) than did their age counterparts in the Late stage of candidature ($Mdn = 34$), although the effect size was small.

To summarise, while all participants declined in State Hope Scale scores across candidature, the steepest decline was for participants aged in their thirties, as illustrated in Figure 13.

![Figure 13. Median Month 1 State Hope scores as a function of age group and stage of candidature.](image-url)
5.4.4.1  *Enrolment load*

The median Month 1 State Hope Scale scores of participants who were enrolled either part-time or full-time are presented in Table 22. An independent-samples Mann-Whitney U Test showed that there was no significant difference between these scores ($U = 123\,924, p > .05$).

Table 22  
*Median Month 1 State Hope Scale Scores by Enrolment Load*

<table>
<thead>
<tr>
<th>Enrolment Load</th>
<th>n</th>
<th>%</th>
<th>State Hope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
</tr>
<tr>
<td>Full-time</td>
<td>746</td>
<td>71</td>
<td>36</td>
</tr>
<tr>
<td>Part-time</td>
<td>310</td>
<td>29</td>
<td>37</td>
</tr>
</tbody>
</table>

5.4.4.2  *Broad field of study*

Table 23 contains the median Month 1 State Hope Scale scores of participants enrolled in Arts-based or Science-based PhD programmes. An independent-samples Mann-Whitney U Test showed that there was no significant difference between these scores ($U = 132\,004, p > .05$).

Table 23  
*Median Month 1 State Hope Scale Scores by Broad Field of Study*

<table>
<thead>
<tr>
<th>Field of Study</th>
<th>n</th>
<th>%</th>
<th>State Hope</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
</tr>
<tr>
<td>Arts-based</td>
<td>517</td>
<td>49</td>
<td>36</td>
</tr>
<tr>
<td>Science-based</td>
<td>539</td>
<td>51</td>
<td>36</td>
</tr>
</tbody>
</table>

5.4.4.3  *University location*

Table 24 presents the median Month 1 State Hope Scale scores of participants from Australian and overseas universities. An independent-samples Mann-Whitney U Test showed that there was no significant difference between these scores ($U = 79\,039, p > .05$).
Table 24
*Median Month 1 State Hope Scale Scores by University Location*

<table>
<thead>
<tr>
<th>University Location</th>
<th>n</th>
<th>%</th>
<th>State Hope Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>858</td>
<td>81</td>
<td>36</td>
<td>9 to 48</td>
</tr>
<tr>
<td>Overseas</td>
<td>198</td>
<td>19</td>
<td>35</td>
<td>8 to 48</td>
</tr>
</tbody>
</table>

5.4.5 **Section summary**

State Hope Scale scores appeared to be independent of gender, enrolment status, broad field of study, and university location. However, both age and stage of candidature appeared to have a small but significant effect on participants’ evaluations of their State Hope levels. In particular, while participants exhibited relatively high scores on the State Hope Scale, there was a general decline in state hope across candidature, with this being most marked in participants aged in their thirties. This interaction of age and stage of candidature would complicate the interpretation of the State Hope Scale for self-monitoring by doctoral research students, making it difficult to monitor change with confidence.

5.5 **CHAPTER SUMMARY**

The overarching aim of the current study was to explore individual differences in students’ self-regulatory behaviours by analysing their self-monitoring of doctoral progress. The first step in this study was to examine students’ responses to three measures of psychological functioning in the first month of a self-monitoring process. On the basis of the quantitative analyses reported in this chapter, participants’ Doctoral Progress scores appeared to be independent of a number of background demographic and current candidature factors that have often been used to describe or differentiate among PhD students in other doctoral education research. As there were no a priori reasons to expect that doctoral research progress would be related to any of these demographic or candidature factors, these results offered preliminary support for the potential of the Doctoral Progress measure to function as an indicator of progress, and for further examination of participants’ Doctoral Progress scores to be undertaken in the next stages of this study of self-monitoring.

Although Doctoral Progress scores were significantly correlated with MHI-5 and State Hope Scale scores, scores on the latter two were associated with demographic and candidature factors.
This could confound interpretation and thus limit the utility of these measures across the doctoral research student population. This placed the Doctoral Progress measure at an advantage over the MHI-5 and the State Hope Scale as a measure of functioning suitable for use in this study, and also for doctoral research students’ self-monitoring more generally, as it would enable more direct comparisons among students of different ages and stages of candidature.

The inclusion of the mental health and state hope measures provided insights into the performance and the relative merits of the Doctoral Progress measure. From this point in the study, the focus turns to the Doctoral Progress scores. However, these examinations of mental health and state hope in this population also raise further questions for further study. For example, it is noteworthy that despite the high levels of mental health in this sample, a sizeable minority of participants reported significant levels of psychological distress, and this deserves more detailed investigation in future research, as will be discussed in Chapter 9.

In Chapter 6, the relationships among Doctoral Progress scores and their accompanying comments are explored firstly to see if they provide any evidence of differences in self-regulatory functioning in this sample of PhD students, and secondly to determine if any differences in self-regulatory functioning are associated with how participants have reported feeling about their recent doctoral research progress.
6. EXPLORING WITHIN: DRILLING INTO STUDENT DIFFERENCES IN DOCTORAL SELF-REGULATION

6.1 INTRODUCTION

The previous chapter investigated how participants responded to the Doctoral Progress measure, as well as to the MHI-5 and the State Hope Scale, to explore the relative utility of these scales in doctoral research student self-monitoring. Having established that the Doctoral Progress measure was the most suitable for this purpose, the next step was to investigate whether scores on this measure could be used to gain insights into differences in participants’ self-regulatory functioning.

As described in Chapter 4, at the time of being asked to rate their feelings about their doctoral progress each month, participants were also invited to type a comment about their progress. This chapter presents the findings from a thematic analysis of the comments made by those participants who in Month 1 recorded the lowest possible two scores (-4 and -3) and the highest possible two scores (3 and 4), on the Doctoral Progress measure. This enabled the comparison of comments made by participants who had been very happy with their progress over the previous month with those who had been very unhappy. In particular, these comments were examined in terms of what they revealed about participants’ self-regulatory efforts.

As mentioned in Chapter 4, comments about progress were not provided by all participants who completed Month 1 of the Journey Tracking Survey. The numbers and proportions of participants who commented, along with their Doctoral Progress scores, appeared in the Method chapter in Table 5. Analyses reported in Chapter 5 showed that Doctoral Progress scores were not associated with an array of background demographic or current candidature factors, however further detail about the characteristics of these participants in relation to all Month 1 participants is available in Appendix 11.13. The method for analysing this qualitative data was described in Section 4.7.2.

Based on the structure of Zimmerman’s (2000) model, the following sections of this chapter describe the range of responses from high and low scoring participants that are relevant to
forethought, performance, and self-reflection phase processes. Further interpretation is undertaken in the final section of the chapter, which draws together the findings to consider the overlap and differences between the responses of the two Doctoral Progress score groups.

For the purposes of this analysis, participants who scored either -4 or -3 on the Doctoral Progress measure are frequently referred to as ‘low scoring participants’ and those who scored 3 or 4 are described as ‘high scoring participants’. However it is important to recognise that as participants assigned these ratings of their progress specifically to Month 1, the term ‘high’ or ‘low’ scoring is intended to categorise the comment rather than the participant. That is, the same participant who was unhappy with their progress and scored ‘low’ in Month 1 might have scored ‘high’ in every subsequent month of the Journey Tracking Survey process. This analysis was designed to explore indicators of self-regulatory functioning that might be associated with times of scoring either high or low. Hence, this chapter presents the findings of the first qualitative analysis undertaken in this study, to address the fourth research question of this study:

**Research Question 4: Is there an association between students’ ratings of their recent doctoral progress and self-reported self-regulatory efforts?**

The next section of this chapter presents the findings associated with the forethought phase of self-regulation. Quotes are followed by the participant’s identification code for this study, Month 1 Doctoral Progress score group (‘Low’ or ‘High’), and the participant’s candidature status in Month 12: Submitted/Graduated, Enrolled, On Leave, Withdrawn (from candidature), or Missing (participant did not complete the Follow-up Survey so candidature status is unknown).

Furthermore, as self-regulation is assumed to be just one factor that is involved in how the doctoral research student progresses through candidature, comments were expected to include information about how other aspects of candidature have been associated with their progress. However, the present analysis focuses on what the comments revealed about participants’ self-regulation, and how this might be optimised in the doctoral research context. As the literature review pointed out, there has been ample documentation of the challenges faced by PhD students. Thus, the emphasis here is on how the participants described approaching or managing the challenges they encountered, rather than on what the challenges were.
This section is concerned with what these comments revealed about the nature and scope of the differences in forethought phase processes between the high and low scoring participants, while participants’ evaluations of the outcomes of these differences are discussed more comprehensively in the self-reflection phase section later in this chapter. Analyses of the comments associated with the high and low scores are reported separately below, and then integrated and summarised in the latter sections of this chapter. Recalling the importance of the cyclical feedback nature of Zimmerman’s (2000) model of self-regulation, it should be noted that the assignation of comments as examples of particular phases or processes is in some cases rather arbitrary. That is, these phases and processes are interrelated, and many comments reflect the resulting overlap and interplay of their enactment in the doctoral research context. As mentioned in Section 4.7.2, it should also be noted that comments are provided verbatim where possible, with spelling, grammatical, or punctuation errors corrected only when deemed necessary for ease of reading.

6.2 HIGH SCORES - FORETHOUGHT PHASE

In Zimmerman’s (2000) model of self-regulation, task analysis refers to the student’s efforts to analyse and understand the requirements of the task, and is associated with the setting of goals and strategic planning implemented to meet these requirements.

As explained in Chapter 4, at the time of completing the Month 1 JTS the participants had been engaged in doctoral research for varying lengths of time, with two thirds having been enrolled from over one year to more than eight and a half years. Thus, unlike asking learners about planning for a task they are yet to start, comments relating to forethought processes were made here in the context of learners’ reflections on their doctoral research as a task that was already in progress. In addition, the question “Overall, how have you felt about your doctoral progress over the past month?” was open-ended and did not specifically enquire about self-regulatory processes. Therefore, consistent with the cyclical nature of Zimmerman’s (2000) model of self-regulation, information pertaining to forethought phase processes and functioning often appeared in terms of evaluations of the effectiveness of these processes as assessed through their outcomes – participants’ achievements in the previous month.

Effective task analysis was evident in the clarity, relevance, and confidence of the high participants’ descriptions of what they had already done, or what they were going to do. Indeed, 54 (65%) of the high scoring participants specified the nature of the tasks that they had
completed or on which they had been working in the past month or even over the previous year or two. The tasks mentioned by high scoring participants included practicing the confirmation of candidature presentation to colleagues, submitting abstracts to conferences, presenting conference papers, completing the confirmation of candidature process, ethics application, and fieldwork, narrowing the research topic, and developing or finalising the thesis.

The documenting of concrete achievements or milestones and the celebration of previous accomplishments appeared important in gaining a sense of perspective and in being able to assess the amount of progress made. This contributed to the sense of focus and purpose in these comments.

“I just celebrated my 1 year in PhD and since, I have submitted the program of study, ethics application, and gone on phase 1 fieldwork.” (0959, High, Enrolled).

“It has been an exciting month as I have submitted my proposal and have my proposal presentation this Friday – it’s a good feeling to have some ‘boxes ticked’ as it provides some tangible evidence that I am progressing! Also I have undertaken some training in data analysis, and am very close to finalising a draft for publication.” (1109, High, Enrolled)

“During the past month I’ve prepared a 1 page paper and a poster for a postgraduate conference. ... As I started less than 2 months ago I am very happy to already be at the stage of constructing papers from my results and analysis.” (1316, High, Enrolled)

“... Have narrowed my topic and feel much more comfortable with it – was 2 PhDs before!” (0574, High, Enrolled)

As well as reflecting on their past behaviours, the high scoring participants sometimes looked to the future. These comments often described the next step or proximal goal towards which they would be working. These goals varied in specificity and concreteness, and included a diversity of doctoral tasks similar to those that had been listed as completed, such as preparing for confirmation of candidature, finalising the ethics application, preparing for an international conference presentation, discussing data interpretation with the supervisor, preparing the final version of the thesis, or preparing for the viva.
“I’m in the stages of revising the entire thesis to get as close to submission ready. I need to submit it to the examiners in August to apply for a post-doc hence I need to get a revised thesis draft to my supervisors ASAP” (0476, High, Enrolled)

The contextualising of recent performance within a larger time frame also conveyed the sense of perceiving recent progress as working towards more distal goals. This aspect of task analysis is demonstrated by the following high scoring participants’ descriptions of strategies employed with the specific goal of developing the thesis from the feedback received. Such comments suggest a conception of doctoral research as a planned process involving taking steps towards an integrated whole.

“…I have submitted proposals to present at a research conference. One abstract links specifically to the methodology I will use for the research project. If accepted this will provide the impetus to develop the methodology chapter.” (0196, High, Enrolled)

“My abstract for an on line conference was accepted and I was also accepted for a five day workshop in my study area. Both of these things were a huge boost to my confidence and will assist me in the development of my research and the writing of the thesis. They will also build networks and break down some of the isolation in my area of research....” (1253, High, Enrolled)

The high scoring participants described few difficulties relating to task analysis or understanding in their doctoral research. In fact, several high scoring participants’ comments reflected perceptions of the developmental nature of doctoral research, and the recognition of its non-linearity and unpredictability. An accommodation of this uncertainty is expressed in the goal-setting adjustments of these three participants.

“My progress over the past month has been slightly less than I would have ideally liked, however this is mainly because my reading has forced me to rethink where I’ve positioned my topic. Whilst this has slowed me down a bit, and will probably force me to rejig my ambitious timeline, it is an important part of the journey and therefore one I’m not unhappy about.” (1215, High, On (maternity) Leave)

“As usual, the research has a tendency to take on its own life. There is challenge in keeping focused towards the goal while not ignoring the many interesting questions
that come up. My schedule has slipped because I have pursued questions I didn't originally intend - but I try to convince myself that its work I would need to do in the future anyways.” (1872, High, Enrolled)

“I was planning to submit my thesis in October but new ideas and unforeseen events meant I had to consult with my supervisor about an alternative plan. I decided to intermit for 6 months and, although I am still actively working on my thesis, the pressure is off a bit. All things considered, I am still happy with my progress and with the advice from my supervisor.” (1094, High, Enrolled)

Only a few expressed concerns about this uncertainty. The following high scoring participant expressed satisfaction with progress to date, but the desire for more certainty and guidance in developing the research proposal in preparation for confirmation of candidature. This participant also perceived preparing for confirmation to be a learning process, with progress indicated by a developing confidence in the level of intellectual engagement with the proposed research.

“I have written over 10,000 words and have about 70% of Chapter One done. I am unsure of how to progress the detailed Program of Research and Study (DPORS). I would like a template to use for this but the University just keeps giving me the headings. My supervisor would like me to present in September but I feel I would like to do it next March 2011, which is still within 1 year of my commencing and as a part time candidate I have two years for this. I feel that the DPORS will come when I have enough information in Chapters 1 and 2 which will allow me time to consolidate my thinking about the whole research project.” (0204, High, Enrolled)

Another high scoring participant in early candidature expressed some epistemological concerns typical of a novice researcher. This is consistent with Kiley’s (2009) observations that the ability to recognise and appreciate alternative perspectives on research may be developed as the student moves through candidature.

“I am slightly frustrated by my theoretical framework with different people giving me mixed messages about what to do. It seems that some people want you to focus on their way of thinking which makes it difficult if you think another way.” (0367, High, Enrolled)
The examples above illustrate how the analysis of doctoral tasks may be influenced by the student’s epistemological understanding and conceptions of research. Students who assume a finite or concrete view of the nature of knowledge, and are actively seeking ‘the truth’ or another type of definite answer, may have difficulty tolerating the higher levels of uncertainty inherent in the process of generating new knowledge, and would be expected to find progress difficult at some stage. However, having scored their progress very positively, it seems they had managed this uncertainty to the extent that it had not been problematic in the previous month.

The high scoring participant who expressed the least confidence about the task placed the responsibility for this with the university and the supervisor. It might be assumed that capitalisation was used intentionally to highlight the participant’s level of frustration.

“LACK OF INFORMATION FROM UNIVERSITY ADMINISTRATION – MISSING AN ESSENTIAL WELCOME PACK AT ENROLMENT. SUPERVISION EXPECTATIONS” (1100, High, Enrolled)

The beliefs that were considered to contribute to an individual’s motivation, as comprised within Zimmerman’s (2000) model, were considered next. Comments were coded as ‘self-motivation beliefs’ when they expressed participants’ beliefs about having the ability to achieve their progress goals (self-efficacy), expectations about the outcomes of their goal pursuit efforts (outcome expectancies), the intrinsic interest or value of their doctoral research, or their goal orientation. Again, as participants commented in relation to their recent doctoral research performance, self-motivation beliefs were often expressed in terms of self-judgements and self-reactions regarding previous performance rather than referring to the planning of future work.

The self-motivational beliefs of the high scoring participants were revealed in references to increases in participants’ self-efficacy or positivity in outcome expectancies, often due to completing work or resolving problems that may have previously impeded progress. This also exemplifies Amabile and Kramer’s (2011) work on perceived progress being motivating.

“Whilst I am on the whole always dissatisfied with my progress I have made a ‘breakthrough’ in the last month...” (1956, High, Enrolled)

“Personal and family events have impeded some progress, but I have worked around it.” (1500, High, Enrolled)
Motivation increased not only with successful problem-solving or problem management by the individual, but also with the resolution of issues through the help of supervisors or other external sources. Again, this assistance appeared motivating through enhancing outcome expectancies regarding the research process.

“The past month has been very encouraging! I have had a great deal of time with my supervisors to work together to sort out some recruitment difficulties I was having. I now feel like it is possible to get through this study!” (0174, High, Enrolled)

“My scholarship has just been extended so I feel I have the space to complete my thesis. The challenge is to keep up the pace and focus.” (1026, High, Submitted/Graduated)

“I was very fortunate to have an expert in the statistics model I will be using for my analysis do some training and consultation with me. This has really increased my knowledge and confidence that I will be able to complete this part of my PhD. Also had a holiday which has left me more refreshed and enthusiastic about my PhD.” (1035, High, Enrolled)

Where goal orientation was apparent, the high scoring participants spoke only of having a mastery goal orientation and described setting high standards for their work.

“... I keep being told that I am a good student and doing well and at times I do not think that my work gets enough scrutiny by one of my supervisors because they assume it will be good. To me this is not helpful when someone else looks at it and then makes comments that I am not expecting. I want constructive criticism so what I produce is good, not just average.” (0367, High, Enrolled)

“I set myself extremely high standards and so I am not going to meet these most of the time, but I realise this.” (0195, High, Submitted/Graduated)

“I have a new (extra) supervisor who has also taken me on as a research assistant. The combination of practical and academic exposure that I have to her is outstanding and I have learned a lot and gained in confidence over the last month. Meeting people through her, being ‘behind the scenes’ in her work and in her
confidence is some learning that I was missing and am now thrilled with.” (1203, High, Enrolled)

However, given the time pressures being experienced, choices to be made about the quality of the output caused conflict for at least one participant.

“I am feeling pretty good about a framework I have been pondering since I commenced my programme 4 years ago. Now I see it coming together. I, however, feel compelled to finish before the next fee payment deadline and that makes me feel rushed. My funding ends this month so that is a new problem on my plate. Still, I am determined not to do a shoddy job just to avoid the fees. Its conflicting.” (2023, High, Submitted/Graduated)

Lastly, observing progress also seemed to reinforce participants’ interest in or perceived value of the doctoral research, which was in turn motivating.

“... am really enjoying the research so far. The more I do the more I get into the topic.” (0574, High, Enrolled)

“I have had positive feedback from a short presentation at a research colloquium, which has boosted my confidence in the relevance of what I am doing.” (1004, High, Enrolled)

6.3 HIGH SCORES - PERFORMANCE PHASE

In Zimmerman’s model, the performance stage of self-regulation encompasses the self-control and self-observation – or self-monitoring – processes employed while the individual is engaged in goal pursuit to assist learning and performance (Zimmerman, 2013).

Considering the timeframe and individuality of PhD theses, and the wording of the JTS Comments question to which the participants were responding, it would seem unlikely that participants would refer to what might be termed ‘micro’ level self-control strategies when asked about their doctoral progress over the previous month. That is, it would not have been expected that participants would describe the use of self-control strategies at the level of imagery, self-instruction, attention focusing, or task strategies such as summarising and memory techniques that might be more salient when a learner is questioned during a brief and specific
learning task. Indeed, little was mentioned regarding tactics or strategies that might be employed for facilitating doctoral research progress on a daily basis. The focus of most comments was on either what had been achieved or what was yet to be achieved, but few talked in detail of how it had been or would be achieved.

Two participants described the benefits of actively addressing problems of self-control via training programmes. Such comments demonstrate not only the participant’s awareness of a problem, but also the sense of agency and responsibility which has driven both the help-seeking and problem-solving behaviour.

“I have been to a workshop put on by [name] - it has changed the way that I approach my thesis and as a consequence I think that I will finish soon.” (0686, High, Enrolled)

“I have been accepted on to a short programme to help me defeat self-sabotage. The mere fact of this has helped me examine the sort of things I do to sabotage myself and I now find I am working a lot more steadily and confidently. I have also discovered that reading for pleasure does not, as I thought it would, clutter my brain, but makes me feel more relaxed.” (0937, High, Enrolled)

Persistence despite difficulties also requires self-control, and two high scoring participants reflected on how they had done this during the previous month.

“I've had some trouble contacting my supervisor and for a while it was quite stressful but I kept working on my research as energetic as usual.” (2190, High, Enrolled)

“I have encountered significant problems with my data collection which hampered my progress. Nevertheless, I have also found ways to get around them and at the moment pursuing them.” (2070, High, Enrolled)

“I did have to set it aside for a few days after being frustrated with it but that gave me fresh eyes to tackle it again.” (2095, High, Missing)

Another self-control strategy for effectively managing the demands of candidature involved participants pacing their application of time and effort efficiently and appropriately. For doctoral research students to manage their time and effort in this way, accurate task analysis and
goal-setting is assumedly required. Few participants talked about the specific self-control efforts they might have used in attempts to organise or manage their time. That is, these comments did not refer to time management in terms of regulating the quality and quantity of time assigned to doctoral research or other activities. The most specific strategies related to time management were described as follows.

“I am getting a little obsessive about it and feel like I need to pace myself a little otherwise I will burn out down the track, so keeping myself in check and not really pushing myself too hard at present.” (0204, High, Enrolled)

“The lead-up [to confirmation of candidature] was fairly stressful, partly because of other things in my life, but everything has now been sorted out. So I’m having a rest!” (0719, High, Enrolled)

“I have decided to simply take one day at a time right now and focus on the tasks of the day. Will get a break in mid-August :)” (2141, High, Enrolled)

One participant spoke of working hard to make up for lost time. This participant also demonstrated help-seeking – a self-control strategy involving the planned, self-initiated recruitment of human or other resources to assist in goal pursuit.

“I requested a new Principal Supervisor this year and we began working together in March. I am very pleased with my choice now and the work is progressing well even though we had to back track a good deal. Now we are working well together and trying to make up for a great deal of lost time, which means many long days (and nights) and dealing with exhaustion often and not much socialising at all. However, this month has been very productive and for the first time in nearly 7 months I am feeling very positive about the progress in my research.” (0756, High, Withdrawn)

Unfortunately, this participant also demonstrated, by later withdrawing from candidature, that while positive outcome expectancies may be motivating in the shorter term and encourage persistence, the complexity of doctoral candidature means that they are not necessarily predictors of longer term outcomes.

The other component of the performance phase of Zimmerman’s (2000) model is self-observation. As previously discussed, exploring self-regulation in the doctoral context needs to
be approached with the recognition that doctoral research is complex, individual, and longitudinal. It involves multiple tasks on varying and overlapping timelines. Some of these tasks may concern learning that is specific to the students’ field, while others may be considered as being generic research or project management tasks. Thus it might be expected that a variety of formal or informal self-observation methods might be adopted or generated by doctoral research students who wish to monitor progress relating to these tasks.

There were no specific reports of using any formal recording methods during self-observation, nor were there any references to regular or systematic self-monitoring processes in the comments of the high scoring participants. However, as mentioned in the previous section on forethought phase processes, many of these participants had at least informally monitored their goal pursuit progress to the extent that they were able to document and describe this progress in terms of their achievements. It was not always clear, however, whether these achievements were also indicators of timeliness. That is, achieving a goal could be celebrated whether or not it was early, on time, or late, and many of the goals and milestones within an individual’s doctoral research are not calibrated against external timelines.

The following high scoring participant was extraordinary amongst this group. Although the method for doing so was not stipulated, the participant had monitored his or her progress against some sort of schedule, and with such confidence as to be able to reduce pace over previous months and remain on track. The fact that this participant completed the thesis within the year suggests that this was an accurate appraisal of progress.

“I’m ahead of schedule by several months, so am feeling very happy with the progress of my research and the chances of finishing it by the end of this year. Because of being so far ahead, I’ve taken some time off and worked at a slower pace over the last few months.” (0940, High, Submitted/Graduated)

It was rather surprising that, having just completed the first JTS survey, one of the high scoring participants wrote about their experience of the JTS as a means of ‘self-evaluation’. This suggests that the participant had quickly recognised the potential for its use in self-monitoring.

“... I also appreciate this survey as an outlet and a self evaluation tool.” (1913, High, Submitted/Graduated)
Self-monitoring provides the basis for self-reflection to occur, therefore, more can be learnt about participants’ self-monitoring within the next section focusing on self-reflection.

6.4 HIGH SCORES - SELF-REFLECTION PHASE

The self-reflection phase of Zimmerman’s (2000) model of self-regulation involves evaluating goal progress, making attributions for outcomes, and using this information about performance to make decisions regarding future goal pursuit efforts (Schunk & Zimmerman, 2012b). These processes are grouped into self-judgements (referring to self-evaluations and causal attributions) and self-reactions (self-satisfaction and affect, and adaptive or defensive inferences).

Self-judgement involves comparing performance against a standard or goal (Cleary & Zimmerman, 2012; Schunk & Zimmerman, 2012b). Firstly, how did these students evaluate their doctoral research progress? What standards did they report using, and to what did they attribute the outcomes?

Completing the Month 1 JTS was one form of self-evaluation common to all these participants in the study, and this group of participants rated themselves very positively at either 3 or 4 on the Doctoral Progress measure. As described in the forethought phase findings, these high scoring participants reflected on their performance not only for the previous month, but often chronicled their accomplishments of earlier months. Also previously discussed was how the high scoring participants’ specific goal setting seemed to enable greater clarity and confidence in evaluating their progress towards these goals. Naturally, the more participants had done, the easier it was to acknowledge.

But how was this evaluated in terms of the amount of progress made towards the more distal goal achievement of thesis completion? Some participants assessed their goal-pursuit progress by perceiving successful proximal goal achievement within the wider context of distal goal pursuit. For example, one high scoring participant mentioned being at the ‘halfway point’. Another described concerns about keeping to the ‘ambitious timeline’, as well as concerns about managing the staging of the research. Other comments from the high scoring participants suggest their awareness of the timeframe within which they are working and setting goals. The following are examples of balanced perspectives on goal pursuit, observing not only what had been done, but what would have been ideal. This approach would be expected to assist with appropriate goal-setting, and is likely to be important in achieving timely completion.
“I feel generally happy with my progress in data collection. I would like to be further ahead with checking transcripts and transcribing interviews that I am.” (0149, High, Enrolled)

The outcome of effective time management was enhanced if monitoring goal-pursuit progress resulted in a sense of success. Getting more done than expected, or of being ahead of time, could be satisfying and lead to increased self-efficacy.

“During the past month, I completed a very intensive 3-month study internship overseas. I was very satisfied with my achievement, having managed to complete significantly more during this time than I had originally expected would be possible. ... I am very satisfied with my doctoral progress, though wished I could have achieved just a little more while overseas.” (0878, High, Enrolled)

Some participants explained how goals and self-motivation beliefs, such as outcome expectancies, had been taken into consideration when they evaluated their progress. This meant that doctoral research progress could be scored highly even if the participant did not reach their goals. It also shows how confusing the assessment of progress can be, particularly in the early stages of candidature. In the following example, although the participant rated their progress highly, the associated comments revealed an underlying uncertainty about the rate and nature of their progress, and suggest inadequate goal-setting had been undertaken, even for the early stages of candidature.

“I've only just started my PhD so I haven't really done much yet. I feel happy about what I've done so far but I'm making pretty slow progress, so I haven't actually achieved a lot but I feel ok about it.” (0144, High, Enrolled)

In the following comment, the participant describes the personal efforts undertaken to become fully immersed in the process of PhD candidature. Of course, it is also possible to be busy and achieving goals without actually making progress with the doctoral research. The lack of evidence of actual research progress is not typical of the other comments by high scoring participants, and it is possible that this reveals doctoral research task analysis difficulties of which the participant is unaware. That is, the performance evaluation might be based on a faulty understanding of the task requirements.
“At the two year mark I feel the best I have ever about this climbing Mt Everest journey. I have worked hard at soaking in the training provided, sought outside my university training, read books to understanding the journey, asked lots of questions and attended many other related forums, meetings etc. Also I have engaged with the university in being a volunteer on a department committee and presented to fellow new students.” (1494, High, Enrolled)

Judgements of performance were not confined to research-related tasks. Other comments highlight the importance of considering the wider context in which doctoral research takes place. Therefore, judging performance as satisfactory could also be due to the sense of making progress while managing other life responsibilities.

“… Am also getting the hang of balancing the roles of student and Mum.” (0195, High, Submitted/Graduated)

The supervisor’s feedback was cited as another source of information used for the participant’s judgement of progress. This feedback can provide an important standard against which the student can judge their own progress. The following comments show that when the student trusts in the supervisor’s judgement, the effects of the supervisor’s feedback on motivation can be profound.

“… my supervisors have been very positive in their feedback and this has made me feel that finishing the work is a strong possibility.” (1956, High, Enrolled)

“I have received lots of encouragement and constructive feedback from my supervisors; I thrive on positive feedback as studying full-time while mothering young children is not easy.” (1109, High, Enrolled)

“I am feeling very happy at the moment because my ethics application was successful and they were very congratulatory on my application and my research.” (0916, High, Enrolled)

The vast majority (71%, n = 59) of high scoring participants attributed their satisfactory progress to their own efforts, either explicitly or implicitly, as was exemplified in the comments pertaining to task analysis. However seventeen participants (20%) acknowledged the supervisor’s positive role in their recent achievements or experience of candidature.
“I have a wonderful Supervisor and team of associate supervisors and they have made my academic progress a fabulous experience so far.” (0170, High, Enrolled)

“...My supervisors are extremely supportive and constructive on the issues I have....” (2070, High, Enrolled)

“...My supervisor has been extremely helpful, although he is busy as he has 4 PhD students. Still, I see him every day so I feel like help is there when I need it.” (1316, High, Enrolled)

“My overwhelming sense is pleasure, within this a major component is the nature and quality of the supervision experience in contrast to that experienced in the MA I finished last year. This time we can discuss ideas and talk more generally, I both go and come away feeling good; I feel supported as well as challenged. My previous experience was akin to visiting the headmaster, I didn’t feel the conversation was ever complete, my sense was that I annoyed this person. The power relationship dominated then, but not now, it’s great!” (1163, High, Enrolled)

“I have just received a new co-supervisor (my previous co-supervisor moved overseas). ... It was nice to discuss my progress and the next steps, talking about the writing up of my thesis and agreeing to set detailed timeline for each of the chapters and sticking with it. We also discussed a few ideas as for the presentation, and it was nice to once again have a bit more direction and support in the supervisor relationship. ...” (1505, High, Enrolled)

Several participants commented that their progress had been assisted by other external factors, including other researchers, the extension of a scholarship, attending a research students’ forum, as well as the following example.

“I received the final data set for analysis, but it was not in a usable format from the programmer (designed and piloted online assessment)! Fortunately this has been reformated thanks to a friend who has encountered similar issue in past. I have received some great help of late, but it has been through unoffical sources rather than supervisors (who have great intentions)...” (1288, High, Enrolled)
As there was little dissatisfaction with progress within this group, there were few negative attributions made by these participants. Two participants said progress had been hindered by inadequate financial or induction resources provided by the university, and one said they had been delayed by data collection problems. Some of these high participants’ comments referred to the impact on progress of factors from the wider domain of their lives: three participants explained that unspecified personal issues had impeded progress, two cited financial concerns, and one described health problems.

Two participants said their paid employment had taken more time than expected away from their doctoral research. However, the first of these examples illustrates the sense of managing the other demands rather than progress being affected by them:

“I also work part-time (as a researcher in a different university) so I have to combine both study and work...The job means that I cannot just get on with it as I might want to but it has been useful to me recently in boosting my self-confidence as a researcher.” (1979, High, Enrolled)

“I have been tutoring over the semester and that has taken a lot more time than originally imagined... hence less progress on doctoral project than I was hoping this month.” (1531, High, Enrolled)

Supervisors were referred to as unhelpful by several participants, generally due to inaccessibility or lack of guidance, but occasionally as a result of differing approaches.

“... My only real issue is that I was allocated a co-supervisor by the school who is not someone I would have chosen at all as he has no expertise or interest in my topic area, methodology or paradigm. While the Principal supervisor and I are working well together and I have been very clear on what I need from the co-supervisor (and really value his involvement in that aspect...and tell him that) he is wanting to do more and is constantly coming to me telling me things he claims my Principal Supervisor has said .... which isn't the case. My Principal Supervisor is excellent and is on to it... but it has caused the most unnecessary angst for me and the lack of my involvement in allocation of that supervisor has left me angry and disempowered as a professional, mature age candidate.” (0953, High, Enrolled)
Self-reactions are the motivational effects that result from self-judgements about goal pursuit progress (Bandura, 1986). Two types of self-reaction have been delineated: self-satisfaction and adaptive or defensive inferences (Zimmerman, 2013).

Self-satisfaction reactions describe the level of satisfaction with which the student perceives their performance, with associated emotions ranging from elation to depression (Zimmerman, 2013). Regardless of the participant’s stage of candidature, knowing that they had attained specific goals or indicators of progress was associated with a sense of satisfaction with progress, and positive affect was expressed with the use of words like ‘exciting’ and ‘celebrated’, again as exemplified by comments in the forethought phase section. Just over half \( (n = 43, 52\%) \) of the high scoring participants explicitly referred to how they felt about their progress. The majority \( (n = 27, 38\%) \) of these participants described their affect in positive terms. Nineteen participants used words associated with excitement, enjoyment, contentment, satisfaction, or relief, with another eight using the word ‘happy’. However some participants described more the ‘ups and downs’ of the month in more detail.

“Had some successful networking pay off with some approvals for new studies come through which was exciting early in the month but now feeling a bit under pressure because of a short time frame to get all relevant ethics paperwork together and in on time, plus preparing for international conference in 3 weeks, and beginning of new teaching semester.” (1037, High, Enrolled)

“… Also for the first time I can actually define an end to my PhD. This has helped my overall mood in an extremely positive manner, but I still feel overwhelmed thinking about the time that has been wasted (often uncontrollably) to get to this point.” (1913, High, Enrolled)

“Getting towards the end so its feeling a little more daunting. Also, there's new anxiety with what comes next. I've been successful with a grant application so my position is secure, however now I'm working through new time pressures and trying to keep focused on finishing my PhD is difficult, but I'm trying to balance everything.” (0716, High, Submitted/Graduated)

“I am in the middle of collecting my data, which is a very stressful period of time, but also very interesting and exciting. I am very relaxed about the interviews and observations, becoming more and more confident.” (2141, High, Enrolled)
Similar to this last comment, nine of the participants observed that they had felt encouraged or had experienced a boost to their confidence in the past month.

“I had the opportunity to practice my confirmation presentation to a group of HDR students and three colleagues. I received very positive feedback and some excellent questions were asked by the audience. I was able to answer most questions and this gave me confidence and also added further thoughts for the forthcoming confirmation process.” (0196, High, Enrolled)

Just one participant made an effort to differentiate between and compartmentalise personal and doctoral research-related feelings.

“The sadness I have felt in the past month is related to my personal life and has nothing whatsoever to do with my studies.” (1215, High, On Leave (maternity))

Finally, it is noteworthy that only four of the high scoring participants referred to feeling somewhat stressed or frustrated in relation to their progress in the previous month.

Perhaps more important than what happened in the previous month is how the student responded. Adaptive or defensive inferences are the self-reactions associated with decisions about the need to adjust future learning attempts (Zimmerman, 2013). Participants’ reports of self-reactions could be the most important indicators of differences in self-regulation in PhD candidature, as they are the result of the participants’ evaluation and responses to previous learning efforts.

Adaptive inferences result in seeking more effective strategies to improve performance. There was little evidence of high scoring participants planning to adjust their future behaviour on the basis of their performance over the previous month. Of course, the high scoring participants were, by definition, generally satisfied with their progress, and may not have needed to engage different strategies or articulate new goals. While all of these participants had scored high on the Doctoral Progress scale, some of these participants indicated that they would have liked to achieve even more in the previous month. One participant referred to adjusting the research timeline following an appraisal of recent performance, as mentioned earlier. In the following two cases, participants identified the need to develop organisational and time management skills for more successful goal pursuit.
“I have yet to develop robust skills to thrive through competing objectives, usually allowing one high pressure demand (specific employment-related activity) to over-ride other pressing demands (daily writing towards my thesis objectives).” (0509, High, Enrolled)

“I am not satisfied with the amount of reading I am doing nor with the speed at which I am writing. I need to do field work more consistently and it needs to be better organised. I also am concerned about the current lack of depth in my knowledge of my research area.” (1253, High, Enrolled)

Defensive inferences produce reactions designed to protect the individual from further discouragement and negative affect, and include helplessness, procrastination, task avoidance, cognitive disengagement, and apathy (Zimmerman & Campillo, 2003). Such reactions were evident only in the low scoring participants’ responses, as will be discussed further in the following section of this chapter.

6.5 LOW SCORES – FORETHOUGHT PHASE

In contrast with the comments of the high scoring participants regarding achievements, those of the 68 low scoring participants appeared focused on the reasons for their lack of progress. That is, if the predominant theme of the high scoring participants’ comments was labelled “This is what I’ve done”, then the theme for the low scoring participants would be “This is why I haven’t done it”. Of course, providing excuses for less than satisfactory progress reflects that at least some degree of task analysis has been undertaken, in that this expresses some level of recognition of the nature of the unmet goals. Still, low scores were more often than high scores associated with expressions of uncertainty about what students should actually be doing.

Indeed, only 28% (n = 19) of low scoring participants described the doctoral research tasks they had been working on in the previous month. This might be expected as, by definition, low Doctoral Progress scores indicated a lack of satisfaction with progress. However, this pattern extended beyond comments about the past month. That is, while some of the high rating participants listed accomplishments stretching back over the previous year or two, the low rating participants rarely mentioned any previous achievements, and instead appeared focused on what had not been done or what should have been done.
Not surprisingly, there were participants who were disappointed in their progress and claimed that despite appropriate goal-setting for their doctoral research, other factors had taken precedence, or perhaps the goals were unrealistic under the circumstances.

“I have been overwhelmed with other work and have been unable to spend the time I planned on my studies.” (0354, Low, Enrolled)

“I have needed to postpone my assessment of canditure due to caring for elderly sick mother, husband losing major work contract and requiring to re-apply for my work position” (0385, Low, Enrolled)

“... I tried to finish a chapter during the semester break but it took a lot longer than I expected and wasn't able to complete it....” (0898, Low, Enrolled)

However, apart from not referring to previous goal-setting, few of the low scoring participants described engaging in goal-setting activities for the future. This was not always due to not thinking about or not wanting to set goals. Indeed, the low scoring participants’ comments regarding task analysis also draw attention to the importance of recognising that doctoral research students ‘do not know what they do not know’. The participant quoted below withdrew from the PhD, possibly due to the impact of the problem described on candidature time.

“I feel that I was not given the appropriate information about the confirmation process early enough. I should have been told about the process and how it works from the very beginning and no one did that. My supervisors told me last year and expect a tremendous amount of work to be done in a shorter period of time than if I had known from the very beginning. It is incredibly stressful, especially when I have a job and a family. I wish I had known from the very beginning what I know now.” (0135, Low, Withdrawn)

Without addressing such task analysis issues, there are likely to be negative consequences for further goal-setting, planning, and strategy choice. Such comments also highlight how mismatched expectations of agency and responsibility can confound the efficacy of student-supervisor relationships and influence progress.

The following comments draw attention to the fact that some participants did know the nature of their difficulties and the type of help they required from the supervisor. Rather than reporting problems with knowing what to do, these participants’ expressed difficulties in knowing how to
do it. More specifically, these participants identified that they needed their supervisor’s
guidance in defining or narrowing the scope of the research. Again, these comments suggested a
mismatch between participant and supervisor, in that more skilled supervision might have
addressed the learning necessary to enable these participants to develop, and build confidence
in, their skills in this respect. Instead, these participants described feeling aimless, and even
misled, and expressed frustration at the negative impact this has had on their available
candidature time. The fact that only one of these participants was still actively enrolled in
Month 12 suggests that these problems had not been resolved.

“I feel as though my project is overwhelming me and I haven't recived enough
guidance from my supervisor as to how to proceed. My main problem is that no
one believes me when I say I am struggling.” (0826, Low, Enrolled)

“I feel like I haven't had enough direction, my supervisor does not seem to know
much about my topic and improvises his way through the sessions, so that I have
been left to drift for too long without focus. I feel like I am nearly ready to start the
process now, after all this time I still have what feels like bulk background reading
to do.” (0778, Low, On Leave)

“[Supervisor] suggested I intermit but that we keep working on it but doing things
his way (the last year or so, I took my PhD in my own direction, because I was
frustrated with his approach). I'm feeling better this week, so I will see whether
blindly following his instructions gets me a PhD, but I'm not going to intermit. ... I
feel that I could have done so much better if my supervisor just had of let me focus
on a single clear and specific research question. I told my supervisor in the first six
months that I didn't understand what we were doing, that it wasn't clear; but no, he
told me my PhD wasn't going to be like that. As a result, my PhD is one giant
fishing expedition.” (1191, Low, Missing)

In addition to uncertainty about how to analyse and approach the doctoral research task, the self-
motivational beliefs of the low scoring participants also appeared to have been lacking
conviction. As previous doctoral research performance had been judged as disappointing, this
may have engendered doubts regarding the participant’s self-efficacy and their ability to
continue to successful completion.
"I'm currently trying to finish my first year proposal review and am really struggling. Feel like I haven't done enough up until now and the clock is ticking, so much more to read. Has bought up a lot of confusion and depression. Also having supervision issues. Not sure as to whether I will make it through this stage” (0406, Low, Enrolled)

“I actually felt for the first time in the past few weeks that I might not be able to finish it on time, maybe I'm just not capable. The idea of trying to finish it without my scholarship is very stressful (financially speaking). But I've been doing this for 2.5 years now, and I've had these feelings before. Unlike when I began, now I have some faith that this feeling will pass (even if that hope is faint some days!).” (0578, Low, Enrolled)

While for some participants this uncertainty was transient or recurring, for others it had become more pervasive, and developed into a greater sense of ‘stuckness’ due to helplessness or hopelessness, and the ramifications for this are discussed in the self-reflection phase section. Doubts about the ability to persist were rarely about the intellectual ability required for the task. Rather, participants more often mentioned uncertainty about the ability to manage the impact of external factors such as poor supervision on their research progress, to manage the demands of both research and other aspects of their lives, or to generate or sustain adequate motivation. These causal attributions are discussed later in the self-reflection phase section.

In addition to considering ‘self-motivational beliefs’ as described by Zimmerman, it is also instructive to consider the ways in which the word ‘motivation’ was used by the participants. It is noteworthy that the word ‘motivation’ (or directly related words such as ‘motivate’ or ‘motivating’) was used by only seven participants in the Month 1 JTS Comments being analysed, all of whom had low Doctoral Progress scores. In all cases, which account for 10% of the low Doctoral Progress score group, motivation was described as lacking. That is, it appeared that if doctoral research progress was rated highly, then the participant did not perceive motivation as a contributing factor to be reported. Yet if progress was less than satisfactory, motivation was more commonly looked to as an explanatory factor. Thus it seems that motivation levels were noticed only when progress was inadequate.

Four of the participants who referred to ‘motivation’ explained that they were so tired by the demands of their employment that they had little time or energy for their doctoral research, but
only two of these cited this as the only reason for their low motivation. Inadequate supervision was a contributing factor to poor motivation levels for one, while another questioned whether completing the PhD was worthwhile. Another one of the seven participants was unhappy with the inadequate guidance provided by their supervisor as well as feeling fatigued by data analysis and writing. One participant described the negative impact on motivation of feeling pressured to write faster to compensate for unsatisfactory progress. The following quotes provide examples.

“*My work (ie. paid employment) has been very demanding of my time and I have had little time or energy to work on my research. I know it is mainly my fault for not being more organised, but it is hard to get motivated when you only have about half an hour to yourself each day.*” (0451, Low, Missing)

“I have started working and am having trouble getting motivated to continue progressing my thesis. This is frustrating.” (0791, Low, Enrolled)

“I am not progressing as fast as I would like and lack serious motivation.” (0917, Low, Enrolled)

According to Zimmerman’s (2000) model, the student’s valuing of, and interest in, their doctoral research would contribute to motivation. The personal value of doctoral research was questioned by some of the low scoring participants. The first of these participants recognised the relationship between task value and motivation.

“*Feel under pressure from other workload issues, particularly teaching, and am wondering what is the point of the PhD. Rationally, I know it will allow me to progress in my career but it is just a long hard slog. I am giving consideration to employment outside academia but for the positions I would really like a PhD is either essential /beneficial. This should be a motivating factor but it isn’t.*” (1466, Low, Enrolled)

“*Work pressures have put the PhD on the back burner since Jan. As the PhD has no effect on my employment future, work has taken preference.*” (0312, Low, Enrolled)

“I have other priorities in life other than working on my PhD material and find that a day or a week will pass without having done much (or any) work.” (1001, Low, Enrolled)
Some low scoring participants also referred to their level of interest in the task. For the participant below, issues of both value and interest may have negatively impacted motivation to the point of causing withdrawal from candidature.

“Since I don’t like the subject, and both my supervisors don’t pay attention to the subject, one is too busy to spent time with me and the other has a divergent ideas, I don’t like to continue this subject at all. In addition, I’m sure the result of this project will not be useful for industry and more modifications makes cost effects for them, so I think I’m doing a redundant job.” (0480, Low, Missing)

This low scoring participant expressed adequate interest in the research, but uncertainty about how to proceed, as was discussed with respect to task analysis.

“I am generally very interested in the broad research area in which my project falls in. 😊 However after a period of over 3 months (since the commencement of my candidature) I’m still struggling to refine a specific topic. 😞” (0646, Low, Missing)

Other participants were also sufficiently interested, but struggled due to lacking the time necessary to spend on their research.

“I would love to spend time on it and wish to progress it but my full time job is demanding and I am frustrated that I do not have time to devote on it.” (2073, Low, Enrolled)

One participant admitted to not having sustained the interest required.

“it's my own research project (my own proposal) but a lot of the time i am totally sick of it” (2048, Low, Missing)

Although the following participant claimed to have maintained an interest in their research, making unsatisfactory progress seemed to have taken a toll on levels of motivation. Nevertheless, this participant remained enrolled until at least Month 12.

“The idea of going off for a while and doing a brain-dead job seriously appeals to me – not that I am ‘not’ passionate about my topic; I believe in it, but I just want a break!!” (0917, Low, Enrolled)
Confidence in the expected outcomes of the doctoral research was lacking for some of these low scoring participants. The influence of this on motivation is evident in the following scenarios, drawn from different stages of candidature. The first of these comments also highlights how the participant’s lack of trust not only in the supervisor’s judgement, but also in the confirmation of candidature system, contributes to these outcome expectancies.

“One of the Honours students who I worked with closely this year is starting a PhD next year (under my supervisor) in my broad area of research. Despite brief reassurances from my supervisor that this won't cut off avenues of research for me, I feel it's inevitable. I haven't been able to meet with him to talk about it for a week and together with my general uncertainty about what "big-picture" questions I can try to answer with my PhD, I'm feeling very uneasy. I wish my proposal had been more closely reviewed instead of just getting rubber-stamped.” (1643, Low, Enrolled)

“I did a presentation this month and thought that - as usually happened - I would be positively lifted to keep on working and do more each day. I didn't feel that way. I have done SO little in the past month - constantly struggling with what my future will be. I feel that I have the PhD to do but it isn't always in my mind as a goal - then I think "this time next year I won't be doing my PhD, it will all be over" and completing the PhD feels like a major goal again.” (1542, Low, Enrolled)

“i cannot believe that i'm supposed to hand in and finish this in the next two months! it feels like it's not going to happen. it doesn't help that each chapter sent to SV ends up with at least 6 months corrections back and forth....” (2161, Low, Submitted/Graduated)

Few comments revealed low scoring participants’ goal orientations, although this participant described how a mastery goal orientation was related to other self-motivational beliefs, that is, concerns about outcome expectancies and to uncertainty about the value of the doctoral research.

“The other thing I'm worried about is if I do end up completing this PhD, what I do next. I feel like I need to do another PhD because I've not gained the skills or expertise that I should have from this one. The other thing I would insist on the next time around is having two supervisors.” (1191, Low, Missing)
Unlike the previous comment, some other low scoring participants’ comments revealed elements of a performance rather than mastery goal orientation. For example, rather than taking a proactive approach to developing data analysis skills, this participant wanted the statisticians to simplify their explanations. Similarly, it seems the participant resented the supervisor’s conceptual concerns, rather than accepting and addressing them as part of the learning process.

“The past month has been really hard. I am struggling with data analysis and there doesn’t appear to be anyone who can help me. My supervisor is not familiar with the analyses that I am running, and the statistical experts in my School/department can’t seem to ‘dumb’ their explanations down so that someone with poor statistical knowledge can understand. I feel like I have been stuck in the same position for months now, and I am extremely worried at how long I have spent on this particular task. My supervisor also complicates the situation for me - every time I see him he has another suggestion about what I should be doing with my analyses and constantly throwing conceptual curve-balls at me, so that I end up spending even more time trying to address his conceptual concerns.” (1329, Low, Enrolled)

6.6 LOW SCORES – PERFORMANCE PHASE

As seen in the comments of the high scoring participants, there were few mentions of the use of self-control strategies by low scoring participants. One low scoring participant talked about implementing a specific self-control strategy. Being enrolled part-time, this participant attempted to make progress through a time management strategy of taking study leave for time away from full-time employment.

“Another delay has been a result of computer problems which took a couple of weeks to rectify, with this occurring during the time that was taken for study leave!!” (0211, Low, Withdrawn)

In contrast, two participants acknowledged struggling with self-control issues, which in the first case might have contributed to the need to take leave.

“I know I need to keep working on this, but I just can’t get myself to sit down and concentrate on it.” (0762, Low, On Leave)
“I am currently making very little progress. I am in the data analysis/write-up phase, have gone beyond the 4 year mark and have PhD fatigue! I continually battle with procrastination and motivational issues – but I'm still fighting for now!” (1001, Low, Enrolled)

None of the low scoring participants referred to systematically observing or monitoring their progress in any way. Moreover, six (9%) of these participants articulated concerns regarding their inability to know how they were progressing, in ways similar to the comments below.

“I feel that I have no way to mark my progress. I have spent every week doing things but I have no idea if what I am doing is the right thing or enough work. I need clearer goals generally for my PhD and even when I asked my supervisors directly what they expected me to have completed by different time frames (1 month, 6 months, One year) they were very vague. I just feel like I'm getting nowhere and doing nothing.” (177, Low, Missing)

“… I also feel as though I haven't done as much as I think I should/had wanted to by now. ....” (0826, Low, Enrolled)

“…We do have to submit an annual progress report, but you can write anything in them and there are no checks....” (1191, Low, Missing)

In one sense, this low scoring participant monitored progress through a lack of activity.

“The past month I think I have opened my document twice.” (0791, Low, Enrolled)

Trying to monitor progress against candidature and stipend time allowances may be limited by inconsistencies between these and university guidelines, apart from by the broad timeframes involved.

“I know the standard time for a PhD is four years but with the Stipend being three, the pressure to bring it in, in three is unbelievable. Then when you do apply for a six months extension (even after illness) Acting Dean of Research and Supervisor make you feel a failure, and like shit when you are actually well within the timeframe and your planned goals and tasks... as you had always assumed four years as was WRITTEN on the BLOODY OFFER DOCUMENT and enrolment papers. They won’t give me casual works as it will 'get in the way’ of my timely
completion so now I am on welfare, doing job tests and getting food vouchers... Think Maslen's hierarchy of needs... I am at the bottom and THEY expect me to function at the apex! [Name of institution] is a joke as to support for their supposedly most valued candidates... we all cringe every time we are hit with the term 'timely completion' representing three years. GRRRRRRRR!” (1584, Low, On Leave)

One low scoring participant’s comments related to the role of the supervisor in providing guidance in progress monitoring. This comment highlighted that the importance of the supervisor’s credibility and expertise extends beyond familiarity with the research area to being a role model for the doctoral research process.

My supervisor for the section I am currently working on is somewhat helpful when available, on the material itself, but is not good at giving general advice and guidance – he is currently trying to finish his own PhD after 10-15 years! (1001, Low, Enrolled)

Together, the low scoring participants’ comments provide further evidence that the absence of clear goals hinders both the making and evaluating of progress.

6.7 LOW SCORES – SELF-REFLECTION PHASE

As for the high scoring participants, the Doctoral Progress measure was a form of self-judgement common to all the low scoring participants. Unlike the high scoring participants, self-judgements by the low scoring participants for this purpose appeared to be made on the basis of what participants had not done, rather than what had been done, even if a little or less than expected had still been achieved. As discussed in the forethought phase section, a few of the low scoring participants referred to not achieving specific goals that they had set for the past month; more often these participants conveyed a more general sense of not making progress or of being delayed.

The value to self-evaluation attempts – and hence to motivation – of receiving positive feedback from supervisors was discussed in the section on high scoring participants. It is noteworthy, then, that only one (1%) low scoring participant spoke of receiving positive feedback from a supervisor, in comparison to eight (10%) high scoring participants referring to this.
Furthermore, this feedback to the low scoring participant was not construed as being either credible or useful.

“At my annual review my supervisors gave me an A, which is the highest 'pleased with progress' ranking a candidate can get, yet I constantly feel behind and feel pressured to write faster. I'm having severe motivation problems at the moment and I'm confused as to why my supervisors always give me A ratings, even though I know they think I'm behind in my writing.” (1624, Low, Enrolled)

Whether other low scoring participants did not actually receive positive feedback, or did not attend to it, is unknown. By definition, less positive feedback would be expected when progress is less satisfactory. However a lack of any feedback from supervisors appeared to be an ongoing issue for many of the low scoring participants. This became apparent in studying the low scoring participants’ causal attributions for their progress. The contrast with the pattern of causal attributions offered by the high scoring participants is striking. Again, it must be noted that the following attributions are not mutually exclusive, in that participants sometimes described the effects of multiple factors on progress.

Twenty five (37%) of the low scoring participants pointed to negative effects that aspects of supervision had had on their progress. Supervisors were most frequently criticised by participants for providing inadequate direction or misinformation, being inaccessible, disinterested or disengaged, or exhibiting administrative inefficiency in ways that affected the participants’ progress. In addition to the following examples, many of these issues have appeared in previous quotes.

“The biggest hurdle that I have found is that when I talk to my supervisor it is very difficult to engage him on any meaningful discussion about what the data say and how to present the data. He does not seem to have read anything that I have written in the last 12 months so when I show him the papers I am working on he has to read them as if he has never seen them and then he corrects my spelling. It is not very encouraging at all. My associate supervisor is similarly disengaged usually but at present it is hard to worry about that as she is at the bedside of her father and that is sad for her so I appreciate the current difficulties she has”.

(0802, Low, Enrolled)
“I am currently doing my PhD through [name of institution] but live in [interstate city]. The difficulty I have limited access to discuss issues and banter ideas with someone. I meet with my supervisors via phone fortnightly but I have not felt comfortable enough to talk and pursue discussions.” (0329, Low, Enrolled)

“…I’ve had only one supervision session this year because I just don’t know what advice I could get from my supervisors that I couldn’t already figure out myself - given that they don’t know the literature in my subject area….” (0898, Low, Enrolled)

“My principle advisor has finally taken interest in my study at the writing stage and is now expecting me to re-analyze my work. This has caused me to feel very discouraged during the past few months.” (0572, Low, Enrolled)

“Due to poor academic and statistical advice I am faced with a major flaw in my PhD. I wouldn’t suggest doing this to my worst enemy.” (0472, Low, Submitted/Graduated)

“…my supervisor failed to send a progress report to the appropriate person and therefore it was not submitted in time. As such, I have received a letter of ‘show cause’ for continuing the PhD. Some days I wonder why I want to do this when it seems all too hard!” (0211, Low, Withdrawn)

“…In addition to my personal life, I am waiting for data which is dependent on my supervisor paying a fee to the data source. My supervisor keeps stalling on this and it is holding up my data analysis. Overall, I am pretty disappointed with my PhD at the moment.” (0865, Low, Enrolled)

A change in supervisory arrangements was another reason for problematic progress, according to participants in the low-scoring group. Related to this was the issue of conflict in the student-supervisor relationship. It is interesting to note that, despite the reported tendency of students to accept responsibility for their role in this relationship (e.g., Golde, 2005; Holbrook et al., 2013), in many cases here the student’s role in the conflict remained unclear. While some of these students’ attributions for their progress might reflect unrealistic expectations of supervisors and the student-supervisor relationship, or indeed of themselves, in other cases it appears that the
quality of supervision had been substandard in some way. A few students described these issues rather impartially; most expressed the unpleasant emotions associated with their experience.

“One of the main factors would be another change in supervisor. This is the 3rd supervisor I have had. My supervisor initially went on sabatical for 6months 1year into my PhD so I was appointed another for that time period. Then 18months later she took parental leave for this current year. This has meant that another new supervisor is guiding me. The problem that I believe I have is that due to the small size of the discipline that I am in everyone is close and in fact friends and due to staff commitments I had no say in who my current supervisor is. This means that there is no one that I can talk to about the impact a third supervisor has on my progress and the fact that she is quite unavailiable. I feel this is a situation that is no ones fault, but a situation I should never have had to face. My new supervisor and I have vastly different ways of working and personalities. The result of this is that I spend too much time stressing about managing the relationship and not enough time working on my thesis. The stress of this 3rd supervisor is stress that I did not need at this stage.” (0132, Low, Missing)

“one supervisor just quit my supervisory panel after a major personality conflict, one of my remaining supervisors, and the main technical support I have, blames me entirely for the conflict, berates me about it and he can’t wait until he doesn’t have to work with me anymore. I have to come to work everyday to see the supervisor who quit, who quite visibly despises me. Its awful!” (0416, Low, Enrolled)

“I have completed my initial data collection and have begun to consider analysis. In this time I have lost my principal supervisor, as she has taken personal leave, and have asked one of my two co supervisors to leave my team as he is extremely difficult to work with. This has left me with one remaining co supervisor. The School has offered an interim replacement for my principal, but I’m not sure about the fit. All of this is happening during a rather stressful period and has added to my overall feeling of anxiety.” (0796, Low, Enrolled)

“I have been working on a paper with my supervisor that I agreed to write at the beginning of the year. It’s been a real challenge because the paper is not related to
my research, so I’ve had to do a lot of additional reading. This has been stressing me out because I would much rather be moving along on my thesis, but my supervisor is pretty insistent that I get this paper out.” (0171, Low, Enrolled)

Although there were no differences between the proportions of high and low scoring participants who were enrolled full-time and part-time, 19 (28%) of the low scoring participants held work pressures at least partly responsible for their unsatisfactory progress in the previous month. It is unknown whether these participants were engaged in employment that was relatively more demanding of their time and effort than that of the high scoring participants.

“It's currently semester two and I have taken on 1 course and 12 hours a week of teaching on top of a full time PhD.” (0898, Low, Enrolled)

“I work full time and have a very high workload, working around ten hours at work most days. I am also experiencing significant health and financial issues so have very little time and energy for PhD study and feel very guilty and dispirited about it.” (0460, Low, Enrolled)

“Work pressures have also gotten in the way, though because I work as a research assistant that's kind of okay - it's interesting and challenging work that is still furthering my career. But the PhD requires a lot of concentration, not just time, so when both are in short supply it's pretty difficult.” (0578, Low, Enrolled)

“I am working as well as studying and am just not able to quarantine the time and head space required for this task. ....” (1232, Low, Enrolled)

“Time has been dominated by full-time work issues and so I have applied far too little effort to the PhD.” (1710, Low, Enrolled)

“Over the past month I have done little in terms of my doctoral progress. I am teaching sessionally and finding that is taking up all of my time. As well, I have been applying for jobs since I will have to give up my permanent teaching position in order to continue this work, and I am unable to get another leave from my school board. This means the pressure to complete my dissertation has increased and the time for me to work on it has decreased, leading to a lot of feeling of frustration”. (1884, Low, Enrolled)
“I am also affected by the end of the teaching term and my responsibility to my students to give them every possible opportunity for success, as well as community volunteer tasks, which are time consuming and essential to organizational sustainability. And always present in my life are issues of the lack of income.” (1895, Low, Enrolled)

Thirteen participants (19%) admitted to being personally responsible for their progress, with nine of these mentioning motivational or self-control problems, while two felt they had applied insufficient effort.

“... a lot of my unhappiness also relates to the slowness of thinking i feel and a difficulty in turning the ideas I do have into words on paper.” (1232, Low, Enrolled)

“I am finding it hard to get in to the swing of it. I have worked as a historian/research assistant for the last three years and am use to dealing with primary sources and am finding it annoying (although I know how beneficial it is) dealing with secondary sources. It does not help that I have done a lot of primary research for my topic in my job as a research assistant (for my supervisor. Not having an allocated study desk does not help as I use my work desk here at [name of institution] people don't know that I am studying and will ask me work stuff - which is confusing am I student or staff??” (2132, Low, Enrolled)

Difficulties with progress were attributed to family responsibilities by eight participants.

“This past month has been an especially busy 'family needs' and thus no progress has been made on the PhD....” (0211, Low, Withdrawn)

Unfortunately my private life got in the way this month! Dramas totally outside my control and extremely stressful, requiring at least over the last three days all my time and energy. (0578, Low, Enrolled)

“Due to family health issues and personal feelings of hopelessness, doctoral progress has been minimal....” (1895, Low, Enrolled)

Family disputes, financial hardship and coping with depression have affected my progress as has the pressure to get the perfect the proposal for each submission
date, only to be advised at the last moment that more time is necessary in order to submit a quality paper -this has happened three times since June 2010. (1378, Low, Missing)

A range of resource issues contributed to the poor progress of five participants, including computer and software problems, campus flooding and renovations.

“…Physical resources at uni are scarce, and have spent bulk days simply attending to my technology and study space needs.” (0778, Low, On Leave)

Other candidature and research-related issues were problematic to progress for some.

“November is reporting month and the amount of time required to redesign non applicable forms is ridiculous. Studios are unavailable for use (flooded and no maintenance available) which is critical as this period after the finish of term was set aside to work in the studios through to my March exhibition. IT support not available and printers have dropped out. Sorry about the litany.” (1734, Low, Enrolled)

“The last three months I have been delayed time and again by ministry of health staff indirectly connected with my ethic application. outside agencies do not pay attention let alone prioritize student ethic applications even if it is their contract and part of the contract requirements to conduct studies.” (0891, Low, Missing)

Five participants reported the effects on progress of experiencing physical or mental health issues, and five described financial difficulties. Three participants had problems associated with research budget constraints and one participant was delayed by an Ethics application process.

“I am very frustrated by continuing health issues with chronic fatigue syndrome. because i am outside australia for my doctoral project work it's hard to get proper support or find a doctor who can help me manage this issue so i feel very isolated and frustrated with the amount of work i can get done in a day and with issues of poor concentration and foggy cognition. consequently when i am able to work on anything i enjoy it immensely! i try not to think about how stressful it is to be running out of time without being able to work really hard because stress only makes things worse.” (0461, Low, On Leave)
“During this month I have had a significant spinal injury, hospitalisation, surgery and have been advised to take a leave of absence from my PhD while I recover and work out a graduated return to work. I will still be working on my PhD, but at a much slower pace.” (0436, Low, Enrolled)

“In the past month I have been feeling really down about the lack of due care and attention that the University provides in regards to ‘real life’ and how it impacts on one’s ability to study. I also feel that University sometimes thinks it’s above ‘real life’ and therefore is justified in ignoring the fact the people have to eat and pay bills and look after family which does not mean that they are not serious about their studies. It just makes it more stressful!” (0191, Low, Enrolled)

As previously stated, some participants mentioned a number of issues and indicated their interactive effects on progress. Although this participant has been quoted elsewhere in this section to exemplify particular issues, taking an integrated view of this participant’s experience is illustrative of how these issues interact and influence progress.

“It’s studying part-time and working full-time means that there is very limited time each month to make any progress. This past month has been an especially busy ‘family needs’ and thus no progress has been made on the PhD. Another delay has been a result of computer problems which took a couple of weeks to rectify, with this occurring during the time that was taken for study leave!! In addition to this, my supervisor failed to send a progress report to the appropriate person and therefore it was not submitted in time. As such, I have received a letter of ‘show cause’ for continuing the PhD. Some days I wonder why I want to do this when it seems all too hard!” (0211, Low, Withdrawn)

It is also interesting that while the high scoring participants referred to both sources of support and hindrance to their progress in their causal attributions, none of the low scoring participants mentioned receiving any forms of support or assistance that might have facilitated progress to any extent.

Previous quotes have revealed the low levels of satisfaction and other negative affect expressed by low scoring participants. Given that these participants’ Doctoral Progress scores indicated that they were feeling at least close to ‘as unhappy as they could feel’ about their progress, it was unsurprising that they described their feelings in negative terms. Indeed, there were no
explicit expressions of positive affect from any of these participants. It is interesting, however, that only one of these participants used the word ‘unhappy’, which can be perceived as a polar opposite to the ‘happy’ expressed by the high scoring participants (this polarity was discussed in Chapter 4). Instead, the most common description was of feeling ‘stressed’, with nine (13%) of the low scoring participants using this word. Another seven (10%) participants described themselves as feeling ‘depressed’, ‘down’, or ‘dispirited’. ‘Frustrated’ was the next most frequent descriptor, and was used by five participants (7%). As this participant simply stated:

“Frustrated and disconnected, unsupported.” (1087, Low, Enrolled)


“In the last few days I considered quitting my PhD, and in fact went and told my supervisor I wanted to quit, and became quite emotional in his office. He said that he thinks my problem is that my standards and expectations are too high or that I’m being affected by anxiety or depression.” (1191, Low, Missing)

“my whole life is upsidedown. trying my best to keep my head above water. pressure is definately tremendous.” (1088, Low, Enrolled).

Considering further the motivational effects associated with participants’ perceptions of their performance, what adaptive and defensive inferences might these participants have made? That is, what decisions did participants make about the need to adjust future learning efforts?

As discussed previously, it could be assumed that doctoral research students have proven their self-regulatory skills, to a large extent, by successfully negotiating their way through previous undergraduate and postgraduate studies. Enrolling in a PhD also requires a significant degree of motivation and commitment to a long-term goal. It might be expected, then, that adaptive inferences would follow poor progress ratings, leading to strategic planning and goal-setting to facilitate improvement in future efforts. A self-reaction featuring an adaptive inference might be to plan to address these factors through the use of self-control strategies such as time management or help-seeking. Time management efforts could include practising more effective use of available time, for example, or possibly garnering more candidature time by changing from a full-time to a part-time enrolment load or requesting a period of leave. Help-seeking
might involve recruiting assistance from another academic, or the Head of School, or the Office of Graduate Studies to address difficult supervisor situations.

However, the comments suggested that rather than feeling agentic and energised to address the underlying issues, these participants were demotivated and disempowered by the perception that their doctoral research progress was inadequate and predominantly subject to the effects of external factors. Where self-reactions were voiced, these decisions seemed more defensive than adaptive, expressing the impossibility of the circumstances, or designed to protect the individual’s sense of self-worth and pride rather than to engage in further action that might risk revealing or confirming personal inadequacies. For example, the first participant was in the middle stage of candidature (as defined by this study), and in a catch-22 situation. The latter two acknowledged the need to implement different strategies, but the difficulty of doing so.

“...Also, I am not allowed to apply for leaves of absence because I do not have my proposal approved yet. I am trapped.” (2073, Low, Enrolled)

“I know it is mainly my fault for not being more organised, but it is hard to get motivated when you only have about half an hour to yourself each day.” (0451, Low, Missing)

“I've been feeling really down about my progress and now I think I'm in a cycle of avoidance/failure/poor motivation that I'm finding very difficult to get out of since I'm so busy with other commitments.” (0898, Low, Enrolled)

In contrast, it seems that this participant hoped that the doubts would pass, rather than planning to implement more effective self-regulatory strategies for making progress.

“I actually felt for the first time in the past few weeks that I might not be able to finish it on time, maybe I'm just not capable. The idea of trying to finish it without my scholarship is very stressful (financially speaking). But I've been doing this for 2.5 years now, and I've had these feelings before. Unlike when I began, now I have some faith that this feeling will pass (even if that hope is faint some days!).” (0578, Low, Enrolled)

Yet the comments of these participants also revealed the previous use of self-regulatory efforts to deal with such issues. For example, the following comment suggests that adaptive self-reactions to previous self-judgements about progress had enabled this participant to persist
through the employment of self-control efforts. In this instance, it might be assumed that the participant had taken leave to proactively manage this situation.

“... All up, I don't think it could have been made much harder, I am amazed that I am still trying to write. I have had some very black months recently, and was very close to throwing it all in. Fortunately I have managed to sort out some of the issues just this week and hope to get back on track soon. However, I am very worried about how much time I have lost and run out of scholarship in a couple of months.” (1056, Low, On Leave)

The conflict inherent in the self-reactions of these low scoring participants is encapsulated within the final part of the comments by the following participant, who has been cited previously in this chapter. Like many other low scoring participants, uncertainty and internal conflict about continuing appeared largely due to perceptions of how this individual was functioning in the current circumstances rather than the ability of the individual per se. To withdraw from candidature would be to admit both responsibility and defeat, which this participant wished to avoid. After all, under different circumstances things might be different. Nevertheless, this participant was missing from the Month 12 analyses.

“Part of me hopes that the school, faculty, or university will audit my progress, discover how little i've acheived, and kick me out. But at this point, I don't want to voluntarily quit because I'd always wonder whether I jumped ship to early...If this PhD doesn't work out, when I attempt my next one, I'm not signing on until I've already written a lit review and have the whole PhD planned out in advance. Why my school, faculty, or university just lets supervisors run their candidates PhDs however they like, I can't understand.” (1191, Low, Missing)

For one participant, the goal of completing the PhD had been surrendered, and the expected outcomes of the doctoral research had been revised. This participant articulated the strength of the interactions that may occur between making progress and the emotional experience of PhD candidature. This participant’s self-reaction was to withdraw from the situation and set new goals in a different domain.

“My feelings about my doctoral progress have become so bad that I have decided to take leave of absence and I'm not sure if I will return after 3 years of full-time study. My experience of postgraduate study has directly precipitated a moderate
depression over the past 18 months, which I can see will take at least a year to lift properly. I feel very angry about my postgraduate experience, and sad that I am forfeiting some of my dreams and re-imagining a life for myself without a PhD.” (0453, Low, Withdrawn)

Ultimately, the categorising of such responses as either adaptive or defensive is a judgement that would be best left to the participants themselves. However, in terms of examining the low scoring participants’ comments for evidence of self-reactions, there was little indication that these participants were responding to their unsatisfactory progress ratings by planning to implement changes to address the factors responsible.

6.8 CHAPTER SUMMARY

As discussed in previous chapters, considering self-regulation in the doctoral research context requires a broader temporal perspective than that of most other self-regulation research. This perspective also needs to recognise the multiplicity of factors and individuality of proximal goals involved in pursuing the distal goal of knowledge generation. The findings reported in this chapter suggested that using data from Month 1 of the JTS was a useful way of exploring self-regulation in the doctoral student population. Although few participants described their functioning using the language of Zimmerman’s (2000) model of self-regulation, the comments associated with Month 1 Doctoral Progress scores provided insights into differences in participants’ self-regulatory efforts and the cyclical relationships among these and doctoral research progress.

Differences between the high and low scoring participants were evident across all three phases of Zimmerman’s (2000) self-regulation model. Approaches to the task analysis and goal-setting processes in the forethought phase would be expected to differ according to participants’ understandings of the nature of doctoral research. Such epistemological beliefs were seldom expressed. However, differences in task analysis were evident in the high and low scoring participants’ comments about more concrete, proximal goal achievements. Where high scoring participants’ comments conveyed confidence and clarity about the task of doctoral research, low scoring participants often expressed uncertainty or ambivalence. Although high scoring participants did not refer to ‘motivation’, they described greater self-efficacy, interest in and value of doctoral research, and exhibited more positive outcome expectancies than did the low
scoring participants. Furthermore, only low scoring participants ascribed problems with progress to motivational issues.

Perhaps the most notable finding regarding the performance phase of self-regulation was that few participants talked about employing self-control or self-observation processes for the management of their doctoral research. That is, while a generally proactive and agentic approach appeared to be associated with feeling more positive about all aspects of performance, there was little other information offered about participants’ efforts to manage their research on a daily basis. However it also seemed that self-control efforts were more likely to be mentioned when they were less successful, suggesting that the participants’ attention was drawn to aspects of their performance if progress was unsatisfactory. Another possible interpretation of these findings is that the high scoring participants were generally more skilled at self-control than the low scoring participants, although knowledge of the stability of self-regulatory functioning is required to examine this possibility further.

Clarity about the task translated into clarity about progress. Being able to recognise progress was facilitated by setting and achieving appropriate proximal goals. Yet the findings regarding self-reflection phase processes highlighted the difficulties that many participants experienced in determining or accessing regular and reliable sources of feedback for monitoring their progress. This issue appeared more problematic for the low scoring participants, and supports the value of a mechanism such as the JTS for the self-monitoring of doctoral research students. The comments contained little evidence of either high or low scoring participants engaging in adaptive self-reactions aligned with effective self-regulatory functioning. However, it is the appearance of defensive inferences in the low scoring doctoral research students that is of concern. These findings suggest that either the participants might need to develop their self-regulatory skills, or that their circumstances are extenuating to the point that these students require special attention and advocacy. Taking into account the low scoring participants’ recounts of the negative effects on progress of a wide range of factors, the latter explanation might have more veracity. However, counter to this is the fact that effective self-regulation targets the causes of performance problems. It may be possible that the low Doctoral Progress scores are an indication that the participant’s self-regulatory skills are not sufficient for the particular set of circumstances in which the participant is attempting their doctoral research. That is, low scores might flag that there is a problem due to either self-regulatory deficits or adverse external circumstances such as inadequate supervision, or to an interaction of self-regulatory and circumstantial factors. If these participants were indeed actively seeking to
maintain satisfactory performance or to improve unsatisfactory performance through self-regulatory efforts, then this might be reflected in the stability or change of Doctoral Progress scores over the remainder of the JTS process. This possibility is explored in Chapter 7.

Perhaps the most important potential limitation of this methodological approach was that participants were not asked directly about their perceived or actual self-regulatory abilities or efforts, either in a prospective or online manner. This meant that if participants did not report the use of self-regulatory processes, then it was unknown if this was due to a lack of awareness, use, or reporting of these processes. Thus, self-regulatory efforts might have been underreported. However, the advantage of this approach is that self-regulatory efforts are not likely to have been over-reported, as participants may have been ‘blind’ to the focus of the study being self-regulation and thus less likely to provide socially desirable responses.

One of the most obvious limits of a self-report instrument such as the Journey Tracking Survey is that its accuracy is dependent on the self-awareness and honesty of the user. Doctoral research students might be unaware, or unwilling to admit, when they are experiencing problems with their progress. That is, using the JTS as a self-monitoring tool is only useful to the extent that the student is cognisant of the requirements of doctoral research, and is aware and honest in observing and evaluating their performance. If the student understands the task and the response required, then the JTS has the potential to alert students to when they need to take action to address problems in their doctoral research performance. Whether the student takes appropriate action and observes and responds to the results is the next step to explore in this study, to determine whether the JTS might be useful as a monitoring device through the doctoral research process.
7. STABILITY AND CHANGE – A LONGITUDINAL EXPLORATION OF DOCTORAL PROGRESS RATINGS

7.1 INTRODUCTION

In challenging situations, effective self-regulation is likely to represent a dynamic cyclical process, dependent on accurate monitoring and appropriate interventions to sustain optimal performance. The Doctoral Progress measure had the potential to be used for self-monitoring purposes, particularly by participants wishing to enhance their self-regulatory efforts. The previous two chapters presented the results of analyses that together showed how Month 1 Doctoral Progress scores can be regarded as indicators of differences in doctoral research students’ self-regulatory functioning. Chapters 7 and 8 extend this investigation of self-regulation in the doctoral research context, taking different but related perspectives. The analyses in Chapter 7 examined participants’ scores on the Doctoral Progress measure over time, concentrating on issues of stability versus the nature and direction of change in these scores. Chapter 8 then reports the analyses of participants’ experiences of taking part in the JTS process. Paralleling the complementarity of the cross-sectional analyses of Chapters 5 and 6, the analyses in Chapters 7 and 8 take a longitudinal perspective in exploring the extent to which Doctoral Progress scores can provide any further insights into differences in doctoral research students’ self-regulatory functioning.

As has been discussed, any effort to interpret the meaning of stability and change in Doctoral Progress scores over time in terms of self-regulation must simultaneously recognise students’ limits of control over all aspects of making progress in their doctoral research. That is, while feelings about progress may either remain steady or fluctuate, differences in self-regulatory efforts may be just one influence on these feelings. For example, a low score followed by a high score could be the result of self-regulatory responsiveness, or the resolution of external factors through no intervention by the participant. Similarly, a high score followed by a low score could be due to a lack of self-regulatory effort, or to the negative impact of unforeseen and uncontrollable events. Moreover, fluctuations in scores could result from a combination or interaction of factors. Given this complexity, assessments of the nature of relatively temporary fluctuations in Doctoral Progress scores would not be expected to be as informative about self-
regulatory functioning as broader assessments of doctoral research progress over time that would incorporate these changes and indicate the general direction of change. Therefore, a broad estimate in terms of averaged Doctoral Progress scores was calculated for use in the following analyses, and is described in the next section of this chapter.

Using these averaged Doctoral Progress scores in conjunction with the Month 1 Doctoral Progress scores enabled an examination of the various factors that might be associated with stability and change in feelings about doctoral research progress over time. This addressed Research Question 5.

**Research Question 5: Do students’ self-evaluations of recent doctoral research progress differ over time in association with:**

a) **background demographic factors?**

b) **current candidature factors?**

c) **receiving visual feedback about Doctoral Progress scores?**

d) **Month 1 Doctoral Progress scores?**

The next issue to explore was related to the meaning or relevance of particular Doctoral Progress scores and their potential use as benchmarks for students’ self-regulatory efforts. Fundamental to effective self-regulation is the willingness to respond to inadequate performance with strategic efforts to address the issues that have caused it. For this to occur, the student needs to be aware of when performance has reached a problematic level. This is important even where poor performance is due to external factors that are beyond the student’s control, as continuing for too long with problematic candidature may influence the student’s prospects of PhD completion due to candidature time constraints, even if other circumstances change.

Based on the response scale of the Doctoral Progress measure and supported by the initial findings reported in Chapter 6, positive scores might be assumed to show that overall progress was at least adequate, whereas scores in the negative domain could suggest that overall progress might be problematic. To determine whether specific scores or the valence of scores – positive or negative – could provide a useful benchmark for students to use in future self-regulatory efforts would require the analysis of the relationships between Doctoral Progress scores and candidature outcomes. Undertaking a preliminary analysis of this question in this study involved investigating if there was any evidence that students’ evaluations of their doctoral research progress, from either Month 1 or averaged Doctoral Progress scores, were associated with later
candidature status at Month 12. This concern with exploring the meaningfulness or relevance of self-evaluations of doctoral research progress was expressed in Research Question 6. That is, this question considered the predictive value of Doctoral Progress scores when used as an independent variable.

*Research Question 6: Are students’ self-evaluations of doctoral research progress associated with later candidature status?*

This next section of this chapter describes in more detail the rationale and process for examining the stability and change in feelings about doctoral research progress used in this study, as well as the methodological issues encountered.

### 7.2 INVESTIGATING DOCTORAL PROGRESS SCORES OVER TIME

Ideally, stability and changes in feelings about doctoral research progress would be explored by studying patterns of participants’ responses across the course of candidature, and the meaning of these patterns would be assessed by considering their relationship with candidature outcomes. Given the limited timeframe of this study within the full length of an individual’s PhD candidature, and a number of issues that were either expected or emerged unexpectedly, a more pragmatic approach to data analysis needed to be developed. The first step was to examine how participants completed the monthly surveys across the 12 month period of the JTS process. Table 25 shows that 80% \((n = 849)\) of the 1056 participants who completed the Month 1 survey continued on to complete more than half of the surveys, with 72% completing at least 10 of the 12 surveys.

Table 25

*Month 1 Participants’ Survey Completions*

<table>
<thead>
<tr>
<th>Number of JTS surveys completed</th>
<th>Number of participants</th>
<th>% of Total Month 1 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 – 12</td>
<td>759</td>
<td>72%</td>
</tr>
<tr>
<td>7 – 9</td>
<td>90</td>
<td>8%</td>
</tr>
<tr>
<td>4 – 6</td>
<td>82</td>
<td>8%</td>
</tr>
<tr>
<td>1 – 3</td>
<td>125</td>
<td>12%</td>
</tr>
<tr>
<td>Total</td>
<td>1056</td>
<td>100%</td>
</tr>
</tbody>
</table>
This response to the study provided a large number of complete individual datasets. These were suitable for exploring how various demographic and candidature factors might be associated with patterns of stability and change in scores over time, as required to address Research Question 5. By definition, however, complete datasets represented only the experience of participants who were still enrolled in Month 12. It was expected that incomplete datasets would be provided by those participants who had completed, withdrawn, or taken leave from candidature during the JTS process. However, surprisingly few participants in this study withdrew or took leave from candidature. Table 26 presents information about candidature status in Month 12 as provided by the 865 participants who completed the Month 1 JTS and also the Follow-up Survey. Considering the numbers of participants in each stage of candidature, the 12 month timeframe, and the attrition rates discussed in Section 1.1, more than 2% of participants would have been expected to withdraw from candidature during the course of this study. Furthermore, where datasets were incomplete, the patterns of missing data varied. That is, surveys were not always completed consecutively. These results precluded the options of using either regression analyses or a cross-lagged panel design.

Table 26

<table>
<thead>
<tr>
<th>Month 1 Participants’ Survey Completions by Month 12 Candidature Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of JTS surveys completed</td>
</tr>
<tr>
<td>----------------------------------</td>
</tr>
<tr>
<td>10 – 12</td>
</tr>
<tr>
<td>7 – 9</td>
</tr>
<tr>
<td>4 – 6</td>
</tr>
<tr>
<td>1 – 3</td>
</tr>
<tr>
<td>Total (% of 865)</td>
</tr>
</tbody>
</table>

To include all participants’ data would have resulted in some longitudinal evaluations of doctoral progress being based on only a few surveys completed several months apart. This was not expected to provide a sufficiently accurate estimate of feelings about doctoral research progress over the year. To include as many participants and as much data as possible involved developing an estimate of feelings about doctoral research progress beyond Month 1 that would accommodate different amounts and patterns of missing data. It was observed that of the 1056 participants who completed the Month 1 JTS, 800 (76%) also completed at least six more surveys during the 12 month survey period. This meant that for each of these participants a
Doctoral Progress score was recorded, on average, at least once every two months. This was considered a satisfactory compromise for the purposes of this study.

Therefore, guided by the patterns of survey completion and the desire for a wide range of doctoral research experience to be represented, an averaged Doctoral Progress score was generated for each of the 800 participants who had completed the Month 1 JTS as well as at least six more surveys during the 12 month survey period. This averaged Doctoral Progress score was computed by averaging all completed monthly Doctoral Progress scores excluding their Month 1 score, that is, from a minimum of six to a maximum of 11 scores. It should be noted that any surveys completed after the participant had withdrawn, begun leave, or submitted their thesis were not included in the calculation of the averaged scores.

The next section of this chapter presents the results addressing Research Question 5. To explore stability and change in scores, between-group analyses were conducted to investigate if participants’ averaged Doctoral Progress scores differed by background demographic, current candidature, Feedback Graph group, or Month 1 score factors. Then, within-group analyses were conducted to see if any differences between participants’ Month 1 and averaged Doctoral Progress scores occurred as a function of these factors. As the first step in addressing each of these sub-questions within Research Question 5, Month 1 Doctoral Progress score data analyses from Chapter 5 were replicated as necessary to check that this subsample of Month 1 participants (who also completed at least six other monthly surveys) was representative of the original group.

Research Question 5a): Do students’ evaluations of their recent doctoral research progress differ over time as a result of background demographic factors?

7.3 BACKGROUND DEMOGRAPHIC FACTORS

7.3.1 Gender

The Month 1 and averaged Doctoral Progress scores for males and females are presented in Table 27.
Table 27
Month 1 and Averaged Doctoral Progress Scores by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
<th>Month 1 score Mdn (range)</th>
<th>Averaged score Mdn (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>209</td>
<td>26</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.22 (-3.09 to 4.00)</td>
</tr>
<tr>
<td>Female</td>
<td>591</td>
<td>74</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>0.91 (-3.86 to 4.00)</td>
</tr>
</tbody>
</table>

Consistent with the Month 1 analyses for the full sample reported in Chapter 5, an independent-samples Mann-Whitney U test showed that in this subsample there was no significant difference between genders on the Month 1 Doctoral Progress scores ($n = 800$, $U = 59\,814$, $p > .05$).

An independent-samples Mann-Whitney U test showed no significant differences between the averaged Doctoral Progress scores of male and female participants ($U = 57\,282$, $p > .05$).

As a repeated measures test for differences within gender groups, the Wilcoxon Signed Ranks test showed there were no significant differences between the Month 1 and the averaged Doctoral Progress scores of either males ($z = -1.12$, $p > .05$) or females ($z = -1.17$, $p > .05$).

7.3.2 Age

The Month 1 and averaged Doctoral Progress scores for the four age groups are presented in Table 28.

Table 28
Month 1 and Averaged Doctoral Progress Scores by Age Group

<table>
<thead>
<tr>
<th>Age</th>
<th>n</th>
<th>%</th>
<th>Month 1 score Mdn (range)</th>
<th>Averaged score Mdn (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20s</td>
<td>327</td>
<td>34</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.10 (-3.70 to 4.00)</td>
</tr>
<tr>
<td>30s</td>
<td>180</td>
<td>33</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>0.87 (-3.71 to 3.82)</td>
</tr>
<tr>
<td>40s</td>
<td>153</td>
<td>34</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.18 (-3.27 to 4.00)</td>
</tr>
<tr>
<td>50s+</td>
<td>140</td>
<td>35</td>
<td>1.50 (-4.00 to 4.00)</td>
<td>0.95 (-3.86 to 4.00)</td>
</tr>
</tbody>
</table>

As found in the Month 1 analyses for the full sample, an independent-samples Kruskal-Wallis test showed there were no significant differences between age groups on Month 1 Doctoral Progress scores ($H(3) = 2.14$, $p > .05$).
An independent-samples Kruskal-Wallis test showed no significant differences among the averaged Doctoral Progress scores of participants in different age groups ($H(3) = 2.25, p > .05$).

Wilcoxon Signed Ranks tests showed there were no significant differences between the Month 1 and the averaged Doctoral Progress scores of participants aged in their 20s ($z = 1.68, p > .05$), 30s ($z = 0.80, p > .05$), 40s ($z = 0.73, p > .05$), or 50s and over ($z = -0.54, p > .05$).

**Research Question 5b): Do students’ evaluations of their recent doctoral research progress differ over time as a result of current candidature factors?**

### 7.4 CURRENT CANDIDATURE FACTORS

Unlike the cross-sectional approach taken to investigating the Month 1 scores, the association between the averaged Doctoral Progress scores and Stage of Candidature factor in Month 1 was not considered meaningful and was not assessed, as a participant’s stage of candidature (as defined in this study) was likely to change within the year of the JTS process. The breakdown of stage of candidature groups was described previously in the Method chapter and displayed in Table 3.

#### 7.4.1 Enrolment load

The Month 1 and averaged Doctoral Progress scores for participants differing by enrolment load are presented in Table 29.

<table>
<thead>
<tr>
<th>Enrolment Load</th>
<th>$n$</th>
<th>%</th>
<th>Month 1 score Mdn (range)</th>
<th>Averaged score Mdn (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td>564</td>
<td>70</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.10 (-3.71 to 4.00)</td>
</tr>
<tr>
<td>Part-time</td>
<td>236</td>
<td>30</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>0.79 (-3.86 to 4.00)</td>
</tr>
</tbody>
</table>

A Mann-Whitney U test showed there was no significant difference between the Month 1 Doctoral Progress scores of participants who were enrolled full-time or part-time ($n = 800, U = 63836, p > .05$), as was found with the full sample of Month 1 participants.
An independent-samples Mann-Whitney U test showed no significant differences between the averaged Doctoral Progress scores of part-time and full-time enrolled participants \((U = 61 872, p > .05)\).

A Wilcoxon Signed Ranks test showed there were no significant differences between the Month 1 and the averaged Doctoral Progress scores of participants enrolled full-time \((z = 1.04, p > .05)\) or part-time \((z = 1.17, p > .05)\).

### 7.4.2 Broad field of study

The Month 1 and averaged Doctoral Progress scores by broad field of study are presented below in Table 30.

**Table 30**: *Month 1 and Averaged Doctoral Progress Scores by Broad Field of Study*

<table>
<thead>
<tr>
<th>Broad field of study</th>
<th>(n)</th>
<th>(%)</th>
<th>Month 1 score (Mdn) (range)</th>
<th>Averaged score (Mdn) (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts-based</td>
<td>396</td>
<td>49</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.00 (-3.86 to 4.00)</td>
</tr>
<tr>
<td>Science-based</td>
<td>404</td>
<td>51</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>0.95 (-3.70 to 4.00)</td>
</tr>
</tbody>
</table>

Like the full sample Month 1 analyses, an independent-samples Mann-Whitney U test showed there was no significant difference between the Month 1 scores of participants in arts- or science-based fields \((n = 800, U = 78 493, p > .05)\).

An independent-samples Mann-Whitney U test showed no significant difference between the averaged Doctoral Progress scores of participants in the broad fields of arts- and science-based studies \((U = 78 941, p > .05)\).

A Wilcoxon Signed Ranks test showed there were no significant differences between the Month 1 and the averaged Doctoral Progress scores of participants studying in arts-based fields \((z = 0.76, p > .05)\) or science-based fields \((z = 1.40, p > .05)\).

### 7.4.3 University location

The Month 1 and averaged Doctoral Progress scores of participants at different university locations are presented in Table 31.
Table 31
*Month 1 and Averaged Doctoral Progress Scores by University Location*

<table>
<thead>
<tr>
<th>University location</th>
<th>n</th>
<th>%</th>
<th>Month 1 score</th>
<th>Averaged score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mdn (range)</td>
<td>Mdn (range)</td>
</tr>
<tr>
<td>Australia</td>
<td>660</td>
<td>82</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.00 (-3.71 to 4.00)</td>
</tr>
<tr>
<td>Overseas</td>
<td>140</td>
<td>18</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.10 (-3.86 to 4.00)</td>
</tr>
</tbody>
</table>

A Mann-Whitney U test showed there was no significant difference between the Month 1 scores of participants enrolled in universities in Australia or overseas \((n = 800, U = 44477, p > .05)\). This was consistent with the findings for the full sample of Month 1 participants.

An independent-samples Mann-Whitney U test showed no significant differences between the averaged Doctoral Progress scores of participants from universities in Australia and overseas \((U = 48368, p > .05)\).

A Wilcoxon Signed Ranks test showed there was no significant difference between the Month 1 and the averaged Doctoral Progress scores of participants enrolled in Australian universities \((z = 0.60, p > .05)\). For participants enrolled in overseas universities, there was a small but significant increase between Month 1 and averaged Doctoral Progress scores \((z = 2.50, p = .012, r = .21)\).

### 7.4.4 Section summary

Consistent with the sample of 1056 participants from which they were drawn, the Month 1 Doctoral Progress scores of this subsample of 800 participants appeared to be independent of any effects of gender, age, enrolment status, broad field of study, or university location. The same pattern of results was found for the averaged Doctoral Progress scores.

The Doctoral Progress scores were shown to be largely stable when considering differences between Month 1 scores and averaged scores as a function of the demographic and candidature factors mentioned above. The only significant difference found was that participants from overseas universities showed a small but significant improvement from Month 1 to the averaged Doctoral Progress scores.
Further investigation of the stability of Doctoral Progress scores proceeded by comparing the Month 1 and averaged Doctoral Progress scores of participants by Feedback Graph group membership, as reported in the next section.

**Research Question 5c): Do students’ self-evaluations of recent doctoral research progress differ over time in association with receiving visual feedback about Doctoral Progress scores?**

### 7.5 DOCTORAL PROGRESS FEEDBACK GRAPH

The averaged scores were then used to examine the effects on Doctoral Progress scores of receiving visual feedback each month about previous Doctoral Progress scores. That is, whereas Month 1 scores were not subject to this feedback, the averaged scores may have been influenced by participants’ random allocation to one of two Feedback Graph groups: the ‘Graph’ group was able to view a graph of their previous Doctoral Progress scores, while the ‘No Graph’ group was not. While this could not influence Month 1 data, there were a number of ways in which participants in the ‘Graph’ group might have responded to this feedback in ensuing months. For example, participants who took note of this feedback might have adjusted their self-regulatory efforts if necessary, or simply their evaluations to manipulate the appearance of the graph. The Doctoral Progress scores by Feedback Graph group are presented in Table 32.

**Table 32**

<table>
<thead>
<tr>
<th>Feedback Graph group</th>
<th>n</th>
<th>%</th>
<th>Month 1 score Mdn (range)</th>
<th>Averaged score Mdn (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Graph</td>
<td>408</td>
<td>51</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>0.91 (-3.86 to 4.00)</td>
</tr>
<tr>
<td>Graph</td>
<td>392</td>
<td>49</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.09 (-3.71 to 4.00)</td>
</tr>
</tbody>
</table>

To check if there were any pre-existing differences, an independent-samples Mann-Whitney U test was conducted with the Month 1 data. This confirmed that there had been no significant difference between the Month 1 Doctoral Progress scores for members of either Feedback Graph group in this subsample ($U = 83,378, p > .05$).

To explore the effects of receiving the Feedback Graph on Doctoral Progress scores over time, the Feedback Graph groups were compared on averaged Doctoral Progress scores. An
independent-samples Mann-Whitney U Test found that the difference between the ‘Graph’ and the ‘No Graph’ groups on averaged Doctoral Progress scores just reached significance, although the effect size of receiving the Feedback Graph was minimal ($U = 86,423$, $p = .048$, $r = .07$). However, when related-samples Wilcoxon Signed Rank tests were conducted separately for both of the Feedback Graph groups, there was no significant difference between the Month 1 and averaged Doctoral Progress scores for either the Feedback Graph recipients ($W = 38,955.50$, $z = 1.48$, $p > .05$) or the participants who did not receive the Feedback Graph ($W = 39,711.00$, $z = 0.71$, $p > .05$).

Therefore, it appeared that the slight but non-significant decrease from Month 1 to averaged scores for the ‘No Graph’ group and the slight but non-significant increase for the ‘Graph’ group resulted in a small and significant difference between the averaged Doctoral Progress scores of the two groups. This trend in the results might suggest that the Feedback Graph was used by participants for self-regulatory purposes to improve progress. However, this difference might also be due to other influences on the Feedback Graph recipients’ ratings of their doctoral progress. For example, being able to see their progress on the Feedback Graph might have encouraged these participants to rate their progress slightly more favourably over time in order to produce a more positive graph than those who had no visual reminders of previous months’ ratings.

Testing for the effects of receiving the Feedback Graph on retention in the study might also provide insights into these differences in Doctoral Progress scores. To do this it was necessary to examine only the survey completion data of the sub-sample of participants ($n = 705$) who were still enrolled in the PhD in Month 12, to control for other reasons for not continuing with the JTS process such as submitting the thesis or withdrawing from candidature. Candidature status was established from Follow-up Survey data, which was completed at the same time as the Month 12 JTS, and more information on this is provided in Table 36.

The effect of receiving graph feedback on retention in the JTS process was tested by comparing the response rates of the ‘Graph’ and ‘No Graph’ groups across the year. Figure 14 shows the total number of surveys completed within the year by participants in the ‘Graph’ and ‘No Graph’ groups. This shows that 81% of the ‘Graph’ group and 75% of the ‘No Graph’ group each completed at least 10 surveys.
A Mann-Whitney U test showed that participants in the ‘Graph’ group \((n = 353, Mdn = 12)\) completed significantly more surveys than did participants in the ‘No Graph’ group \((n = 352, Mdn = 11)\), \(U = 56,922, z = -2.06, p = .039, r = -.08\). This was, however, well below the .1 criterion for even a small effect size (Cohen, 1992), with the groups’ median number of completed surveys differing by only one, that is, 12 versus 11. It appears then that receiving graph feedback about Doctoral Progress scores may have had a slight but significant effect in encouraging retention in the JTS process.

Another investigation of this data was concerned with whether the survey completion rate varied by survey month. Again, to control for attrition from the JTS process due to candidature reasons, such as submission of the thesis, the pattern of survey completions focused on the subset of Month 1 participants who remained enrolled in their PhD candidature for the entire JTS period \((n = 705)\). Figure 15 displays the total number and distribution of surveys completed by JTS month, and like the previous section is also broken down by Feedback Graph group. There is little attrition from either group for the first six months, and thereafter the attrition from the ‘No Graph’ group occurs at a higher rate than does the ‘Graph’ group. In contrast, the

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**Figure 14.** Total number of JTS completions by Feedback Graph group.
‘Graph’ group displayed a relatively more consistent pattern of responding, with less attrition overall than the ‘No Graph’ group.

Pearson chi-square tests confirmed that while there were no significant differences between the groups in Months 1 to 8, participants in the ‘Graph’ group \((n = 353)\) were significantly more likely than participants in the ‘No Graph’ group \((n = 352)\) to complete the survey for Month 9 \((\chi^2(1, n = 705) = 9.06, p = .003)\), Month 10 \((\chi^2(1, n = 705) = 17.16, p < .001)\), Month 11 \((\chi^2(1, n = 705) = 18.47, p < .001)\), and Month 12 \((\chi^2(1, n = 705) = 20.61, p < .001)\).

Having controlled for attrition from the study due to candidature completion or termination, these data show that attrition from the study due to other reasons was more likely to occur in the later months of the study. These data also show that being able to view the graph as it developed over time, that is, from Month 2 onwards, may have provided an incentive for participants to continue to complete the survey each month, resulting in improved retention for the ‘Graph’ compared to the ‘No Graph’ group for Month 9 and beyond. Along with the changes in Doctoral

**Figure 15.** Number of participants who completed each month of the JTS by Feedback Graph group.
Progress scores seen in these groups, these findings have implications for further development and application of the JTS process for students’ use, as will be discussed in Chapter 9.

The next section considers the stability and change in self-evaluations of doctoral research progress as a function of specific Month 1 Doctoral Progress scores.

*Research Question 5d): Do students’ self-evaluations of recent doctoral research progress differ over time in association with Month 1 Doctoral Progress scores?*

### 7.6 THE RELATIONSHIPS BETWEEN MONTH 1 AND AVERAGED DOCTORAL PROGRESS SCORES

As explained previously, the desirability of stability or change in scores depended on the starting point: the Month 1 Doctoral Progress score. First, a Wilcoxon Signed Rank test showed that there was no significant difference between the Month 1 (Mdn = 1.00, range = -4.00 to 4.00) and averaged Doctoral Progress (Mdn = 1.00, range = -3.86 to 4.00) scores of the whole group (n = 800, z = 1.53, p > .05). Participants were then grouped by Month 1 score groups, as shown in Table 33. Grouping participants into these four groups was designed to enable further exploration of the findings reported in Chapter 6.

<table>
<thead>
<tr>
<th>Doctoral Progress Scores</th>
<th>n</th>
<th>%</th>
<th>Month 1 score (Mdn (range))</th>
<th>Averaged score (Mdn (range))</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4 or -3</td>
<td>84</td>
<td>10</td>
<td>-3.00 (-4.00 to -3.00)</td>
<td>-0.80 (-3.86 to 3.00)</td>
</tr>
<tr>
<td>-2 or -1</td>
<td>165</td>
<td>21</td>
<td>-1.00 (-2.00 to -1.00)</td>
<td>0.18 (-2.91 to 3.50)</td>
</tr>
<tr>
<td>0, 1, or 2</td>
<td>361</td>
<td>45</td>
<td>1.00 (0.00 to 2.00)</td>
<td>1.10 (-3.27 to 4.00)</td>
</tr>
<tr>
<td>3 or 4</td>
<td>190</td>
<td>24</td>
<td>3.00 (3.00 to 4.00)</td>
<td>2.27 (-2.10 to 4.00)</td>
</tr>
<tr>
<td>Total</td>
<td>800</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An independent-samples Kruskal-Wallis test showed that there was a significant difference among the averaged Doctoral Progress scores of participants when grouped as above by Month 1 Doctoral Progress scores (H(3) = 235.72, p < .001). These differences are evident in Figure 16.
Figure 16. Median averaged Doctoral Progress scores for Month 1 Doctoral Progress score groups. Error bars show the 95% confidence interval for each median.

Post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons showed significant differences between all groups. That is, participants who scored -4 or -3 in Month 1 had significantly lower averaged Doctoral Progress scores than participants who scored either -2 or -1 ($z = -2.90, p = .022$), 0, 1, or 2 ($z = -7.99, p < .001$), or 3 or 4 ($z = -13.02, p < .001$). Similarly, participants who scored -2 or -1 in Month 1 had significantly lower averaged Doctoral Progress scores than participants who scored either 0, 1, or 2 ($z = -6.16, p < .001$), or 3 or 4 ($z = -12.37, p < .001$). Finally, participants who had scored 0, 1, or 2 in Month 1 had significantly lower averaged Doctoral Progress scores than participants who scored either 3 or 4 in Month 1 ($z = -8.24, p < .001$). These results suggest that the differences between participants that are evident in Month 1 scores are maintained to some extent as reflected in the differences in averaged Doctoral Progress scores.

To examine more closely the degree of stability and the nature of change in Doctoral Progress scores within these groups, participants were divided by Month 1 scores into narrower groups as shown in Table 34. In contrast to the presentation of previous results, and due to the number of analyses conducted, Table 34 also contains the results of the repeated measures analyses regarding differences between Month 1 and averaged Doctoral Progress scores for each of these groups. This series of Wilcoxon Signed Rank tests showed that there were significant
differences between the Month 1 and the averaged Doctoral Progress scores for all but one of the groups. These differences varied in magnitude and direction of change. Participants with Month 1 scores of 4, 3, or 2 showed a significant decline from Month 1 scores to averaged scores, while participants who scored zero or below in Month 1 all showed a significant increase in their averaged Doctoral Progress scores. Only the participants who scored 1 in Month 1 did not show any change between their Month 1 and averaged Doctoral Progress scores. Large effect sizes were apparent for all significant differences.

Table 34

<table>
<thead>
<tr>
<th>Doctoral Progress Scores</th>
<th>Month 1</th>
<th>Averaged</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Score</td>
<td>n</td>
<td>%</td>
<td>Median</td>
<td>Range</td>
<td>z</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>7</td>
<td>2.50</td>
<td>(-0.18) to (4.00)</td>
<td>-6.34</td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td>17</td>
<td>2.09</td>
<td>(-2.10) to (4.00)</td>
<td>-8.49</td>
</tr>
<tr>
<td>2</td>
<td>170</td>
<td>21</td>
<td>1.38</td>
<td>(-2.36) to (4.00)</td>
<td>-7.06</td>
</tr>
<tr>
<td>1</td>
<td>130</td>
<td>16</td>
<td>0.91</td>
<td>(-3.27) to (3.73)</td>
<td>-1.87</td>
</tr>
<tr>
<td>0</td>
<td>61</td>
<td>8</td>
<td>0.73</td>
<td>(-1.80) to (3.18)</td>
<td>4.15</td>
</tr>
<tr>
<td>-1</td>
<td>91</td>
<td>11</td>
<td>0.40</td>
<td>(-2.14) to (3.50)</td>
<td>7.59</td>
</tr>
<tr>
<td>-2</td>
<td>74</td>
<td>9</td>
<td>-0.36</td>
<td>(-2.91) to (3.40)</td>
<td>7.03</td>
</tr>
<tr>
<td>-3</td>
<td>60</td>
<td>8</td>
<td>-0.73</td>
<td>(-3.70) to (3.00)</td>
<td>6.52</td>
</tr>
<tr>
<td>-4</td>
<td>24</td>
<td>3</td>
<td>-1.14</td>
<td>(-3.86) to (2.86)</td>
<td>4.29</td>
</tr>
<tr>
<td>Total</td>
<td>800</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

These findings might be explained in terms of regression to the mean, in that the natural and non-systematic variation that results in extreme scores can be followed in repeated measurements by less extreme scores, and interpreted as real change (Barnett, van der Pols, & Dobson, 2005). Acknowledging this possibility, the relevance of stability and change in these scores were then considered in terms of the broader factor of score valence. Using the median averaged Doctoral Progress scores listed above in Table 34, these group differences are also depicted in Figure 17. This serves as the first part of the investigation into the relevance of score valence. Marking in the zero or neutral position on this graph demonstrates how participants...
with Month 1 scores of -1 or above were likely to score in the positive domain of averaged Doctoral Progress scores. While averaged Doctoral Progress scores showed an overall improvement for participants with negative Month 1 scores, the averaged scores were still negative for the groups of participants who had Month 1 scores of -4, -3, and -2. These scores indicate a persistent dissatisfaction with doctoral progress in these groups. Participants with Month 1 scores of either -1 or 0 also showed an overall increase, so that their averaged Doctoral Progress scores were placed in the positive range of scores. Participants with Month 1 scores of 1 showed a non-significant decline, with the averaged Doctoral Progress scores still in the positive range. While there was a general decline from the remaining positive Month 1 scores (2, 3, and 4) to averaged Doctoral Progress scores, all the averaged scores remained positive.

![Figure 17. Averaged Doctoral Progress scores by Month 1 Doctoral Progress score group.](image)

The relationship between Month 1 and averaged Doctoral Progress scores can be illustrated in more detail by examining the percentages of participants whose averaged Doctoral Progress score fell in either the negative range of scores (less than zero) or the neutral or positive range of scores (zero to 4 inclusive). As a score of zero on the Doctoral Progress measure response scale...
was labelled as ‘Feel neither happy not unhappy about it’, then a neutral or ambivalent response may not be problematic, whereas a score below this point is in the negative range bounded by ‘As unhappy as I could feel about it’, and is assumedly more likely to indicate problems with doctoral research progress. Table 35 displays the proportions of participants in these groups according to Month 1 Doctoral Progress scores, and these are represented visually in Figure 18.

Table 35
_Averaged Doctoral Progress Score Valence by Month 1 Doctoral Progress Score_

<table>
<thead>
<tr>
<th>Month 1 Doctoral Progress score</th>
<th>n</th>
<th>Averaged Doctoral Progress score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Negative (-4 – &lt; 0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Positive (0 – 4)</td>
</tr>
<tr>
<td>4</td>
<td>55</td>
<td>2 (4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>53 (96)</td>
</tr>
<tr>
<td>3</td>
<td>135</td>
<td>9 (7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>126 (93)</td>
</tr>
<tr>
<td>2</td>
<td>170</td>
<td>19 (11)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>151 (89)</td>
</tr>
<tr>
<td>1</td>
<td>130</td>
<td>28 (21)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>102 (79)</td>
</tr>
<tr>
<td>0</td>
<td>61</td>
<td>17 (28)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44 (72)</td>
</tr>
<tr>
<td>-1</td>
<td>91</td>
<td>31 (34)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>60 (66)</td>
</tr>
<tr>
<td>-2</td>
<td>74</td>
<td>40 (54)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>34 (46)</td>
</tr>
<tr>
<td>-3</td>
<td>60</td>
<td>38 (63)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22 (37)</td>
</tr>
<tr>
<td>-4</td>
<td>24</td>
<td>15 (62)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9 (38)</td>
</tr>
<tr>
<td>Total</td>
<td>800</td>
<td>199 (25%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>601 (75%)</td>
</tr>
</tbody>
</table>
Figure 18. Proportions of negative and positive averaged Doctoral Progress scores by Month 1 Doctoral Progress scores.

This breakdown of averaged Doctoral Progress scores provides further illustration of the association between Month 1 scores and differences in stability in self-ratings of doctoral progress over time. Four main groups are represented in this graph: the participants who scored positively on both Month 1 and averaged Doctoral Progress scores, the participants who scored negatively on both Month 1 and averaged Doctoral Progress scores, the participants who scored negatively in Month 1 but positively overall, and those participants who scored positively in Month 1 but negatively overall.

A large proportion of participants was comprised of those who either scored consistently positively, or who initially rated their progress negatively but went on to complete the JTS process with a positive overall score. While maintaining satisfactory progress no doubt requires some level of self-regulation even in the presence of supportive external factors, improvements in scores suggest that participants might have responded to negative scores by engaging in the self-monitoring process and increasing their self-regulatory efforts. Of course, the influence of more favourable external factors might also have contributed to these changes. Without
additional information from the participants, and in the absence of a control group, it is not possible to determine whether such changes occurred more or less deliberately in the process of completing the questionnaires. Perhaps participants who persisted with candidature for the year of the JTS process might naturally have adapted their efforts to enable more satisfactory progress regardless of their participation in this study.

Figure 18 also shows that a small percentage of the participants who initially rated their feelings about their progress as positive continued on to rate the remainder of their year of monitoring as being negative overall, and that a much larger percentage of the participants with initially negative ratings of progress rated the rest of the year as negative. Might such results suggest that these participants did not engage in effective self-regulatory efforts, or maybe that factors beyond the participants’ control were responsible for the unsatisfactory progress, or that there was an interaction of influences on this patterns of scores? These questions are considered further in Chapter 8.

Regardless of the cause, while these results provide hope that the majority of students maintain or even improve on their Month 1 progress evaluation in order to feel generally positive about their doctoral progress across a one-year period, it is of concern that a high proportion of participants (25%) either sustained or generated an overall negative evaluation of their progress as indicated by their averaged Doctoral Progress scores. This appears to be a group of students who deserve further attention. Indeed, the sixth research question was concerned with discovering more about the meaning and relevance of these scores over time. Did either the Month 1 or averaged Doctoral Progress scores provide any indication of future candidature outcomes? This is the subject of the next set of analyses.

*Research Question 6: Are students’ evaluations of their doctoral research progress associated with later candidature status?*

### 7.7 RELATIONSHIPS BETWEEN DOCTORAL PROGRESS SCORES AND MONTH 12 CANDIDATURE STATUS

The next set of analyses investigated the relationships between Doctoral Progress scores and candidature status in Month 12. Information about Month 12 candidature status was obtained from the Follow-up Survey which became available for participants to complete at the time of the Month 12 JTS.
Many participants were unable to complete all 12 months of the survey process as they ceased enrolment prior to Month 12 due to thesis submission, taking leave, or withdrawing from PhD candidature. Other participants reported that missed surveys were the result of being on field work, on leave, or withdrawing from the study during the JTS period. Depending on their length of candidature, participants may or may not have moved into the next stage of candidature defined by this study (Early, Mid, or Late) within the previous year of the JTS process. Therefore, all participants who were still enrolled in Month 12 were grouped together into the “Enrolled” group, and compared with those who had already submitted their thesis or graduated from the PhD (“Submitted/Graduated” group), those who had withdrawn from candidature (“Withdrawn” group), and those who were on leave at the time of the final JTS in Month 12 (“On Leave” group).

As shown in Table 36, of the 1056 participants who completed the Doctoral Progress measure in Month 1, a subsample of 886 completed the question regarding candidature status in the Follow-up Survey. The remaining 170 participants did not complete this question. A smaller subsample of 772 also completed at least six other JTSs during the 12 month survey period as well as the Follow-up Survey. Thus from the original Month 1 group, 284 participants were missing due to not having completed the Follow-up Survey question regarding candidature status, or for not completing sufficient JTSs to calculate an averaged score. At the time of the Month 12 survey, the vast majority of these participants were still enrolled.

The first analysis focused on the Month 1 Doctoral Progress scores and participants’ candidature status in Month 12. The next analysis was concerned with the averaged Doctoral Progress scores and Month 12 candidature status, while the final analysis investigated any differences between Month 1 and averaged Doctoral Progress scores by candidature group. The median Doctoral Progress scores for each analysis are presented in Table 36.
Table 36

*Month 1 and Averaged Doctoral Progress Scores by Month 12 Candidature Status*

<table>
<thead>
<tr>
<th>Month 12 Candidature Status</th>
<th>Doctoral Progress Scores</th>
<th>Month 1</th>
<th>Averaged</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>Mdn (range)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Withdrawn</td>
<td>17 (2)</td>
<td>-2.00 (-4.00 to 3.00)</td>
<td>9 (1)</td>
</tr>
<tr>
<td>On Leave</td>
<td>48 (5)</td>
<td>-1.00 (-4.00 to 3.00)</td>
<td>39 (5)</td>
</tr>
<tr>
<td>Enrolled</td>
<td>705 (80)</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>660 (86)</td>
</tr>
<tr>
<td>Submitted/Graduated</td>
<td>116 (13)</td>
<td>2.00 (-4.00 to 4.00)</td>
<td>64 (8)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>886 (100)</td>
<td></td>
<td>772 (100)</td>
</tr>
<tr>
<td>Missing/Incomplete</td>
<td>170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Month 1</td>
<td>1056</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As illustrated in Figure 19, a significant difference in the distributions of Month 1 Doctoral Progress scores across Month 12 Candidature Status groups was found using an Independent-Samples Kruskal-Wallis test ($H(3) = 56.45, n = 886, p < .001$). Post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons showed that there was no significant difference between the scores of participants in the Withdrawn and On Leave groups ($z = -1.52, p > .05$), but that the Withdrawn group scored significantly lower than the Enrolled group ($z = -4.09, p < .001$), and the Submitted/Graduated group ($z = -5.60, p < .001$). The On Leave group also scored significantly lower than the Enrolled group ($z = -3.86, p = .001$) and the Submitted/Graduated group ($z = -5.98, p < .001$). Finally, the Enrolled group scored significantly lower than did the Submitted/Graduated group ($z = -4.48, p < .001$).
The next question to be addressed was whether averaged Doctoral Progress scores differed for participants in different candidature status groups in Month 12. An independent-samples Kruskal-Wallis tests showed a significant difference in the averaged Doctoral Progress scores of different Month 12 candidature status groups ($H(3) = 71.00, n = 772, p < .001$), as illustrated in Figure 20.

Figure 19. Month 1 Doctoral Progress scores by Month 12 Candidature Status. Error bars show the 95% confidence interval for each median.
Following the same pattern of the Month 1 Doctoral Progress results, Post-hoc Dunn’s tests of pairwise comparisons with Bonferroni adjustments for multiple comparisons revealed that there was no significant difference between the averaged Doctoral Progress scores of participants who had withdrawn from PhD candidature or were on leave ($z = -0.799, p > .05$), but the Withdrawn group scored significantly lower than the Enrolled group ($z = -3.23, p = .007$) and the Submitted/Graduated group ($z = -5.16, p < .001$), and the On Leave group scored significantly lower than the Enrolled group ($z = -4.79, p < .001$) and the Submitted/Graduated group ($z = -7.59, p < .001$). In accordance with the Month 1 pattern of results, the Enrolled group also scored significantly lower than the Submitted/Graduated group ($z = -5.75, p < .001$) on averaged Doctoral Progress scores.

The last analysis was to determine whether there was any difference between Month 1 and averaged Doctoral Progress scores for any of the Month 12 candidature groups. A related-samples Wilcoxon Signed Rank test showed that there were no significant differences between the Month 1 and the averaged Doctoral Progress scores of the Withdrawn group ($z = 0.42, p > .05$), the On Leave group ($z = 0.45, p > .05$), the Enrolled group ($z = 1.01, p > .05$), or the Submitted/Graduated group ($z = 1.94, p > .05$). However, it is interesting to note that a non-significant decline in self-ratings of progress over time was observed for those who later...
withdrew or took leave from candidature, and a concomitant non-significant increase in scores for those who went on to submit the thesis or graduate from PhD candidature.

In summary, although there was only a small amount of data available for participants who withdrew or took leave from candidature during the course of the present study, a clear trend emerged in the results of the preceding section regarding Doctoral Progress scores and candidature outcomes. That is, participants who had either taken leave or withdrawn from candidature had been feeling significantly less positive about their recent doctoral progress, even over six months prior to withdrawing or taking leave, compared to the participants who remained enrolled or who submitted their thesis or graduated. This is hardly surprising, but does provide empirical evidence that monitoring students’ ratings of their feelings about their doctoral research progress can provide useful feedback for students’ use in self-regulatory efforts.

7.8 CHAPTER SUMMARY

While doctoral research progress can be a function of factors both internal and external to the PhD student, Chapters 5 and 6 together showed that differences in self-regulatory efforts are associated with feelings about having made progress. Based on a cyclical model of self-regulation, this relationship would be expected to be reciprocal: feelings about the amount of progress made would then influence future self-regulatory efforts, the outcomes of which would be evaluated by the student in terms of feelings about the progress made, and so on. Thus, this chapter was concerned with exploring the factors associated with stability and change in Doctoral Progress scores, in order to explore the role of these scores in the study of self-regulation in the doctoral research context.

Firstly, the lack of change in Doctoral Progress scores over time for the whole group suggested that simply participating in the JTS process did not lead to a uniform change in feelings about doctoral research progress. However, further exploration revealed that the effects of different components of JTS participation and other factors were easily masked. While Doctoral Progress scores did not change significantly over time as a function of gender, age, enrolment load, or broad field of study, these scores did increase slightly over time for participants attending universities outside Australia. There was no obvious explanation for this finding at this stage of the investigation, and the discussion of this point is delayed until the end of Chapter 8 when all analyses have been reported.
Another factor shown to have a small but significant effect on Doctoral Progress score stability was the receipt of the Feedback Graph, with a trend evident of increases in scores for those who received this feedback and a decrease in the scores of those who did not. Furthermore, investigating the survey completion data suggested that making the developing graph available to participants encouraged retention in this study, and this has implications for future applications of the JTS process.

The strongest predictor of change in Doctoral Progress scores over time was participants’ Month 1 Doctoral Progress score. In general, participants whose Month 1 scores were negative or zero significantly increased their overall ratings of progress while those who scored two or higher in Month 1 showed significant decreases in their self-evaluations. In contrast, participants who rated their feelings about their doctoral progress as ‘1’ in Month 1 were likely to maintain this appraisal over time. Considering these changes from Month 1 to averaged Doctoral Progress scores in terms of positive or negative valence revealed that at least a quarter of participants remained in, or moved into, the negative score domain over time, which can be classified as an overall negative appraisal of their doctoral progress across the year.

It is also noteworthy that most demographic and candidature groups, as well as the whole group, deviated little from a median of 1. This score is barely above the neutral position of ‘feeling neither happy nor unhappy’, and suggests that it is quite ‘normal’ to feel only just positive about the amount of progress being made during the doctoral research process. However, when considering the distribution and stability of Doctoral Progress scores, it also seems that it is realistic for PhD students to expect to feel generally positive about their doctoral research progress, and that not doing so is reason for concern.

Indeed, the results showed that Doctoral Progress scores were related to later candidature outcomes. In particular, these results showed that participants’ negative evaluations of progress can function as an indicator of withdrawal and of taking leave from doctoral candidature in the following months, whereas higher scores augured well for continued enrolment or completion of candidature. Furthermore, participants who had either taken leave or withdrawn from candidature had been feeling significantly less positively about their recent doctoral progress, even up to 11 months prior to withdrawing or taking leave, compared to the participants who remained enrolled or who submitted their thesis or graduated. This provides empirical evidence that monitoring students’ ratings of their doctoral research progress can provide useful feedback for use in self-regulatory efforts.
Together with the results of the previous two chapters, these results reported in this chapter provide evidence that while Doctoral Progress scores might fluctuate across a year of candidature, they are likely to be relatively stable in their valence beyond an initial evaluation. While this is of no concern when scores are positive, the connection between negative scores and candidature outcomes means that stability here is an issue that warrants further investigation. Having examined these patterns of stability and change, Chapter 8 further explores the meaning of these changes by analysing participants’ responses to the JTS process, and what this might reveal about the relationships between Doctoral Progress scores and self-regulatory efforts.
8. RECIPROCAL BENEFITS? EXPLORING RESPONSES TO JTS PARTICIPATION

8.1 INTRODUCTION

This chapter builds on the three previous results chapters with the continued exploration of the relationships between participants’ Doctoral Progress scores and other indicators of self-regulatory functioning. The results of Chapter 5 established that the Doctoral Progress measure appears useful for self-monitoring purposes in this exploration of self-regulation, as it differentiated among students’ evaluations of progress while remaining independent of the effects of demographic and candidature factors. Chapter 6 then showed that the comments associated with these Doctoral Progress scores provided evidence that participants differed in their self-regulatory efforts. This signified that the Doctoral Progress scores might be useful as indicators of self-regulatory functioning. Chapter 7 reported that feelings about doctoral research progress over time generally remained unaffected by demographic and candidature factors, but did appear to be influenced by the participant receiving visual feedback about previous scores, and were strongly associated with original Month 1 scores. These results also provided some evidence that certain Doctoral Progress scores could be used as benchmarks of functioning when self-monitoring.

This chapter reports on the next step in this exploratory research, which was an analysis of what participants’ reported use of the JTS process might reveal about the self-regulatory functioning of doctoral research students, and how this might provide further insights into the meaning of the changes in the Doctoral Progress scores discussed in Chapter 7. This is articulated in Research Question 7:

Research Question 7: How do doctoral research students respond to a self-monitoring process during PhD candidature?

To do this, the comments made by participants regarding their experience of participating in the JTS process were examined, with a focus on what these comments indicated about participants’ use of this self-observation device for self-regulatory purposes. In addition, participants’ feedback about their use of the JTS process provided an opportunity to explore how factors such as survey issues, including response burden, might have contributed to attrition or retention.
from the JTS. Therefore, these findings regarding participants’ experiences of the JTS are reported under three broad themes of interest to this study:

- logistics,
- relevance, and
- application

The ‘logistics’ section examines the feedback received from participants regarding the accessibility and ease of completion of the survey instrument via the website, and ideas for improvement. This feedback provided qualitative data regarding survey response burden to supplement the quantitative data reported in Chapter 7 pertaining to survey response rates. The ‘relevance’ section considered participants’ feedback about the utility of participating in the survey. In the ‘application’ section, the focus was on exploring participants’ reported use of the JTS for self-regulatory purposes. The findings of the ‘application’ section then directed the final quantitative data analyses. That is, the participants were grouped by their written feedback about the JTS process, and these groupings were used in a quantitative analysis using Doctoral Progress scores to further explore participants’ self-regulatory functioning. This analysis addressed the final research question.

**Research Question 8: Is there a relationship between the reported use of the JTS for self-regulatory purposes and changes in students’ self-evaluations of recent doctoral research progress?**

The following section of this chapter provides a brief overview of the participants who provided feedback about their experience of the JTS process, prior to presenting the analyses regarding participants’ feedback pertaining to the logistics of the JTS.

### 8.2 PARTICIPANTS

The sample of participants involved in the following analyses consisted of those who had responded to the open-ended invitation which appeared at the completion of the final JTS in Month 12: “We’d appreciate any feedback about your experience of the Journey Tracking Survey process”. This invitation was extended to all JTS participants, whether or not they had completed Month 1 or at least six surveys in total, as it was important to hear from participants...
who were willing to report on issues with their experience as well as those who had completed all twelve months without any concerns.

Thus, the first question to be addressed regarding this sample was how it compared in terms of composition and experience of the JTS to the larger group of JTS participants who did not comment. As most background demographic and current candidature factors did not influence Doctoral Progress scores, these were not considered further, although a breakdown of participants by these factors is provided in Appendix 11.14. As described in Chapter 7, the one candidature factor that was associated with differences in Doctoral Progress scores, and hence potentially with self-regulatory differences, was university location. However, according to a Pearson chi-square test, there was no association between providing feedback on the JTS experience and university location ($\chi^2(1, n = 1167) = 2.56, p > .05$), as displayed in Table 37.

<table>
<thead>
<tr>
<th>JTS Process Feedback</th>
<th>University Location</th>
<th></th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Australia</td>
<td>Overseas</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>141</td>
<td>40</td>
<td>181</td>
</tr>
<tr>
<td>No</td>
<td>817</td>
<td>169</td>
<td>986</td>
</tr>
<tr>
<td>Total</td>
<td>958</td>
<td>209</td>
<td>1167</td>
</tr>
</tbody>
</table>

As outlined in Chapter 4, approximately half of the participants were able to watch their Feedback Graph develop by adding a new Doctoral Progress score each month. The results reported in Chapter 7 showed that small changes in the scores of the ‘Graph’ and ‘No Graph’ groups over time eventuated in a significant difference between these groups. This suggested that the experience of the JTS process might have been enhanced by the provision of this visual feedback, and this in turn may have also influenced participants to comment about their experience. However, as shown in Table 38, the majority of the participants who offered feedback about their experience of the JTS process ($n = 126, 70\%$) had been in the ‘No Graph’ group. A Pearson chi-square test confirmed that participants who provided feedback were significantly more likely to have been in the ‘No Graph’ group ($\chi^2(1, n = 1167) = 30.57, p < .001$).
Table 38

*JTS Process Feedback Participation by JTS Feedback Graph Group*

<table>
<thead>
<tr>
<th>JTS Process Feedback</th>
<th>JTS Feedback Graph</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>55</td>
<td>126</td>
<td>181</td>
</tr>
<tr>
<td></td>
<td></td>
<td>520</td>
<td>466</td>
<td>986</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>575</td>
<td>592</td>
<td>1167</td>
</tr>
</tbody>
</table>

Based on the content of the comments, one possible reason for this was that the novelty of viewing their personal Feedback Graph for the first time – which was just prior to being invited to comment on their JTS process experience – prompted these participants to comment on the graph as well as other aspects of their experience. However there are other possibilities to be considered. Given the association between Feedback Graph group and providing feedback about the JTS process, did participants who commented differ from non-respondents on Doctoral Progress scores across the year? That is, did the commenters represent a group who were particularly happy or unhappy with their progress during the JTS period, for example? Nearly all of those participants who commented ($n = 172; 95\%$) had persisted with the JTS process for at least six months, so that an averaged Doctoral Progress score could be calculated. The averaged Doctoral Progress scores for participants who did and who did not comment on their JTS process experience appear in Table 39. Although the participants who commented scored slightly higher than those who did not participate, a Mann-Whitney U test showed there was no significant difference between these scores ($U = 64\,022$, $p > .05$).

Table 39

*Averaged Doctoral Progress Scores by JTS Process Feedback Participation*

<table>
<thead>
<tr>
<th>JTS Process Feedback</th>
<th>n</th>
<th>%</th>
<th>Averaged Doctoral Progress Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Range</td>
</tr>
<tr>
<td>Yes</td>
<td>172</td>
<td>19</td>
<td>1.09 (-3.90) to (+4.00)</td>
</tr>
<tr>
<td>No</td>
<td>746</td>
<td>81</td>
<td>1.00 (-3.88) to (+4.00)</td>
</tr>
<tr>
<td>Total</td>
<td>918</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Overall, these results suggested that the participants who provided feedback were a satisfactorily representative sample of the whole group who took part in the JTS process.
In the following sections, as in Chapter 6, comments are again provided verbatim where possible, with spelling, grammatical, or punctuation errors corrected only when deemed necessary for ease of reading.

8.3 LOGISTICS OF THE JTS PROCESS

Thirty six (20%) of the 181 JTS Process Feedback participants provided feedback about logistical aspects of the JTS process. This included comments about the accessibility and ease of completion of the survey instrument via the website, and ideas for improvement. These comments were studied to identify the factors that might have positively or negatively affected monthly response rates, and ultimately the retention and attrition rates from the JTS process. A wide range of factors were evident in participants’ feedback, and these are discussed in the following sections.

8.3.1 Survey response burden

The majority of the feedback regarding the logistics of the JTS process indicated that the time and effort required to complete the surveys was minimal, with many participants describing it as “quick” and “easy”, and that it had been facilitated by the email reminders containing a hyperlink to the website. These comments are supported by the evidence that was presented in Chapter 7 that the majority of participants completed the Month 1 JTS survey within five minutes. A few participants even expressed interest in continuing with the survey beyond the twelve month period.

In contrast, one participant commented that the process was long and that they were “over it”. Of course, others who had ceased responding to the surveys, and therefore did not access the final survey with the feedback invitation, may have felt likewise. Another participant from the ‘No Graph’ group felt that the effort expended was worth it after viewing the final graph.

8.3.2 The feedback graph

As discussed in Section 7.5, higher rates of retention in this study were evident for participants in the ‘Graph’ group compared to the ‘No Graph’ group. Participant feedback suggested that one reason for this was that being able to view the graph provided some contextualising of previous responses and facilitated responding in the following months. Not having had this visual cue, one participant from the ‘No Graph’ group stated:
“I liked tracking my progress - especially towards the beginning, when I could remember what I had put in the last one and so could compare. Towards the end, I couldn’t remember, but it still felt like an emotionally valuable experience.” (1939, ‘No Graph’ group)

8.3.3 Anonymity

The JTS process provided participants with anonymity, and the lack of personal, demographic, or candidature information reported in participants’ comments each month suggests that maintaining privacy around the discussion of the emotional experiences of doctoral research is an important element for students. As one participant explained:

“I have also appreciated the anonymity, since some of the issues that I have faced were very personal and distressing. It was good to share in a neutral way without judgement” (0272, ‘No Graph’ group)

8.3.4 Retrospective graph adjustment

The opportunity to change Doctoral Progress scores retrospectively, as described in Section 4.5.2 in the Method chapter, was condemned by a number of participants. In fact, there were no positive comments about this option, suggesting that participants did not see the retrospective rating of progress to be as valid as a current one. It should be noted here that preliminary investigations showed that very few participants (for example, 2% in Month 1 and 4% in Month 12) changed their original Doctoral Progress measure responses, and that the majority of these responses were adjusted by just one response scale point. Only the original responses were used in the analyses reported in this study.

“I’m not sure why you would allow people to alter their previous responses” (0081, ‘No Graph’ group)

“I don’t see why I should be given the opportunity to change a submission I made 12 months ago. On what evidence would I make such a change?” (1133, ‘No Graph’ group)

“Are you asking me to reconsider my responses from over the last 12 months? Is that reliable? I don’t remember how I was feeling a year ago...or a month ago.” (0943, ‘No Graph’)
8.3.5 Missing graph data

It is also noteworthy that a few participants expressed annoyance that their graphs contained missing data, insisting that they had not failed to complete any surveys. One possible explanation for this is that the email reminders were redirected to spam or junk mail without the participants’ knowledge. Indeed, one limitation of the study design is that many participants – and a few institutions – changed email addresses in some way during the course of the year, and this resulted in efforts to resolve the issues associated with ‘bounced’ emails becoming a regular occurrence. In addition to causing at least some of these ‘missed’ surveys, these email issues may have resulted in some unintentional attrition from the study. Technological developments that have occurred since the completion of data collection for this study, and that may be relevant to addressing this limitation, are discussed in the Section Summary.

8.3.6 Clarity of survey input form

Two participants suggested that displaying the survey dates on the online input form, rather than Month 1, Month 2, etc., would facilitate the current and retrospective entering of missing data at the time of the Month 12 survey, although the survey completion dates were shown on the Feedback Graph itself. While the form could be adapted to accommodate this suggestion, it is unlikely that further iterations of the JTS process would allow for retrospective addition of data.

8.3.7 Self-regulatory factors

Apologies and other explanations for incomplete surveys were offered by some participants. For these participants, at least, incomplete survey sets point more to difficulties in self-regulation processes rather than to the response burden of the survey. That is, missing data were explained in terms of difficulties in managing candidature-related issues regarding emotions, time, or motivation:

“I apologise for my missing data in the middle. I have had a huge rollercoaster of emotions on this journey and have been too overwhelmed at times to participate in things like this.” (1228, ‘No Graph’ group)

“When I started in the data collection process of my PhD I seemed to have no time to finish the survey as I had so many other things to get through.” (0367, ‘No Graph’ group)
“I’m wondering whether you will find that those who are either going badly or, like me, just unable to make any progress, will have skipped months of the detailed survey. While one is procrastinating (with or without reason) on a project, one tends also to procrastinate on the surveys.” (0725, ‘Graph’ group)

In a similar vein, two participants admitted that completing the surveys required self-regulatory effort, perhaps due to familiarity, disinterest, or boredom with the survey content.

“Hard to stay focused on the questions. Answers probably depend on how busy I am.” (0743, ‘No Graph’ group)

“As the questions did not change each month I did come to expect them, and had to make myself think about my answers.” (0976, ‘No Graph’ group)

8.3.8 Section summary

Of the 20% of participants who commented on the logistical aspects of the JTS, the majority offered positive feedback about the survey format and process, and there were very few criticisms or suggestions for changes. From this analysis it appears that attrition or missing data from the survey was more likely to have been the result of individual- rather than survey-based factors. That is, incomplete surveys were more often attributed to motivational or other self-regulatory difficulties than to problems with accessing or completing what was generally regarded as a user-friendly survey. Of course, this conclusion is limited by being based on the feedback from participants who persisted with the JTS process, or at least completed Month 12. Yet it seems reasonable to assume that if persisting participants acknowledged the influence of self-regulatory factors on survey completions, then similar reasons would be pertinent to participants who did not remain involved. Thus, outcomes such as incomplete or missing surveys need to be investigated further for their potential use as diagnostic markers of problematic progress.

Despite the strong positive response to the survey tool, a number of improvements are recommended for future applications of the survey process on the basis of this feedback, and these are discussed in more depth in the following chapter. The next section of this chapter discusses the findings regarding the relevance of the JTS content and process.
8.4 RELEVANCE OF THE JTS PROCESS

Two sources of information were taken into account in assessing how participants perceived the relevance of the JTS process. Firstly, the satisfactory survey completion rates that were discussed in Chapter 7 provided some indication of the survey’s relevance, at least when considering the participants who remained enrolled in the PhD for the entirety of the JTS process. Secondly, feedback from participants conveyed information about their perceptions of the relevance of the JTS process in two ways: one was how they described the meaning or value of the survey content and process, and the other was how they reported having engaged with or applied the content and survey process. The current section focuses on participants’ perceptions of the relevance of the survey content and process, while Section 8.5 discusses the relevance of the JTS in terms of participants’ application or engagement with the survey process.

8.4.1 Relevance of the JTS content

It should be recalled here that the JTS comprised the MHI-5, the State Hope Scale, and the Doctoral Journey Scale, the latter incorporating the Doctoral Progress measure as well as the Comments section that was the source of data for Chapter 6. The relevance and acceptability of the content of the JTS was endorsed by the many general comments about the value of the process to participants. Both the survey content and process appeared relevant to these participants, with most describing the process as being “interesting”, ‘useful’, ‘rewarding’ or ‘valuable’.

“This has been quite a good process because it has allowed me to think about my progress in an emotional way rather than in a purely academic way.” (1506, ‘No Graph’ group)

“It has been good to take time to reflect on how I am tracking and to remember that it is a journey!” (1259, ‘No Graph’ group)

However, one participant contended that:

“I think that the repetitive nature of this survey has contributed to a sense of dissatisfaction with my progress. When I fill in my semester progress reports the questions I have to answer give me a sense that I have achieved something – your questions give me a sense that I am not achieving anything – I’m not sure what you
Some participants offered more specific feedback regarding the JTS content. The State Hope Scale items were criticised for being unclear by four participants:

“I only managed to understand one of the questions about half way through the process. The one about ‘there are many ways around a particular problem’ or something like that, it took me a while to understand what that was actually asking.” (0772, ‘Graph’ group)

“Some of the questions, particularly the ones regarding problems in the second section each month, were difficult to answer and sometimes seemed contradictory. But this contradiction was often caused by specific things happening in my life, particularly work, which was stopping me from doing my thesis.” (0091, ‘No Graph’ group)

“I appreciated considering the wellbeing and progress sections in each survey, but the goals scale one really annoyed me! Particularly the two questions around thinking of lots of ways to be able to meet any goal/solve any problem I had. My immediate feeling was that it was too non-specific and seemed to be suggesting that I SHOULD be able to think of lots of solutions. But I think why it got to me was a frustration that the things that come up as problems for me are just ‘the way things are’ and not to be solved, just to be put up with. By this I mean all the deficiencies of my project, things I can’t go back and change (the way I did things). So I usually felt that I was just giving token answers to these particular questions.” (1001, ‘No Graph’ group)

Although this constituted a relatively small amount of feedback (only 2% of all commenting participants), it still suggests that caution should be taken in interpreting the State Hope Scale scores. Furthermore, given that the analyses in Chapter 5 showed that it held no advantages over the Doctoral Progress measure for self-monitoring purposes, the inclusion of the State Hope Scale in future versions of the JTS needs to be considered.

The Doctoral Journey questions acknowledged that doctoral research is multifactorial rather than monolithic, and asked participants how they had felt about the different aspects of doctoral
study on which they had been working. Just one participant reported that this was challenging, drawing attention to the diversity of feelings that may be associated with each aspect.

“Sometimes it is difficult to be able to summarise all the different feelings in relation to different PhD components into a single answer for all the questions”. (0607, ‘No Graph’ group)

Participants were also asked to rank their feelings about their ‘overall progress’ in terms of ‘as happy’ or ‘as unhappy as I could feel about it’ in the Doctoral Progress measure. This measure directed participants’ attention to a possible relationship between their feelings and progress, and the feedback suggested that while this was neither revelatory nor confronting for some participants, for others this was quite enlightening. Firstly, many participants noted the interrelatedness of their mood or emotional state and their feelings about their progress.

“I know that my progress and sense of achievement in my studies is related to my well-being and vice versa, so it has been helpful to see this objectively.” (1881, ‘No Graph’ group)

It was through participating in the JTS that other participants recognised the relevance of this.

“Completing this survey has been very informative – it has made me consciously reflect on my progress and feelings. I now view my research within the context of my life experiences at the time. Before this I tended to see the research as separate to other events. I realise how important my general confidence, enthusiasm and physical energy is to my ability to write and research. So obvious – but without the survey I did not have this perspective.” (2105, ‘No Graph’ group)

It was also apparent that while some participants saw aspects of well-being as being integrated and interrelated with their doctoral research progress, this in itself created difficulties in assessing their feelings about progress via the JTS.

“...sometimes it was difficult to select a completely appropriate answer for my particular situation.” (0756, ‘No Graph’ group)

“the questions were easy to answer although at times (when I was simply struggling to make decisions) I wanted an “it depends” option.” (0146, ‘No Graph’ group)
Several participants described this difficulty in more detail, highlighting their responses to different aspects of their doctoral research, and the interactions that occur with factors that influence their progress. Indeed, these interactions caused confusion for some in determining how to assess their feelings about the components of their doctoral research. The following participants tried to discriminate among and compartmentalise the antecedents of their feelings.

“I am sometimes a bit confused about whether your questions relate to how I am feeling about my thesis/research (which is fine) or to wider life events (which have been pretty grim over the last six months).” (1985, ‘Graph’ group)

“The journey tracking has been interesting and appears to reflect times of some negative thoughts about supervision rather than the PhD journey which has really been most enjoyable to date.” (0204, ‘No Graph’ group)

“My level of happiness seems to be strongly affected by personal matter. [Participant provided a description of illness and death of a parent, and experiencing a natural disaster at home] Those personal matters extremely affected my study progress and motivation for study.” (0711, ‘No Graph’ group)

“...this year I have started to get behind, and my personal life has been a little dodgy, so even though the phd is doing “ok” and my supervisors are happy about how I’m going, I don’t “feel” happy about it.” (0718, ‘No Graph’ group)

“I enjoyed the tracking process, although sometimes I felt it reflected just as much (or more) about how life was going in general.” (1615, ‘No Graph’ group)

“The down times tend to relate to PhD supervisors loosing interest and me feeling that I can’t do anything until I get some formal feedback! However saying that I don’t think I could sustain the same energy and concentration every month.” (0525, ‘No Graph’ group).

Having taken a variety of approaches to answering this question, one participant suggested that further explication of the relationships among well-being, personal and doctoral research factors would be helpful, as would some measure of sense of control in assessing the extent or nature of the impact.
“With the questions concerning well being: Sometimes I answered regarding my personal life, other times regarding my work. It might be useful to ask a question about how much your well being is influenced by personal factors this month, or something to differentiate it.” (0845, ‘Graph’ group)

Finally, some participants spoke of enjoying the opportunity and freedom of ‘blogging’ in the Doctoral Journey Scale comments box. One participant suggested keeping a diary of events as a memory prompt to improve the accuracy of these comments. The comments for Month 1 were discussed in Chapter 6.

“A good way to vent a little about the whole process” (0292, ‘No Graph’ group)

A few participants suggested adding questions to enable an exploration of the impact on PhD candidature of external factors from a wider life context.

“It would have been nice to have more about how various stressors affect the PhD, e.g. teaching, other work, family crises, housing problems, etc.” (2193, ‘No Graph’ group)

Similarly, while one participant appreciated ‘the opportunity to give qualitative information to clarify their responses’, a self-identified qualitative researcher participant felt the survey items were ‘unable to fully capture the depth of their PhD experience’, although also acknowledged that this was not the intention of this study. Another participant recommended the addition of case studies to examine gender and discipline issues. A few participants suggested that adding questions relevant to the ‘post-submission’ phase would be beneficial, noting that self-regulatory efforts are required to deal with the period of time incorporating the emotional aftermath of thesis completion and the months-long wait for thesis examination results to arrive.

Related to the consideration of survey content were participants’ comments about their perceptions of the accuracy of the graph. Most participants commented positively on the accuracy of their graph as a representation of how they had been feeling about their progress over the previous year.

“I generally feel that my experience of the PhD has been more negative than positive, and that my ratings accurately reflect this.” (2170, ‘No Graph’ group)

A few participants doubted the accuracy of their graphs, as the next example shows.
“... Interesting big drop off from a year ago though. I don't believe that much has changed and realistically speaking I would have it as a flat liner at the bottom...but I said what I said and so I suspect that I was probably feeling better about it then. ... Actually, looking at these results, I question whether there is any validity to the data I have supplied. I was drinking more a year ago. Maybe that made me happier...or delusional.” (0943, ‘No Graph’ group)

Regarding the presentation of the graph feedback, one participant would have preferred the Doctoral Progress points to be represented as a trend line on the Feedback Graph. Another participant voiced the desire to see graphs for the MHI-5 and State Hope Scale scores, and to be able to compare their journey to that of other students.

Many participants also provided contextual information to help interpret the profile of their final graph. Following the pattern of the Month 1 comments and Doctoral Progress scores, this information often described either achievements or impediments to progress, or other causes of emotional responses. The consistency of these patterns provides further support for the findings reported in Chapter 6.

8.4.2 Relevance of the JTS process experience

Another way of assessing the relevance of the JTS process was by examining participants’ feedback regarding the value of participation. This is in contrast with the findings presented in Section 8.5 of this chapter, which examine more specifically whether participants reported actually using the JTS process, and in particular how it might have been used for self-regulatory purposes.

There was a substantial amount of feedback claiming that participation in the process had been ‘useful’, ‘valuable’, “enjoyable”, or ‘rewarding’. Many participants expressed gratitude for the opportunity to be involved and for the graph feedback, which suggested that these doctoral research students did not tend to be systematically self-monitoring using any other methods, and that they appreciated being offered a structure within which to conduct this. Yet these participants often seemed keen to consider things from a different perspective and to take an active role in their learning about the PhD experience. There was great interest in seeing the results and a curiosity about other students’ responses, presumably against which to benchmark or validate their own. One participant observed that the outcomes of this research should be highlighted to commencing doctoral research students.
“I think that it really demonstrates the ebb and flow of the doctoral process. This would be great information for students embarking on a PhD, i.e. at orientation and throughout the process.” (1899, ‘No Graph’ group)

The reasons given for the survey being useful varied. A few participants described the sense of connectedness that participating in the study had provided:

“... makes it feel like there’s someone out there interested in how it is all going!”  
(0585, ‘Graph’ group)

“I am a remote student living in a non-English speaking country and do not have any peers here who are studying.” (0584, ‘No Graph’ group).

One participant contrasted the process with other monitoring processes:

“It is much more useful than the hopeless university review forms that are just irritating.” (1979, ‘No Graph’ group)

Other participants described how they had found participation in the JTS process to be a learning experience, and expressed the hope that the results of this research will assist future doctoral research students. Several participants commented that they would like to have had the JTS process available for their whole candidature, while others endorsed its use for other students. Some participants suggested that the survey process could be taken up by universities, and in particular planned to use something similar in their own futures as academic supervisors. These comments were all supportive of the utility and relevance of the JTS process for doctoral research students.

“I would recommend this (or a variant) be used as a standard for all research students” (1961, ‘No Graph’ group)

“I think it would be fantastic if each university had some form of program like this tracking survey for their students...I have quite limited contact with my supervisors (only formally meet a few times a year), so I found this particularly useful.” (0292, ‘No Graph’ group)

“I think that this should be compulsory for everyone, so you can assess your personal and academic life, and recognise whatever may be causing troubles, and do something
about it, or satisfaction and then you can think of ways to remain that way.” (0085, ‘Graph’ group)

Some of these students considered the potential for its use from a future perspective of themselves as academics, with some responses suggesting that they might use it in conjunction with the student being supervised.

“From this I have learned much that should help me as I start supervising other candidates.” (0349, ‘No Graph’ group)

“If I become a supervisor, I would consider using a similar tool to aid students in their PhD journey.” (1932, ‘No Graph’ group)

“I have found this to be a very useful reflective exercise and would recommend this (or a variant) be used as standard for all research students.” (1961, ‘No Graph’ group)

“I would recommend that all PhD students undertake this survey for the duration of their entire PhD. This would help students to monitor themselves and see how they might make changes. Also the information should be aggregated and provided to supervisors so that they can better respond to the needs of their students.” (0551, ‘Graph’ group)

Only one participant voiced the following suggestion.

“It would be good if students and their supervisors could access this information, especially when that frequent contact is lacking.” (0292, ‘No Graph’)

However, given the importance that anonymity seemed to play in students feeling able to honestly rate their progress and express their feelings, it is doubtful that this instrument would function in the same way if students were sharing this information with their supervisors. This issue was considered by one participant who questioned the value of including the ‘personal’ in supervision:

“I’ve found it useful having to reflect on my experience and think about my mood and how it may affect my progress or perceptions. I find that these more personal aspects are missing from supervision, which usually tends to focus on getting things done, achieving goals, etc. Perhaps this is how it needs to be? It may not be helpful to focus
too much on feelings, and having this approach has certainly helped me to just get on with things!” (1867, ‘No Graph’ group)

In contrast, one participant expressed relief that the JTS process had come to an end.

“It’s a long process and I feel so over it!” (1523, ‘No Graph’ group)

Of course, this may have been the sentiment of participants who did not persist to this point in the JTS process.

How often should this survey be completed for maximum benefit to the student? Most of those who commented on the frequency suggested that monthly surveys were appropriate. However, several participants pondered whether being surveyed on a monthly basis provided a sufficiently nuanced representation of their feelings about their doctoral research progress.

“It was hard at times to think about how I felt about my progress for the entire month. At times I was as happy as I could feel about it, but at times I was so nervous and scared. Though for the most part, I have felt pretty happy about my progress overall and have enjoyed the PhD process.” (1949, ‘No Graph’ group)

“I find it interesting too, that if I had completed the survey on a different week or day the answers could be very different. Sometimes I experience a lot of difficulties or ‘bumps’ in one week (e.g. technology playing up and having difficulties fixing it) and another week everything will be working fine, I feel I’m progressing better and feel a lot happier about things.” (0873, ‘No Graph’ group)

“it changes from day to day, really.” (0943, ‘No Graph’ group)

“Sometimes can’t really remember what happened in last month and answers somewhat dependent on mood today/this week.” (0175, ‘Graph’ group)

8.4.3 Section summary

In general, the relevance of the JTS process as a means of self-monitoring progress through doctoral research was supported by the participants’ comments about their positive experiences of participating in this study. In terms of the content of the JTS, the State Hope Scale items caused some confusion, whereas the MHI-5 and the Doctoral Journey items seemed to resonate as being relevant to the PhD experience. The Feedback Graph, derived from the Doctoral
Progress measure, appeared to be valuable for feedback purposes. It was also interesting that there were no suggestions that any indicators of cognitive functioning or higher intellectual development should be included. Thus it seems that these students found the more emotionally-rather than cognitively-based indicators to be more relevant to progress monitoring.

Having found further support for the relevance of the JTS process as a self-monitoring process suitable for doctoral research students, the following section of this chapter examines whether participants reported using the JTS process for self-regulatory purposes.

8.5 APPLICATION OF THE JTS PROCESS

Although the JTS process may have been ‘easy’ or ‘enjoyable’, of even more interest to this study was what comments about the application of or engagement with the survey process might reveal about doctoral research students’ use of self-monitoring and other self-regulatory processes. The following section reports on an analysis of the feedback differentiated by the two broad types of personal responses to the JTS process that appear to have occurred: 1) non-specific responses; and 2) self-regulatory responses, which incorporated responses reporting i) the use of self-reflective processes, or ii) evidence of more complete self-regulatory cycles.

Again, it is important to remember that comments about the survey may have referred to all three scales (MHI-5, State Hope, and Doctoral Journey), and for approximately half the participants this would have included the monthly Feedback Graph. The first section describes the non-specific responses to the JTS process that were reported by the majority of participants.

8.5.1 Non-specific responses

The majority of comments (n = 109; 60%) did not mention any form of engagement with the JTS process. As described in Sections 8.3 and 8.4, many participants offered feedback about various aspects of the JTS process, without indicating whether they used it for self-regulatory purposes. Other participants explained or contextualised the peaks and troughs in their final Feedback Graph, without providing any sense of their level of engagement with the survey process.

While it was possible that some participants had simply not mentioned that they had been using the JTS for self-regulatory purposes, the data suggested that many participants perceived the JTS process to be an “interesting” exercise in simply recording their experiences or expressing
their feelings without further interpretation at that time. Their comments provided no sense that these participants reflected on their experience or changed their behaviour as a result of their participation in the study.

“I just tried my best to reply to all the questions hoping that it will help with a research.” (2179, ‘No Graph’ group)

Further evidence of participants recording, rather than reflecting or acting on, their experiences during the JTS process came from comments regarding the Feedback Graph. Recalling that more than half of these participants had not seen their graph until shortly before commenting, it is not surprising that there were many comments about the Feedback Graph’s appearance. As mentioned in Section 8.4, the majority of comments about Feedback Graph accuracy were positive, saying that the graph was an accurate record of how they had felt about their progress over the previous 12 months. However, comments about the accuracy of the graph also revealed information about participants’ engagement with the JTS process. Indeed, the interest or surprise expressed by many of these participants suggests that during the course of the JTS process they had not really considered the emerging pattern of their responses and the meaning of the profile.

For example, some participants interpreted the final Feedback Graph in light of their assumptions and beliefs about the doctoral research process in general. For the following participants, the profile of the graph confirmed what they had heard from other sources of information about the emotional experiences of PhD candidature. These comments conveyed a sense of detachment and objectivity as participants compared their graphs with a ‘standard’, and suggests the participants might have had a limited awareness, or at least recall, of how they had felt about their doctoral progress during the year.

“Looks a lot like the roller coaster journey which the PhD is often described as.”
(0120, ‘No Graph’ group)

“It’s great to see an overview picture and to realise that troughs and highs do happen”
(0749, ‘No Graph’ group)

“I found this really interesting as anecdotally from colleagues that there are definite ups and downs during the whole PhD process.” (0525, ‘No Graph’ group)
Other participants interpreted the graph profile at a more personal level. Some expressed surprise at the shape of the graph, whether for the valence, the stability, or the topography of the feedback graph.

“This has been a very interesting experience. I really didn’t realise I was depressed for so long.” (0472, ‘Graph’ group)

“Wow! Sailing the ocean waves. But really that’s how it has felt.” (1836, ‘No Graph’ group)

“I’m surprised it varies as much as it does.” (0233, ‘No Graph’ group)

Again, these comments suggest that during the year of the JTS these participants had been simply recording their responses, with little reflection on the meaning of their monthly self-observations until the end of the process. It seems then that most participants had not been otherwise actively and systematically observing or monitoring how they were feeling about their progress over the previous year. These comments also draw attention to the fact that, without this frequent and regular self-monitoring, the participant’s memory of their feelings about progress could be selective, erroneous, or misleading. This highlights the limits to basing studies on retrospective designs using PhD graduates’ recollections of their experiences of candidature.

These findings also confirm that the Feedback Graph provides an important visual cue for both recalling and validating feelings, which may have contributed to the higher retention rate of participants in the ‘Graph’ group. It also shows that simply viewing the graph after 12 months’ of observations had the potential to increase participants’ awareness and understanding of the emotional aspects of doctoral research in their unique situation. That is, through the juxtaposition of their recorded experience with their expectations or their memories of the year, participants were able to develop a more enhanced understanding of their own responses to candidature. Therefore, even if participants merely recorded their responses on the survey each month, being presented with feedback at the end of the year appeared to be enlightening for at least some of these participants. Indeed, descriptions of the experience of receiving this feedback included “interesting”, “informative”, and “rewarding”.

Of course, considering the wording of the open-ended question to which they were responding, it is possible that participants did use the JTS for self-regulatory purposes without describing
this. Indeed, one participant articulated surprise at having used the JTS process for recording, rather than in the more reflective way predicted.

“While I considered the questions and answered them accurately when I was completing each survey, I thought initially that the questions would cause me to spend some time after I had completed each survey reflecting on the information that they were asking. Surprisingly, I didn’t spend much time at all doing that thinking after each survey” (1677, ‘No Graph’ group)

Although it is possible that more participants interacted proactively with the JTS process without saying so, the general stability of Doctoral Progress scores discussed in Chapter 7, particularly with respect to score valence, also suggests that this is unlikely.

Responses to the JTS process that were clearly of a more self-regulatory nature are described in the following sections. These sections focus on the comments of a total of 71 participants (39% of the 181 commenting participants) who described making personal use of the JTS process in various self-regulatory ways. These comments were divided into two groups: those who described using the JTS for reflecting on their progress in a more isolated or limited sense, and those who reported using the monthly surveys in a more integrated and cyclical self-regulatory fashion. These two groups of comments were analysed in more detail and discussed in turn in the following sections.

8.5.2 ‘Reflecting’

A group of 46 participants (25% of all JTS Process Feedback participants) reported that during the year they had used the Journey Tracking Surveys as an opportunity to reflect more purposefully on how they had been feeling about their doctoral research progress. That is, these participants were considered to have employed not only the performance phase process of self-monitoring, but also the self-reflection phase processes associated with Self-judgement, in that they reported evaluating, and considering causal attributions for, their performance during the JTS process. However, while the participants’ comments described an increase in awareness of the quality of and reasons for their recent doctoral research progress, they did not report making any conscious changes in cognition, affect, or behaviour. As such, these participants did not provide evidence of engaging in other self-regulatory processes as a result of self-monitoring, such as Self-reaction processes that might lead to changes in Self-motivational beliefs.
Again, a large proportion of these comments were made by participants who had not seen the graph until after the Month 12 survey. It should also be noted that although some participants in the ‘No Graph’ group referred to ‘reflecting’ on the results of the previous year when they viewed their graph for the first time in Month 12, this feedback was not included as evidence of a reflecting level of engagement with the JTS process (as defined in this study), as it occurred after the event. Moreover, although many comments pertained to the appearance of the graph in Month 12, it is important to recall that the generation of the graph was only one component of the JTS process, and that the process of completing all scales could itself be used for self-regulatory purposes. Indeed, the number of ‘No Graph’ group participants whose comments referred to self-reflecting or self-regulating responses during the JTS process bear testament to this.

In what ways, then, was the JTS process reportedly used by participants for self-reflection purposes in the doctoral research context? Almost all of the participants who referred to using the JTS for self-reflection purposes found it to be a valuable experience. For some, it provided a different and personalised perspective on their progress.

“I think this process is useful for me, as I can measure my own view of the thesis, as I progress month by month.” (1986, ‘No Graph’ group)

The sense of perspective or ‘overview’ provided by the JTS was reported by a number of participants to be useful in self-evaluation.

“This has been a positive experience which has allowed me a sense of overview. This is a luxury.” (0272, ‘No Graph’ group)

“It was helpful to look back over the month and take stock of what I had done.” (0821, ‘No Graph’ group)

These comments provide further support for the findings of Chapter 6, that participants equate ‘feelings about progress’ – as recorded by the Doctoral Progress measure – with actual progress. Therefore, it seems that the systematic manner of self-reflection encouraged by the JTS process was important in reassuring participants that they were making progress, especially in times of doubt. As predicted by Zimmerman’s (2000) model, this appears to have contributed to sustaining motivation at these times.
“It has been very useful to reflect on my journey over the last year – especially seeing the graph. It is good to see that you are progressing, even when sometimes you feel like you are not.” (0760, ‘No Graph’ group)

“I think that the process has been very helpful in gaining an overview of what influences my level of engagement with the thesis. It is easy to lose sight of the positive aspects when things may not be progressing smoothly.” (0734, ‘Graph’ group)

Some endorsed this self-reflection as the first step in facilitating their understanding and interpretation of the emotional experience of doctoral research.

“This survey helps to sort out and express ones feelings regarding the doctoral process.” (1734, ‘No Graph’ group)

The interactions among thoughts, feelings, and behaviours associated with the doctoral research experience were pondered by many participants.

“It has actually been very useful to reflect on how I’ve been/worked/felt in the last month.” (1844, ‘No Graph’ group)

Beyond this increase in self-awareness, the self-monitoring opportunity afforded by the JTS was a precursor to other self-judgement and self-reaction processes. Some participants began to offer causal attributions for their progress. In doing so, they clearly varied in whether the relationships among cognitive, affective, and behavioural elements were seen as unidirectional or more complex. For example, the first participant’s interpretation of these relationships takes a rather linear view, while the second example is more interactive.

“I am happier about my progress when I am making progress” (0815, ‘No Graph’ group)

“It’s been interesting to systematically track my well-being alongside progress in my doctoral program as I have not done so before. I know that my progress and sense of achievement in my studies is related to my well-being, and vice versa, so it has been helpful to see this objectively.” (1881, ‘No Graph’ group)

Other participants recognised the need also to take into account the effects of external factors.
“It has been extremely interesting to chart my progress – and also to note how external factors have impacted on my feelings towards my PhD.” (1932, ‘No Graph’ group)

“It has been an interesting journey in that it has allowed me to assess my expectations and the ‘real’ outcomes of all factors.” (0829, ‘No Graph’ group)

A more inclusive perspective of the effects and interactions of all these factors enabled a comprehensive evaluation of progress. This perspective is evident in the holistic approach to the survey questions taken by some participants. For example, taking a broader perspective meant looking at their doctoral research within the context of their lives more generally.

“It makes me wonder how I really am doing as a PhD student and as a person.” (0085, ‘Graph’ group)

These comments suggest that some PhD students had not been expecting, or had not been aware of, the impact of the PhD on their well-being, or vice versa. For example, another participant seemed to expect that the PhD could be compartmentalised away from other parts of life.

“I am very sorry that I am such an unsuccessful student at the moment. This has been a very difficult 12 months for me and my family and my PhD has really suffered. I feel as though I have really skewed your data, but I guess you will always have someone who is having a hard time personally, and is unable to really focus on their research for a period of time. This just happens to be my bad period of time. Again, I apologise.” (1287, ‘Graph’ group)

Some participants evaluated, contextualised, and summarised their JTS responses in more detail, generally attributing poor performance to working full-time, procrastinating, being tired, unmotivated, or affected by financial issues, natural disasters, or by other factors external to candidature. Indeed, the range of factors reported as affecting doctoral research progress was consistent with those identified in the Month 1 comments discussed in Chapter 6. Thus, the JTS process appeared helpful in assisting participants to recognise the reasons for poor progress, and where these were unexpected or beyond their control.

“I also recognise that the times I was not happy with my progress were generally out of my control (e.g. having an ethics application refused, after I had been told it would be supported). It also helps to have a 12 month perspective to see when the lows were
really low and be reassured that most of the time, things were going well.” (0821, ‘No Graph’ group)

“In my case [the ‘ups and downs’] really shows how a bad supervisor can negatively impact upon a candidate’s happiness.” (0873, ‘No Graph’ group)

“I suspect the downs in the above graph are related to the earthquakes that we have experienced in Christchurch. 4 September, 23 February, 13 June. This has put my data gathering on hold and has generally been distracting.” (0916, ‘No Graph’ group)

Some participants noted the value of systematically reflecting on their performance as a means of maintaining or improving perceptions about progress.

“Participating in this study has been personally reflective, and at times made me aware of strengths or weaknesses, and sometimes even improved my confidence with my progress.” (1592, ‘No Graph’ group)

“This has been an interesting exercise and it has helped me remain fairly positive about my work.” (1376, ‘No Graph’ group)

While the two comments above showed how engaging in this form of self-monitoring during the JTS process can influence self-motivational beliefs, these participants were not included in the ‘self-regulatory’ category as they provided less sense of a complete cycle of self-regulation occurring than was evident in other participants’ comments.

Few participants cited the role of more stable personal or dispositional factors in managing their doctoral research progress more effectively. Yet while the following examples of approaches to life could also be framed in terms of self-regulatory strategies, these participants did not refer to using the JTS process in a more self-regulatory way:

“I have always been an up and down person with regard to moods and feelings but have a fundamental optimism that stops me getting too down, and your graph reflects this perfectly” (1094, ‘No Graph’ group)

“Aligned with what I would say about my feelings about my progress - up and down but generally on the positive side. This is what will get me there in the end I think – that and
the ability to just keep plodding away at it, but sometimes I wonder if I put a more positive spin on things when they aren’t that great.” (0279, ‘No Graph’ group)

In contrast, recognising poor progress as being caused by individual factors could be demotivating, and potentially reinforced by the JTS, as the following participant explained. It is noteworthy that this participant completed the first two surveys, and then the final one 10 months later. In terms of self-regulatory functioning, this comment could be construed as evidence of a defensive inference form of self-reaction. As there was no evidence that the participant attempted to resolve the cause of the progress issue, the avoidance of self-monitoring seems to have been an effort to protect the participant from further discomfort.

“Most of the time I felt that I made very little (or no) progress, due to my own lack of motivation. This influenced me not to complete the survey during many months, as I felt that I had nothing good to report, and didn’t want to dwell (or think about) on my lack of progress” (0321, ‘Graph’ group).

This is the type of sentiment that for other participants might have led to attrition from the JTS process. However, for most of the participants in the ‘reflecting’ category, engagement in the process was described as an ‘enjoyable’ and ‘useful’, ‘beneficial’ or ‘rewarding’ experience, and they appreciated the opportunity to do this in a regular and systematic manner. Furthermore, participants often indicated that they would not have otherwise engaged in routine self-monitoring or self-reflection activities during the doctoral research process.

“Generally it has been very interesting to consider my feelings throughout the last 12 months. It is not a form of reflection I would naturally partake in.” (0091, ‘No Graph’ group)

“It’s been a great way of reflecting on how I feel about my work. Rarely get an opportunity like this, so it has been good.” (0171, ‘Graph’ group)

“This was a wonderful experience, as it’s rare to stop and take stock of where one is when one is surrounded by the maelstrom of paper and ideas that is postgraduate life.” (1083, ‘Graph’ group)

“Its been useful for me to reflect each month on what I’ve really achieved. Often I’m too busy to really sit back and look so the whole experience has been of value to me personally.” (0300, ‘No Graph’ group)
“It has been interesting to stop and reflect on the ‘journey’. It is easy to get bogged down in the daily demands of study, family, etc. and forget that you are actually making progress, so I have enjoyed completing the surveys as they provide a form of self-feedback that I would not otherwise get.” (1109, ‘No Graph’ group)

How participants used the JTS process more proactively during goal pursuit efforts is described in the following section on ‘Regulating’.

8.5.3 ‘Regulating’

A small group of 26 participants, just 14% of all the JTS Process Feedback participants, reported that they had engaged with the JTS process in a more interactive way. These participants had used the self-monitoring process systematically to enhance their self-regulatory efforts.

The most pervading theme running through these comments was that the JTS process had prompted or enabled participants’ self-regulatory efforts. More specifically, the type or level of self-regulation that they reported may not have occurred had they not been engaging in the JTS process. This raises the question of whether these participants differed from other participants who did not mention making use of the JTS for self-regulatory purposes: Were there any real differences between either the behaviour or the outcomes of the participants who said they engaged in self-regulatory efforts and those who did not refer to doing so?

Even within this ‘regulating’ group, participants differed in the aspects of the JTS process that they emphasised as being helpful, and in the ways in which they applied this assistance to their self-regulatory efforts. The similarities and differences in these comments are illustrated in the following quotes from participant’s comments. These comments usually provided relatively succinct descriptions of participants’ experience of using the JTS to assist self-regulation. Since self-regulation is a cyclical process, these comments also illustrate how making changes in just one area of self-regulatory functioning affects other aspects of self-regulatory functioning.

Consistent with the ‘reflecting’ comments from Section 8.5.2, the ‘regulating’ participants regarded the JTS as a means of recognising and monitoring their thoughts and feelings and using these as indicators of doctoral research progress.

“I think it’s really great, it gets me to actually put time into thinking about how I’m feeling about my project. Without this process I probably wouldn’t recognise a lot of my
negative thoughts, but actually taking note of them helps me to figure out ways that I could feel happier about my project ...
” (0144, ‘No Graph’ group).

“I think it was an interesting and useful survey to take part in. It also helped me to keep on track a little bit, as I would see all the things I should be doing and have fallen behind in.” (2132, ‘No Graph’ group)

With an enhanced understanding of how they were functioning in this context, these participants actively used this information to make the requisite changes to facilitate their progress. Like the high scoring participants discussed in Chapter 6, these participants expressed a sense of personal agency and took responsibility for themselves and their doctoral research. Changes sometimes involved forethought phase processes, such as setting or re-assessing goals, or aspects of task analysis and strategy choices. Thus, the JTS process enabled the focusing of attention required for effective task analysis and task performance.

“The journey tracking survey was very helpful and useful. It made me reflect on ideas and made me realise where I should give more attention to my research project.” (1453, ‘Graph’ group)

“I found the Journey Tracking Survey was a great way to reflect on my progress each month and be truthful about the effort I was putting in and the progress. I am so relieved that the end is looking far better than the beginning – it gives me more motivation.” (0262, ‘Graph’ group)

“This was a great way for me to recognise the progress I was making and what factors limit my progress. Having to answer the questions allowed me to be reflective on where I was and what I need to do to move forward. Thank you for allowing me to be part of your research.” (1884, ‘Graph’ group)

“This has been an excellent and useful activity. It has prompted metacognitive considerations of my progress and approach.” (1288, ‘No Graph’ group)

“it helped me take stock and consider what I had achieved and what my goals were for the next month” (0147, ‘Graph’ group)

By engaging with the JTS process in a self-regulatory manner, many of these participants became more aware of the interactions among their thoughts and feelings and progress, and
gained a new perspective on how to manage their research in the context of the rest of their lives. The need to manage the emotional experiences of doctoral research in order to preserve well-being and to maintain progress also became apparent to some participants. Thus, the following comments could be regarded as examples of participants’ engagement in performance phase processes that were designed to enable persistence in the task.

“I feel that it has helped me in many ways regulate my feelings towards the PhD.” (1939, ‘No Graph’ group)

“It was a useful tool for reflection and for setting future goals. It also put my study issues into perspective compared with the other aspects of my life.” (2089, ‘No Graph’ group)

“Completing this survey has been very informative – it has made me consciously reflect on my progress & feelings. I now view my research within the context of my life experiences at the time. Before this I tended to see the research as separate to other events. I realise how important my general confidence, enthusiasm and physical energy is to my ability to write and research. So obvious – but without the survey I did not have this perspective.” (2105, ‘No Graph’ group)

“This has been an interesting experience for me. It has allowed me to put my feelings about the dissertation into perspective and perhaps feel less stressed about the work. I am mostly pleased that I can see my progress has been a positive one.” (1956, ‘Graph’ group)

“I think completing the tracking survey has made me realise how much I focus on getting through each day and each week, and don’t think ahead too much. It has also made me realise that getting through a PhD is more about being aware of my health and well-being and employing strategies (e.g. self-care and talking with my supervisor on a personal level) before things get really bad.” (0873, ‘No Graph’ group)

“I have also found it instructive in how it is important to channel the positive moments to get yourself through the troughs. It is also instructive that if you allow yourself to head into the down slope, it requires a lot of energy to get out of it” (1253, ‘Graph’ group)
“This reflective time has helped me consider my perspective and at times I have needed to change it - especially when I was completing the survey during a time of particular ‘low’. I logged off and mentally slapped myself for being so sad and pathetic!” (0146, ‘No Graph’ group)

In terms of self-reflection phase processes, even if the main cause of previous unsatisfactory performance was attributed to another factor, these participants seemed to take responsibility for seeking to improve subsequent performance wherever possible.

“…For months that weren’t as productive, the survey was a great way to reflect on why that was the case (often there are things that happen which are beyond a PhD student’s control, so it was good to be reminded of this; on the flip side, sometimes the motivation is just lacking, so it’s also good to reflect on that and be prepared to work harder the next month). For months that were productive, it was also great to be able to acknowledge this and be proud of my efforts. …” (0292, ‘No Graph’ group)

“I found the process to very informative as it made me reflect on how the PhD process can influence all aspects of my life. It also made me realise that at times I didn’t have a good work life balance and that I needed to make that a priority so that I the PhD doesn’t consume my life.” (1135, ‘No Graph’ group)

Several participants provided specific examples of such adaptive self-reactions to poor self-judgements of doctoral progress, explaining that they had responded by proactively addressing issues with supervisors. This stands in contrast to the reports of the low scoring participants in Chapter 6, who seemed defeated by similar issues with supervisors.

“It also helps me identify which specific areas I’m having trouble with, e.g. through this process I’ve figured out that it seems to be times when my supervisors aren’t around that I start to feel negative about my project, so I now make sure that when I see them we make some concrete goals and deadlines so that I still have some direction and targets for when they’re not around.” (0144, ‘No Graph’ group)

“It’s been unexpectedly enjoyable - forcing me to take stock of where I’m at, which has at times alerted me to the need to change some things (my attitude, my work habits, etc. - some of these things involve changing my relationship with other people too, like my supervisors, or at least changing how I perceive that relationship, or perhaps only just
reflecting on the effect they have on how I feel about my thesis... and myself!” (0578, ‘No Graph’ group)

“When I gave poor scores in the survey it prompted me to organise meetings with my supervisors and get some help and support. If I hadn’t been doing the survey I think I would have been slower to get help.” (2121, ‘No Graph’ group)

“it also helps me identify which specific areas I’m having trouble with, e.g. through this process I figured out that it seems to be at times when my supervisors aren’t around that I start to feel negative about my project. So I now make sure that when I see them we make some concrete goals and deadlines so that I still have some direction and targets for when they’re not around” (0144, ‘No Graph’ group).

These improvements in functioning became evident when the participants responded in later JTS months. Reflecting on these positive outcomes of adaptive self-reactions then continued to feed self-motivational beliefs such as self-efficacy and outcome expectancies in a cyclical manner. It is noteworthy, too, that some participants explicitly sought to improve their JTS scores for further motivation.

“It has helped me to reflect on the various factors which influence my abilities to succeed in PhD research. It has also been a bit of an incentive, because sometimes it has helped me to set goals so that I can make sure I have at least one thing that I can really take pride in for each month.” (0878, ‘Graph’ group)

“I don’t think it made me feel any better about my studies, but it did make me actually *think* about how I was *feeling* about my PhD, and perhaps motivated me a little to change something so that I could honestly answer the questions with a more positive answer the next month.” (1643, ‘No Graph’ group)

“During my low moments, the updated graph from my survey results has reminded me that I have worked effectively at times and that I do have the ability to complete my thesis.” (0572, ‘Graph’ group)

“Participating in this study has been personally reflective, and at times made me aware of strengths or weaknesses, and sometimes even improved my confidence with my progress.” (1592, ‘No Graph’ group)
Fifteen (60%) of the comments coded as ‘regulating’ were by participants from the ‘No Graph’ group. This was similar to the proportion of this group within the whole group of commenting participants. In conjunction with the nature of the comments made, this suggests that completing the scales rather than viewing the graph may have been the more salient feature of the reflective process.

“Some of the questions make you think about things you could be doing differently.”
(1148, ‘Graph’ group)

However the graph was also clearly useful as a visual cue to participants in the ‘Graph’ group.

“It really helped me to realise that I needed a change in supervision and topic, because I was able to see in a graph how I was doing in the previous months (as a PhD student in engineering, that is clarifying and particularly helpful).” (0085, ‘Graph’ group)

In addition, the JTS process seemed to prompt some participants into responding more quickly than they might have done otherwise.

“when I gave poor scores in the survey, it prompted me to organise meetings with my supervisors, and get some help and support. If I hadn’t been doing the survey, I think I would have been slower to get help.” (2121, ‘No Graph’ group)

At least one participant demonstrated further self-regulatory effort by spontaneously applying the JTS process as a form of self-observation between surveys.

“I have found myself asking some of the tracking questions in between surveys as a mini check-in when things seem to be going badly.” (1901, ‘Graph’ group)

Yet, as mentioned earlier, the participants in this ‘regulating’ group, like those in the ‘reflecting’ group, also seemed unlikely to have been self-monitoring without the JTS process. As one participant said:

“I’ve really enjoyed completing the surveys as it gave me ‘permission’ to stop and think about how I was feeling about my study in a way I would never have initiated myself.” (0146, ‘No Graph’ group)
8.5.4 Section summary

Participants’ feedback was coded into three types of comments that suggested different levels of application of, or engagement with, the JTS process. The majority ($n = 109, 60\%$) of participants who commented offered ‘non-specific’ comments that did not explain whether they engaged with the JTS process. In fact, these comments suggested that the participants might not have spent much time reflecting on their experience of doctoral research or seeking to change their behaviour during the study. Thus, these participants could be considered to have engaged only in the performance phase process of self-monitoring. Of course, given that the median of the score distribution was 1 and the mode was 2, change might not have been necessary or desirable for many of these participants – they may have felt sufficiently satisfied with the progress they were making. It is also possible that feeling more positive overall than a 1 or 2 on the Doctoral Progress measure is an unrealistic goal for the majority of students, given the demands of candidature, and considering that these scores equated to roughly $62.5 – 75\%$ of the maximum level of happiness that can be indicated on the scale.

In addition to recording or monitoring their progress for the purposes of the JTS process, 25% ($n = 46$) of the participants who commented about their experience reported using the JTS for self-reflection phase processes. That is, these participants reported assessing and evaluating the effects of various factors on their progress, although they did not describe making any changes in their behaviour in an effort to alter their progress trajectory. These participants referred to the systematic self-monitoring inherent in the JTS process as enabling a sense of perspective on their doctoral research progress, and described how this could assist in sustaining motivation.

The remaining 14% ($n = 26$) of participants who commented about the JTS experience reported applying the JTS process more proactively in an effort to improve their doctoral research progress. These participants described the use of the JTS as part of the cyclical process of self-regulation, and in doing so illustrated a heightened sense of responsibility, awareness, initiative, and motivation as they addressed progress issues.

The results of this section also provide further reinforcement of the utility of the Doctoral Progress measure and the JTS process in exploring self-regulation in this population, in that many participants acknowledged the value of considering the interactive effects of feelings, thoughts, and behaviours on their management of doctoral research progress, but clearly had not done this previously in a systematic way. The results also draw attention to the importance of
ensuring that PhD students are well-educated with respect to the potential psychological demands of doctoral research, and that they are equipped with appropriate support in order to reduce the negative impact on research progress.

Ultimately, though, were there any real differences between either the behaviour or the outcomes of the participants who said they engaged in self-regulatory efforts and those who did not refer to doing so? This question of whether the diversity in the use of the JTS process was reflected in participants’ feelings about doctoral research progress is addressed in the following section of this chapter.

8.6 USING THE JTS FOR SELF-REGULATION

This section addresses Research Question 8. To reiterate:

Research Question 8: Is there a relationship between the reported use of the JTS for self-regulatory purposes and changes in students’ self-evaluations of recent doctoral research progress?

To address this research question, the final step in the analyses was to compare the Month 1 and averaged Doctoral Progress scores of the participants in each of the four JTS Process Feedback groups that can be defined in this chapter: those who did not provide feedback regarding the JTS process, those who responded with non-specific feedback, the participants who described self-reflecting, and the participants who described self-regulating.

The Month 1 and averaged Doctoral Progress scores for these groups are presented in Table 40. The number of participants in each group is slightly less than those reported earlier in the chapter, as exploring change in Doctoral Progress scores required both a Month 1 score and more than six other JTS for the averaged score. Not all participants who commented on the JTS experience had fulfilled these requirements.
Table 40
*Month 1 and Averaged Doctoral Progress Scores by JTS Process Feedback Group*

<table>
<thead>
<tr>
<th>JTS Process Feedback Group</th>
<th>n</th>
<th>%</th>
<th>Month 1 score Mdn (range)</th>
<th>Averaged score Mdn (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No response</td>
<td>647</td>
<td>81</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.00 (-3.86 to 4.00)</td>
</tr>
<tr>
<td>Non-specific response</td>
<td>85</td>
<td>11</td>
<td>1.00 (-4.00 to 4.00)</td>
<td>1.00 (-3.27 to 3.36)</td>
</tr>
<tr>
<td>Self-reflection</td>
<td>44</td>
<td>5</td>
<td>0.00 (-4.00 to 4.00)</td>
<td>1.14 (-1.75 to 3.82)</td>
</tr>
<tr>
<td>Self-regulation</td>
<td>24</td>
<td>3</td>
<td>0.50 (-4.00 to 3.00)</td>
<td>1.35 (-1.67 to 2.91)</td>
</tr>
<tr>
<td>Total</td>
<td>800</td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Independent-samples Kruskal-Wallis tests found no significant differences among the Month 1 scores of these groups ($H(3) = 2.59, p > .05$), nor among the averaged Doctoral Progress scores of these groups ($H(3) = 1.03, p > .05$).

A series of Related-Samples Wilcoxon Signed Rank Tests was then conducted using these data. These tests showed that there were no significant differences between the Month 1 and averaged Doctoral Progress scores of the participants who did not provide any feedback regarding the JTS process ($z = .46, p > .05$), and those who provided feedback about the JTS that was non-specific to self-regulation ($z = .23, p > .05$).

However, the averaged Doctoral Progress scores were significantly higher than the Month 1 scores within both the ‘reflecting’ group ($z = 2.63, p = .009$), and the ‘regulating’ group ($z = 2.13, p = .033$). Thus, participants who described using the JTS for self-regulatory purposes, whether for self-reflection or more comprehensive self-regulating, became more positive overall in their feelings about their doctoral research progress following Month 1.

To further explore the concerns expressed in Chapter 7, Section 7.6, regarding the proportion of all participants who rated their progress negatively both at Month 1 and overall thereafter, score stability was also examined in terms of score valence for the JTS Process Feedback participants. Thus, both the Month 1 and averaged Doctoral Progress scores of each of the JTS Process Feedback groups were inspected to identify the proportions of these participants who scored in the positive or negative domains. These findings are illustrated in Figures 21 to 24.
Figure 21. Month 1 Doctoral Progress scores with averaged Doctoral Progress score valence for participants who provided ‘no JTS Process Feedback’.

Figure 21 shows the valence of averaged Doctoral Progress scores against Month 1 scores for the participants who did not offer feedback on their JTS process experience. This reveals that most participants who scored below -1 in Month 1 sustained a negative evaluation of their progress over time according to the averaged Doctoral Progress scores. It can also be seen in Figure 21 that, regardless of the original rating in Month 1, some participants in this group evaluated their progress as negative over the longer term, although the frequency of this was proportionally much lower for those participants who had rated their progress positively in Month 1.
Figure 22. Month 1 Doctoral Progress scores with averaged Doctoral Progress score valence for participants who provided ‘non-specific’ comments.

Regarding the participants who made ‘non-specific’ comments about the JTS experience, Figure 22 shows that, across most Month 1 Doctoral Progress scores, there remained participants who scored negatively overall. However, the distributions of negative and positive scores are not as symmetrical as that seen in Figure 21. Indeed, the frequency of change from negative to positive score valence from Month 1 to averaged Doctoral Progress scores was particularly noteworthy for those participants who scored -2 or above in Month 1. Similarly, only a small proportion of participants who scored very positively (2 or above) in Month 1 felt negatively overall about their progress.

There was no a priori reason to assume that providing feedback of any type indicated greater engagement in the JTS process than did the choice to decline offering feedback. Yet these results might suggest otherwise. If more interest in providing feedback was related to greater engagement in the JTS process – although not necessarily at the level articulated in the following two groups – then this may nonetheless have influenced scores in a positive way.
Figure 23. Month 1 Doctoral Progress scores with averaged Doctoral Progress score valence for participants who provided ‘reflecting’ comments.

Figure 23 shows the Doctoral Progress scores of participants whose JTS Process Feedback comments related to self-reflecting behaviours. Perhaps as a result of these behaviours, the averaged Doctoral Progress scores became positive for most of the participants for whom the Month 1 score was negative. Furthermore, only one participant who initially scored above 0 later evaluated their progress negatively overall.
Figure 24. Month 1 Doctoral Progress scores with averaged Doctoral Progress score valence for participants who provided ‘regulating’ comments.

Figure 24 illustrates the changes in score valence for participants who reported having used the JTS process for self-regulatory purposes. While one participant who scored -4 in Month 1 remained negative in evaluating progress over time, two of the four participants who scored -3 then gained a positive score overall. In contrast to the previous three groups, all participants in this group who scored above -3 in Month 1 evaluated their doctoral research progress as positive over time.

8.6.1 Section summary

In this section, changes in Doctoral Progress scores over time were considered in conjunction with shifts in score valence that might indicate the positivity or negativity of participants’ perceptions of their progress. From these results, it appeared that higher levels of engagement with the JTS process – as evidenced by more specific self-reports of applying aspects of the JTS process during self-regulatory efforts – were associated with greater improvements in evaluations of doctoral research progress. These findings provide further evidence for the benefits of using the JTS process to assist self-regulatory efforts. However it also appears that
participants did not necessarily make use of this opportunity. The stability of low Doctoral Progress scores among participants who did not report using self-regulatory behaviours in response to their low scores is of particular concern, and highlights the need for further research and interventions to focus on determining how best to assist students in this situation.

8.7 FURTHER INVESTIGATION OF THE UNIVERSITY LOCATION EFFECT

Reflecting on the pattern of changes that emerged across the preceding chapters, the change in Doctoral Progress scores for participants attending overseas universities (please see Section 7.4.3) remained unexpected and deserved further exploration. Potential interactions with other factors (all categorical or ordinal) that were found to have a significant association with Doctoral Progress scores were tested via a series of Pearson chi-square tests. There were no significant differences found between the Australian and overseas universities in terms of proportions of participants who had received the Feedback Graph ($\chi^2(1, n = 1056) = 0.180, p > .05$), or proportions of participants across categories of JTS process feedback ($\chi^2(3, n = 1056) = 5.41, p > .05$). However, a significantly larger proportion of students attending overseas universities compared to Australian universities had submitted their thesis during the year of the JTS process ($\chi^2(1, n = 865) = 6.26, p < .012$).

Returning to the Month 1 data, it was discovered that this corresponded with differences between university location groups at baseline. A Pearson chi-square test revealed that within the overseas university sample there was a significantly higher proportion of students in late relative to early or mid-candidature, while in Australia the situation was reversed ($\chi^2(2, n = 1056) = 15.84, p < .001$).

Although no differences had been found in Doctoral Progress scores by candidature group, the higher proportion of students at overseas universities who became participants in this study while in the later stages of candidature resulted in a higher proportion of students who submitted their thesis or dissertation prior to the end of the study. The analyses regarding Month 12 candidature status showed a pattern of greater positivity about progress as participants approached thesis submission, as described in Section 7.7. There was also a lack of significant change across stage of candidature that was seen in the cross-sectional analysis of Month 1 scores. Taken together, these results suggest that those who were in late candidature at baseline and went on to submit prior to the end of the study were feeling more positive about their
progress than those at the same stage of candidature who either remained enrolled, took leave, or withdrew from candidature. This divergence would cancel out differences within the stage of candidature, resulting in no significant difference between Doctoral Progress scores across stages of candidature. Therefore, rather than being an effect of university location per se, the small increase over time in scores of the students at overseas universities appeared more likely due to the larger proportion of these students successfully completing their doctoral research during the course of this study. For these reasons, this finding regarding university location was not considered meaningful, and better explained by an interaction between stage of candidature and later candidature status.

8.8 CHAPTER SUMMARY

This chapter reported on the participants’ feedback about the logistics, relevance, and application of the JTS process, and this enabled the continued exploration of the relationships between participants’ Doctoral Progress scores and other indicators of self-regulatory functioning. Participants’ feedback about the logistics of participating in the JTS process was predominantly positive, and in conjunction with the relatively low attrition rate for a year-long study, indicated that participants found the process not only manageable but even enjoyable. The Feedback Graph appeared to contribute to retention in the study, and facilitated participants’ efforts to respond accurately in relation to previous ratings, while the opportunity to adjust graphs retrospectively was dismissed as invalid. Anonymity was appreciated. In summary, the feedback about participants’ experiences of the JTS process suggested that at least a large proportion of missing data could be explained by individual rather than survey factors, and there was certainly evidence that self-regulatory factors could be involved.

Participants generally found that the JTS content and process were useful and relevant in terms of self-monitoring during doctoral research. Further research is needed to ascertain whether the State Hope Scale needs to be adapted or reworded to be more suitable, or simply excluded from the survey. The Feedback Graph was reportedly helpful, although not essential, to participants for self-monitoring purposes, and as discussed in Chapter 7 seemed to contribute to retention in the JTS process.

Considering together participants’ Doctoral Progress scores and comments about their application of the JTS process enabled a more comprehensive exploration of self-regulation in the doctoral research context and the potential use of the JTS process in self-regulatory efforts.
Participants who declined the invitation to provide feedback about their experience of the JTS process showed no significant change in Doctoral Progress scores over time. The median score of 1 was thus maintained for this group, indicating that these participants were mildly positive about their progress overall. The participants who provided feedback about their experience of the JTS process but did not refer to the use of self-regulatory behaviours also maintained a median score of 1. However, while both groups had engaged in at least a minimal level of monitoring in order to record their feelings about their doctoral research progress, these groups showed different patterns of changes in score valence. In the ‘no feedback’ group, participants were unlikely to score positively overall unless their Month 1 score had been -1 or above, whereas participants in the ‘non-specific’ comments group who had scored -2 or above were more likely to score positively overall. This pattern continued as reports of self-regulatory behaviours involving the JTS process became more specific. Thus, participants who reported using the JTS process for self-reflection or in more complete self-regulatory cycles were at least equally likely to score positively overall following a Month 1 Doctoral Progress score of -3 or higher. Moreover, unlike the participants in the first two groups, the participants in these latter two groups showed statistically significant improvements from Month 1 to averaged Doctoral Progress scores, with median averaged scores of just above 1.

The next chapter draws together and discusses the findings from all four results chapters, along with identifying the limitations of the study and areas for further research.
9. DISCUSSION AND CONCLUSIONS

9.1 INTRODUCTION

Many factors can influence students’ doctoral research progress and the likelihood of achieving the timely and successful completion of PhD candidature. The results of this study suggest that self-regulation is one of these factors. More specifically, Zimmerman’s (2000) cyclical feedback model of self-regulation was found to be useful in explaining differences in students’ management of their doctoral research progress, which were reflected in both proximal and distal indicators. By extending the study of Zimmerman’s model to the doctoral research context, the results provide support for the utility of this construct in a broader temporal frame and within a more complex academic domain than has previously been reported.

The next section of this chapter provides a summary of the findings, by integrating the results reported in Chapters 5 through 8. This is followed by further interpretation and discussion of these findings, focusing on the implications to stakeholders in doctoral education of self-regulatory behaviours being relevant to: i) successful progress through candidature, and ii) life beyond the PhD. After the limitations of this study are considered, a number of possibilities for future research in this area are outlined.

9.2 SUMMARY OF FINDINGS

The first stage in exploring self-regulation in the doctoral research context involved identifying a measure that could function as a proxy indicator of the outcome of self-regulatory efforts for self-monitoring purposes. Guided by Zimmerman’s (2000) self-regulation model, the JTS process was developed for use in this study as a self-monitoring task and was instrumental in facilitating this exploration. This enabled the evaluation of three measures (the Doctoral Progress measure, the MHI-5, and the State Hope Scale) as potential proxy indicators of the outcomes of self-regulatory behaviours, as reported in Chapter 5. Secondly, as discussed in Chapters 6 and 8, the JTS elicited students’ feedback about the experiences of both doctoral research and the JTS process, which then allowed insights into differences in students’ reported use of self-regulatory behaviours. Thirdly, the JTS process enabled an examination of stability and changes in Doctoral Progress scores over time, and the possible implications for PhD candidature progress and outcomes, as was discussed in Chapters 7 and 8. The following
summary of the findings from each stage shows that, while being implemented for data collection purposes, participants’ engagement with the JTS process also provided information about the future utility of this self-monitoring process to doctoral research students.

In the first stage of the study, the three potential measures were incorporated in parallel within the JTS, and the performances of these measures were compared for their use in terms of both a single self-observation point and for longer-term self-monitoring purposes. Participants’ scores on the single-item Doctoral Progress measure were well distributed across the response scale, although negatively skewed, and were found to be independent of all the background demographic and current candidature factors that were examined in this study. In contrast, MHI-5 scores were related to age, and State Hope scores were associated with both age and stage of candidature. Thus, although more research is required to determine if self-regulation varies with age and gender in adulthood (Zimmerman & Schunk, 2011), these results provided preliminary support for the use of the Doctoral Progress measure in exploring self-regulation.

The ready applicability of the Doctoral Progress measure to all students across candidature, as well as its parsimony, placed it at an additional advantage over both the MHI-5 and the State Hope Scale as a self-monitoring measure. Furthermore, feedback regarding the experience of participating in the JTS process suggested that participants found the Doctoral Progress measure to be more relevant for self-monitoring purposes compared to either the MHI-5 or the State Hope Scale.

The next stage of this exploration determined that there was a relationship between students’ feelings about their doctoral research progress and their self-reported use of self-regulatory behaviours. More specifically, high as compared to low Month 1 Doctoral Progress scores were associated with reports of more effective task analysis processes and more positive self-motivation beliefs, possibly underpinned by more advanced epistemic beliefs. There was little evidence in either score group that participants had used self-control processes or systematic self-monitoring behaviours, aside from participation in the JTS process. Amongst the high scoring participants, self-judgements were more positive and success was attributed to the individual, whereas the low scoring participants were more likely to attribute problems with progress to issues associated with the supervisor or supervisory relationship. The high scoring participants also described more adaptive than defensive reactions to their judgements of recent progress than did the low scoring participants, which augured well for their future self-regulatory efforts.
The final stage of this study was concerned with exploring stability and change in students’ feelings about their doctoral research progress, and how these might relate to the use of self-regulatory behaviours. Changes in Doctoral Progress scores were found to be independent of demographic and candidature factors. Small increases in ratings of progress occurred as a function of receiving visual feedback about previous Doctoral Progress scores. Changes in self-ratings of doctoral progress were strongly associated with participants’ Month 1 scores. Negative and neutral baseline scores were associated with significant improvements in ratings, while positive scores in Month 1 were generally followed by significant declines in ratings. The exception to this pattern was that participants who initially rated their progress as slightly positive (with a score of 1) showed no significant difference in their later self-ratings. Thus, the trend was that self-ratings shifted over time towards the median of both the original and averaged scores; this median score could be described as a slightly positive evaluation. However, when scores were considered in terms of score valence, it was shown that initially negative scores were more likely to be followed by negative rather than positive averaged scores, while initially positive scores were more likely to remain positive. For 25% of these students, negative evaluations of progress persisted across a year of self-monitoring.

The factor that demonstrated the most significant effect on self-ratings of progress was how participants reported responding to the JTS process. Participants who explicitly referred to using the JTS process for either self-reflective or more complete self-regulatory purposes showed significant increases in Doctoral Progress scores over time, while participants who did not make such claims showed no changes in scores. Thus, to summarise, observed changes in self-ratings of doctoral research progress were independent of demographic and candidature factors, and were associated only with factors relating to participation in the JTS process: i) baseline self-ratings of progress, ii) receiving feedback about prior self-ratings, and iii) self-reported use of the JTS to inform and assist the implementation of self-regulatory behaviours.

Insights into the meaning and implications to students of rating and monitoring their own progress were gleaned by looking to later candidature status. When considered as an independent variable, Doctoral Progress scores were found to be related to candidature status up to eleven months later. That is, participants who differed in candidature status in Month 12 had also differed significantly on Month 1 and averaged Doctoral Progress scores, while scores remained stable over time within each candidature status group. Lower initial and averaged self-ratings of progress were associated with withdrawal or taking leave from candidature, while
students who were more satisfied with their progress were more likely to be persisting with, or have completed, the PhD by the end of the JTS process.

The next section continues with more detailed interpretation and integration of these results, and their theoretical and practical implications for students, supervisors, and other stakeholders in doctoral research and doctoral pedagogy.

9.3 INTERPRETATION AND IMPLICATIONS OF FINDINGS

The main purpose of this study was to explore differences in students’ management of their doctoral research progress in terms of Zimmerman’s (2000) cyclical feedback model of self-regulation. As a self-regulatory process itself, self-monitoring via the JTS enabled the collection of data pertaining to other self-regulatory behaviours. The results suggested that how PhD students felt about their recent doctoral research progress was associated with differences in these students’ application of self-regulatory processes in all phases of the cycle defined by Zimmerman (2000). By providing a window into differences in students’ self-regulatory efficacy, this study also demonstrated the potential of the self-monitoring process for identifying signs of problematic candidature that may be amenable to intervention and resolution.

The JTS process was developed for the purposes of this study, and its utility was central to this study for both methodological and substantive reasons. All three measures incorporated in the JTS (the Doctoral Progress measure, the MHI-5, and the State Hope Scale) were chosen for their relevance to doctoral research students, and were theorised to be responsive to the effects of self-regulatory behaviours. These measures were not expected to function as direct measures of self-regulatory efficacy, given that completing the JTS occurred on a monthly basis, and that many factors that influence the doctoral research may lie beyond the control of the student’s self-regulatory efforts. Of the three measures contained in the JTS, the Doctoral Progress measure appeared to have the most potential as a proxy indicator of differences in self-regulatory behaviours.

Low self-ratings of progress could have been a function of unrealistic personal expectations despite sound performance, or the presence of external factors that hinder progress despite the student’s otherwise efficacious self-regulatory efforts, or of ineffective self-regulatory behaviours and the recognition of ‘room for improvement’. Conversely, the reasons for high self-ratings of progress might have included a false or inaccurate sense of making progress, the
presence of external factors that support progress despite otherwise ineffective self-regulatory efforts, or the student’s effective self-regulatory behaviours. Similarly, score changes in either direction could be the product of any of these factors, while a lack of change in scores could result from either inactivity or sustained self-regulatory efforts aimed at maintaining or exceeding a satisfactory score. Thus, all efforts to interpret these scores, as well as the meaning of stability and change in feelings about doctoral progress in terms of self-regulation, need to be undertaken with caution. It is important to remain mindful that PhD students do not have control over all the factors that might influence doctoral research progress, as was illustrated in participants’ comments. Similarly, neither could all these factors be accounted for when exploring how differences in self-regulatory behaviours might influence how students approach and manage doctoral research.

Yet clear patterns emerged from these data. The reported employment of effective self-regulatory behaviours was associated with higher self-ratings of doctoral research progress, and the stability of these ratings suggested that students who were able to implement effective self-regulatory strategies enjoyed the outcome of continued satisfaction with their progress. While other factors might have influenced the students’ doctoral research progress, the results suggested that these students might have been more successful in managing their potential negative impact than those with less efficacious self-regulatory skills. A quarter of the latter group, apparently approaching PhD candidature with a less agentic and independent approach and an underdeveloped epistemological awareness of the nature of doctoral research, continued to feel negative about their progress across the year. The extent to which this was due to persistent ineffective self-regulatory behaviour rather than the negative impact of external factors beyond the students’ control remains to be determined through finer-grained future research studies. Indeed, these students provided plentiful evidence of the negative impact of disengaged or ineffective supervisors on their progress. However, the lack of change in these students’ negative scores can be contrasted with the significant improvements in the progress ratings of the other 75% of students who originally rated their progress negatively. Moreover, the potential for improved ratings of progress as the result of self-regulatory efforts – which could arguably assist with the management of detrimental factors – was especially evident in those students who reported actively implementing the JTS process for self-regulatory purposes.

This study highlighted the importance of asking PhD students to monitor and reflect on their feelings about their doctoral research progress. Students generally considered these feelings to be a relevant reflection of their recent experience of candidature, but the stability of the
underlying processes mean they can function as predictors of longer-term progress through PhD candidature. Negative feelings about progress should therefore be perceived as warning signals, as these indicate that the student is at higher risk of continued negative self-evaluations than those who rate their progress positively, and this augurs poorly for later candidature outcomes. As one possible reason for dissatisfaction with recent doctoral research may relate to ineffective self-regulatory skills or application, the results of this study suggested that these doctoral research students might benefit from interventions to assist them to enhance their self-regulatory efforts. Although the focus of this research was an exploration of self-regulation in doctoral research students, quality of supervision appeared to be an important factor that influenced students’ feelings about their doctoral research progress. Students’ self-monitoring of their doctoral research progress can also provide insights into the effects of other issues, such as the quality of the student-supervisor relationship, and could be used to prompt help-seeking behaviours when such action is required.

Indeed, although the majority of the students reported satisfactory levels of doctoral research progress over time, of concern is that 25% of all participating students were unhappy about their progress for the majority of the year of self-monitoring. This period of time represents one quarter or more of the time usually allocated by institutions for full-time PhD candidature. Furthermore, feeling unhappy about progress was associated with a poor prognosis for persisting with candidature. The results suggested that while there are many potential causes for dissatisfaction with doctoral research progress that may be beyond students’ control, unsatisfactory progress was at least partly associated with aspects of self-regulatory inefficacy, many of which could be addressed by students independently or with the assistance of their supervisors. The implications of these findings will be discussed further using the framework of Zimmerman’s (2000) model.

With respect to the forethought phase of the model, task analysis efforts assumedly reflect participants’ perceptions and understandings of the nature of knowledge generation in the doctoral research process. Doctoral research students’ conceptions of research have been found to vary widely, often including misconceptions (e.g., Meyer, Shanahan, & Laugksch, 2005, 2007), and possibly demonstrating some development across candidature (Kiley, 2009). Although doctoral students’, supervisors’, and researchers’ conceptions of research have been categorised in multiple ways, two of these broad conceptions of research appear repeatedly across studies (Kiley, 2009; Vermunt, 2005), and seem relevant to the findings of the current study. The first conception regards research as an innovative, insightful, and integrative process
of creating new knowledge, while the second conception takes a more technical perspective of research as being a systematic and rigorous process of analysis that is appropriate to the discipline (Kiley & Mullins, 2005; Vermunt, 2005). The latter conception appeared to be predominant in this study, insofar as comments pertaining to doctoral tasks seemed to be more focused on the project management rather than the creative aspects of the research.

Relatively sophisticated conceptions of research would be expected to facilitate the management of doctoral research, as well as the quality of the learning outcomes (Cantwell et al., 2012b). Indeed, the willingness to engage with the uncertainty inherent in the process of knowledge creation may be a prerequisite for further transformational learning of doctoral study to occur (Cantwell et al., 2012b). Although the mechanisms are as yet undetermined, the development of students’ conceptions of research appears to be influenced by supervisory and disciplinary factors (Kiley, 2009). Thus, since lower satisfaction with progress was related to less clarity about the task, as well as less satisfaction with supervisor guidance, the results of this study seem to support Kiley’s (2009) assertion that the student needs a skilled supervisor to enable a transition through candidature that leaves them with both the passion and technical ability to conduct rigorous independent research.

One of the most striking findings of the study pertained to the performance phase of the model, and was the students’ lack of references to the use of self-control processes involving systematic self-monitoring of any sort, and the expressions of interest in the JTS process for this purpose. Yet accurate self-monitoring is a fundamental part of effective self-regulation. This study found a strong relationship between students’ feelings about their recent progress and indicators of their later progress and candidature outcomes, providing evidence that the Doctoral Progress measure can also function as a suitable proximal performance measure. Thus, the Doctoral Progress measure can be used by students who wish to monitor their progress during PhD candidature and interpret their score profile against benchmarks established in this study.

Although there are many possible reasons for unsatisfactory progress, students can use their JTS score profile as feedback on which to reflect and to consider whether they need to maintain their self-regulatory efforts, employ different self-regulatory behaviours, or to seek assistance to optimise their self-regulatory behaviours to align with the demands of doctoral study. The notion of being able to self-monitor progress so simply – even just in terms of positive and negative valence – may be empowering to students, especially to those who are uncertain about how to monitor and evaluate their progress in a meaningful way. To encourage openness and
honesty in students’ responding, it seems important that self-monitoring of progress is conducted privately, rather than being imposed by supervisors with the expectation that the results will be discussed. However there may be some students who appreciate the option of using a self-monitoring process in consultation with their supervisor.

Another important facet of the performance phase is the awareness of when it is necessary to seek help. The results suggest that the JTS process offers a means of identifying when progress is problematic and can encourage students to intervene earlier where possible. Using the JTS process to alert students to the impact on doctoral research progress of family or work commitments, for example, could enable adjustments to be made to research plans or schedules that might reduce the need to withdraw from candidature.

These results also provide support for acknowledging the importance of the emotional aspects of doctoral research. The role of emotions in the self-regulatory cycle was perhaps most evident when considering students’ self-reflection phase processes. Feelings about progress functioned here as both a dependent and an independent variable. Positive emotions were experienced by students who judged their progress favourably, and along with taking responsibility for this success, this appeared to lead to adaptive reactions such as continued engagement in effective self-regulatory efforts. In contrast, students who felt negatively about their progress were more likely to attribute this outcome to a variety of external sources, including the supervisor or the supervisory relationship, and many responded with defensive self-reactions that resulted in ongoing dissatisfaction with progress.

While it is not the responsibility of the academy to simply make PhD students ‘feel good’, the advantages of engendering positivity through promoting competent supervisory guidance and support are clear. Indeed, these conclusions are similar to those made by Amabile and Kramer (2011) relating to what they called ‘the progress principle’: the notion that making progress is motivating. It was noteworthy that motivational difficulties were referred to by only those participants who were dissatisfied with their progress; adequate motivation appeared to be taken for granted by not being mentioned by those students who were functioning satisfactorily. Students who are struggling with motivational difficulties might benefit from recognising that employing self-regulatory processes to make progress can feed the motivation required to persist, as explained by Zimmerman’s (2000) model. Furthermore, the value of receiving frequent and constructive feedback to the sense of making progress, and hence to boosting motivation, should be noted by supervisors seeking to encourage their PhD students.
Recognising the role of emotions at an individual level also enabled some important insights into patterns of emotional responses across PhD candidature more generally. Claims have been made that changes commonly occur in emotions and other indicators of well-being over the period of PhD candidature. For example, Martinsuo and Turkulainen (2011) found that doctoral students felt more negative about progress as candidacy time increased. Analysing scores on the JTS measures yielded mixed findings with respect to changes in these emotion-related factors across candidature. Taking a cross-sectional perspective, the only change across the early, middle, and late stages of candidature was a decline in state level hope – feelings about progress and mental health did not appear to change. This finding provides some evidence of the discriminant validity of the three emotion-related indicators used in the JTS. A later series of analyses in response to an anomaly regarding the Doctoral Progress scores of students from overseas institutions revealed a trend consistent with Martinsuo and Turkulainen’s (2011) findings regarding delayed completion. Hardly surprisingly, the students who in Month 1 were in late candidature and then went on to submit their thesis had been more positive about their progress than those who were still enrolled, had taken leave, or had withdrawn from candidature. However, the scores of these sub-groups were counterbalanced within this stage of candidature, resulting in no overall significant difference observed between Doctoral Progress scores across stages of candidature. This draws attention to the importance of acknowledging the interplay between particular facets of candidature and emotions, and to the need for further research to be specific in the focus and measurement of the emotional experiences of PhD candidature.

In particular, the results of this study highlight the importance of Cummins’ (2012) call to reduce ‘terminological anarchy’ in this area by ensuring that studies of doctoral research student well-being are specific in the definition and operationalisation of well-being. In this study, for example, students’ ratings of their psychological well-being, as measured by a mental health scale, were associated with age, whereas assessments of feelings about doctoral research progress were not. This suggests that more detailed studies are required to enhance the understanding of the experience and management of different emotions during doctoral research.

However it was noteworthy that, of the participants who commented on their experience of participating in the JTS process, only a minority described engaging with the self-monitoring process in a self-regulatory manner, and this was reflected in the positive changes in their perceptions of doctoral research progress. Thus, despite being provided with the opportunity to
self-monitor their feelings about progress, it seems likely that few incorporated this into their self-regulatory efforts. It is recommended that future studies examine how students respond to the JTS if it is presented as a self-monitoring tool along with an explanation of how it might be used to optimise self-regulation, and including an interpretation of scores as generated by this study. By increasing PhD students’ awareness of the relative efficacy of the various self-regulatory processes that they apply during the management of their doctoral research, these students might be empowered to make the necessary changes to enable satisfactory progress. Certainly, this study showed that some PhD students, using the JTS to become more aware of the extent to which certain factors influenced their doctoral research progress, were proactive in making the requisite changes to improve their progress.

While the focus of this study was on exploring the relationship between students’ reported use of self-regulatory behaviours and their feelings about their doctoral research progress, it is also important that the results of this study are considered within a wider context that acknowledges the important interrelationships among self-regulation, doctoral research progress, and other factors such as the quality of supervision. That is, the results of this study do not propose that self-regulation issues are the prime cause for problematic doctoral research progress or attrition from PhD candidature. Rather, the results revealed the potential for the JTS process to act as a window into the differences in the self-regulatory behaviours of PhD students that might influence progress through candidature. Thus, this study contributes to the understanding of how students might most effectively manage the array of factors with which they contend by using self-regulatory processes, while acknowledging that students cannot be expected to take responsibility for all the factors that contribute to their doctoral candidature outcomes.

Together the results of this study revealed heterogeneity in students’ application of self-regulatory skills and effort, even at the elite level of doctoral study. More importantly, given the relationship between self-regulatory efficacy and distal indicators of progress or persistence with candidature, the results suggest that many PhD students would benefit from more actively applying self-regulatory practices during candidature. Yet, despite the wide range of support available to PhD students, much of which alludes to the importance of using various self-regulatory processes, it seems that some students either do not necessarily acknowledge the importance of these processes, lack the understanding of how to improve their self-regulatory functioning, or are unwilling to apply these strategies. This discussion has outlined a number of ways in which students might benefit by receiving guidance, encouragement, or training to
optimise their self-regulatory efforts, in addition to using a self-monitoring process such as the JTS.

9.4 LIMITATIONS

Exploring self-regulation in this longitudinal, individualised and complex educational context holds many challenges, not least of which are the circularity of the self-regulation process described by Zimmerman (2000), the reciprocity of the method and the object of the study (self-monitoring), and other sampling issues that may also relate to the nature of the study. In addition, evidence of the implementation of self-regulatory behaviours and the outcomes of this was reliant here on participants’ self-reports. However, relatively confident interpretations could be made through the triangulation and integration of the quantitative and qualitative results.

Probably the most important limitation of this study concerns the self-selection of the participants. There are many possible reasons for students not choosing to participate in the study. For example, given the time requirements of the Initial Survey, students whose doctoral research was running behind schedule, as well as those who were strictly managing their time in order to stay on schedule, may have declined the invitation to participate in the study. This may also have applied to students who were disinterested in the idea of examining any aspects of psychological functioning. Conversely, students with a particular interest in self-awareness or self-monitoring might have found the invitation to participate in such a study to be appealing. Considering the different perspectives on self-regulation that might underlie these choices, it is possible that even the Month 1 analyses were not based on either the full range of self-regulatory approaches that exist in the doctoral research student population, or the true proportions of students with these approaches. Then, as the original sample of participants tapered across the months of the JTS process, the resulting sample may also have become more homogeneous: by the time of the Month 12 survey the sample may have contained a disproportionate representation of the most diligent and persistent of all the participants. At the conclusion of the study, when participants were asked to complete both the Month 12 JTS survey and the Follow-up Survey, the extra time needed to comment on the JTS experience might have been a disincentive to all but those who had a strong desire to offer feedback at that time. Such reasons for non-participation or study attrition could be problematic in a study seeking to explore self-regulation in this population, as they suggest different types of self-
motivational beliefs could be operating in non-participants and those who attrited from the study than for those who participated fully.

As described in Chapter 4, the majority of the participants who elected to complete the Initial Survey also subsequently agreed to take part in the JTS. Many continued on to complete most of the twelve monthly surveys. However, participants were less likely to respond to the survey items involving written responses compared to the survey items completed via rating scales. Therefore, it was the minority rather than the majority of participants whose perceptions of the previous month of doctoral research were examined in Chapter 6, and whose experiences of the JTS process were explored in Chapter 8. While the final numbers in each of the analyses were sufficiently large and appeared to provide adequate variation in the responses, it is still possible that the self-selection process that occurred meant that some participants in the study were not well-represented in these analyses. In summary, this ongoing self-selection of participants throughout the study may have had a greater impact on the validity of the qualitative analyses presented in Chapters 6 and 8 than on the quantitative analyses presented in Chapters 5 and 7. However, the triangulatory design of this study enabled the discernment and investigation of a wide range of responses and perspectives regarding self-regulation in the doctoral research context, through integrating the quantitative and qualitative data reported in Chapters 5 to 8.

Another limitation of the study was the lack of some form of control group against which the effects on self-regulatory efforts of participating in the JTS process could be assessed. In this study, the exploration of the relationship between students’ self-regulatory efforts and concomitant evaluations of doctoral research progress was dependent on the self-monitoring process. That is, self-monitoring provided the self-evaluations of progress on which the students were compared, and these scores would not, by definition, have been generated by a control group who did not self-monitor. However, with the insights into score stability and change that have been provided by this study, future studies can be designed in which participants use the JTS as a one-off measure, or in a pre- and post-intervention design, that would enable comparisons with participants who engage fully with the JTS process for a certain time period.

Common method bias (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003) is another limitation that needs to be acknowledged. This study relied completely on students’ self-reports for data pertaining to all independent and dependent variables. Moreover, the survey responses based on self-assessments of cognitions, emotions and behaviour could have been influenced by each other. This phenomenon is difficult to avoid in research regarding doctoral research, given the
few standardised formal assessment points inherent in the process, as was discussed in the literature review.

Finally, although the combination of quantitative and qualitative data drawn from many students across multiple universities in different countries provided rich, contextual data on the self-monitoring of doctoral research students, the differences in doctoral programmes may mean that the results of this study are not generalisable to students in all countries or all doctoral programmes.

9.5 FUTURE DIRECTIONS

This study drew on prior research from diverse sources, and has revealed a number of avenues for further research relating to both methodological and substantive issues. The potential directions for future study identified below include those pertaining more directly to the JTS process and its possible future applications, as well as more general suggestions for research regarding self-regulation and its associations with doctoral education.

While the ways in which doctoral research students differ in self-regulatory functioning is now somewhat clearer, and the implications of this for doctoral research progress have been outlined, it remains to be determined why and how these differences occur, and the ways in which self-regulatory skills might develop and be applied across and beyond candidature. For example, does the development of epistemic beliefs facilitate more effective forethought phase processes? Whether effective self-regulation expedites progress through candidature, or increases the chances of timely and successful completion, also needs to be determined. Such investigations would need to follow one or more cohorts through candidature, preferably with greater attention to the interaction between self-regulation and factors external to the student, such as the quality of supervision. The relationships between self-regulatory skills and other graduate attributes, and the associations with outcomes such as employability or research productivity in academe, for example, are also worthy of further research attention. So too would be the study of the effects on progress of individual differences in self-regulation in supervisor and student dyads. But perhaps the most pressing need is to determine if and how PhD students can be assisted to optimise their self-regulatory efforts during candidature. The differences in efficacy among the self-regulatory efforts reported by students in this study could guide the development of interventions to be trialled.
As explained previously, the data from this study were drawn from a larger project examining the metacognitive beliefs of doctoral research students. Until this point, the data analyses for this study and those relating to the focus of the larger project were conducted separately. Now, however, an integration of the results of this study and those reported by Cantwell et al. (2015) can be considered, and further questions explored. In particular, it is important to determine if differences in participants’ metacognitive beliefs, as identified by Cantwell et al. (2015), are related to the differences in self-regulatory efficacy that were evident in this study. Integrating this information might contribute to an enhanced understanding of the nature of the change and stability in students’ feelings about their doctoral research progress. Creating a more complete picture of individual differences in students’ self-regulatory functioning might be possible through these analyses, and offer further insights into the management of doctoral research and implications for progress through candidature.

The findings of this study support the use of the JTS process in further research, but offer a number of recommendations for minor improvements to the process. As a starting point, providing monthly graph feedback appears to encourage retention in the survey process, while not significantly influencing the nature or quality of survey responses, and therefore should be included as a standard feature for all participants. Moreover, if participants were able to see the graph each month, they would be able to notify the website manager immediately in the case of unexplained missing data. While the possibility of missing data acting as an indicator of potential self-regulatory difficulties needs to be investigated, participants could include an alternative email address at the time of registration in the process to reduce the missing data, and the administrative costs, resulting from email reminders ‘bouncing’. Such problems are also expected to be overcome with rapidly emerging innovations in survey designs, such as utilising Cloud-based connectivity in conjunction with the more sophisticated personal self-monitoring and data recording capabilities becoming available on mobile phones and watches. Indeed, the advent of affordable and wearable self-monitoring devices is expected to enable the cost- and time-efficient collection of more frequent and reliable self-observations for doctoral research students, for both research and personal use. The use of biodata for this purpose is another avenue for further study. This technology could also facilitate extended periods of engagement in the survey process, perhaps even for the duration of candidature.

As discussed in the Method chapter, the option for changing or adding Doctoral Progress data points on the graph retrospectively was included solely to allow a comparison of survey methods with a previous study. For this reason, as well as the negative participant feedback
received, this option is not recommended for future studies or applications of the survey process. The suggestion from a few participants to add the survey month dates to the input form applied only to this retrospective data entry option, and therefore would no longer be relevant to future surveys.

While the Doctoral Progress measure appeared useful in enabling this exploration of self-regulation, whether its performance differs when used in isolation from the remainder of the Doctoral Journey Scale, and from the other scales within the full Journey Tracking Survey, needs to be examined. Indeed, the construct of ‘doctoral progress’ could be investigated in more detail using the remaining Doctoral Journey items. In this study, the purpose for their inclusion was to encourage participants to consider all aspects of doctoral research on which they had been working, prior to answering a general question about how they had been feeling about their progress in the past month. However it would also be possible to investigate the use of a more comprehensive scale based on the remaining items, or to include other items representing the issues related to progress to which doctoral research students referred in their comments and feedback. The sensitivity and specificity of such a scale should be compared with the utility of the single item measure used in this study.

Having considered here the role of emotions in the self-regulatory cycle, it is clear that greater explication of the relationships among other emotional and progress indicators needs to be undertaken. For example, more complete understandings of psychological well-being and distress in PhD candidature depend on clarity in the operationalisations of these constructs, as Cummins (2013) has noted. Similarly, the measurement of candidature time and the categorisation of candidature outcomes, including the definition and discernment of when attrition is either desirable or undesirable, or perhaps necessary or unnecessary, warrants further attention.

The choice of analytical procedures that were appropriate for use in this study was restricted by non-normal distributions on most variables, the need to link the qualitative data with the original quantitative data, and insufficient complete datasets to enable the comparison of some subgroups. There were several limitations in using the non-parametric equivalents of paired-sample t-tests or repeated measures ANOVA to compare Month 1 and averaged scores. Apart from only estimating the average change in scores, these analyses do not account for the effects of measurement error. Future studies of interventions to assist students who wish to improve their self-regulatory functioning should explore the use of more sophisticated analytical tools,
such as latent growth curve analyses, to take into account measurement error and to model individual differences in longitudinal change in progress ratings.

More generally, there is a need to address with more transparency how supervisor competencies and the functionality of the student-supervisor relationship might affect student progress through candidature. As Jones (2013) noted in his review of themes in the doctoral education literature over the previous forty years, there is a need for further research into how the delivery, timing, and style of feedback from supervisors and other sources influences student performance. The results of this study endorse Jones’ (2013) call, having observed here the importance of feedback to PhD students’ self-regulatory efforts. As discussed in the previous section, this research also highlights the need for further discussions about the purpose of doctoral education.

9.6 CONCLUSIONS

This exploratory study used Zimmerman’s (2000) theory of self-regulation as a conceptual framework to examine individual differences in the management of doctoral research. Although it is not proposed that problematic candidature is always explained by difficulties with self-regulation, nor that self-regulatory difficulties necessarily result in poor progress, the results of this study demonstrated that self-regulation is an important factor in doctoral research progress, and that many doctoral research students would benefit by optimising their self-regulatory efforts.

In addressing the methodological challenges to the study of self-regulation in this context, the results of this study offer a new and simple approach to assist students with their self-regulatory efforts based on a system of self-monitoring of their doctoral research progress. It was demonstrated how this self-monitoring system can assist with identifying and predicting potential problems with candidature. In turn, these results suggest a further potential for remediating or averting such problems through timely interventions. While this self-monitoring is a self-regulatory process, the efficacy of other self-regulatory activity also appeared to be associated with making progress in doctoral research.

The results of this study also support research highlighting the need for universities to ensure that doctoral research students receive high quality academic guidance and support from supervisors to assist their progress through candidature. The outcomes of this study show the
potential for effective and practical solutions to be developed that could address the issues of high attrition and slow completion that have persisted in many PhD programmes.

At the individual level, the evidence suggests that the effective use of the JTS will empower students and encourage a stronger sense of agency, timely help-seeking, more effective self-regulatory activity, and greater satisfaction with progress. Encouraging students to utilise a self-monitoring system such as the Journey Tracking Survey process during candidature may assist in the effort to achieve timely and successful PhD completion by alerting students to the warning signs of problematic progress and encouraging early intervention. For a PhD student, responding to the question ‘how have you been feeling about your doctoral progress?’ could be more useful than they might have expected.
10. REFERENCES


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11. APPENDICES

11.1 APPENDIX 1: LIST OF APPENDICES

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Table 41

*Correlations Among Month 1 Doctoral Journey Items*
### Correlation Coefficients - Spearman’s rho (n varied as shown)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
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<th>8</th>
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<th>10</th>
<th>11</th>
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</thead>
<tbody>
<tr>
<td>1. Reading</td>
<td></td>
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<tr>
<td>2. Reflecting</td>
<td>.712**</td>
<td>(907)</td>
<td></td>
<td></td>
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<td></td>
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<td>3. Literature review</td>
<td>.706**</td>
<td>(664)</td>
<td>.569**</td>
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<tr>
<td>4. Confirmation</td>
<td>.577**</td>
<td>(271)</td>
<td>.532**</td>
<td>.609**</td>
<td>(255)</td>
<td></td>
<td></td>
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<tr>
<td>5. Ethics</td>
<td>.368**</td>
<td>(230)</td>
<td>.411**</td>
<td>.363**</td>
<td>.485**</td>
<td>(194)</td>
<td>(129)</td>
<td></td>
<td></td>
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<td>6. Data collection</td>
<td>.414**</td>
<td>(518)</td>
<td>.460**</td>
<td>.368**</td>
<td>.457**</td>
<td>.551**</td>
<td></td>
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<td>7. Data analysis</td>
<td>.526**</td>
<td>(547)</td>
<td>.556**</td>
<td>.430**</td>
<td>.460**</td>
<td>.389**</td>
<td>.696**</td>
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<td>8. Writing</td>
<td>.584**</td>
<td>(576)</td>
<td>.566**</td>
<td>.607**</td>
<td>.562**</td>
<td>.410**</td>
<td>.491**</td>
<td>.650**</td>
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<td>9. Supervision</td>
<td>.384**</td>
<td>(859)</td>
<td>.452**</td>
<td>.361**</td>
<td>.478**</td>
<td>.415**</td>
<td>.419**</td>
<td>.405**</td>
<td>.497**</td>
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<td>10. Project management</td>
<td>.517**</td>
<td>(871)</td>
<td>.563**</td>
<td>.519**</td>
<td>.594**</td>
<td>.540**</td>
<td>.624**</td>
<td>.616**</td>
<td>.680**</td>
<td>.657**</td>
<td></td>
</tr>
<tr>
<td>11. Other</td>
<td>.405**</td>
<td>(135)</td>
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<td>.314**</td>
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<td>.348**</td>
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<td>.342**</td>
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<td>12. Doctoral Progress</td>
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<td>.590**</td>
<td>.623**</td>
<td>.501**</td>
<td>.642**</td>
<td>.656**</td>
<td>.745**</td>
<td>.563**</td>
<td>.773**</td>
</tr>
</tbody>
</table>

*Correlation is significant at $p < .05$

**Correlation is significant at $p < .001$
11.2 APPENDIX 2: EMAIL INVITATION TO DDOGS
(AUSTRALIA)

Information Statement for the Research Project:

Research into PhD Study

[name]
[title – e.g. Pro Vice-Chancellor (Graduate Research)]
[name of University]

Dear [__________________],

The University of [_____________] is invited to participate in the research project identified above which is being conducted by Professor Sid Bourke, Dr Robert Cantwell, Dr Jill Scevak, and Professor Allyson Holbrook, from the School of Education/Faculty of Education & Arts at the University of Newcastle. The research is also part of Ms Janene Budd’s doctoral research at the University of Newcastle, which is being supervised by Dr Jill Scevak and Dr Robert Cantwell. This project is funded by the Australian Research Council (DP0987446).

Why is the research being done?
The purpose of the research is to explore the metacognitive beliefs associated with persistence in doctoral research. The research is unique in the field of education, and will substantially contribute to our understanding of factors that influence progression and timely completion of doctoral study. Detailed feedback will be accessible to the participating universities and research participants through our study website: http://www.phdstudy.net

What is being asked of the participants?
PhD candidates are being invited to complete an online survey (of approximately 30 minutes duration) on two occasions separated by one year. This is the minimum level of agreement to participate.

Participants will also be invited to complete online a brief monthly doctoral experience questionnaire (approximately 5 minutes) for one year. Australian participants will also be invited to take part in two telephone interviews relating to aspects of their doctoral experience (approximately 45 minutes per interview).

Participation in each stage of this research is entirely by student choice. Only those who give their informed consent will be included in the project. Non-participation will not disadvantage the student. Participating students also have the right to withdraw from the study at any point without prejudice, and to withdraw any data that may identify them.

Who can participate in the research?
We are inviting all universities in Australia as well as several overseas institutions to participate. Overseas institutions have been selected using a number of criteria, including doctoral programs offered, doctoral program structure, and the number of doctoral students enrolled.
The relevant legal custodians (i.e., staff in Graduate Schools or higher degree research administrative units/Graduate Studies Offices) will be asked to invite current PhD candidates who fulfil the following criteria:

- candidates must be currently enrolled in a Doctor of Philosophy programme, and not in a professional doctorate programme,
- where relevant, PhD candidates must be in the Dissertation stage of their PhD programme

**What would your university be asked to do?**

If you agree to participate, the Office of Graduate Studies of each participating university will be asked to forward an email to currently enrolled PhD candidates, inviting them to participate in this research project. This email would be followed by a reminder email two weeks later. Initial contact with candidates will only be made by the Office of Graduate Studies of each participating university. Candidates who wish to participate in the project will then log onto the linked project website and complete the informed consent process.

**How much time will it take?**

Staff at the Graduate Studies Office will be required to use or generate an email address group of all currently enrolled PhD candidates in order to forward the attached email invitation, and the reminder two weeks later. We anticipate that the time involved would be minimal, as such address groupings are likely to be in regular usage at most institutions. This would be the only requirement for university participation.

However it would be greatly appreciated if you could advise us by email of the number of enrolled PhD candidates at your institution, and if the email invitations distributed and the follow-up reminder email are both copied to the research team at the following address: phdstudy@newcastle.edu.au

**What are the risks and benefits of participating?**

There are no identifiable risks associated with participation in this research. Following completion of data analysis, reports will be accessible to participating universities and to candidates through the study website: http://www.phdstudy.net

**How will participant privacy be protected?**

No individual or university will be identifiable in any material published by the researchers. Individual universities will not be identifiable in the reporting of these data. Data security will be managed by an independent third-party software engineering firm with extensive experience in managing large-scale medical and multidisciplinary research trials. The software engineering firm will be the initial recipients of the data, will de-identify the survey responses by replacing the student’s email address with a computer-generated alphanumeric code, and will store files in a secure environment. Therefore, no individual participant will be identifiable in the data accessible to the research team, unless consent to access this data is specifically given by the participant for the purposes of the telephone interviews.

**Further information**

If you would like further information please contact Professor Sid Bourke on +61 2 4921 5901 or by email Sid.Bourke@newcastle.edu.au

Thank you for considering this invitation,

Sid Bourke
On behalf of the research team

**Complaints about this research**

This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2009-0340. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone +61 2 4921 6333, email Human-Ethics@newcastle.edu.au.
APPENDIX 3: EMAIL INVITATION TO DDOGS

Information Statement for the Research Project:

Research into PhD Study

Dear [__________________],

The University of [_____________] is invited to participate in the research project identified above which is being conducted by Professor Sid Bourke, Dr Robert Cantwell, Dr Jill Scevak, and Professor Allyson Holbrook, from the School of Education/Faculty of Education & Arts at the University of Newcastle. The research is also part of Ms Janene Budd’s doctoral research at the University of Newcastle, which is being supervised by Dr Jill Scevak and Dr Robert Cantwell. This project is funded by the Australian Research Council (DP0987446).

Why is the research being done?

The purpose of the research is to explore the metacognitive beliefs associated with persistence in doctoral research. The research is unique in the field of education, and will substantially contribute to our understanding of factors that influence progression and timely completion of doctoral study. Detailed feedback will be accessible to the participating universities and research participants through our study website: http://www.phdstudy.net

What is being asked of the participants?

PhD candidates are being invited to complete an online survey (of approximately 30 minutes duration) on two occasions separated by one year. This is the minimum level of agreement to participate.

Participants will also be invited to complete online a brief monthly doctoral experience questionnaire (approximately 5 minutes) for one year, and will also have the option of responding to an email containing about 15 questions regarding aspects of their doctoral experience sent on two occasions separated by one year (approximately 30 to 60 minutes per email).

Participation in each stage of this research is entirely by student choice. Only those who give their informed consent will be included in the project. Non-participation will not disadvantage the student. Participating students also have the right to withdraw from the study at any point without prejudice, and to withdraw any data that may identify them.

Who can participate in the research?

We are inviting all universities in Australia as well as several overseas institutions to participate. Overseas institutions have been selected using a number of criteria, including doctoral programs offered, doctoral program structure, and the number of doctoral students enrolled.
The relevant legal custodians (i.e., staff in Graduate Schools or higher degree research administrative units/Graduate Studies Offices) will be asked to invite current PhD candidates who fulfil the following criteria:

- candidates must be currently enrolled in a Doctor of Philosophy programme, and not in a professional doctorate programme,
- where relevant, PhD candidates must be in the Dissertation stage of their PhD programme

**What would your university be asked to do?**

If you agree to participate, the Office of Graduate Studies of each participating university will be asked to forward an email to currently enrolled PhD candidates, inviting them to participate in this research project. This email would be followed by a reminder email two weeks later. Initial contact with candidates will only be made by the Office of Graduate Studies of each participating university. Candidates who wish to participate in the project will then log onto the linked project website and complete the informed consent process.

**How much time will it take?**

Staff at the Graduate Studies Office will be required to use or generate an email address group of all currently enrolled PhD candidates in order to forward the attached email invitation, and the reminder two weeks later. We anticipate that the time involved would be minimal, as such address groupings are likely to be in regular usage at most institutions. This would be the only requirement for university participation.

However it would be greatly appreciated if you could advise us by email of the number of enrolled PhD candidates at your institution, and if the email invitations distributed and the follow-up reminder email are both copied to the research team at the following address: phdstudy@newcastle.edu.au

**What are the risks and benefits of participating?**

There are no identifiable risks associated with participation in this research. Following completion of data analysis, reports will be accessible to participating universities and to candidates through the study website http://www.phdstudy.net

**How will participant privacy be protected?**

No individual or university will be identifiable in any material published by the researchers. Individual universities will not be identifiable in the reporting of these data. Data security will be managed by an independent third-party software engineering firm with extensive experience in managing large-scale medical and multidisciplinary research trials. The software engineering firm will be the initial recipients of the data, will de-identify the survey responses by replacing the student’s email address with a computer-generated alphanumeric code, and will store files in a secure environment. Therefore, no individual participant will be identifiable in the data accessible to the research team, unless consent to access this data is specifically given by the participant for the purposes of the telephone interviews.

**Further information**

If you would like further information please contact Professor Sid Bourke on +61 2 4921 5901 or by email Sid.Bourke@newcastle.edu.au

Thank you for considering this invitation,

Sid Bourke
On behalf of the research team

**Complaints about this research**

This project has been approved by the University’s Human Research Ethics Committee, Approval No. H-2009-0340. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone +61 2 4921 6333, email Human-Ethics@newcastle.edu.au.
Dear PhD candidate,

As a PhD candidate enrolled at this University, you are invited to participate in an international research project on aspects of PhD study. The project is being conducted by a research team at the University of Newcastle, Australia. It has been funded by an Australian Research Council Grant (DP0987446).

As many of you would be aware, undertaking doctoral study can be very demanding. Our purpose in this project is to explore how PhD candidates think about these demands and how they manage them. We aim, at the completion of the project, to inform universities, supervisors, and advisors of ways to support and facilitate successful candidature.

Taking part in this project would require about 30 minutes of your time to complete some online questionnaires now, and another 25 minutes or so to complete a shortened version in 12 months’ time. There are two other optional components of the project: a brief (less than 5 minutes) online survey once a month for a year, and the opportunity to take part in a telephone interview about your experiences as a PhD student.

If you are interested in being involved in this project, please click on the link below to access the research project website for further information:

http://www.phdstudy.net/consent.aspx

Thank you very much for your time,

Professor Sid Bourke
Dr Robert Cantwell
Dr Jill Scevak
Professor Allyson Holbrook
Ms Janene Budd
Dear PhD candidate,

As a PhD candidate enrolled at this University, you are invited to participate in an international research project on aspects of PhD study. The project is being conducted by a research team at the University of Newcastle, Australia. It has been funded by an Australian Research Council Grant (DP0987446).

As many of you would be aware, undertaking doctoral study can be very demanding. Our purpose in this project is to explore how PhD candidates think and feel about these demands and how they manage them. We aim, at the completion of the study, to inform universities, supervisors, and advisors of ways to support and facilitate successful candidature.

Taking part in this project would require about 30 minutes of your time to complete some online questionnaires now, and another 25 minutes or so to complete a shortened version in 12 months’ time. There are two other optional components of the study you may also wish to consider: a brief (less than 5 minutes) online survey once a month for a year, and two email interviews of about 15 questions each.

If you are interested in being involved in this study, please click on the link below (or copy and paste it into your internet browser address bar) to access the research project website for further information:

http://www.phdstudy.net/consent.aspx

Thank you very much for your time,

Professor Sid Bourke
Dr Robert Cantwell
Dr Jill Scevak
Professor Allyson Holbrook
Ms Janene Budd
11.6 APPENDIX 6: PARTICIPANT INFORMATION
STATEMENT – SURVEY COMPONENT

Information Statement for the Research Project:

Research into PhD Study

You are invited to participate in the research project identified above, which is being conducted by Professor Sid Bourke, Dr Robert Cantwell, Dr Jill Scevak, and Professor Allyson Holbrook, from the School of Education at the University of Newcastle. The research is also part of Ms Janene Budd’s doctoral research at the University of Newcastle, which is being supervised by Dr Jill Scevak and Dr Robert Cantwell. This project is funded by the Australian Research Council (DP0987446).

Why is the research being done?

The purpose of the research is to investigate how doctoral candidates perceive and manage the personal and academic demands of doctoral study. It is well recognised that the demands of doctoral study are great, and require significant effort and management by candidates and their supervisors/advisors. This research aims to better understand the processes involved in undertaking doctoral study, and to assist in developing effective ways of supporting students to successful completion.

Who can participate in the research?

We are inviting students who are currently enrolled in a Doctor of Philosophy programme to participate in this research. For PhD students attending a university outside Australia, participation is open to those who have completed the Coursework requirements and are in the Dissertation stage of their PhD programme.

What choice do you have?

Participation in this research is entirely your choice. Whether or not you decide to participate, your decision will not disadvantage you in any way. Only people who give their informed consent will be included in the project. If you give informed consent to participate, you may still withdraw from the project at any time without giving a reason. You also have the option of withdrawing any data that may identify you, simply by clicking the appropriate link on the website.

What would you be asked to do?

This study involves up to three components. All participants are firstly invited to complete the Survey component. Secondly, all participants are then invited to take part in a brief monthly Journey Tracking survey component. Finally, for participants at Australian universities only, there is an invitation to take part in the Telephone Interview component.

Survey component

The Initial Survey consists of a set of online questionnaires which usually takes less than 30 minutes to complete. The questionnaires ask about how you approach the tasks required for doctoral study, and about the thoughts and feelings you have about these tasks. You will also be asked for some demographic details (such as your age and gender), and general academic details (such as your attendance status and
supervision arrangements). After 12 months, you will be contacted by email and asked to login to the website to complete the Follow-up Survey, which is a shorter form of the Initial Survey and usually takes less than 25 minutes to complete.

**Journey Tracking component (monthly for 1 year)**

Each month, participants in the Journey Tracking component will receive an email with a link to the project website to complete a brief survey about their experiences of doctoral study over the previous month. This should take less than 5 minutes each time.

**Participants from Australian universities only:**

**Telephone Interview component (approximately four months and then eight months after completing the Initial Survey)**

The third component of the study involves taking part in two telephone interviews about your experiences with doctoral study. We expect each interview to take between 30 to 60 minutes.

**What are the risks and benefits of participating?**

Some people find it beneficial to think or talk about how they perceive and approach their PhD. Of course, there is always a risk that you might feel upset by thinking or talking about your experiences. If this should happen you are free to either withdraw from the study, or to stop and return to it some other time. In the unlikely event that participation in this study causes you distress, we would encourage you to make immediate contact with a psychologist or counsellor in your University Counselling Service or other health or community service.

**How will your privacy be protected?**

If you choose to participate in this study, your privacy will be protected in a number of ways.

- Access to the project website is via a secure server, so any information you enter will be encrypted and transmitted using industry standard Secure Socket Layer (SSL) technology.

- To login to the project website, you will be asked to use your unique email address as your username, and to enter a password. You may choose to use a non-identifying email address. This email address is required to automatically generate survey reminder emails and to enable password re-setting.

- To ensure your privacy, your email address and data will be recorded in a secure, password-protected master data file accessible only to the software engineering firm who is managing the website. This firm has extensive experience in managing large-scale medical and multidisciplinary research trials, and is bound by a confidentiality agreement. At the completion of data collection your email address will be replaced by a computer-generated alphanumeric code. Your initial and follow-up questionnaire data will be matched using this alphanumeric code.

- **Telephone Interview Participants (from Australian universities only):**
  - If, after completing the initial questionnaires, you further consent to take part in the Telephone Interview component of the study, you will need to provide us with your name, telephone number/s, and email address so that we can contact you to arrange the interviews. This information, along with all data collected during the interview, will be treated confidentially and will be accessible only to the research team.
  - You will be able to review the recording and/or transcripts to edit or erase your contribution.
  - Following completion of the data analysis, any identifying information collected during the interview will be removed or replaced with non-identifying alphanumeric codes.

- It will not be possible to identify individual participants or universities in any reports arising from the project.

- De-identified data will be retained electronically in a secure, password-protected format for a minimum of 5 years at the School of Education, University of Newcastle.
How will the information collected be used?
At the conclusion of the study, a summary of the results and associated reports will be available on the website.

The results will also be reported in a thesis to be submitted for Ms Budd’s degree, and as appropriate, in papers for presentation at conferences or for publication in scientific journals.

What do you need to do to participate?
Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, please contact the research team at phdstudy@newcastle.edu.au or by telephoning +61 2 4921 5901. If you choose to participate in this study, please print and keep a copy of this Information Statement and Consent Form, then click on the “I consent” button below. This will take you to the questionnaires, and you will have the option to start completing them now or at a later time. When you have completed the questionnaires, you can choose whether or not you would like to take part in the monthly surveys or the interviews.

Further information
If you would like further information please contact the research team at phdstudy@newcastle.edu.au.

Thank you for considering this invitation.

Professor Sid Bourke
(On behalf of the research team)

Complaints about this research
This project has been approved by the University’s Human Research Ethics Committee, Approval No. H-2009-0340. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.
APPENDIX 7: CONSENT FORM (ONLINE) – SURVEY COMPONENT

Consent Form for the Research Project:

Research into PhD Study - Survey Component

I understand that the project will be conducted as described in the Information Statement on this website, a copy of which I have printed and retained.

I understand that I can withdraw from the project at any time and do not have to give any reason for withdrawing.

I understand that I have the opportunity to be involved in up to three components in this study, as described in the Information Statement above.

I understand that my personal information will be de-identified and will remain anonymous to the research team, unless I later choose to provide this information to the research team for the purposes of participating in the Telephone Interview component of this research project.

I understand that it will not be possible to identify any individual participants or universities in any reports arising from the project.

I have had the opportunity to contact the research team and to have any questions answered to my satisfaction.

I consent to completing the Initial Survey and the Follow-up Survey.

Please select one:

- YES – directs to login page
- NO – back to home page
APPENDIX 8: PARTICIPANT INFORMATION
STATEMENT – JTS COMPONENT

Information Statement for the Research Project:
Research into PhD Study – Journey Tracking component

Having completed the Survey component of this study, you are now invited to participate in a brief monthly Journey Tracking survey component.

As you are aware, the study is being conducted by Professor Sid Bourke, Dr Robert Cantwell, Dr Jill Scevak, and Professor Allyson Holbrook, from the School of Education at the University of Newcastle. The research is also part of Ms Janene Budd’s doctoral research at the University of Newcastle, which is being supervised by Dr Jill Scevak and Dr Robert Cantwell. This project is funded by the Australian Research Council (DP0987446).

What choice do you have?
Participation in this research is entirely your choice. Whether or not you decide to participate, your decision will not disadvantage you in any way. Only people who give their informed consent will be included in the project. If you give informed consent to participate, you may still withdraw from the project at any time without giving a reason. You also have the option of withdrawing any data that may identify you, simply by clicking the appropriate link on the website.

What would you be asked to do?
Each month for a year, participants in the Journey Tracking component will receive an email with a link to the project website to complete a brief survey about their experiences of doctoral study over the previous month. This should take less than 5 minutes each month.

What are the risks and benefits of participating?
Some people find it beneficial to think or talk about how they perceive and approach their PhD. Of course, there is always a risk that you might feel upset by thinking or talking about your experiences. If this should happen you are free to either withdraw from the study, or to stop and return to it some other time. In the unlikely event that participation in this study causes you distress, we would encourage you to make immediate contact with a psychologist or counsellor in your University Counselling Service or other health or community service.

How will your privacy be protected?
If you choose to participate in this study, your privacy will be protected in a number of ways.

- Access to the project website is via a secure server, so any information you enter will be encrypted and transmitted using industry standard Secure Socket Layer (SSL) technology.
- To login to the project website, you will be asked to use your unique email address as your username, and to enter a password. You may choose to use a non-identifying email address.
This email address is required to automatically generate survey reminder emails and to enable password re-setting.

- To ensure your privacy, your email address and data will be recorded in a secure, password-protected master data file accessible only to the software engineering firm who is managing the website. This firm has extensive experience in managing large-scale medical and multidisciplinary research trials, and is bound by a confidentiality agreement. At the completion of data collection your email address will be replaced by a computer-generated alphanumeric code. Your initial and follow-up questionnaire data will be matched using this alphanumeric code.

- **Telephone/Email Interview Participants:**
  - If, after completing the initial questionnaires, you further consent to take part in the Telephone/Email Interview component of the study, you will need to provide us with your name, telephone number/s, and email address so that we can contact you to arrange the interviews. This information, along with all data collected during the interview, will be treated confidentially and will be accessible only to the research team.
  - Following completion of the data analysis, any identifying information collected during the interview will be removed or replaced with non-identifying alphanumeric codes.

- It will not be possible to identify individual participants or universities in any reports arising from the project.
- De-identified data will be retained electronically in a secure, password-protected format for a minimum of 5 years at the School of Education, University of Newcastle.

**How will the information collected be used?**

At the conclusion of the study, a summary of the results and associated reports will be available on the website.

The results will also be reported in a thesis to be submitted for Ms Budd’s degree, and as appropriate, in papers for presentation at conferences or for publication in scientific journals.

**What do you need to do to participate?**

Please read this Information Statement and be sure you understand its contents before you consent to participate. If there is anything you do not understand, or you have questions, please contact the research team at phdstudy@newcastle.edu.au or by telephoning +61 2 4921 5901. If you choose to participate in this study, please print and keep a copy of this Information Statement and Consent Form, then click on the “I consent” button below. One month later you will be sent the first Journey Tracking reminder email, prompting you to login to the website to complete the brief survey.

**Further information**

If you would like further information please contact the research team at phdstudy@newcastle.edu.au. Thank you for considering this invitation.

- Professor Sid Bourke
- Dr Robert Cantwell
- Dr Jill Scevak
- Professor Allyson Holbrook
- Ms Janene Budd

**Complaints about this research**

This project has been approved by the University’s Human Research Ethics Committee, Approval No. H-2009-0340. Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, Australia, telephone (02) 49216333, email Human-Ethics@newcastle.edu.au.
Consent Form for the Research Project:

Research into PhD Study – Journey Tracking component

I understand that the project will be conducted as described in the Information Statement on this website, a copy of which I have printed and retained.

I understand that I can withdraw from the project at any time and do not have to give any reason for withdrawing.

I understand that my personal information will be de-identified and will remain anonymous to the research team, unless I later choose to provide this information to the research team for the purposes of participating in the Telephone/Email Interview component of this research project.

I understand that it will not be possible to identify any individual participants or universities in any reports arising from the project.

I have had the opportunity to contact the research team and to have any questions answered to my satisfaction.

I consent to completing one Journey Tracking survey each month for twelve months.

Please select one:

- YES (message appears advising participant that the first Journey Tracking survey reminder email will be sent one month later)
- NO – back to home page
11.10 APPENDIX 10: INITIAL SURVEY – CONTENTS

The surveys used in the Initial Survey for the larger project were comprised of items developed for this project by the research team, or drawn or adapted from the scales referenced below. Permission was obtained by the researchers to reproduce these scales where required. This list appeared as follows, along with the above information, on the project website.


## APPENDIX 11: CORRELATIONS AMONG DOCTORAL JOURNEY ITEMS

### Table 41

Correlations Among Month 1 Doctoral Journey Items

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*Correlation is significant at $p < .05$

**Correlation is significant at $p < .001$
### APPENDIX 12: INTERNAL RELIABILITIES FOR JTS MEASURES

Table 42

*Internal Reliabilities for JTS Measures*

<table>
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<th>JTS Month</th>
<th>MHI-5</th>
<th>State Hope Scale</th>
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## 11.13 APPENDIX 13: JTS MONTH 1 COMMENT GROUPS BY DEMOGRAPHIC AND CANDIDATURE FACTORS

Table 43

*Distribution of Participants in Month 1 Comment Groups by Demographic and Candidature Factors and by Doctoral Progress Score Group*

<table>
<thead>
<tr>
<th>Doctoral Progress Score Group</th>
<th>Low (-4, -3)</th>
<th>High (3, 4)</th>
<th>Total</th>
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<td><strong>Gender</strong></td>
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<tr>
<td>Males</td>
<td>21 (25.3%)</td>
<td>13 (19.1%)</td>
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<tr>
<td>Females</td>
<td>62 (74.7%)</td>
<td>55 (80.9%)</td>
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<td><strong>Age group</strong></td>
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<tr>
<td>In 20s</td>
<td>16 (19.3%)</td>
<td>24 (35.3%)</td>
<td>40</td>
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<tr>
<td>In 30s</td>
<td>28 (33.7%)</td>
<td>14 (20.6%)</td>
<td>42</td>
</tr>
<tr>
<td>In 40s</td>
<td>15 (18.1%)</td>
<td>17 (25.0%)</td>
<td>32</td>
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<tr>
<td>50s plus</td>
<td>24 (28.9%)</td>
<td>13 (19.1%)</td>
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<td><strong>Stage of Candidature</strong></td>
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<tr>
<td>Early</td>
<td>30 (36.1%)</td>
<td>15 (22.1%)</td>
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<tr>
<td>Mid</td>
<td>31 (37.3%)</td>
<td>24 (35.3%)</td>
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<tr>
<td>Late</td>
<td>22 (26.5%)</td>
<td>29 (42.6%)</td>
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<td><strong>Enrolment Load</strong></td>
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<tr>
<td>Full-time</td>
<td>58 (69.9%)</td>
<td>42 (61.8%)</td>
<td>100</td>
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<tr>
<td>Part-time</td>
<td>25 (30.1%)</td>
<td>26 (38.2%)</td>
<td>51</td>
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<td><strong>Broad Field of Study</strong></td>
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</tr>
<tr>
<td>Arts-based</td>
<td>58 (69.9%)</td>
<td>41 (60.3%)</td>
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<tr>
<td>Science-based</td>
<td>25 (30.1%)</td>
<td>27 (39.7%)</td>
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<tr>
<td><strong>University Location</strong></td>
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<tr>
<td>Australia</td>
<td>72 (86.7%)</td>
<td>57 (83.8%)</td>
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<tr>
<td>Overseas</td>
<td>11 (13.3%)</td>
<td>11 (16.2%)</td>
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<tr>
<td><strong>Total</strong></td>
<td>83</td>
<td>68</td>
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### APPENDIX 14: JTS PROCESS FEEDBACK
PARTICIPATION BY DEMOGRAPHIC AND CANDIDATURE FACTORS

Table 44
*Distribution of Participants in JTS Process Feedback Analysis by Demographic and Candidature Factors*

<table>
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<th>JTS Process Feedback Provided</th>
<th>n (% of Feedback Group)</th>
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</tr>
<tr>
<td><strong>Gender</strong></td>
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</tr>
<tr>
<td>Males</td>
<td>35 (19.3%)</td>
<td>291 (29.5%)</td>
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<tr>
<td>Females</td>
<td>146 (80.7%)</td>
<td>695 (70.5%)</td>
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<td><strong>Age group</strong></td>
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<tr>
<td>In 20s</td>
<td>67 (37.0%)</td>
<td>404 (41.0%)</td>
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<td>In 30s</td>
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<td>In 40s</td>
<td>38 (21.0%)</td>
<td>194 (19.7%)</td>
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<td>50s plus</td>
<td>34 (18.8%)</td>
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<td><strong>Stage of Candidature</strong></td>
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<td>Early</td>
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<td>Mid</td>
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<td>382 (38.7%)</td>
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<td>Late</td>
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<td><strong>Enrolment Load</strong></td>
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<td>Part-time</td>
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<td>Arts-based</td>
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<td>460 (46.7%)</td>
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<td>Science-based</td>
<td>69 (38.1%)</td>
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