Battling the black dog on farm:

Sleep deprivation and stressors in agriculture

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B Psych (Hons)

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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 provision of the Copyright Act 1968.

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I hereby certify that the work embodied in this thesis has been done in collaboration with other researchers: I have include as part of the thesis a statement clearly outlining the extent of collaboration, with whom and under what auspices

The work in this thesis was carried out under the supervision of Dr Sean Halpin and Dr Keith Harris

Acknowledgement of Authorship

I hereby certify that the work embodied in this thesis contains scholarly work of which I am a joint author. I have included as part of thesis a written statement, endorsed by my supervisor, attesting to my contribution to the joint scholarly work.

I, Andrew Wilkinson contributed to each phase of the scholarly work, including the research design, recruitment, data collection, data analysis and writing of the thesis and manuscript.

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Dated: 19th May 2015
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“For it is written,

‘I will destroy the wisdom of the wise and set aside the understanding of the scholars.’

So then, where does this leave the wise? Or the scholars? The skilful debaters of this world? God has shown that this world’s wisdom is foolishness!”

1 Corinthians 1: 19-20
Abstract

Scope: Farmers have been identified as a rural group with a high threshold for stress, and are renowned for their resilience in adversity. However the mental health of farmers has become an area of concern, due to an elevated risk of suicide in comparison to the general population. The physical and mental demands of farming can influence sleep, stress and depression. Most farming mental health literature presents farmers as a homogenous group, even though farming is a diverse industry. There remains a significant gap in literature evaluating what unique stressors farmers may experience in relation to work-related pressures and various types of farming. Numerous risk factors are linked with farmer psychiatric morbidity but little is known about the role of sleep deprivation in farmer distress or how mental health may differ by farming type.

Purpose: This thesis presents a critical review of the literature on stress and distress in farming. This review summarises recent knowledge around risk and protective factors for distress in farmers, and identifies areas of need for further research. The thesis than presents a manuscript reporting an original research study that aimed to evaluate farmer’s experiences of stress and depression. This study considered the role of sleep deprivation along with other key risk factors for farmer stress and depression. Sleep deprivation had not been examined with psycho-social and work related demands in previous Australian farming literature. This current study also aimed to improve upon previous studies that tended to consider farmers as a homogenous group, by investigating variations in farmer well-being associated with types of farming enterprises.

Methodology: A sample of 148 farmers completed an online survey targeted at participants in NSW, Victoria and Queensland. Participants completed self-report measures of psychological distress, general health, satisfaction with life, farming stress, social support, sleep deprivation and demographics. This study was advertised to farmers through key
farming organisations, an agricultural field day and media outlets. Multiple regression analyses examined key predictor variables for stress and depression. The Kruskal Wallis Test and Mann Whitney U post hoc analysis explored between group differences for farmer type.

**Results:** Insomnia, finance, isolation and general health accounted for 50% variance in predicting stress. General health, sleep dysfunction, satisfaction with life and friends (social support) accounted for 59% of the variance in predicting depression. Sleep deprivation ranked more prominently than social support and work related factors for farmer stress and depression. Mann Whitney U post hoc analysis results demonstrated that Beef Farmers experienced significantly higher levels of insomnia and sleep disturbance than Cropping Farmers. Beef farmers were also less hopeful about their future in farming and Australia’s when compared with Cropping Farmers. An ‘Other’ group of farmers, predominantly involving small, intensive agricultural industries indicated higher levels of time pressure than Beef and Cropping Farmers.

**General Conclusions:** Work related stressors, finance and isolation were key predictors of psychological stress. However sleep deprivation, was an even stronger predictor of psychological stress than other study variables. The main predictors of depression were psychological attributes such as satisfaction with life and general health factors that included diminished confidence and social dysfunction. Sleep deprivation was also a key predictor of depression. These findings suggest that health professionals should provide targeted treatments for sleep deprivation in farmers.

These findings also suggest that future research must acknowledge the heterogeneity of farming groups when investigating work related factors, financial pressures and mental health outcomes. Future treatment approaches could also adapt more efficiently to farmer distress, by flexibly responding to the unique pressures in different farming sectors with specialised clinical assessment and treatment intervention. In particular, greater holistic assessment is
required, including screening by front-line mental health providers for sleep quality, stress and depression. Treatment for farmers with mental health difficulties may require psycho-education specifically targeting sleep hygiene.
# Table of Contents

Statement of Originality ........................................................................................................... i

Acknowledgements .................................................................................................................. iii

Abstract................................................................................................................................... iv

Table of Contents ..................................................................................................................... vii

Critical Literature Review ....................................................................................................... 1

Stress and distress in farming ................................................................................................... 2

Biological sex ............................................................................................................................... 3

Self-report measures ................................................................................................................ 5

Help seeking ............................................................................................................................... 7

Risk factors for psychological distress in farming ................................................................. 8

Social dysfunction ..................................................................................................................... 8

Psychological risk ..................................................................................................................... 10

Work related pressures .......................................................................................................... 12

Sleep problems ......................................................................................................................... 17

Protective factors for psychological distress in farming ........................................................ 20

Resilience ................................................................................................................................. 20

Community support ................................................................................................................. 21

Limitations of existing research ............................................................................................. 23

Conclusion ............................................................................................................................... 24

Manuscript............................................................................................................................... 25
Abstract .............................................................................................................................................. 26

1. Introduction ...................................................................................................................................... 27

2. Method ............................................................................................................................................. 33

  2.1 Participants .................................................................................................................................. 33

  2.2 Measures ...................................................................................................................................... 33

    2.2.1 Depression Anxiety Stress Scale ......................................................................................... 33

    2.2.2 Edinburgh Farmer Stress Inventory ...................................................................................... 34

    2.2.3 Insomnia Severity Index ........................................................................................................ 34

    2.2.4 Multidimensional Scale of Perceived Social Support ......................................................... 34

    2.2.5 Pittsburgh Sleep Quality Index ............................................................................................. 35

    2.2.6 General Health Questionnaire .............................................................................................. 35

    2.2.7 Satisfaction with Life Scale .................................................................................................... 35

  2.4 Data Analysis ............................................................................................................................... 35

3. Results ............................................................................................................................................... 36

  3.1 Descriptive Statistics ...................................................................................................................... 36

    Table 1 ............................................................................................................................................. 38

  3.2 Farm Stress .................................................................................................................................. 39

    Table 2 ............................................................................................................................................. 39

  3.3 Analysis 1: Correlations ............................................................................................................... 39

    Table 3 ............................................................................................................................................. 41

  3.4 Analysis 2: Regression modelling for stress ............................................................................... 42
References.................................................................................................................................82

Appendix A: Ethics Approval........................................................................................................94

Appendix B: Information sheet and exit page.................................................................................98

Appendix C: Recruitment Flyer ..................................................................................................102

Appendix D: Beyondblue funding approval.................................................................................104

Appendix E: Participant Questionnaire .......................................................................................106
Critical Literature Review

Negotiating a career in farming requires a high threshold for stress (Judd et al., 2006). The Australian farming industry has absorbed an increasing amount of domestic and global stressors that has translated into concerns about farmer’s mental health (Lunner Kolstrup et al., 2013; Roy, Tremblay, Oliffe, Jbilou, & Robertson, 2013). Pressures are often in the public arena, for example, tensions between New South Wales (NSW) and Queensland farmers and major gas conglomerates over coal seam gas (Huth et al., 2014). Severe stress also ensued for farmers after a sudden halt in live trade exports, that overnight short circuited northern beef industry exports to Indonesia in 2011 (Schoenmaker & Alexander, 2012). Similarly, the ire of dairy farm producers was raised when supermarket giants Woolworths and Coles decreased the value of milk to $1 a litre (Keith, 2012). The introduction of stringent native vegetation legislation in 2003 has also placed an excessive burden on NSW farmers over the past decade (Byron, Craik, Keniry, & Possingham, 2014). There should be little surprise then, that farming stress and potential psychological distress has generated attention. There are however, a number of influences that often remain out of the public eye that draw less attention but remain of key importance to farmer stress and distress. The purpose of this paper is to investigate influences on farmer stress and depression amongst beef, cropping and other agricultural sectors.

Australian farming is a manual industry that typically relies on the enterprise of family owned business (Fraser et al., 2005). These family owned enterprises, often involve generations of families that establish a livelihood and identity of rurality and independence. In the context of a rapidly developing 21st century Australian farmers face a number of unique pressures, many socio-economic, including government legislation, unpredictable commodity prices, rural population decline, volatile global markets and declining rural services (Fragar, Henderson, Morton, & Pollock, 2008). Other factors such as weather
extremities, hazardous working environment, high numbers of farm related injuries and isolation have all been linked to bear negatively on farmer health outcomes (Fraser et al., 2005). Therefore the term ‘stress’ is one akin to farmers who endure many of these pressures. Significant stressors in farming lifestyle have been linked with elevated psychiatric morbidity and suicide risk compared to the general population (Hirsch & Cukrowicz, 2014; Fraser et al., 2005). The suicide risk alone in male farmers has been close to twice as high as the rest of the male working age population in Australia (Fragar, Henderson, et al., 2008).

Given the wide ranging influences on farmer’s mental health this paper aims to review recent literature, evaluate key risk factors and triggers involved with distress for Australian farmers and explore a framework to direct future research in the area. Farmer mental health will be evaluated in the broader context of work-related, social, and psychological impacts on farmers. Pragmatic treatment approaches that address the epidemiology of stress and mental health illness in farming will be explored.

Stress and distress in farming

Similar to Hogan, Scarr, Lockie, Chant, and Alston (2012) this current review argues that literature on Australian farming and mental health presents a disjointed account of why male farmers experience distress in the face of specific stressors. Nearly thirty years on from a landmark study by Walker and Walker (1987) little has changed in regards to examining what practical implications can be drawn out of research into farming practice and stress and distress. Walker and Walker (1987) set a precedent in their study by defining exactly what stress is and how they were going to measure it. They noted that stress can be conceptualised as an individual’s subjective appraisal of environmental demands, whereas distress could be classified as a reaction to these events with an absence of appropriate coping strategies (Walker & Walker, 1987). Distress therefore, is earmarked by symptoms characterised by
physiological, emotional, cognitive and behavioural changes, directly associated with stress (Walker & Walker, 1987).

Walker and Walker (1987) established two key findings that have failed to have been effectively replicated and built on. Firstly, occupational stressors of farm life are most predictive of distress levels and secondly, stress levels have been found to differ as a function of farming operation. A current issue in Australian farming and mental health literature has been a lack of distinction between agricultural sectors. Even primary agriculture sectors such as grain, beef and dairy, lack thorough comparison of factors such as stress, suicide and depression. Farmers are too often considered a homogenous group, where they would be better defined as a heterogeneous entity (Kennedy, Maple, McKay, & Brumby, 2014). For example, do smaller more intensive producers such as poultry and pork farmers experience worse time pressures than beef farmers? Would cropping farmers depend more on predictability or consistency with weather than smaller intensive operators? Do differences in terms of trade between agricultural sectors lead to compounding stress that could trigger elevated rates of stress or depression in particular industries? It is vital to understand differences between agricultural sectors so support services and government/non-government organisations can flexibly counter pressures that may lead to distress.

*Biological sex*

Prior to the last decade little information was available on Australian rural mental health. Only 13 articles were available from 1996-2000 and none of these addressed mental health in farming (Fraser et al., 2002). The paucity of information on psychological distress in farming was concerning. However, in 2002, landmark research by Page & Fragar found that male manager and agricultural labourer rates were much higher than the national rates and rates in the wider population. This has prompted a high volume of Australian research into farming and mental health since, because of, the prevalence of stress within the
occupation, considerably high rate of suicide and a predominantly male population (Lunner Kolstrup et al., 2013). Also, although men are less likely to experience depression and psychological distress than women they are 3-4 times more likely to end their own life (Piccinelli & Wilkinson, 2001; Roy et al., 2013). Hence, the farming sector presents a significant opportunity to understand distress because of occupational and biological sex factors. The process of stress to distress is a complex entity; however a number of studies venture to hypothesis a range of factors that may explain significant disparities between farmers and the general population.

The differences between male and female psychiatric morbidity may well be explained by more than biological differences. There is a view that male depressive symptoms are expressed differently to females (Brownhill, Wilhelm, Barclay, & Schmied, 2005; Jensen, Munk, & Madsen, 2010). Features and behaviours commonly associated with depression are more akin to symptoms reported by women, including crying, mood amplification, and expression of helplessness, passivity and increased consumption of food (Brownhill et al., 2005). Many of these symptoms are grouped as affective components of depression. Features of depression such as expression of hopelessness, helplessness and guilt are representative of cognitive features of depression (Mcdowell, 2006). Men typically display features of depression that are marked by risk-taking, aggression, irritability, drug and alcohol taking (Brownhill et al., 2005). Many of these behaviours have been labelled as ‘masked depression’ as it has been proposed males convey mood problems through behaviour rather than verbally expressing how they feel (Patterson-Kane & Quirk, 2014).

Brownhill et al. (2005) identified a need to more accurately understand depression within the meaning attached to depression for men. There is a paucity of research identifying the unique meaning and expression depression has for men, particularly those in rural and remote areas (Fraser et al., 2002; Patterson-Kane & Quirk, 2014). Recent qualitative research
by Patterson-Kane and Quirk (2014) investigated the how experience and expression of depression in men may differ in rural and remote areas. They argue contemporary language based on generic diagnostic criteria does not match the language of men in rural and remote areas. This concern is of important relevance to farmers, as they can tend to be stoic and show stigmatised attitudes to mental health care (Roy et al., 2013). A similar difficulty also exists within elderly populations, in that when asked directly about depression they have a tendency to deny any problems (Mcdowell, 2006).

There is also concern that research on women and mental health in farming has been neglected (Kennedy et al., 2014; Bryant & Garnham, 2013). An increase of male farmer suicide, not found in women has been acknowledged internationally, to some extent however, this has detracted from understanding the role of rural women and distress (Roy et al., 2013; Bryant & Garnham, 2013). Female farmers have been found to experience greater levels of financial distress than male farmers, and women supporting male farmers can experience significant burden over their husband’s wellbeing (Huat Bin, Lamm, Tipples, & Nguyen, 2012; Bryant & Garnham, 2013). Female farmers also indicate isolation as a key source of stress, whereas male farmers do not. A major limitation in this area is some farmer suicide research has excluded female fatalities, due to the small population size (Kennedy, 2014).

**Self-report measures**

Research into psychiatric morbidity within farming generally relies on generic self-reporting measures that predominantly examine cognitive and affective components of depression (Mcdowell, 2006). A recent farming literature review by Roy et al. (2013) argues that male farmer’s depressive symptoms may be misinterpreted because they are not accurately assessed through generic screening tools. Rather, male behaviours such as overinvestment in work, somatised problems, externalising behaviour, interpersonal conflict and alcohol use may more accurately reflect depression in men. Patterson-Kane and Quirk
(2014) also suggests males are more likely to engage avoidant and escape behaviours. Many of these behaviours are not routinely screened for in generic depression measures (Roy et al., 2013).

Studies in Australian farming and mental health rely on brief generic measures such as the Kessler 10 to indicate a level of ‘psychological distress’ usually with the absence of any report about somatic problems such as sleep deprivation, pain and appetite (Brumby et al., 2011; Fragar et al., 2013; Gunn, Kettler, Skaczkowski, & Turnbull, 2012; Handley et al., 2012; Judd et al., 2006; Kelly et al., 2011). The examination of subjective and affective components of depression by generic measures are useful to screen for distress (Kelly et al., 2011). There may be another opportunity however to provide more knowledge to gaps in psychiatric morbidity in farmers by counterbalancing these screening tools with investigation of somatic factors related to stress and depression. There is evidence indicating men may minimise depressive features, forget symptoms or even describe problems in terms of somatic complaints (Brownhill et al., 2005; Gregoire, 2002). It has been found that farmers are more likely to seek help in the context of somatic or physical complaints such as sleep, tiredness and fatigue (Booth et al., 2000; Kallioniemi, Simola, Kymalainen, Vesala, & Louhelainen, 2009; Parry, Barnes, Lindsey, & Taylor, 2005). Somatic factors may also require attention to risk factors that precipitate farmer distress.

The current study will seek to improve on previous research by providing thorough analysis of somatic factors, particularly sleep deprivation and mental health. The investigation of farmer’s mental health will also aim to target specific components of distress, such as, depression and psychological stress. This will help identify research outcomes specific to these mental health illnesses, rather than the broad, and somewhat vague approach of research that has utilised measures of ‘psychological distress.’
Help seeking

Booth, Briscoe, and Powell (2000) revealed differences and similarities between farmers and the general population for help-seeking. Using a retrospective case control design they discovered that over 30% of farmers presented exclusively to a General Practitioner (GP) with somatic health symptoms prior to death by suicide or open verdict. They also found no significant difference between farmers and controls in contact with a GP in a week, month and 3 months before their death. Male farmers and controls were taken from a database of 662 deaths where a suicide or open verdict had been declared. Of the 662 deaths, 70 (9.5%) were farmers, although 7 cases were excluded because they were female (Booth et al., 2000). Controls were non farmers who were matched by age, sex and social class (Booth et al., 2000).

Despite these findings by Booth and colleagues (2000), broader consensus within recent farm mental health research argues that male farmers are more likely to display more stoic, less help seeking behaviour (Roy et al., 2013; Roy, Tremblay, & Robertson, 2014). Men in particular are more likely to attempt to self-manage mental illness and refuse help seeking, particularly in rural communities where help seeking efforts may be stigmatised (Roy et al., 2013). It has been suggested that stoic efforts to manage distress are underpinned by the socio-cultural positioning of males or even the responsibility that farming plays in shaping the identity of men for generations (Price & Evans, 2009). The loss of these identities however, is presumed to culminate in multiple sources of distress that can trigger suicide when farming (Price & Evans, 2009). Furthermore, threats to identity through pressures such as financial hardship, familial conflict and a changing rural environment can quickly escalate distress (Hogan et al., 2012; Price & Evans, 2009).
Risk factors for psychological distress in farming

The pressure of extreme job related stress in farming has prompted a number of problematic directed conceptualisations of farmer psychological distress (Roy et al., 2013). Australian farmer stress has been broadly described in the literature in terms of psychological, social and work related factors that load on mental health problems (Fraser et al., 2005; Judd et al., 2006). Evaluating current risk factors for psychological distress will open discourse regarding protective factors that can improve intervention.

Social dysfunction

Farming enterprises are often highly structured around family networks. Farming is a unique lifestyle as the location is often work and home for the farmer and his or her family (Fraser et al., 2005). The farming lifestyle is such, that roles and expectations can be blurred as work, home and family commitments compete for attention (Fraser et al., 2005). The balance of responsibility and conflict over roles can reach flashpoints as demanding work practices, on-farm injuries, challenges of success planning and personal conflicts can cause tension and stress in a family farming business (Fraser et al., 2005; Kennedy et al., 2014). Severe conflict in the family unit is linked with a negative impact on quality of life and reduced productivity in the family business (Weigel, Weigel, & Biundali, 1987). The loss of social support has been highlighted as a risk factor to rural and farming mental health (Handley et al., 2012).

Loss of social support, not just within family but also within local communities has significant implications for health and well-being (Hart, Berry, & Tonna, 2011). It has been argued that a chain effect invariably happens, as pressures such as drought and limited social service infrastructure erode economic and social resources in rural communities (Bryant & Garnham, 2013; Hart et al., 2011). This, in turn, leaves farming communities more vulnerable, as reduced employment opportunities, urban migration and decreased community
Stress and depression in farming

Community variables, otherwise known as contextual effects have direct links with physical health outcomes but little research has investigated mental health outcomes (Judd et al., 2006). Judd et al. (2006) report that living in a declining rural area may have a negative impact on mental wellbeing, although this does not necessarily translate to negative mental health outcomes such as depression and suicide (Kelly et al., 2011). A relevant study investigating rural mental health is the longitudinal Australian Rural Mental Health Study (ARMHS) by Kelly and colleagues (2011). Kelly et al. randomly sampled 2,639 participants from remote/very remote regions on measures examining psychological distress, social support, personality, sense of community, rural and district characteristics. Kelly and colleagues completed a cross sectional analysis of this group, which represented the baseline for a longitudinal project. They found key determinants of distress in rural communities included, dispositional factors such as trait neuroticism and marital status. Recent adversity in the form of problems with personal social networks or serious personal accidents and the level of social support were also key determinants of distress. The study observed little support for the impact of district level based variables such as remoteness and population change, as indicators of risk to mental health in rural and remote regions.

Interestingly, Kelly et al. (2011) investigates aspects of farming stress, including drought severity but did not include analysis of farmers as a demographic group. Participants were instead grouped according to Australian Standard Geographic Classification (ASGC) with categories including inner regional, outer regional, remote and very remote. Therefore, conclusions drawn in the study that drought severity was a determinant for psychological distress, may not accurately represent particular rural populations such as farmers. Their study also had a focus on the broad outcome of psychological distress but does not capture
where distress may fit on a continuum, such as what differences may lie between psychological stress and depression. Kelly and colleagues were also not able to identify individual characteristics required to manage coping with stress and more acute distress states such as depression.

_Psychological risk_

Kelly et al. (2011) assert, that individual level attributes and perceptions matter more than district level rural characteristics in the evolution of psychological distress. Studies in the Australian population demonstrate that if depression was effectively prevented, suicidal behaviour and ideation would be eliminated in 40% to 50% of individuals treated (Judd et al., 2006; Pirkis, Burgess, Meadows, & Dunt, 2001). A number of studies have focussed on the implications of underlying mental health illness such as depression, anxiety and stress in Australian farming (Brumby, Kennedy, & Chandrasekara, 2013; Judd et al., 2006; Kelly et al., 2011) Research into mental health and farming present inconsistent evidence regarding whether farmers actually experience high rates of mental illness (Judd et al., 2006; Thomas et al., 2003). For example research has demonstrated that Australian farming males are more likely to be psychologically healthy when compared with rural non farming males, with lower levels of neuroticism and higher levels of positive affect. Conclusions have been drawn that male farmers may experience distress differently to the normal population (Thomas et al., 2003).

It has been argued that male farmers may have a more functional attitude to death accompanied by a decisive, problem solving approach to issues that present at hand (Fraser et al., 2005). The farmer is used to making quick decisions off-hand, adapting to his environment to offset considerable burden and strain (Judd et al., 2006). Hirsch (2006) articulates the importance in rural ideology of strong work ethic, independence and adaptation. However, long term stressful experiences for farmers can hinder adjustment as
individual factors such as financial strain and interpersonal difficulties bring challenges to wellbeing (Kelly et al., 2011). When combined with rural and physical isolation, the reduced ability to access resources can potentially lead to significant stress, depression or suicide (Fraser et al., 2005; Handley et al., 2012). A number of these psychological risk factors, including masculinity constructs, personality traits, stigma, isolation, coping strategies and mental illness have shaped recent discourse on farm mental health (Alston, 2012; Bryant & Garnham, 2013; Judd et al., 2006; Roy et al., 2013).

The concept of a “masculine hegemony” (p. 517) that embeds stoicism, toughness and a breadwinner mentality has been linked to high levels of distress (Alston, 2012). This position asserts masculine roles have been defined by toughness in the face of adversity, which can contribute to reticence in help seeking and avoidance of facing emotional issues tied with stress (Alston, 2012). This position also promotes the idea that women play a diminutive position, consistent with feminist critiques that argue family farming denies women equality and opportunity for off farm work and development of rural activities (Price & Evans, 2009). In summary, the feminist position argues family farming roles and expectations are defined by male domination and female subjugation (Price & Evans, 2009).

Hegemonic stereotypes of male farmers may not provide an accurate representation of how women and men in farming actually perceive their roles (Hogan et al., 2012). Furthermore, this stereotype may continue to perpetuate a dominant urban conceptualisation of rural lifestyle as “backward” and undesirable (Bourke, Humphreys, Wakerman, & Taylor, 2012). Hogan et al. (2012) highlights that arguments based on biological sex for risk of psychological distress are an over-extension of theory in light of major unpredictable occupational factors in farming such as weather, economic volatility and a changing environmental landscape. A call has also been made to adopt language that promotes adaptive
capacity through resilience in farming, rather than idealising a negative stereotype which could prevent farmers from seeking help and acknowledging difficulties (Kiem et al., 2010).

A culture of self-reliance and independence cultivated in rural areas also impacts attitudes toward addressing mental health problems (Hogan et al., 2012). The tendency to perceive emotional problems as weakness, along with a reluctance to acknowledge problems, is associated with a risk of psychological distress (Hogan et al., 2012). The attitude of independence and unwillingness to identify mood related problems is also generally considered the broader expression of the ‘Aussie male’ stereotype (Komiti, Judd, & Jackson, 2006). Reframing attitudes of independence and toughness by encouraging resilience, rather than stoicism may help overcome obstacles to help-seeking behaviour (Kiern et al., 2010; Komiti et al., 2006).

Work related pressures

According to the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) limited government assistance and exposure to volatile international market forces means many farming operators have had to restructure their operations (ABARES, 2015). A report by the Australian Bureau of Statistics (ABS) stipulates that rural communities have been forced to adjust to the economic climate, as agricultural employment has dropped from 10% of Australia’s employment market in the 1950’s to less than 5% at 2000 (Pollard, 2000). Most rural communities have either diminished or evolved as other sectors, notably mining, manufacturing, service industries and construction outstrip the importance of agriculture to the economy (Pollard, 2000).

The changing nature of the agricultural industry means farmers are struggling to make their occupation and lifestyle viable. The values of keeping tough and saving face in adversity is intrinsically held by many farmers who resolutely hold a deep connection with the land they own (Gullifer & Thompson, 2006). Fragar, Henderson, et al. (2008) report that
the key pressures faced by families in farming can be narrowed to government legislation, financial problems, drought/weather, time pressure and family related issues. Huat Bin (2008) investigated stress in New Zealand farm managers and also found that major sources of stress stem from government bureaucracy, unpredictable factors, time pressure and personal hazards. Huat Bin (2008) explored stress with the General Health Questionnaire (GHQ) 12 and investigated farm stress with the EFSI.

For farmers, attachment to the land means their occupation is more than a job; it is a unique lifestyle that gives meaning and identity (Gullifer & Thompson, 2006). Perceived failure at this existence through financial difficulties has the potential to invoke feelings of shame, which bear directly on self-perception (Hogan et al., 2012). A response to a shameful experience can be characterised by an individual isolating themselves from community as a means to evade the confrontation of embarrassment (Retzinger, 1996). The theory of this reactive process has serious implications for the way a farmer’s stress may escalate to depression or suicide. Hogan argues that personal physical or psychological shocks, experiences of shame, poor help-seeking and a misperception of an individual’s own problems may trigger suicidal thoughts and/or behaviour (Hogan et al., 2012). As important as land and place is, farmers shape their identity by developing the farm as a viable business enterprise (Hogan et al., 2012). Work related factors in farming, primarily long term exposure to significant stress due to financial pressure, has been identified as a key influence on farmer mental health, and at worst, suicide (Bryant & Garnham, 2013).

A combination of pressures can compound psychological stress, as many farmers maintain an ingrained belief they can overcome hardship through dedication and work (Bryant & Pini, 2010). Bryant and Garnham (2015) also conclude that many farming families face adversity with dedication and hard work. They suggest this effort can come at the cost of overwhelming distress, particularly when the end result of reducing work related stress is not
achieved. Kiem et al. (2010) reported that rural counsellors anecdotally observed that some farmers lose the capacity to be objective through extreme pressures such as financial loss. Consistent with Hogan et al. (2012) theory, Kiem argues that farmers may respond to financial stress experiencing shame and personal blame and instead of approaching the financial difficulty they attempt to solve the problem by working harder. Because the attempt to be more productive does not produce a result, stress can worsen and mental well-being decompensate.

Despite correlation between unpredictable events such as weather and distress, there remains some doubt as to the impact of environmental circumstances such as drought in the Australian farming context (Guiney, 2012; Kelly et al., 2011). Prolonged drought is considered to be a major stressor in rural communities as financial hardship may impact farming families and communities alike (Sartore, Kelly, & Stain, 2007). However an Australian study examining farmer suicides during a drought period from 2001 and 2007 coronial findings did not find an increase in farmer suicides during this period (Guiney, 2012).

A more recent study by Edwards, Gray, and Hunter (2015) completed analysis of a 2007 survey that examined 8,000 people living in rural and remote areas of Australia. At this time much of the Australian continent was in severe drought. Edwards et al. (2015) reported that drought had a negative impact on farmers and farm workers. The authors also demonstrated a significant difference between farmers in “drought” and “not in drought” on mental health wellbeing using the 5 item Mental Health Inventory. They further examined mental health problems by using a cut off score for clinical diagnostic criteria for depression with the Mental Health Inventory. However there was no significant difference on mental health problems between farmers due to drought. This leaves some uncertainty as to whether drought impacts directly upon farmer’s distress, and the relative contribution of drought.
compared to other factors in explaining mental health wellbeing. The authors acknowledge that drought impacts farmer’s mental health due to financial pressure and burden. Limitations of this study included a failure to consider the possible role of terms of trade and commodity influence and the dual impact this contributes to financial pressure and mental health (Page & Fragar, 2002). This study also only considered drought as a dichotomous variable, either “drought” or “not in drought,” limiting the extent to which they could ascertain the severity of drought on farmers. Further research may need to elucidate mechanisms of stress and distress and how environmental adversity relates to mental health.

The literature regarding distress and mental health in Australian farming, tends to ignore diversity in farming practices and how this might also impact farmer’s mental health. Farmers are treated as a homogenous group and there is a paucity of literature that explains the influence of socio-economic factors in different sectors of agriculture (Kennedy et al., 2014). International studies have shown greater awareness of this diversity. For example, Walker and Walker (1987) conducted a large scale (n = 808) Canadian study investigating farm stress. It was found that mixed farming enterprises (grain and beef) and dairy farmers in Manitoba, Saskatchewan and Alberta experienced more stress than grain farmers (Walker & Walker, 1987). In the same study younger farmers also reported high levels of distress than older farmers, possibly due to more financial pressure with higher debt loads. A subsequent study by Walker and Walker (1988) found off farm employment exposed farmers to a greater risk of stress related symptoms. In UK research, Deary, Willock, and McGregor (1997) observed that livestock (beef/sheep) farmers experienced more financial stress than dairy and cereal farmers. They also found that mixed type and dairy farmers reported more time pressure stress than cereal (cropping) farmers. Deary et al. (1997) examined farmers using the Edinburgh Farm Stress Inventory (EFSI). Conclusions of differences between farming sectors
in Deary et al. (2007) study, need to take into account variance in sample sizes for groups sampled, cereals \((n = 32)\), livestock \((n = 46)\), dairy \((n = 53)\) and mixed \((n = 89)\).

Another concern documented of relevance to mental health and farming, is access to means (Fraser et al., 2005; Roy et al., 2013). Males generally prefer more lethal means of suicide such as hanging or firearms compared with females who prefer less lethal means, for example overdose with medication (Hawton & van Heeringen, 2009). Research from 1988-1997 showed the majority of male farmer suicide is accounted for by firearms \((51\%)\) compared with 23\% across the general population (Fragar, Henderson, et al., 2008; Page & Fragar, 2002). It had been stipulated that tightened firearm legislation in the National Firearms Agreement (NFA) in 1997 would reduce the number of suicides by firearms and also act as an effective means of targeting suicide prevention (Baker & McPhedran, 2007; McPhedran & Baker, 2012). These assumptions have been challenged by research indicating the overall decrease of firearm suicides in Australia since the 1980’s while suicide by other methods has been rising simultaneously (Baker & McPhedran, 2007). McPhedran and Baker (2012) conclude there is lack of sufficient evidence from Australia’s own NFA reforms to link a tightening of firearm legislation with an improvement in public health issues such as suicide.

Pragmatically, any further attempted reform would be difficult to implement as farmers require the use of firearms for both vermin control and euthanasia of livestock (Judd et al., 2006; Kennedy et al., 2014). Tightening of firearm legislation has instead disadvantaged farmers as they were no longer able to acquire high powered semi-automatic weapons for feral pest control (Baker & McPhedran, 2007). State police authorities in Australia even deem a special class of license for primary producers (farmers) to access restricted firearms that are unavailable to the general public because of ‘genuine reason’ directly related to farming and grazing operations (NSW Government, 1996). This necessity
accompanied by inconsistency in research suggests significant limitations for the potential firearm legislation reforms as a targeted suicide intervention strategy in farming.

Sleep problems

Farming is an industry which often requires long work hours in arduous conditions. The opportunity may therefore present for farmers to overinvest and ‘mask’ symptoms of distress (Roy et al., 2013). In Australia, one in two farmers have been in their current job for 20 years of more, compared with only 10% of all employed persons (Australian Bureau of Statistics, 2012). The majority of farmers work long hours, for example full-time farmers average 57 hours per week compared to 44 hours for other full-time occupations (Australian Bureau of Statistics, 2012). Longer and irregular working hours present a challenge because of negative outcomes with stress, fatigue and sleep disorders (Johnson & Lipscomb, 2006). According to Parry et al. (2005), farmers consistently score high on stress related symptoms such as chronic tiredness, difficulty with relaxing, forgetfulness, loss of temper, concentration and back pain. A Finnish study concluded that 34% of a sample of farm entrepreneurs reported symptoms that could be classified as exhaustion, consisting of self-reported difficulties with concentration and memory, feelings of being overwhelmed and indecisiveness and fatigue (Kallioniemi et al., 2009). Walker and Walker (1988) reported that approximately 50% of their sample of 817 Canadian farmers reported a moderate to high frequency occurrence of fatigue, loss of temper, and trouble relaxing.

A link between stress and sleep in farming has also been established following an earthquake in the Canterbury district of New Zealand. A number of Canterbury farmers were interviewed (n =56) post the earthquake to identify what factors may potentially mitigate earthquake related impacts and also ascertain the vulnerability of farms to an earthquake (Whitman, Seville, Wilson, & Vargo, 2012). Psychosocial stress was just as important as physical damage sustained on farm from the earthquake to farmer’s abilities to maintain
operations (Whitman et al., 2012). Sleep deprivation and feelings of uncertainty were the most commonly cited products of stress (Whitman et al., 2012). Sleep deprivation was partly attributed to on-going aftershocks disrupting sleep; the study did not investigate the impact of worry of economic loss and sleep deprivation. There was also no study of any relationship depression, anxiety or suicide might potentially have with sleep deprivation.

Sleep problems and fatigue are prevalent symptoms amongst both farming populations and the general population (Kallioniemi et al., 2009; Thomas et al., 2003; Whitman et al., 2012). The inability to sleep is cited as a key reason some farmers seek medical attention (Alston, 2012). This is supported in a qualitative study by Kilpatrick, Willis, Johns, and Peek (2012) who found that sleep problems are a common health issue raised in farming networks. Labrash et al. (2008) investigated the relationship between effect of stress and worry on sleep quality in a sample of ninety four Saskatchewan farms. They found a significant association was observed between impaired sleep and daily worry in peak season (planting and harvesting) about cash flow. This result was not replicated in non-peak season when subjects had 6 hours or more of sleep (Labrash et al., 2008).

A limitation of many generic mental health screening measures is they do not take into account or thoroughly investigate somatic factors such as sleep disturbance, sleep elimination and appetite (Mcdowell, 2006). Part of the difficulty of recording somatic symptoms is ascribed to the potential for self-assessment to produce false positives in populations such as the elderly and medically ill (Mcdowell, 2006). Sleep deprivation however, is rated alongside fatigue as a key symptom of Major Depressive Disorder (MDD) in the Diagnostic and Statistical Manual of Mental Disorders 5 (DSM-5) (American Psychiatric Association, 2013). Furthermore the DSM-5 outlines for MDD that “sometimes the reason that the individual seeks treatment is for the disturbed sleep” (p. 163). In the case of farmers who typically present with physical complaints, Booth et al. (2000) report chronic
tiredness and fatigue could motivate help-seeking, while masking depression or suicidal intent.

Research has identified the role of sleep deprivation as a prodromal symptom of depression, indicating it may trigger or precipitate new episodes (Baglioni et al., 2011). Various studies have also pointed to the bidirectional relationship between sleep disturbances and depression (Alvaro, Roberts, & Harris, 2014). A study by Buysse et al. (2008) investigated sleep and depression bidirectionality longitudinally over 20 years and across 6 time points. Their findings suggested that insomnia as a baseline is stronger and more consistent predictor of follow up depression than baseline depression is of insomnia. Mechanisms involved in this bidirectional association can vary from similar neurobiological underpinnings in depression, anxiety and sleep. Other genetic, familial, social and environmental factors may co-exist and although each disorder is independent, response might only vary in respect to the order of appearance of symptoms (Alvaro et al., 2014).

The order and presentation of symptoms has been assessed through a retrospective study aimed at understanding etiologic relationships between anxiety, sleep and depression (Johnson et al., 2006). Participants were adolescents with co-morbid anxiety, insomnia and depression. Anxiety disorders preceded insomnia 73% of the time, while insomnia developed before depression in 69% of cases (Johnson et al.). This relationship between insomnia and depression has also been demonstrated in an elderly population where persistent insomnia was linked as a key precipitating factor for depression (Pigeon et al., 2008). Another study by Eaton, Badawi, and Melton (1995) similarly demonstrated that 47% of the incidence of depression at a one year follow-up could have been prevented had sleep problems been managed at baseline.

The recognition of potential pathways between all three disorders has significant treatment ramifications. In a population such as farmers who will primarily present with
somatic complaints such as tiredness/fatigue for treatment, a significant opportunity may exist to intervene before major mental health problems develop. At this stage, this literature review has not discovered any comprehensive research that examines the interplay between sleep deprivation, farm stressors and mental distress.

*Protective factors for psychological distress in farming*

*Resilience*

Despite a distinct emphasis on risk factors throughout literature there is evidence that farmers may also demonstrate a number of strengths that can buffer them from adversity when compared to non-farmers (Judd et al., 2006). Thomas et al. (2003) concluded that farmers in Britain experience lower rates of depression than the general population. Similarly, Judd et al. (2006) report farmers are more psychologically healthy and report lower distress than non-farming rural residents sampled from rural localities across Victoria and NSW in Australia. Although these results suggest farmers are resilient in the face of adversity in a high stress occupation, these strengths have been relatively ignored (Fraser et al., 2005). Developing tailored mental health interventions that understand how farming families can adaptively cope with adversity may be a key to helping those who struggle with social, psychological and work related pressures (Gunn et al., 2012).

The dominant discourse around protective factors for farmer suicide engages the notion of resilience. Resilience can be conceptualised as the process, by which an individual can positively adapt despite experience of adversity or trauma (King, Lane, MacDougall, & Greenhill, 2009). As mentioned previously adversity can present in many areas of farming, including, unpredictable weather patterns, financial hardship, on-farm accidents and family conflict. Kiem et al. (2010) suggest there is a subtle difference between stoicism and resilience, which causes confusion around meaning. Kiem et al. (2010) argued that stoicism is an ideal that strongly resonates in rural areas, yet its working can impede farmer’s
adaptability and limit strategic decision making. Stoicism embodies the notion of endurance that is characterised by self-reliance, rigid decision making and a survival attitude (Kiem et al., 2010). Resilience similarly promotes strength in adversity, but the means of achieving this is through flexibility, strategy and open-mindedness (Kiem et al., 2010). King et al. (2009) investigated longitudinal resilience in a farming community in South Australia, using a qualitative design. Two key mechanisms facilitated resilience: confidence in personal coping capacity and confidence in business strategies (King et al., 2009). Similar to King et al. (2009) qualitative study of farmers, Kiem et al. (2010) qualitative study found that community strength and practical knowledge have a significant impact on resilience in rural communities.

**Community support**

McLaren and Challis (2009) explored resilience in the context of social support and sense of belonging with an Australian farmer sample. McLaren and Challis (2009) investigated the relationship between sense of belonging/social support and psychological distress, using depression and suicide screening tools. Their study confirmed a link for both social support and sense of belonging as protective factors for suicidal ideation and depression in male farmers (McLaren & Challis, 2009). Potential drawbacks to the study include a relatively small sample size ($n=99$) of farmers and analysis limited to correlation, thereby meaning no causal relationships were able to be established (McLaren & Challis, 2009). Availability of social support is linked with a decrease in suicidal ideation (Handley et al., 2012; McLaren & Challis, 2009). Evidence also suggests that when individual’s sense of belonging within a valued group is low there can be an association with depression and suicidal ideation (Bailey & McLaren, 2005).

The quality and quantity of human relationships, otherwise known as social capital is a major contributor to improved health outcomes (Gunn et al., 2012; Kilpatrick et al., 2012).
In NSW two key government programs have been established to address rural mental health development in the community (Hart et al., 2011; Holley, Perceval, Fanning, & Kelly, 2009). Farm link has been developed to specifically respond to mental health needs of farming families by engaging government, non-government organisations, private and public businesses in health and agriculture (Holley et al., 2009). Similarly, the Rural Adversity Mental Health Project (RAMHP) has been developed to enhance capacity and resilience in rural communities, during prolonged drought and increasing pressures on rural financial and social resources (Hart et al., 2011). One of the immediate needs frontline agencies and networks are often called to deal with is financial strain in the context of drought and other unpredictable weather events (Tonna et al., 2009). Front line rural mental health agencies can play a pivotal role in facilitating engagement between agricultural and health sectors (Tonna et al., 2009). Practical support is often needed for individuals and farming family’s vulnerable to economic strain. This may involve access to financial guidance, problem solving with land and water management or even consideration of long-term viability (Tonna et al., 2009).

Addressing challenges to mental health must focus on early intervention that promotes a system of care (Tonna et al., 2009).

Criticism has been directed at some rural mental health providers for not providing adequate service delivery due to poor understanding of barriers to care and rural issues (Kilpatrick et al., 2012). Kiem et al. (2010) reported that many farmers initial contact regarding mental health issues is with rural financial counselling services (RFCS), accountants and financial advisors. Kiem et al. (2010) suggested this trend is partly due to the perception that rural mental health professionals and outreach workers are ill-equipped to meet their needs. Effectively engaging farmers, particularly with regards to a highly stigmatised issue such as mental health, often requires credibility to be established beforehand (Kilpatrick et al., 2012). Kiem et al. (2010) decried the lack of trained and supported
mental health professionals from rural backgrounds and called for more workers who understand farming experiences. This is in response to an increasing burden being placed on frontline agribusiness workers and financial advisors, who at times operate outside of their professional capacity managing farmer distress (Kiem et al., 2010). For any mental health professional engaging with a farmer, understanding the pressure of farming practice and lifestyle is an essential component in providing clinical care that can promote resilience (King et al., 2009).

Limitations of existing research

This paper has considered psychological distress, broadly examining farming as unique in position as a family based occupation exposed to local and international pressures. The issue of farmer mental health has come to the fore in the past decade as research has established the role of occupational demands and rural disadvantages that contribute to an elevated risk of suicide within the farming community. This review of stress and depression in farming has exposed significant gaps in existing knowledge.

The literature currently lacks clarity in describing what key determinants may precipitate and perpetuate male farmer distress. There is also a profound shortage of studies investigating differences between farmer type and outcomes in mental health. The only studies found for this review that drew comparison between key farming groups was international research by Walker and Walker (1987) and Deary et al. (1997). Therefore, identifying distress, particularly depression and stress, needs to be contextually specific to individual and occupational demands of farming. As it stands there is disagreement as to even whether male farmers experience higher levels of distress compared to non-farmers (Edwards et al., 2015; Judd et al., 2006; Thomas et al., 2003). Very few studies have considered the impact of somatic components of depression and distress alone, yet somatic complaints such as sleep problems factor as a prevalent reason a farmer will access a health provider (Alston,
Stress and depression in farming (Booth et al., 2000). The interaction between occupational work demands, sleep deprivation and distress must be further investigated to understand possible early intervention strategies for mental health problems in farming.

Until researchers actively seek to understand the mindset of a farmer, the identity this brings and subsequent sacrifices made, it will be difficult to accurately encapsulate distress for farmers. More importantly, approaches that could prevent stress and depression in the farming community will remain disjointed. Future delivery of services to farmers will need to consider pragmatic treatment approaches related to potential ‘markers’ of stress and depression. Contributions to research should consider tailoring effective treatment responses that resonate with the problem solving, ‘no fuss’ mentality of farmers. Point of access services must be ready to assist farmers with an approach mindful of rigid expressions of masculinity.

Conclusion

Stress and distress in farming has been linked with psychological, social and work related factors. The changing shape of rural communities, driven by economic pressure and technology growth, urban migration and the increasing depletion of social resources has worked a collective disadvantage against farmers and non-farmers alike. A culture of self-reliance and independence has been forged as farmers face significant adversity. Identification with stoic attitudes that view acknowledging problems as a sign of weakness has contributed to some trepidation with help-seeking and a masking approach to mental health issues. Without further understanding the experience of farmers across agricultural sectors, it is highly doubtful current approaches will adequately meet the needs of those farmers prone to risk of psychological stress and depression. Future treatment strategies and research should consider the contribution of somatic factors such as sleep deprivation to farmer mental health.
Battling the black dog on farm:

Sleep deprivation and stressors in agriculture

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Abstract

The mental health of farmers has become an area of concern, due to an elevated risk of mental health problems in comparison to the general population. The unique physical and mental demands of farming can influence sleep quality, stress and depression. There remains a significant gap in the literature evaluating what unique stressors farmers may experience in relation to work-related pressures and types of farming industries. A sample of 148 farmers (aged 23-82 years) completed an online survey that recruited farmers from Australia. Results showed that sleep deprivation was a key predictor of stress and depression for farmers. Financial hardship and isolation were significant farm stressors that predicted psychological stress. Comparisons of farmer types demonstrated differences in mental health and occupational demands. This study presents new directions for intervention with risk and protective factors for mental health in farming, including targeting sleep deprivation and farmers susceptible to financial distress. These results have important implications for clinical intervention and program initiatives for farmers experiencing sleep deprivation and financial hardship.

Highlights

- Sleep deprivation was found to be a key predictor of farmers’ psychological stress and depression levels
- Work related stressors were primarily related to psychological stress and individual characteristics to depression.
- Beef farmers reported higher levels of sleep deprivation than cropping farmers
- Variation in study outcomes for beef and cropping farmers may indicate unique farming demands
Key words
Farming, mental health, sleep deprivation, work-related stress, rural and remote health

1. Introduction

Negotiating a career in farming requires a high threshold for stress (Judd et al., 2006). The increasing domestic and global stressors on the Australian farming industry have raised concerns about the effects of these pressures on farmers’ mental health (Lunner Kolstrup et al., 2013; Roy, Tremblay, Oliffe, Jbilou, and Robertson, 2013). Pressures are often in the public arena, for example, coal seam gas exploration (Huth et al., 2014), live trade export limitations (Schoenmaker and Alexander, 2012), stringent native vegetation legislation (Byron, Craik, Keniry, and Possingham, 2014) and mining expansion on prime farming land (Moffatt and Baker, 2013). Unsurprisingly, farming stress and potential psychological distress has generated attention.

Significant stressors in farming lifestyle have been linked to elevated psychiatric morbidity and suicide risk compared to the general population (Fraser et al., 2005). Male farmers’ suicide risk is approximately twice as high as that of the general male working age population in Australia (Fragar, Henderson, et al., 2008). Given the unique pressures on farmers’ mental health this paper aims to evaluate key risk factors associated with distress for Australian farmers’ and contribute investigation of unique risk factors not previously examined in Australian farming and mental health. Conceptualisation of farmer stress and distress will be evaluated in the broader context of understanding the discourse of work-related, social, and psychological impacts on farmers. Pragmatic treatment approaches that address the epidemiology of stress and mental health illness in farming will be explored.

Hogan, Scarr, Lockie, Chant, and Alston (2012) argue that literature on Australian farming mental health presents a disjointed account of why male farmers experience distress in the face of specific stressors. Nearly thirty years on from a landmark study by Walker and
Walker (1987) little has changed in regards to examining exactly what practical implications can be drawn out of research into farming practice and stress and distress. Stress can be conceptualised as an individual’s subjective appraisal of environmental demands, whereas distress could be classified as a reaction to these events, marked by an interference with the ability to cope (Carolan, Smith and Forbat, 2015). Distress therefore, is earmarked by symptoms characterised as physiological, emotional, cognitive and behavioural changes, directly associated with stress (Carolan, Smith and Forbat, 2015). Australian farmer stress has been broadly described in the literature in terms of psychological, social and work related factors that load on mental health problems (Fraser et al., 2005; Judd et al., 2006). Evaluating current risk factors for psychological distress will open discourse regarding useful protective factors that can improve intervention.

The changing nature of the agricultural industry means farmers are struggling to make their occupation and lifestyle viable in the face of adverse pressures (Gullifer and Thompson, 2006). As important as land and place is, farmers’ shape their identity by developing the farm as a viable business enterprise (Hogan et al., 2012). Work related factors in farming, primarily long term exposure to significant stress due to financial pressure, has been identified as a key influence on farmer mental health (Bryant and Garnham, 2013). These unique financial pressures and attachment to land can place increased pressure not only on the farmer but also on the system around them (Gullifer and Thompson, 2006).

Farming enterprises are often highly structured around family networks. Farming is a unique lifestyle as the location is often work and home for the farmer and his or her family (Fraser et al., 2005). Roles and expectations can be blurred as work, home and family commitments compete for attention (Fraser et al., 2005). The balance of responsibility and conflict over roles can reach flashpoints as demanding work practices, on-farm injuries, challenges of succession planning and personal conflicts can cause tension and stress in a
family farming business (Fraser et al., 2005; Kennedy et al., 2014). Severe conflict in the family unit is linked with a negative impact on quality of life and reduced productivity in the family business (Weigel, Weigel and Biundali, 1987). The loss of social support has been highlighted as a risk factor to rural and farming mental health (Handley et al., 2012). Loss of social support, both within family and within local communities has significant implications for health and well-being (Hart, Berry and Tonna, 2011). Pressures such as drought and limited social service infrastructure erode economic and social resources in rural communities (Bryant and Garnham, 2013; Hart et al., 2011). This, in turn, leaves farming communities more vulnerable as reduced employment opportunities, urban migration and decreased community morale place a collective disadvantage on health and well-being (Kelly et al., 2011; Kennedy et al., 2014).

The focus on the mental health of farmers and their experience of distress has also highlighted their ability to adjust to extreme changes in their environment (Fraser et al., 2005). Male farmers may have a functional attitude to death accompanied by a decisive, problem solving approach to issues that present at hand (Fraser et al., 2005). Farmers are familiar with making quick decisions off-hand, adapting to his environment to offset considerable burden and strain (Judd et al., 2006). Hirsch (2006) articulates the importance in rural ideology of adaptation, strong work ethic and independence. However, long term stressful experiences for farmers can hinder adjustment as individual factors such as financial strain and interpersonal difficulties bring challenges to wellbeing (Kelly et al., 2011). When combined with rural and physical isolation, the reduced ability to access resources can potentially lead to significant stress or depression (Fraser et al., 2005; Handley et al., 2012).

A number of psychological and physical symptoms are directly connected with farm stress, including anxiety, fatigue, loss of temper, forgetfulness, concentration difficulties, back pain and sleep disruption (Walker and Walker, 1987). Walker and Walker (1988)
reported that approximately 50% of their sample of 817 Canadian farmers reported a
moderate to high frequency occurrence of fatigue, loss of temper, and trouble relaxing. A
direct link between farm stress load and increasing psychological distress symptoms is
consistently reported in more recent literature (Fragar, Kelly, Peters, Henderson, and Tonna,
2008; Huat Bin, 2008; Roy et al., 2013). Demanding working hours combined with strenuous
agricultural work may lead to mental exhaustion and burnout (Kallioniemi et al., 2009; ABS,
2012). Most Australian farmers’ work long hours, averaging 57 hours per week compared to
44 hours for other full-time occupations (Australian Bureau of Statistics, 2012). Longer and
irregular working hours contribute to stress, fatigue and sleep disorders (Johnson and
Lipscomb, 2006).

Farmers report high levels of stress related symptoms such as chronic tiredness,
difficulty with relaxing, forgetfulness, loss of temper, concentration and back pain (Parry et
al., 2005). A Finnish study concluded that 34% of a sample of farm entrepreneurs reported
symptoms that could be classified as exhaustion, consisting of self-reported difficulties with
concentration and memory, feelings of being overwhelmed and indecisiveness and fatigue
(Kallioniemi et al., 2009). However, they did not assess farmers sleep patterns. Fatigue issues
are prevalent symptoms for both farming populations and the general population (Kallioniemi
et al., 2009; Thomas et al., 2003; Whitman et al., 2012). Sleep issues are a common health
issue raised in farming networks (Kilpatrick, Wills, John and Peek, 2012) and a primary
reason for farmers seeking medical advice (Alston, 2012). There is evidence that farmers
experience impaired sleep and increased worry, primarily during peak planting and
harvesting seasons (LaBrash et al., 2008).

Sleep deprivation has been identified as a prodromal symptom of depression
(Baglioni et al., 2011). There is some evidence of a bidirectional relationship between sleep
disturbances and depression (Alvaro, Roberts, and Harris, 2014). Mechanisms involved in
this bidirectional association may involve similar neurobiological underpinnings in depression, anxiety and sleep. Other genetic, familial, social and environmental factors may co-exist, and individuals may vary, with some reporting insomnia prior to depression, and others reporting the onset of insomnia after depression (Alvaro et al., 2014).

Investigations of somatic factors such as sleep deprivation have been neglected in research addressing Australian farmers’ mental health. Many studies rely on brief measures to indicate a level of ‘psychological distress,’ usually based on cognitive and affective features rather than somatic symptoms such as sleep deprivation, pain and appetite (Brumby et al., 2011; Fragar et al., 2013; Gunn, Kettler, Skaczkowski, and Turnbull, 2012; Handley et al., 2012; Judd et al., 2006; Kelly et al., 2011). The current study aimed to evaluate differences between stress and depression measures, by assessing key risk factors and sleep deprivation for stages of distress.

Another gap in Australian farming and mental health research has been a lack of distinction between agricultural sectors. Farmers are too often considered a homogenous group, where they would be better defined as a heterogeneous entity (Kennedy, Maple, McKay, and Brumby, 2014). For example, do smaller more intensive producers such as poultry and pork farmers experience more time pressures than beef farmers? Do cropping farmers depend more on predictability or consistency with weather than smaller intensive operators? Do differences in terms of trade (pricing and productivity) between agricultural sectors lead to compounding stress that could trigger elevated rates of stress or depression in particular industries? It is vital to understand differences between agricultural sectors so support services and farming organisations can flexibly counter pressures that may lead to distress. Identifying distress, particularly depression and stress, needs to be contextually specific to individual and occupational demands of farming. The current study therefore
aimed to investigate psycho-social, work-related stressors and mental health between major farming sectors.

Very few studies have considered the impact of somatic components of depression and distress alone, yet somatic complaints such as sleep problems factor as a prevalent reason a farmer will access a health provider (Alston, 2012; Booth et al., 2000). The interaction between occupational work demands, sleep deprivation and distress were investigated in this study to understand possible early intervention strategies for mental health problems in farming. It was hypothesised that: (a) farm stress would be positively associated with stress and depression; (b) farm stress would be positively associated with sleep deprivation; (c) sleep deprivation would be positively associated with stress and depression and; (d) In addition farmers were compared by type of farming industry to examine whether there were significant differences in their mental health symptoms.
2. Method

2.1 Participants

The study was designed as cross sectional analysis of farmers with data obtained through an online survey. Participants were invited to join the study through key farming agencies and media, via online newsletters, email, an agricultural field day and media outlets. Participation was voluntary and anonymous. If participants completed the survey or chose to exit early they were directed to an exit page with telephone and online help sources in case of distress.

Farmers’ age ranged from 23 to 82 years with a median age of 54.15. The total sample was 148 participants, this included 94 men, 43 women and 11 not otherwise specified. The majority of the sample were married (n = 106) with 27 either single or in other living arrangements. Two thirds of the sample had finished Grade 12 and the majority of participants had completed post school education (n = 115), including a trade, diploma or university. Over 95% of the sample were Caucasian and the majority identified as a farmer owner (n = 106), followed by farm agricultural worker (n = 14) and farm manager (11).

Participants were informed that for every survey completed $5 would be donated to a well-recognised mental health organisation within farming communities. The $5 donation was devised as an incentive to encourage farmer’s participation, while also promoting mental health awareness and resources within the target population. At the conclusion of the questionnaire, farmers were invited to provide any additional comments about mental health and farming and provide feedback regarding the survey.

2.2 Measures

2.2.1 Depression Anxiety Stress Scale (Lovibond & Lovibond, 1995). The DASS is a 21 item self-report scale, with subscales that measure anxiety, depression and stress. The DASS is a reliable measure used in both clinical and research settings (Crawford and Henry, 2003).
Items are totalled for the subscales with higher scores indicating a greater severity for stress, anxiety or depression. For this study the Cronbach’s alpha for the depression subscale was high ($\alpha = .91$) and adequate for the stress subscale ($\alpha = .88$). Only depression and stress subscales were used in this study to allow a simpler distinction of features present with stress and distress.

2.2.2 *Edinburgh Farmer Stress Inventory* (Deary et al., 1997). The EFSI is a 27 item self-report measure of farming stress (Deary et al., 1997). The EFSI comprises six farming stress domains, including, farming bureaucracy, isolation, acts of God, personal hazards, time pressure and finance. Previous research indicates the internal consistency on each subscale ranges from borderline adequate ($\alpha = .67$) to high ($\alpha = .82$). In the current study internal consistency ranged from adequate ($\alpha = .78$) to high ($\alpha = .92$). Correlations between the farming stress subscales have been demonstrated to be positive and significant (Deary et al., 1997). Each item is rated on a scale from 1 “none” to 5 “very severe.” Items are totalled for each subscale score with a higher score indicating more severe stress. Only subscale results were used in the current study.

2.2.3 *Insomnia Severity Index* (Bastien, Vallieres, and Morin, 2001). The ISI is a seven item self-report scale that assesses an individual’s report of insomnia for the previous 2 weeks (Nadorff, Fiske, Sperry, Petts, and Gregg, 2013). The test has demonstrated good internal reliability and the scale has a clinical cut-off that indicates moderate to severe insomnia. An example item from the ISI is “How satisfied/dissatisfied are you with your current sleep pattern?” Answers range from 0= “Very Satisfied” to 4= “Very Dissatisfied” on a 5 point Likert scale. Items are totalled for a full scale score with a higher score indicating worse insomnia. The Cronbach’s alpha for the ISI in this study was adequate ($\alpha = .90$).

2.2.4 *Multidimensional Scale of Perceived Social Support* (Zimet, Powell, Farley, Werkman, & Berkoff, 1990). The MSPSS is a 12 item self-report measure that utilises a 7-point Likert
scale. Items are rated on a 7 point Likert scale, ranging from 1 “Very Strongly Agree” to 7 “Very Strongly Disagree.” The MSPSS demonstrates strong internal consistency (α = .85–.91) (Zimet et al., 1990). The internal consistency for the three subscales in this study were all adequate (Friends, α = .94; Family, α = .95; Significant Other, α = .98).

2.2.5 Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1988). The PSQI has several subscales related to subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, sleep medication and daytime dysfunction (Buysse et al., 1988). The seven subscales contribute to a global score ranging from 0 to 21. Higher scores suggest greater sleep disturbance and scores greater than 5 suggest significant sleep disturbance. The PSQI demonstrated adequate internal reliability in the current study (α = .74).

2.2.6 General Health Questionnaire (Goldberg & Williams, 1988). The GHQ 12 is a self-report questionnaire designed to detect individuals with a diagnosable psychiatric disorder (Sanchez-Lopez and Dresch, 2008). The GHQ 12 validity and reliability has been demonstrated across several populations with adequate internal consistency α = .70 − .80 (Werneke, Goldberg, Yalcin, and Ustun, 2000). Each item is scored from 0 to 3 with higher scores indicating a higher level of distress. The GHQ demonstrated adequate internal consistency in the current study (α = .88).

2.2.7 Satisfaction with Life Scale (Eid & Diener, 2004). The SWL is a 5 item self-report measure. Items are rated on Likert response scale from 1 “Strongly Disagree” to 7 “Strongly Agree.” The SWL scale demonstrated adequate internal reliability (α = .93) in the current study.

2.4 Data Analysis

Data clean-up followed Tabachnick and Fidell (2006) with respect to normality and missing values analyses. Missing values were replaced through the expectation maximisation
method. Eleven partially completed cases were deleted from the data set due to extensive missing data. Data was analysed using SPSS v22. Shapiro Wilks test of normality revealed that a number of key variables were skewed; therefore non-parametric statistics were utilised. Non-parametric correlations using Spearman’s Rho correlations were initially completed to examine associations between key variables. Step-wise multiple regression analyses were then undertaken, including all significant independent variables associated with the dependent variables, depression and stress. Finally, between group comparisons examining differences among broad acre cropping, beef and other farmers were undertaken with the Kruskal Wallis Test. If key farming types were found to have a significant difference on an independent variable, they were further examined with Mann Whitney U post hoc analyses to identify where differences occurred.

Power analysis was conducted using G*Power (Erdfelder, Lang, and Buchner, 2009). With power (1-β) set at .95 and α = .05, G*Power analysis showed sample size requirements of \( n = 139 \) for a model including 5 test predictors and a total of 25 predictors. Therefore, sample size for the current study was adequate (\( n = 148 \)). However, sample sizes for between groups analyses (Crop \( n = 40 \), Beef \( n = 43 \) and Other \( n = 49 \)) were small with limited statistical power.

3. Results

3.1 Descriptive Statistics

From 148 participants, 132 completed the survey giving a response rate of 89.2%. Mann Whitney U analyses revealed a significant difference in age for gender (1592.5, \( z = -3.02, \rho = .003 \)), with median age for females being 51 and males being 58. Participants’ primary sources of agricultural production included, beef \( n = 43 \) (32.6%) and broad acre cropping, \( n = 40 \) (30.3%). All other farming types were combined, to form a third group called ‘other’ farmers. This group included sheep (12.9%), fruit and vegetable (9.1%) and miscellaneous
small farming groups such as pork, poultry and dairy farmers (15.1%). The combined total for the ‘other’ group was $n = 49$ (37.1%).
### Table 1

**Demographic Information of Study Participants**

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age range</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23-82 years</td>
<td></td>
<td>M = 54.15, SD = 13.04</td>
</tr>
<tr>
<td>Biological sex</td>
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<td></td>
</tr>
<tr>
<td>Male</td>
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</tr>
<tr>
<td>Female</td>
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</tr>
<tr>
<td>Ethnicity</td>
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<tr>
<td>Caucasian</td>
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<tr>
<td>Other</td>
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<td>4.5%</td>
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<tr>
<td>Marital status</td>
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<tr>
<td>Married</td>
<td>106</td>
<td>79.7%</td>
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<tr>
<td>Single</td>
<td>19</td>
<td>14.3%</td>
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<tr>
<td>Other living arrangements</td>
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<td>6.0%</td>
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<td>High school education history</td>
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<td>Year 11 or under</td>
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<tr>
<td>Year 12 or equivalent</td>
<td>87</td>
<td>66.9%</td>
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<td>Post school education history</td>
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<td>Trade Certificate</td>
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<td>Associate or Advanced Diploma</td>
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<td>University degree</td>
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<td>Employment status</td>
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<td>Farmer (owner)</td>
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<td>Farm manager</td>
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<tr>
<td>Farm agricultural worker</td>
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<td>10.7%</td>
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<tr>
<td>Primary Farmer Type</td>
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<tr>
<td>Broad acre cropping (Grain/Cotton)</td>
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<td>30.3%</td>
</tr>
<tr>
<td>Fruit/vegetable grower</td>
<td>12</td>
<td>9.1%</td>
</tr>
<tr>
<td>Sheep meat production</td>
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<td>Sheep wool production</td>
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<tr>
<td>Beef cattle</td>
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<td>32.6%</td>
</tr>
<tr>
<td>Other</td>
<td>20</td>
<td>15.1%</td>
</tr>
</tbody>
</table>
3.2 Farm Stress

Results of EFSI subscales as shown in Table 1 indicate that average scores for farm stress were highest in finance and farm bureaucracy. The lowest mean stress results were isolation and personal hazards. Mann Whitney U analyses indicated females experienced significantly greater levels of financial distress both with on-farm matters (1679.50, z = -2.67, p = .008) and general financial hardship (1476.50, z = -3.54, p = .001).

Table 2

Edinburgh Farm Stress Inventory

<table>
<thead>
<tr>
<th>Subscales</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>Α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Bureaucracy</td>
<td>3.24</td>
<td>.88</td>
<td>1.0-5.0</td>
<td>.79</td>
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<tr>
<td>Finance</td>
<td>3.46</td>
<td>1.18</td>
<td>1.0-5.0</td>
<td>.92</td>
</tr>
<tr>
<td>Isolation</td>
<td>2.28</td>
<td>.94</td>
<td>1.0-5.0</td>
<td>.86</td>
</tr>
<tr>
<td>Acts of God</td>
<td>3.20</td>
<td>.82</td>
<td>1.0-5.0</td>
<td>.86</td>
</tr>
<tr>
<td>Personal Hazards</td>
<td>2.73</td>
<td>.93</td>
<td>1.0-5.0</td>
<td>.78</td>
</tr>
<tr>
<td>Time Pressure</td>
<td>3.20</td>
<td>.98</td>
<td>1.0-5.0</td>
<td>.84</td>
</tr>
</tbody>
</table>

Note: A symbol is chronbach’s alpha of subscale. Items were scored 1 = No stress to 5 = Severe Stress.

3.3 Analysis 1: Correlations

Table 2 displays Spearman’s Rho correlations coefficients for key variables. Hypotheses were tested utilising Kruskal Wallis one way analysis of variance. Results confirmed the hypothesis that greater farm stress was associated with insomnia, demonstrating that farmers under greater farm pressure experience higher levels of sleep deprivation. Furthermore, results confirmed the hypothesis that insomnia was associated with higher levels of stress and depression. The hypothesis that farm stressors were significantly associated with stress and depression was also supported. Greater farm stress was associated
with depression. Increased stress on all farm stress subscales except personal hazards were also associated with psychological stress. Age was found to have a significant association with stress (Spearman’s Rho = -.21, $\rho = .012$). Neither depression nor stress was significantly correlated with gender. A negative correlation was found between age and two farm stressors: acts of God (Spearman’s Rho = -.26, $\rho = .002$), isolation (Spearman’s Rho = -.17, $\rho = .041$) and age. A negative correlation was also found between financial hardship and age (Spearman’s Rho = -.24, $\rho = .004$).
Table 3
Associations for age, biological sex, mental health, social support, farm stress and sleep variables

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<thead>
<tr>
<th>Measure</th>
<th>1</th>
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<th>3</th>
<th>4</th>
<th>5</th>
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<th>10</th>
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<td>.33**</td>
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<td>.17*</td>
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<td>.25**</td>
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<td>.14</td>
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<td>.09</td>
<td>-.07</td>
<td>-.10</td>
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<td>.13</td>
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<td>.22**</td>
<td>.21*</td>
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<td>.47**</td>
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<td>-.37**</td>
<td>-.31**</td>
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<td>.16</td>
<td>.18*</td>
<td>.10</td>
<td>.19*</td>
<td>.18*</td>
<td>.46**</td>
<td>.33**</td>
</tr>
</tbody>
</table>

Note: *p<.05, **p<.01
3.4 Analysis 2: Regression modelling for stress

Regression modelling further tested the hypothesis that poor sleep quality would be associated with stress. Kruskal Wallis one way analysis of variance indicated a number of variables were potential predictors of stress. Following multiple regression modelling, a number of variable associations were not significant, subsequently they were excluded. The excluded variables for stress were, satisfaction with life, family, friends, significant other, sleep dysfunction, sleep disturbance, farm bureaucracy, acts of God, personal hazards, time pressure and perceived future in agriculture variables. In the first step of the stress model age was included as a potential predictor as it was significantly associated with stress. In the second step of the model when other key variables were included, age was not significantly related to stress. Hence, it was excluded and the following predictors, insomnia, finance, isolation and general health registered significant impacts on stress (see Table 3). The stress regression model predicted 50% of variance for stress. Insomnia was a key predictor variable, based on beta values it was a stronger predictor of stress than other models.
Table 4

Hierarchical Multiple Regression Modelling Predicting Farmer’s Stress from Risk and Protective Mental Health Factors

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SEB</th>
<th>(\beta)</th>
<th>LL</th>
<th>UL</th>
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<td><strong>Step 1</strong></td>
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<td>.07</td>
<td>.39**</td>
<td>.25</td>
<td>.53</td>
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<td>.28**</td>
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<td>.36</td>
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<tr>
<td>Finance on farm</td>
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<td>.08</td>
<td>-.22**</td>
<td>-.38</td>
<td>-.06</td>
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<td>.09</td>
<td>.38</td>
</tr>
<tr>
<td>Constant</td>
<td>12.76</td>
<td>9.32</td>
<td>95% CI</td>
<td>5.68</td>
<td>31.19</td>
</tr>
</tbody>
</table>

Age: \(R^2 = .04, F(1, 148) = 6.25, \rho = .014\); Step 2: \(R^2 \Delta = .50, F(5, 148) = 25.41, \rho < .001\).

*p<.05. ** p<.01

3.5 Analysis 3: Regression modelling for depression

Regression modelling further tested the hypothesis that poor sleep quality would be associated with depression. Results confirmed the hypothesis that sleep deprivation would be a primary predictor for depression, demonstrating a significant association for sleep problems with both stress and depression. For this model neither age nor gender were confounding variables. Kruskal Wallis one way analysis of variance was undertaken to analyse potential predictors of stress. A number of independent variables were excluded in the final model, including, insomnia, all farm stress subscales and financial hardship variables. The
depression regression model accounted for 59% of variance for depression. In this model, based on beta values general health and sleep dysfunction were key predictors of depression.

Table 5

Multiple Regression Modelling Predicting Depression from Risk and Protective Mental Health Factors for Farmers

<table>
<thead>
<tr>
<th>Predictor</th>
<th>B</th>
<th>SEB</th>
<th>β</th>
<th>LL</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Health</td>
<td>.37</td>
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<td>.38**</td>
<td>.25</td>
<td>.50</td>
</tr>
<tr>
<td>Sleep Dysfunction</td>
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<td>.07</td>
<td>.25**</td>
<td>.13</td>
<td>.40</td>
</tr>
<tr>
<td>Satisfaction with Life</td>
<td>-.20</td>
<td>.07</td>
<td>-.21**</td>
<td>-.35</td>
<td>-.06</td>
</tr>
<tr>
<td>Friends (Social Support)</td>
<td>-.16</td>
<td>.06</td>
<td>-.16**</td>
<td>-.28</td>
<td>-.03</td>
</tr>
<tr>
<td>Constant</td>
<td>53.57</td>
<td>11.02</td>
<td>31.97</td>
<td>75.54</td>
<td></td>
</tr>
</tbody>
</table>

Predictor model: $R^2\Delta = .59$, $F(4, 148) = 50.73$, $p < .001$.

*p < .05. **p < .01

3.6 Analysis 4: Kruskal Wallis Test and Mann Whitney U post hoc analysis

Chi square tests of associations between gender and farming groups were conducted to investigate whether gender was associated with farming types. There were no differences found in farming groups with respect to gender. Table 5 illustrates Kruskal Wallis comparisons between three farmer groups; broad acre cropping, beef cattle and other. Table 5 includes Kruskal Wallis analysis of significant independent and dependent variables. Dependent variables stress and depression were not found to have significant differences between farming groups, therefore no post hoc Mann Whitney U analysis was completed. All other independent variables included in the table demonstrated that a significant difference
existed somewhere between the three farmer types. Mann Whitney U analysis was undertaken to examine where the differences lied between groups. A Bonferonni correction was applied for the number of tests completed in the post hoc comparison ($p = .05/3 = .017$).

It was expected that possible seasonal pressures and time pressure issues on cropping and the ‘other’ farming group would mean these groups would have higher levels of insomnia and sleep dysfunction than beef farmers. In contrast to predictions beef cattle farmers reported higher levels of insomnia ($U = 564.0, p = .007$) and sleep disturbance ($U = 551.5, p = .002$) compared to cropping farmers. Beef farmers self-perception of their own future in farming was also significantly less hopeful than cropping farmers ($U = 14.98, p = .001$). Beef farmers were also less hopeful in the future of Australian farming compared to cropping farmers ($U = 12.55, p = .003$). Although the result was not statistically significant after Bonferonni correction ($U = 603.5, p = .019$) beef farmers satisfaction with life median score was also lower than cropping farmers (Beef $M = 21.00$, Crop $M = 27.50$).
Table 6

**Risk and protective mental health factors for cropping, beef and other farming groups**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Kruskal Wallis Test</th>
<th>Mann-Whitney U Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crop (n = 40)</td>
<td>Beef (n = 43)</td>
</tr>
<tr>
<td>Age</td>
<td>50.5 (20.25)</td>
<td>59 (14)</td>
</tr>
<tr>
<td>Stress</td>
<td>4.5 (4.75)</td>
<td>5.0 (6)</td>
</tr>
<tr>
<td>Depression</td>
<td>2 (3)</td>
<td>3 (6)</td>
</tr>
<tr>
<td>Finance on Farm</td>
<td>12 (8)</td>
<td>13 (9)</td>
</tr>
<tr>
<td>Time Pressure</td>
<td>11 (6)</td>
<td>12 (6)</td>
</tr>
<tr>
<td>Insomnia</td>
<td>6 (7.5)</td>
<td>9 (9)</td>
</tr>
<tr>
<td>Sleep Disturbance</td>
<td>1 (1)</td>
<td>2 (1)</td>
</tr>
<tr>
<td>Future Ag for self</td>
<td>6 (2)</td>
<td>4 (4)</td>
</tr>
<tr>
<td>Future Ag for Australia</td>
<td>6 (3)</td>
<td>4 (4)</td>
</tr>
</tbody>
</table>

**Note.** Kruskal Wallis Test for not normally distributed data followed by Bonferonni corrected ($\rho < .017$) post hoc test (Mann-Whitney U). $n =$ number of participants. Kruskal Wallis Test medians reported with interquartile range in brackets. Future Ag variables relate to farmers self-perception of whether they foresee a future in agriculture for themselves and country.
4. Discussion

This study examined associations between psycho-social and work-related factors, such as sleep deprivation and farming type and farmers’ stress and distress. Work related factors, general financial hardship, financial problems with farm income and isolation were primary predictors of stress. Psychological characteristics, including general health and satisfaction with life were predictive of depression. The hypothesis that predicted greater farm stress would be associated with sleep deprivation was supported. The hypotheses that sleep deprivation would be associated with stress and depression was also tested and supported by this study.

This study compared farmers by primary agricultural sectors, finding important differences in sleep deprivation, perception of future in farming and time pressure. These results demonstrate important differences between key agricultural sectors, supporting the argument for a heterogeneous approach to farmers. It was hypothesised that farming groups such as cropping farmers and small intensive farm operators (poultry, dairy cattle, pork, fruit/vegetable) would report greater difficulty with sleep deprivation. In contrast to predictions, beef farmers experienced poorer sleep deprivation than cropping farmers. Beef farmers also demonstrated less hope and optimism in the future for agriculture both for themselves and the country. It was also found that beef farmers experienced fewer time pressure problems than the ‘other’ farming group that included smaller intensive farm operators and sheep farmers. Cropping farmers were also under less time pressure than the ‘other’ group.

Three sleep variables demonstrated significant associations with a variety of farm stressors. Sleep disturbance (marked by broken sleep at night) was significantly associated with farm bureaucracy. Sleep dysfunction (marked by daytime interference due to fatigue) was significantly correlated with isolation. Finally, insomnia, a key variable in this study was
linked with farm stressors, time pressure and finance. A number of other weaker correlations were also observed between additional sleep variables and farm stress. These findings highlight the importance of sleep factors for mental health, as well as their pertinence to the farming community.

Regression modelling demonstrated insomnia was a key predictor of stress, and sleep dysfunction was a key predictor for depression. These results indicate different aspects of sleep deprivation may play a primary role at different stages of distress. Sleep deprivation appears with night time interference of sleep associated with stress and may evolve to interfere with day and night functioning for depressed farmers. It is difficult to pinpoint exactly when significant sleep problems begin due to fatigue and exhaustion commonly experienced by farmers (Kallioniemi and Kymäläinen, 2012; Kallioniemi et al., 2009). What can be drawn from this study is the decompensating effect of sleep deprivation on functioning, from milder stages of stress to more serious mental health problems such as depression.

These results support findings by Whitman and colleagues (2012) that sleep deprivation is a main component of stress for farmers. Previous research has also demonstrated that insomnia predicts the development of major depression and anxiety disorders in adults (Johnson, Roth, and Breslau, 2006). At the extreme end of this continuum from psychological stress to distress can be suicide (Hounsome, Edwards, Hounsome, and Edwards-Jones, 2012). Traditionally, sleep deprivation or insomnia has been considered a secondary phenomenon to stress and depression (Pigeon et al., 2008). Research has indicated however, that insomnia may well be a primary disorder, potentially prodromal to major psychiatric illness (Pigeon et al., 2008). Results from this study indicate sleep deprivation is the most prominent risk factor associated with stress and depression for this sample of farmers. Whether farmers are exposed to heightened pressures and increased sleep deprivation that likens the risk of psychiatric morbidity remains to be seen. It is clear however from previous studies that farmers
experience distress differently to the general population (Thomas et al., 2003). The combination of unique work-related pressures farmers face, psychological and physical changes that onset with sleep deprivation warrant considering sleep problems a major target of treatment.

This study also found other key predictors of variance in stress and depressive symptoms in a sample of Australian farmers. The final model, which accounted for over half the variance in depressive symptoms revealed that significant predictors included lower levels of general health and satisfaction with life, sleep dysfunction and low levels of support from friends. No farm related stressors were predictors for depression in the final model. It was found that stress and depression were largely independent of gender. Results showed support for age as a potential contributing variable for stress. Although age was found to be positively associated with farmers’ stress, other factors, such as sleep deprivation and financial hardship demonstrated greater relevance.

Studies in farming have drawn links between stressors that contribute to stress symptoms, which can in turn develop into depression or suicide (Lunner Kolstrup et al., 2013; Walker, 2012). The difference between the predictors of stress and depression in the current study is notable. Work-related concerns that act as determinants of stress represent concerns tied with farming. It is undisputed that multi-faceted farming demands are stressors for farmers (Fragar, Henderson et al., 2008; Judd et al., 2006). High workload, time pressure, adverse weather events, hazardous working conditions, economic demands, isolation and government legislation are noted pressures in farming (Deary et al., 1997; Lunner Kolstrup et al., 2013). Fragar, Henderson, et al. (2008) reported that the primary issues farmers struggle with are finance, time, drought/weather, government, physical demands, record keeping skills and family demands. Their study investigated Australian farmers from North West NSW, a similar recruitment location to that used in the current study.
The current study examined a number of farming pressures noted in previous research, including workload (Kallioniemi et al., 2009), time pressure (Fragar, Henderson et al., 2008), acts of God (unpredictable weather events) (Deary et al., 1997), government legislation (Fragar, Henderson et al., 2008), hazardous working conditions (Deary et al., 1997), isolation and financial demands (Armstrong and Schulman, 1990). The results provide information regarding the relative contribution of various farming pressures in explaining the variance in symptoms of stress. Only farm stressors, finance and isolation were significant predictors of stress for farmers. Previous research indicated that farm bureaucracy, the farm stress subscale of the EFSI was the most significant farm stress noted by farmers (Deary et al., 1997). Farm bureaucracy showed positive associations with farmers’ stress as measured by psychological stress, however the subscale was not a strong predictor in the final stress model for this study. This may be due to the demonstrated relevance of the other key farm stress subscales, such as finance problems on farm with psychological stress. The current study’s findings that financial problems and isolation were strongly predictive of stress, add a unique contribution to current literature regarding mental health of Australian farmers. Research is consistent with previous research from the UK, which also identified the contributions of economic issues and isolation to stress, albeit with non-farming rural populations (Lobley, Johnson, Reed, Winter, and Little, 2004).

Findings in this study link diminished confidence, social dysfunction and decreased satisfaction with life with depression for farmers. These results are similarly echoed by Hogan et al. (2012) appraisal that shame, social dysfunction and diminished confidence is experienced by some farmers, often in the context of financial problems. Loss of confidence can mean the individual avoids support and disconnects from others, making it difficult for others to perceive or acknowledge the difficulties they face. These reactions in the face of ongoing shocks such as finance constraints and isolation can then further intensify shame and withdrawal. This can have a profound impact on mood and be a trigger for contemplation of
psychological distress or suicidal thoughts or behaviour (Hogan et al., 2012). A plausible explanation for this disengagement, particularly with a trigger such as financial problems for the individual farmer is they may blame themselves rather than other potential explanations, such as drought, global events or policy responses (Alston, 2012). Farmer responses in this survey also reflect a similar pattern. As one participant reported, “The farm financial situation and weather conditions and how both affect property management and stock welfare create constant worry, which translates into poor and erratic sleeping (which in turn affects one's mental and physical performance and sometimes self-esteem).”

The experience of beef farmers in reported higher levels of sleep deprivation than cropping farmers and somewhat greater financial hardship warrants further attention. Beef farmers also experience less optimism in the future of farming for themselves and the country and somewhat lower levels of satisfaction with life. The differences revealed between beef and cropping farmers must be evaluated in the context of the recruitment period. During this time rainfall was below average and even the lowest on record in some areas sampled. Both cropping farmers and beef farmers were exposed to unseasonal weather patterns. A key farming stakeholder report, produced by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES, 2015), report that significant cash flow shortages and reduced equity have impacted cropping, beef and dairy farmers alike.

A number of comments by beef farmer participants from this study reflected concerns with terms of trade, including, “major concerns are weather affecting water and feed for cattle and ultimately marketability of weaners; markets affecting sale prices of cattle” and “Beef prices are as low as they were 30 years ago.” Another participant stated, “Declining terms of trade is another gradual stress inducer, though somewhat like the old boiling the frog story, and we don't realise that we're cooked until it's too late.” Terms of trade has also been suggested as a major predictor for male farmer suicide (Page and Fragar, 2002). From 1988 to
1997 the male farmer suicide rate increased from 24.8 to 51.4 per 100,000 while at the same time the terms of trade index declined from 100 to 82.

The current finding that financial problems are a major predictor of psychological stress for farmers is consistent with previous research (Armstrong and Schulman, 1990). The recent ABARES (2015) agricultural commodities report revealed stark differences in terms of trade between key farming groups beef, cropping and sheep specialists (Australian Bureau of Agricultural and Resource Economics and Sciences, 2015). The profitability of specialist beef farmers in comparison to specialist cropping farmers has been markedly lower for much of the past four decades (Australian Bureau of Agricultural and Resource Economics and Sciences, 2015). Changing trends with commodities and seasonal influences should be closely followed in future studies.

4.1 Limitations

Based on power analyses the present sample size was adequate for the multiple regression analyses. However the sample size for between-groups’ analyses was small, resulting in reduced power for these analyses. A small sample size limits the confidence with which potential cause-effect relationships could be described. In addition, participants were self-selected, and might not be representative of all farmers. For example, the study might have appealed to farmers with a specific interest in the topic of farming and mental health. Future research may address these limitations with a larger random sample and a longitudinal design with repeated measures. Given the widespread geography of farmers, difficulty to access and over sampling in the population already, this would require a significant research effort.

It is worth considering, particularly with farming, the time of year a sample is taken. Generic measures offer a snapshot of farm stress and depression symptoms that limits the extent to which a study can capture transient stressors in farming (LaBrash et al., 2008). This time period also reflected significant strains in terms of trade, particularly within the beef
industry (ABARES, 2015). The economic climate has changed and recent conditions have improved (mid to late 2014) in terms of weather and commodity prices for the cropping and beef sectors (ABARES, 2015).

4.2 Implications

The current study found that psycho-social and work related influences in the development of psychological stress and depression in farmers. This study has identified the key role of sleep deprivation on farmer mental health. Sleep deprivation was a significant contributor to both stress and depression. Particular focus on the physiological and psychological mechanisms associated with sleep deprivation, which may elevate risk of stress and depression, is recommended. This would be a useful starting point for GP consultations and rural mental health organisations starting a conversation with farmers about mental health; as sleep deprivation is both a critical component of distress and for farmers a potential reason for help-seeking (Booth et al., 2000). It is recommended that psycho-education and training is disseminated to promote awareness of the link between farmers’ sleep difficulties and their mental health. It is an imperative that frontline treatment by health professionals incorporates effective assessment and intervention for sleep disturbance, including screening for stress and depression.

This study has implications for both broad health policy and targeted individual interventions. The farming sector has been under increasing pressure with prolonged drought, declining terms of trade, rural to urban population decline and a loss of social capital (ABARES, 2015; Hart et al., 2011; Tonna et al., 2009). These results reflect this increasing pressure on farmers. Previous literature recognises the impact of unseasonal weather changes on the financial resources of farmers (Judd et al., 2006; Fraser et al., 2005). However, it is recommended that future research should also include a focus on differences between farming groups, investigating, terms of trade, mental health and farm stress. Various agricultural industries have been impacted by external influences such as coal seam gas exploration,
mining, native vegetation legislation and livestock trade limitations over recent years (Byron et al., 2014; Moffatt and Baker 2013; Schoenmaker and Alexander, 2012). Workshops and education could be targeted at agricultural industries under considerable pressures, such as beef farmers and small intensive farm operators (vegetable/fruit, dairy etc.). Specific themes should include management of sleep deprivation and mental health and support for those struggling with financial difficulty.

5. Conclusion

The current study reflects the contribution of psycho-social and work related pressures to stress and depression in farmers. The current study provides a unique insight into the cropping and beef cattle farming industry within Australia. The current study also provides the first comprehensive investigation of sleep deprivation alongside other key psycho-social stressors for a sample of farmers in Australia. Beef farmers demonstrated significantly higher levels of sleep deprivation and less optimism for a future in farming than cropping farmers. Key farm stressors predicting stress and depression were identified as finance problems and isolation. Lack of sleep was also a major predictor of significant distress for farmers. Therefore, clinical services must anticipate that farmers may present with primarily sleep-related problems and somatic complaints which may signal underlying stress or depression.
References


Labrash, L. F., Pahwa, P., Pickett, W., Hagel, L. M., Snodgrass, P. R. and Dosman, J. A. 


Stress and depression in farming


Extended Discussion

The current study examined how psycho-social and work-related factors, including sleep deprivation and farming type were associated with farmer’s stress and distress. Sleep deprivation was a prominent predictor of both stress and depression. Work related factors, general financial hardship, financial problems with farm income and isolation were also primary predictors of stress. Psychological characteristics, including general health and satisfaction with life were predictive of depression. There were critical differences between key agricultural sectors, supporting the argument for a heterogeneous approach to farmers rather than a “one size that fits all” approach. Differences between Beef, Cropping and ‘Other’ farming groups were observed in sleep, satisfaction with life, finance, perception of future in farming and time pressure.

Stress depression continuum

This paper has established key predictors of variance in stress and depressive symptoms in a sample of Australian farmers. The study aimed to identify what potential stressors may precipitate mental decompensation to depressive symptoms. Kruskal Wallis one way analysis of variance presented several potential farm stress predictors of depression. However, further regression modelling revealed that many of these farm stress factors were not significant in a final model, which accounted for 59% of the variance in depressive symptoms. It was found that stress and depression were largely independent of biological sex. Results showed support for age as a potential contributing variable for stress. However, when age was included in hierarchical multiple regression analysis it became non-significant in the final model, which accounted for 50% variance of stress.

The predictors of stress and depression in this study are suggestive of a process that may unravel as the individual farmer experiences stress, and then depression. Studies in farming have drawn links between stressors that contribute to stress symptoms, which can in turn develop into depression or suicide (Lunner Kolstrup et al., 2013; Walker, 2012). In the current
study, stress had key associations with sleep deprivation and work related factors, finance and isolation. Depression was also associated with sleep deprivation but other key predictors were driven by individual characteristics. The difference between the predictors of stress and depression is notable. Work-related concerns that are associated with stress represent concerns tied with farming. It is undisputed that multi-faceted farming demands are stressors for farmers. High workload, time pressure, adverse weather events, hazardous working conditions, economic demands, isolation and government legislation are noted pressures in farming (Deary et al., 1997; Lunner Kolstrup et al., 2013). Fragar, Henderson, et al. (2008) reported that the primary issues farmers struggle with are finance, time, drought/weather, government, physical demands, record keeping skills and family demands. Their study investigated Australian farmers from North West NSW, a similar recruitment location to that used in the current study.

The current study examined a number of farming pressures noted in previous research, including workload (Kallioniemi et al, 2009), time pressure (Fragar, Henderson et al., 2008), acts of God (unpredictable weather events) (Deary et al., 1997), government legislation (Fragar, Henderson et al., 2008), hazardous working conditions (Deary et al., 1997), isolation and financial demands (Armstrong & Schulman, 1990). The results from the current study provide information regarding the relative contribution of various farming pressures in explaining the variance in symptoms of stress. As mentioned, only farm stressors, finance and isolation were found to be key predictors of stress for farmers. Previous research indicated that farm bureaucracy was the most significant farm stress noted by farmers (Deary et al., 1997). Although farm bureaucracy was the second highest farm stress in the current study, it was not significant as a predictor for either stress or depression. The current study’s findings that financial problems and isolation were strongly predictive of stress, add a unique contribution to current literature regarding mental health of Australian farmers. Research is consistent with previous research from the UK, which also identified the contributions of
economic issues and isolation to stress, albeit with non-farming rural populations (Lobley, Johnson, Reed, Winter, & Little, 2004).

Psychological attributes, such as satisfaction with life and general health were key predictors of depression in the current study. The general health measure, incorporated three factors of general health, social dysfunction, loss of confidence and anxiety/depression. Social dysfunction, loss of confidence, anxiety/depression and satisfaction with life are intrinsic features that are strongly linked with identity (Hogan et al., 2012). Hogan et al. (2012) argued that persistent physical or psychological shocks in farming can destabilise or rupture the sense of identity for a farmer. A loss of confidence can arise from a loss of predictability in everyday life that is linked to the stability of social identity. This predictability in farming may be challenged by financial problems, isolation, socioeconomic disadvantage and climate unpredictability (Hogan et al., 2012). Kelly et al. (2011) similarly reported that the chief determinants of distress for rural adults were reflected best by individual level attributes and perceptions, rather than district level rural characteristics.

Considering these previous findings, outcomes for depressive symptoms could be associated with a damaged view of one’s own identity. The connection between stress and depression, may be exacerbated by financial and isolation barriers that persist they are ultimately detrimental to the farmers own sense of self. A theory might be, that if a threshold for depression has been reached, the original farm stressors that were associated with stress, may become far less important than the psychological changes of social withdrawal, reduced confidence and decreased satisfaction with life. Therefore, it might be that the appraisal of precipitating stressful events such as financial burden or isolation and the resulting shifts in self-concept may actually be the chief link with depression rather than the event itself.

The importance of to the farmer’s identity has been well established, as farmers cite generational farming and succession planning as major challenges (Kennedy et al., 2014). This self-concept can be a major incentive to keep farming, thereby preserving a heritage out
of an attachment to the land (Gullifer & Thompson, 2006). Farmer identity is closely aligned with the business of farming, in particular financial feasibility. Threats to the financial viability of the farm can challenge identity, family tradition and feelings of self-worth (Fraser et al., 2005).

Work related stressors appear to be a key factor that predict stress. However, this does not necessarily translate to depression. The changing nature of physiological and psychosocial influences from stress to depression in this study, allow a positive reframe that can be offered for farmers. Severe farm stressors may well be managed in an effective way that does not lead to serious distress or depression.

*The impact of sleep deprivation on farmer’s distress*

The hypothesis that sleep deprivation would predict greater farm stress was supported by the current study. Three key sleep variables demonstrated significant associations with a variety of farm stressors. Sleep disturbance (marked by broken sleep at night) was significantly associated with farm bureaucracy. Sleep dysfunction (marked by daytime interference due to fatigue) was significantly correlated with isolation. Finally, insomnia, a key variable in this study was linked with farm stressors, time pressure and finance. A number of other weaker correlations were also observed between sleep variables and farm stress.

The differential associations between forms of sleep deprivation and type of farm stressors may indicate a unique process in the development of sleep difficulties. The stress of farm bureaucracy may well be a task that is undertaken outside the boundaries of conventional farm work during the day. As the working day extends to later hours in the day, farm bureaucracy demands may be considered a secondary priority to day-time tasks on farm. Hence, as an activity undertaken at night it might be possible a form of night time sleep disturbance might occur. For example, questions that may be relevant to after hour activities in this farming subscale ask about stress associated with “filling in government forms” and “keeping up with new technology and procedures.” The role of farm stress isolation with
sleep deprivation in contrast, has been found to markedly impact daytime fatigue. In the current study isolation also had a key association with depression. This may warrant consideration as to whether isolation, due to its association with depression may involve a deficit in day and night sleep functioning. Sleep deprivation symptoms in major depressive disorder include, both a change in sleep patterns and fatigue or loss of energy (DSM-5).

The broader hypothesis that sleep deprivation would predict stress and depression was also supported by the current study. Regression modelling demonstrated insomnia was a key predictor of stress and sleep dysfunction a key predictor for depression. These results suggested that different aspects of sleep deprivation may play a primary role at different stages of distress. Sleep deprivation appears to begin primarily with night time interference of sleep with stress and may evolve to interfere with day and night functioning for depression in farmers. It is difficult to pinpoint exactly when significant sleep problems begin due to the underlying fatigue and exhaustion commonly experienced farmers (Kallioniemi & Kymäläinen, 2012; Kallioniemi et al., 2009). What can be drawn from this study is the decompensating effect of sleep deprivation on functioning, from milder stages of stress to more serious mental health problems such as depression.

These results support findings by Whitman and colleagues (2012) that sleep deprivation is a main component of stress for farmers. Previous research has also demonstrated that insomnia predicts the development of major depression and anxiety disorders in adults (Johnson, Roth, and Breslau, 2006). At the extreme end of this continuum from psychological stress to distress can be suicide (Hounsome, Edwards, Hounsome, and Edwards-Jones, 2012). Traditionally, sleep deprivation or insomnia has been considered a secondary phenomenon to stress and depression (Pigeon et al., 2008). Research has indicated however, that insomnia may well be a primary disorder, potentially prodromal to major psychiatric illness (Pigeon et al., 2008). Results from this study indicate sleep deprivation is the most prominent risk factor associated with stress and depression for this sample of farmers. Whether farmers are exposed
to heightened pressures and increased sleep deprivation that likens the risk of psychiatric morbidity remains to be seen. It is clear however from previous studies that farmers experience distress differently to the general population (Thomas et al., 2003). The combination of unique work-related pressures farmers face, psychological and physical changes that onset with sleep deprivation warrant considering sleep problems a major target of treatment.

Lack of sleep has been linked with indecisiveness, poor concentration, chronic tiredness, fatigue and low energy in previous farming studies (Kallioniemi et al., 2009; Parry et al., 2005; Whitman et al., 2012). Existing literature reports that long work hours may be a significant contributor to insomnia (Kallioniemi et al., 2009). Australian farmers work long hours with over 50% of farmers working 49 hours or more a week (ABS, 2012). This means Australian farmers may be at increased risk of fatigue and insomnia (Kallioniemi et al., 2009). This study found however there was no link between the number of hours worked on average in a week and lack of sleep. Similarly, an association was not found between number of hours worked and stress or depression. Therefore, results do not support the notion that male farmers may necessarily overinvest in work to mask feelings of stress or depression (Roy et al., 2013). Factors that influence stress, depression and sleep deprivation for farmers in this sample are more likely to be related to other farm stress factors and psycho-social triggers.

The impact of financial problems on farmer distress

In this study hypothesis was confirmed that unique farm stressors would be associated with stress and depression. Interestingly, finance and isolation were the only farm stressors that were major predictor for stress in the final hierarchical multiple regression model. This finding was consistent with previous research demonstrating a link between financial hardship and farmers stress and depression (Armstrong & Schulman, 1990; Lunner Kolstrup et al., 2013; Walker, 2012). No farm stressors were predictors of depression. However, predominantly environmental factors were predictors for stress and psychological factors
were predictors for depression. This may indicate a process of distress in farmers that is uniquely related to work pressures.

Theories of distress in farming help to understand how work related stressors and psychological changes unfold (Hogan et al., 2012). Hogan et al. (2012) suggests major economic pressures have increased on farmers due to the declining value of agriculture to Australia sustained by low commodity prices and climate challenges. Financial stress has been well-established as a primary cause for stress, depression and suicide for farmers (Armstrong & Schulman, 1990; Edwards et al., 2015; Roy et al., 2013). Hogan et al. (2012) argued that financial difficulty may lead to a sense of shame, resulting in social withdrawal. Similarly, Alston (2012) states that in the face of difficulty or embarrassment farmers isolate themselves from their networks.

Results from the current study support Hogan et al. (2012) appraisal that financial problems may be linked with shame and withdrawal behaviours, expressed through diminished confidence, social dysfunction and decreased satisfaction with life. A loss of confidence may have implications for how an individual engages with supports or friends. A disconnects from others, can make it difficult for others to perceive or acknowledge the difficulties faced by the individual. Hogan et al. (2012) suggest that these reactions to on-going shocks such as finance constraints and isolation can further intensify shame and withdrawal. This can have a profound impact on mood and be a trigger for psychological distress and suicidal thoughts (Hogan et al., 2012). A plausible explanation for this disengagement, is that a farmer engages in internalising self-blame for adverse events explanations such as drought, global events or policy responses (Alston, 2012). Farmer responses in the current research revealed a similar pattern. As one participant stated, “The farm financial situation and weather conditions and how both affect property management and stock welfare create constant worry, which translates into poor and erratic sleeping (which in turn affects one's mental and physical performance and sometimes self-esteem).”
Interestingly, current study findings also suggest that the older age of farmers was associated with decreased financial hardship and less stress concerning unpredictable events on the farm. There was no difference observed regarding age and depression, however increased stress was associated with younger farmers. A possible conclusion that could be drawn is that older farmers become more resilient through their experiences. The average age of Australian farmers is now 58 years, comparatively older than most other working professions (Garnham & Bryant, 2014).

Given these findings and the ageing of the farmer population, the current study brings into question a recent increasing focus on the mental health of older male farmers (Garnham & Bryant, 2014; Polain, Berry, & Hoskin, 2011). Garnham and Bryant (2014) highlighted problems with older farmer’s mental health, drawing on Page and Fragar's (2002) study that identified a higher rate of suicide in farmers aged over 60 years (106 suicides per 100,000 in 1997). However, Page and Fragar (2002) also reported that agricultural labourer’s suicide rates peaked at 127 per 100,000 in 1989. Assertions that older farmers have worse mental health outcomes is also contradicted in a study by Kallioniemi et al. (2009) who found older farmers aged 55-64 years have a better state of mental health than their younger counterparts. Similarly Gunn et al. (2012) found younger farmers aged 25-54 years experienced significantly higher levels of distress than those in the 55-64 age group. Based on findings in the current study, any future age based research of farmers should take into account farmers’ exposure to financial difficulty and resilience to farm pressures such as extreme weather events.

*The impact of isolation and social support on farmer distress*

The current study supported Alston's (2012) recognition that isolation is associated with stress. However, in contrast to Alston’s, assertion “despair causes them to isolate themselves” (pp. 519), the current study’s findings suggest that isolation and reduced social support are key predictors through both stress and depression stages of distress. Previous studies have
established that depression is associated with withdrawal and isolation (Alston, 2012). This is a unique finding in that for the majority of farmers overall in the study, isolation was the least severe “farm stress” on mean scores. However when included in the stress model it was a significant predictor. Therefore, farmers experiencing psychological stress are impacted by isolation, whereas those who don’t experience psychological stress find isolation of relatively little importance. The burden of isolation was reflected in the opinion of farmers on farming and mental health. Comments included, “Most farmers feel isolated and not cared about by the general population especially in the cities or coastal regions. We are a tough mob and use to doing what needs to be done no matter how long it takes or how it impacts our social life or health” and “A lot of farmers work in isolation and often alone. Most don't mind that however, from time to time we all need company and reassurance for our psychological wellbeing.”

Perceived social support from friends was also a key predictor in the depression model, indicating the importance of social support as a protective factor for depression. Other social support constructs, significant other (close friend or partner) and family were not significant in the final depression or stress model. Handley et al. (2012) reported that in rural Australian communities, lower perceived availability of social support and lower sense of belonging were associated with distress. Attempting to engage social supports to counter isolation may meet a number of obstacles when distressed. A particular challenge to seeking social support is addressing reduced motivation or energy and negative thinking when depressed. As discussed earlier, sleep deprivation can also complicate depressive symptoms due to increased day time fatigue (sleep dysfunction). As difficulty with fatigue and concentration persist the individual may have reduced motivation to seek appropriate supports. The individual farmer instead, may seek other coping strategies such as alcohol, to deal with problems through withdrawal and avoidance (Gunn et al., 2012). This could further perpetuate the negative view of self, self-defeated attitude and feelings of worthlessness (Hogan et al., 2012).
The importance of acknowledging farmer’s heterogeneity

Little previous Australian research has investigated the mental health of farmers with full recognition of the heterogeneity within the farming industry. The current study aimed to address this gap in the literature by investigating whether mental health and sleep quality would differ between various types of farmers due to unique farming pressures. The variation in work role with seasonal fluctuations in farming sectors (such as cropping) and workload issues is well documented (Fetsch, 2014; Labrash et al., 2008; Walker & Walker, 1987). It was hypothesised that farming groups such as cropping farmers and small intensive farm operators (poultry, dairy cattle, pork, fruit/vegetable) would report greater difficulty with sleep deprivation and time pressure on farm. As expected beef farmers experienced less time pressure problems than the ‘other’ farming group that included smaller intensive farm operators and sheep farmers. Cropping farmers were also under less time pressure than the ‘other’ group.

The current study demonstrated that beef farmers experienced worse sleep deprivation than cropping farmers. Beef farmers also demonstrated less hope and optimism in the future for agriculture both for themselves and the country. Importantly, beef farmers satisfaction with life was also less than the cropping group overall and financial hardship was somewhat increased. Satisfaction with life and sleep deprivation were key predictors for stress and depression in this study. This highlights the possibility that beef farmers may be at greater risk of experiencing stress. They may also have a greater risk of depression due to their higher sleep deprivation and somewhat lower satisfaction with life.

The outcomes of the current study must be considered in the context of farming during the recruitment period. During this time rainfall was below average and even the lowest on record in some areas sampled (see Figure 1). Both cropping farmers and beef farmers were exposed to unseasonal weather patterns. A key farming stakeholder report, by the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES, 2015), reports that
significant cash flow shortages and reduced equity have impacted cropping, beef and dairy farmers alike. Therefore, differences in sleep deprivation and perceived future in agriculture between cropping farmers and beef farmer’s cannot be based on climate pressures alone. Alternative explanations for these results need to be considered. Results from this study suggest evidence that farmers should be understood as heterogeneous group and also in the context of environmental conditions in effect at the time of study recruitment.


Note: Below average = rainfall in the lowest 30% of historical totals, but not 10%. Very much below average = rainfalls in the lowest 10% of historical totals

A plausible alternative explanation may be differences in the terms of trade for both sectors at the time the sample was taken. A number of comments by beef farmers from this study reflected difficulty with terms of trade, including, “major concerns are weather affecting water and feed for cattle and ultimately marketability of weaners; markets affecting sale
prices of cattle” and “Beef prices are as low as they were 30 years ago.” Another farmer commented, “Declining terms of trade is another gradual stress inducer, though somewhat like the old boiling the frog story, and we don't realise that we're cooked until it's too late.” Terms of trade has also been brought to attention in mental health literature by Page and Fragar (2002) who suggest terms of trade as a major predictor for male farmer suicide. From 1988 to 1997 the male farmer suicide rate increased from 24.8 to 51.4 per 100 000 while at the same time the terms of trade index declined from 100 to 82.

A key farming stakeholder report, produced by ABARES (2015) has revealed some stark differences in terms of trade between the key farming groups of beef, cropping and sheep specialists. The profitability of specialist beef farmers in comparison to specialist cropping farmers has been markedly lower for much of the past four decades (ABARES, 2015). Profitability as indicated in Figure 2 is measured on the rate of return on total capital (total value capital of farm divided by profit before interest and tax). During the time period 1977-78 to 2012-2013 the average rate of return for beef farmers was 0.3 percent in contrast to 3.2 percent for cropping.

As mentioned, current research findings indicate the major role financial problems contribute to psychological stress. Although significant differences in financial problems were not found between beef and cropping farmers, unseasonal weather conditions negatively impacted both farming sectors. Unseasonal conditions potentially negated the influence differences that terms of trade may have on differences reported with financial problems, due to loss of income to both farming types with drought (ABARES, 2015). Future research should also investigate seasonal patterns when they are above average to understand whether terms of trade differences impact farmer’s reported financial difficulties. Current study results that found beef farmers have higher sleep deprivation, a worse outlook on their farming future and somewhat poorer satisfaction with life than cropping farmers may be related to current
terms of trade differences. Results from this study, have certainly resounded beef farmer uncertainty over their own future and the country’s in agriculture at the time of the sample.

Figure 2. Rate of return (%) on capital for beef sheep and crop specialists, 1977-78 to 2012-13 average per farm. Reprinted from ABARES, Agricultural Commodities: March quarter 2015. Retrieved March 31, 2015 from http://data.daff.gov.au/data/warehouse/agcomd9abcc004/agcomd9abcc20150303/AgCommodities201503_1.0.0.pdf Reprinted with permission. Note: Rate of return excludes capital appreciation.

Over the past four decades grain industries (cropping) have exploited more efficient and productive technologies that have increased profits despite declining terms of trade (Australian Bureau of Agricultural and Resource Economics and Sciences, 2015). The beef industry on other hand has had relatively slow structural adjustment and in contrast to the cropping industry beef farms are predominantly owned in smaller ventures (whole farm receipts less than $200 000) that are mostly unprofitable.

Strengths and Limitations

A key strength in this study is between groups analysis of farming groups, with a focus on Australia’s two largest farmer groups, cropping and beef producers. To provide a sample contextually representative of farmers across farming type and population, the survey was distributed electronically via Lime Survey for ease of online access. Although the sample
recruited was not randomised a number of farming organisation across a wide range of farming groups contributed to advertising the survey. This survey was unique in that a $5 contribution to beyondblue was offered as a genuine incentive to participate and also raise awareness of mental health and decrease stigma. Beyondblue is a well-recognised advocate of health issues in the farming community. Participants recruited for the sample represented each of Australia’s largest major farming groups including, cropping, beef, sheep, dairy, fruit/vegetable and smaller intensive operations such as pork and poultry.

G*Power analysis was conducted to check statistical power for the analyses used in the current study. The sample size was adequate for the multiple regression analyses. However the sample size for between groups analyses was small, resulting in reduced power for these analyses. Another limitation was the cross sectional survey design of this study, which precludes potential cause-effect relationships that could be described. In addition, the study was self-selected, and might not be representative of all farmers. For example it might be the study appealed to farmers with a specific interest in the topic of farming and mental health. Future research may address these limitations with a larger random sample size and a longitudinal design with repeated measures. Given the widespread geography of farmers, difficulty to access and over sampling in the population already, this would require a significant research effort. Future studies should also be aware of the potential effects of demand or social desirability bias, particularly due to stigma of mental health in rural areas. In the future, a semi structured interview could assist the rigour of the methodology.

Consideration of outcomes must take into account the time of year the sample was taken. Generic measures offer a snapshot of farm stress and depression symptoms that limits the extent to which a study can capture transient stressors in farming (LaBrash et al., 2008). This time frame participants were recruited in reflected significant downtrend in terms of trade, particularly within the beef industry (ABARES, 2015). The economic climate has
changed and recent conditions have improved (late 2014 early 2015) in terms of weather and commodity prices for the cropping and beef sectors.

Finally, if further studies were to build on this research the inclusion of variables that specifically measure unintentional injuries and substance use for farmers may yield useful information. The rate of hospitalisations related physical injury is 1.5 times higher for rural than urban residents and linked with twice the odds of experiencing depressive symptoms (Fragar et al., 2013). This may warrant further attention on the potential impact physical injury has, not just on individuals but also families and communities. Alcohol consumption is another issue that has emerged in rural Australia. High risk alcohol use is significantly higher in farming men and women than the Australian average (Brumby et al., 2013). Research in farming communities also highlights a link between alcohol and psychological distress, obesity and age (Brumby et al., 2013). Hence, these are key variables that might influence stress and depression for farmers.

Implications

The current study found that psycho-social and work related influences in the development of psychological stress and depression in farmers. Predictors of depression in farmers included lower satisfaction with life, diminished confidence and social dysfunction. Lower social support from friends and isolation were predictive of both stress and depression. The key work related predictor for stress was financial difficulty. Financial difficulty clearly defined problems with stress, whereas other farming factors, including unpredictable events, personal hazards, time pressure and even farm bureaucracy did not contribute in a significant way. This study has also added to literature by exposing the key role of sleep deprivation on farmer mental health. Sleep deprivation was a significant contributor both to stress and depression.

Future conceptualisation of farmer distress, particularly within the dimension of farmers’ experience of depression should target intervention specific to these environmental
and psychological demands. Particular focus on the physiological and psychological mechanisms associated with sleep deprivation, which may elevate risk of stress and depression, is recommended. Sleep deprivation is a critical component of distress and for farmers a potential reason for help-seeking (Booth et al., 2000). This provides an opportunity for dissemination of psycho-education and training to promote awareness of the link between farmers’ sleep difficulties and their mental health. It is imperative that frontline treatment from health professionals for sleep deprivation in farming thoroughly investigate contextual when considering the most effective intervention for sleep disturbance.

Effective treatment strategies for sleep deprivation should be endorsed by mental health organisations and GP’s working with farmers. Traditionally, pharmacological treatments have been first preference for treatment of insomnia (Trauer et al., 2015). Recent advances in treatment of sleep disorders have now underlined the importance of psychological therapies, such as Cognitive Behavioural Therapy for insomnia (CBT-i). CBT-I is considered first-line treatment, as it is preferred by patients because of side effects with drug therapy (Trauer et al., 2015). Typically, CBT-I has been delivered through standard care routes utilising weekly face to face sessions. Due to the improvement in new technologies opportunity now exists to deliver therapy such as CBT-i through e-health applications online (Cockayne et al., 2015). A perceived additional benefit is research that has found that internet based CBT-i has demonstrated efficacy and acceptability in males who are less likely to help-seek than females in standard care environments, such as mental health settings (Cockayne et al., 2015). The majority of farmers are male and are often limited to what mental health resources they can access, due to isolation and rural inhabitancy. Therefore, e-health treatment for sleep deprivation and even stress and depression, may be worth future investigation as a treatment mode in the farming population.

This study has implications for both broad health policy and also for targeted individual interventions. The farming sector has been under increasing pressure with prolonged drought, declining terms of trade, rural to urban population decline and a loss of social capital
(ABARES, 2015; Hart et al., 2011; Tonna et al., 2009). These results reflect this increasing pressure on farmers. Previous literature recognises the impact of unseasonal weather changes on the financial resources of farmers (Judd et al., 2006; Fraser et al., 2005). However, it is recommended future research should also include a focus on differences between farming groups, investigating, terms of trade, mental health and farm stress. Various agricultural industries have been impacted by external influences such as coal seam gas exploration, mining, native vegetation legislation and livestock trade limitations over recent years (Byron et al., 2014; Moffatt & Baker 2013; Schoenmaker & Alexander, 2012). The farming sector in Australia is also under considerable pressure globally when compared to other countries support of their agricultural industries.

Developing direct access services that are adept at dealing with the unique pressures farmers face is necessary. Previous research has members of rural and remote communities seek specialist mental health service and GP support for psychological problems at a much lower rate than member of non-rural communities (Judd et al., 2006). This pattern has been attributed to either the lack of availability of services or a broader culture that dissuades people from acknowledging emotional difficulty (Judd et al., 2006). There is a call to develop effective outreach interventions beyond traditional GP/hospital settings (Roy et al., 2014).

Current strategies for intervention incorporate education and awareness through farming mental health organisations. This has some merit however staff employed in these organisations often do not have a specialised understanding of farm pressures (Kiem et al., 2010).

Evidence based research has highlighted the importance of early intervention with mental health and the need to target predictors of distress as intervention at later stages can become more complicated (Australian National Mental Health Commission, 2014). Yet, according to the Australian National Mental Health Commission (2014) current rural mental health services are not adequately resourced to deal with rural mental health issues. To
counteract it is recommended that adequate financial and counselling resources could be flexibly targeted at agricultural sectors and locations under strain. An efficient use of resources could engage multi-disciplinary input from psychologists, psychiatrists and specialised financial counselling services. Creating “one stop shops” in rural centres that can provide outreach yet also tele-link to particular sites or services may help provide more comprehensive coverage to farmers struggling under the weight of mental illness, isolation and financial difficulty. This could appeal to farmers, particularly if these services exclusively dedicated resources to farming, by placing well equipped mental health professionals in rural areas. These clinicians would then be an accessible source of expertise for other local professionals, such as GP’s, agribusiness bankers, accountants, agronomists who regularly come into contact with farmers.

Finally, future research and intervention will need to much more acutely aware of the sensitivity in agricultural sectors to unique shocks and stressors (Hogan et al., 2012). Particular pressures in particular farming sectors will potentially increase the risk of that population to psychological problems, at worst suicide (Bryant & Garnham, 2015). Government funding, may then, be well invested toward programs and services that continue to decrease stigma of mental health in rural communities. Intervention from services already well recognised, such as beyondblue or the Black Dog Institute could outreach to farmers through key agricultural field days and farming organisations. Importantly, reticence in help seeking due to stigma might be less confronting through an organisation with established credibility (Roy et al., 2014).

Conclusion

The current study reflects the importance of psycho-social and work related pressures with stress and depression in farmers. Key farm stressors for stress and depression were narrowed to finance and isolation problems. The critical role sleep deprivation interplays with farm related stressors cannot be ignored. Lack of sleep is a major antecedent to significant
distress for farmers. Physiological and somatic factors associated with sleep may also play a role from stress to depression. The delivery of clinical services must anticipate the importance of farmers presentation tied with physical and somatic complaints and potential for underlying stress/depression.

The link between internalised psychological symptoms and depression is of paramount importance. At the stress stage externally related farm related problems are of primary concern. However once the threshold for clinical depression has been reached, reduced confidence, increasing social dysfunction and a general dissatisfaction become prominent. The process of how stress transforms into depression needs to be further investigated in the context of relational pressures, identity and attachment with land and rural culture. Current financial constraints in many agricultural sectors due to declining terms of trade and unseasonal weather patterns present the opportunity to reframe difficulties in terms other than self-blame. Future research should also consider what protective factors allow farmers a sense of control and hope in the face of adversity.

Further intervention in farming mental health must work to understand the industry’s dynamic challenges in each primary sector, including beef, cropping, sheep, dairy and fruit/vegetable production. Global and local markets impact terms of trade and can pass on unique pressure and challenges to each sector. Australian farming mental health research and intervention is lacking credibility and relevance to farmers as key issues in farming sectors have not been adequately addressed (Hogan et al., 2012; Kennedy et al., 2014). Coal seam gas/mining battles, native vegetation legislation, price squeezes from major supermarket chains and declining recognition of the importance of agriculture to the national interest has left farmers more vulnerable to stress (ABS, 2012; Byron et al., 2014; Keith, 2012; Moffatt & Baker 2013).

Mental health delivery and intervention should seek to meet the challenges of advocating for farmers, build awareness and decrease stigma of mental health, whilst
providing evidence based education/intervention relevant to farmer’s needs. For this to happen, individuals with clinical expertise and a background experience unique to the rural context must be employed in rural mental health services. Clinical intervention needs to address key somatic complaints, namely sleep deprivation in the context of financial and isolation pressures on farm. Government policy must be geared towards helping vulnerable farming sectors that are exposed adverse terms of trade and unseasonal weather patterns such as drought. Currently, there is not enough being done to act in the best interest of farmers.
References


Appendix A: Ethics Approval
HUMAN RESEARCH ETHICS COMMITTEE

Notification of Expedited Approval

| To Chief Investigator or Project Supervisor: | Doctor Keith Harris |
| Cc Co-investigators / Research Students: | Mr Andrew Wilkinson |
| Re Protocol: | The effect of sleep and occupational stress in farming: Implications for mental health |
| Date: | 03-Feb-2014 |
| Reference No: | H-2013-0418 |
| Date of Initial Approval: | 31-Jan-2014 |

Thank you for your Response to Conditional Approval (minor amendments) submission to the Human Research Ethics Committee (HREC) seeking approval in relation to the above protocol.

Your submission was considered under Expedited review by the Chair/Deputy Chair.

I am pleased to advise that the decision on your submission is Approved effective 31-Jan-2014.

In approving this protocol, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the National Statement on Ethical Conduct in Human Research, 2007, and the requirements within this University relating to human research.

Approval will remain valid subject to the submission, and satisfactory assessment, of annual progress reports. If the approval of an External HREC has been "noted" the approval period is as determined by that HREC.

The full Committee will be asked to ratify this decision at its next scheduled meeting. A formal Certificate of Approval will be available upon request. Your approval number is H-2013-0418.

If the research requires the use of an Information Statement, ensure this number is inserted at the relevant point in the Complaints paragraph prior to distribution to potential participants You may then proceed with the research.

Conditions of Approval

This approval has been granted subject to you complying with the requirements for Monitoring of Progress, Reporting of Adverse Events, and Variations to the Approved
Protocol as detailed below.

PLEASE NOTE:
In the case where the HREC has “noted” the approval of an External HREC, progress reports and reports of adverse events are to be submitted to the External HREC only. In the case of Variations to the approved protocol, or a Renewal of approval, you will apply to the External HREC for approval in the first instance and then Register that approval with the University's HREC.

6. Monitoring of Progress

Other than above, the University is obliged to monitor the progress of research projects involving human participants to ensure that they are conducted according to the protocol as approved by the HREC. A progress report is required on an annual basis. Continuation of your HREC approval for this project is conditional upon receipt, and satisfactory assessment, of annual progress reports. You will be advised when a report is due.

- Reporting of Adverse Events

1. It is the responsibility of the person first named on this Approval Advice to report adverse events.
2. Adverse events, however minor, must be recorded by the investigator as observed by the investigator or as volunteered by a participant in the research. Full details are to be documented, whether or not the investigator, or his/her deputies, consider the event to be related to the research substance or procedure.
3. Serious or unforeseen adverse events that occur during the research or within six (6) months of completion of the research, must be reported by the person first named on the Approval Advice to the (HREC) by way of the Adverse Event Report form (via RIMS at https://rims.newcastle.edu.au/login.asp) within 72 hours of the occurrence of the event or the investigator receiving advice of the event.
4. Serious adverse events are defined as:
   - Causing death, life threatening or serious disability.
   - Causing or prolonging hospitalisation.
   - Overdoses, cancers, congenital abnormalities, tissue damage, whether or not they are judged to be caused by the investigational agent or procedure.
   - Causing psycho-social and/or financial harm. This covers everything from perceived invasion of privacy, breach of confidentiality, or the diminution of social reputation, to the creation of psychological fears and trauma.
   - Any other event which might affect the continued ethical acceptability of the project.
5. Reports of adverse events must include:
   - Participant's study identification number;
   - date of birth;
   - date of entry into the study;
   - treatment arm (if applicable);
   - date of event;
   - details of event;
   - the investigator's opinion as to whether the event is related to the research procedures; and
   - action taken in response to the event.
6. Adverse events which do not fall within the definition of serious or unexpected, including those reported from other sites involved in the research, are to be reported in detail at the time of the annual progress report to the HREC.
Variations to approved protocol

If you wish to change, or deviate from, the approved protocol, you will need to submit an Application for Variation to Approved Human Research (via RIMS at https://rims.newcastle.edu.au/login.asp). Variations may include, but are not limited to, changes or additions to investigators, study design, study population, number of participants, methods of recruitment, or participant information/consent documentation. Variations must be approved by the (HREC) before they are implemented except when Registering an approval of a variation from an external HREC which has been designated the lead HREC, in which case you may proceed as soon as you receive an acknowledgement of your Registration.

Linkage of ethics approval to a new Grant

HREC approvals cannot be assigned to a new grant or award (ie those that were not identified on the application for ethics approval) without confirmation of the approval from the Human Research Ethics Officer on behalf of the HREC.

Best wishes for a successful project.

Professor Allyson Holbrook

Chair, Human Research Ethics Committee

For communications and enquiries:

Human Research Ethics Administration

Research Services
Research Integrity Unit
The Chancellery
The University of Newcastle
Callaghan NSW 2308
T +61 2 492 17894
F +61 2 492 17164
Human-Ethics@newcastle.edu.au


Linked University of Newcastle administered funding:

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<th>Funding project title</th>
<th>First named Investigator</th>
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Appendix B: Information sheet and exit page
Information Statement

Andrew Wilkinson/Keith Harris
School of Psychology
Faculty of Science and Information Technology
University of Newcastle
Callaghan NSW 2308
0429 955 727
a.j.wilkinson@uon.edu.au

Information Statement for the Research Project:
The Effect of Sleep and Occupational Demands in Farming: Implications for Mental Health
Document Version 1; dated 24/1/14

You are invited to participate in the research project identified above which is being conducted by Andrew Wilkinson from the School of Psychology at the University of Newcastle in partial fulfilment of his Doctor of Clinical Psychology Degree. The project is being supervised by Dr Keith Harris and Dr Sean Halpin from the School of Psychology at the University of Newcastle.

Why is the research being done?
The purpose of the research is to investigate sleep patterns and occupational demands that may influence mental health and suicidal behaviours in farming.

Who can participate in the research?
Any farmer or agricultural worker.

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.

If you do decide to participate, you may withdraw from the project at any time without giving a reason, data however cannot be withdrawn once survey responses are submitted.

What would you be asked to do?
If you agree to participate, you will be asked to fill in an online survey with a range of questions on sleep, farming demands, mental health and suicidal behaviours.

How much time will it take?
The online survey will take approximately 15-20 minutes to complete.

What are the risks and benefits of participating?
There are no foreseeable risks however the survey will contain questions of a sensitive and personal nature. Your choice to participate in the study will contribute to the research on improving mental health outcomes in farming. For every participant in the survey a small amount of money will be donated to Beyond Blue. Beyond Blue are actively involved in promoting awareness, support and treatment for mental health issues in rural areas.

If you feel at significant distress at any time during the survey we encourage you to contact Beyond Blue on 1300 78 99 78.
**How will your privacy be protected?**

All information is strictly anonymous. No identifying information will be collected. The survey instrument and data will be stored on a secure database for a minimum of five years, with restricted access, at the School of Psychology, University of Newcastle. Only members of the research team will have access to data collected.

**How will the information collected be used?**

The findings may be published in academic journals, presented at professional conferences, and presented at community seminars. In addition, some data will be used as part of Andrew Wilkinson’s theses. Individual participants will not be identified in any reports arising from the project.

A summary of the study results will be made available through the School of Psychology, or through provided by the researchers involved. You can directly receive a summary of study results by emailing Andrew Wilkinson at a.j.wilkinson@uon.edu.au

**What do you need to do to participate?**

Please read this Information Statement and be sure you understand its contents. If there is anything you do not understand, or you have questions, contact the researcher.

If you would like to participate, please click “NEXT” to begin the online survey.

**Further information**

If you would like further information please contact Andrew Wilkinson via email at a.j.wilkinson@uon.edu.au. Alternatively you can contact Dr Keith Harris at esensei@yahoo.com or Dr Sean Halpin at sean.halpin@newcastle.edu.au

Thank you for considering this invitation.

Andrew Wilkinson  
Clinical Doctorate Student

Dr Sean Halpin  
Primary Supervisor

Dr Keith Harris  
Secondary Supervisor

**Complaints about this research**

This project has been approved by the University’s Human Research Ethics Committee, Approval No. H- 2013-0418

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
Thank You!

Your responses will be of great help in our understanding of sleep, occupational demands and mental health in farming. This information will be particularly useful in helping people in distress.

If you are feeling distressed or suffering any personal problems, please seek help!

When feeling distressed, others have found the following to be useful:

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<th>Phone</th>
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<td>1300 22 4636</td>
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<td>Man Therapy Website</td>
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<td>1300 22 26 38</td>
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<td>NSPL</td>
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<td>1 800 273 8255</td>
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<td>Suicide Call Back Service</td>
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<td>Australia</td>
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If you are having any distressing thoughts you can also contact the researcher Andrew Wilkinson on 0429 955 727 or a.j.wilkinson@uon.edu.au. Alternatively you can contact Keith Harris at keith.harris@newcastle.edu.au or Sean Halpin at sean.halpin@newcastle.edu.au
Appendix C: Recruitment Flyer
Research Supporting Farmers

Online survey- proudly supporting beyondblue

Farmers are asked to complete an anonymous, short online survey to contribute to research at the University of Newcastle. For each survey completed $5 will be donated towards beyondblue from the University of Newcastle.

The research investigates work demands and stress that impact the Australian farmer. It will help understand how farmers cope well with on and off farm pressures and how we can better support those who don't manage as well.

To participate, please enter this address into your internet browser:

http://psych.newcastle.edu.au/farming

Dr. Sean Halpin/Dr. Keith Harris/Andrew Wilkinson School of Psychology
Faculty of Science and Information Technology University of Newcastle
Callaghan NSW 2308 a.j.wilkinson@uon.edu.au

* The Effect of Sleep and Occupational Stress in Farming: Implications for Mental Health
Complaints about this research
This project has been approved by the University's Human Research Ethics Committee, Approval No. H-2013-0418]. 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 D: Beyondblue funding approval
5th August, 2014

Mr Andrew Wilkinson
SCHOOL OF PSYCHOLOGY

Dear Andrew

The Committee considered your funding application and I am pleased to advise that you have been granted $1,000.00 for donation to Beyondblue.

Attached are the following:

1. Postgraduate funding advice – please contact the appropriate person listed on this form for assistance.
2. Report on Postgraduate Funding Support – due within 14 days of completing your purchases, to Sharon Harris. Please note that future requests for funding will not be considered if you have not submitted your report on postgraduate funding support.

Kind regards

Assoc. Professor Frances Martin
Appendix E: Participant Questionnaire
Edinburgh Farmer Stress Inventory (EFSI) 26

Each of the events and situations below represent a potential source of farming stress: How severe is the stress caused by this?

<table>
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<th>○</th>
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<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Complying with environmental regulations</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Debt load</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Not enough ready cash</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Concerns about the continuing viability of the farm</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Worrying about owing money</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Feeling isolated on the farm</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Having to travel long distances for services, shopping and healthcare</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Not seeing enough people</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Lack of close neighbors</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Significant production loss due to disease/pests/weeds</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Bad weather</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Machinery breakdowns at busy times</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Unplanned interruptions</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Unpredictability of the weather</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Personal illness during busy times</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Farming-related accidents</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>No farm help or loss of help when needed</td>
<td></td>
<td>○</td>
<td>○</td>
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<tr>
<td>Hazardous materials on the farm (dust/chemicals/powders)</td>
<td></td>
<td>○</td>
<td>○</td>
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<tr>
<td>Risk of injury on the farm</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
<tr>
<td>Increased work load during peak times</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
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<tr>
<td>Long hours of work</td>
<td></td>
<td>○</td>
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<td>○</td>
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<tr>
<td>Few holidays away from the farm</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
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<tr>
<td>Too much to do and too little time to do it</td>
<td></td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
</tr>
</tbody>
</table>
**Insomnia Severity Index (ISI) 7**

For each question, please TICK the number that best describes your answer.

*Please rate the CURRENT (i.e. LAST 2 WEEKS) SEVERITY of your insomnia problem(s).*

<table>
<thead>
<tr>
<th>Insomnia Problem</th>
<th>None</th>
<th>Mild</th>
<th>Moderate</th>
<th>Severe</th>
<th>Very Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Difficulty falling asleep</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2. Difficulty staying asleep</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. Problems waking up too early</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

4. How SATISFIED/DISSATISFIED are you with your CURRENT sleep pattern?

<table>
<thead>
<tr>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Moderately Satisfied</th>
<th>Dissatisfied</th>
<th>Very Dissatisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

5. How NOTICEABLE to others do you think your sleep problem is in terms of impairing the quality of your life?

<table>
<thead>
<tr>
<th>Not at all Noticeable</th>
<th>A Little</th>
<th>Somewhat</th>
<th>Much</th>
<th>Very Much Noticeable</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

6. How WORRIED/DISTRESSED are you about your current sleep problem?

<table>
<thead>
<tr>
<th>Not at all Worried</th>
<th>A Little</th>
<th>Somewhat</th>
<th>Much</th>
<th>Very Much Worried</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

7. To what extent do you consider your sleep problem to INTERFERE with your daily functioning (e.g. daytime fatigue, mood, ability to function at work/daily chores, concentration, memory, mood, etc.) CURRENTLY?

<table>
<thead>
<tr>
<th>Not at all Interfering</th>
<th>A Little</th>
<th>Somewhat</th>
<th>Much</th>
<th>Very Much Interfering</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
**Depression Anxiety Stress Scale (DASS) 21**

Please read each statement and click on which rating applied most you **over the past week**.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Did not apply to me at all</th>
<th>Applied to me to some degree, or some of the time</th>
<th>Applied to me to a considerable degree, or a good part of the time</th>
<th>Applied to me very much, or most of the time</th>
</tr>
</thead>
<tbody>
<tr>
<td>I found it hard to wind down</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I was aware of dryness of my mouth</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I couldn't seem to experience any positive feeling at all</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I found it difficult to work up the initiative to do things</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I tended to over-react to situations</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I experienced trembling (e.g. in the hands)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt that I was using a lot of nervous energy</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I was worried about situations in which I might panic and make a fool of myself</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt that I had nothing to look forward to</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I found myself getting agitated</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I found it difficult to relax</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt down-hearted and blue</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I was intolerant of anything that kept me from getting on with what I was doing</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt I was close to panic</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I was unable to become enthusiastic about anything</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt I wasn't worth much as a person</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt that I was rather touchy</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I felt scared without any good reason</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
I felt that life was meaningless ☐ ☐ ☐ ☐ ☐

**Pittsburgh Sleep Quality Index (PSQI) 9**

1. When have you usually gone to bed? __________
2. How long (in minutes) has it taken you to fall asleep each night? __________
3. When have you usually gotten up in the morning? __________
4. How many hours of actual sleep do you get at night? (This may be different than the number of hours you spend in bed)?

5. During the past month, how often have you had trouble sleeping because you…
   a. Cannot get to sleep within 30 minutes ☐ ☐ ☐ ☐
   b. Wake up in the middle of the night or early ☐ ☐ ☐ ☐
   c. Have to get up to use the bathroom ☐ ☐ ☐ ☐
   d. Cannot breathe comfortably ☐ ☐ ☐ ☐
   e. Cough or snore loudly ☐ ☐ ☐ ☐
   f. Feel too cold ☐ ☐ ☐ ☐
   g. Feel too hot ☐ ☐ ☐ ☐
   h. Have bad dreams ☐ ☐ ☐ ☐
   i. Have pain ☐ ☐ ☐ ☐
   j. Other reason(s), please describe, including how often you have had trouble sleeping because of this reason(s): ☐ ☐ ☐ ☐

6. During the past month, how often have you taken medicine (prescribed or “over the counter”) to help you sleep? ☐ ☐ ☐ ☐
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity? ☐ ☐ ☐ ☐
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done? Very good ☐ Fairly good ☐ Fairly bad ☐ Very bad ☐
9. During the past month, how would you rate your sleep quality overall? ☐ ☐ ☐ ☐
### Multidimensional Scale of Perceived Social Support (MSPSS) 12

We are interested in **how you feel** about the following statements. Please read each statement carefully and indicate how you feel by clicking the number that best applies to you.

<table>
<thead>
<tr>
<th>There is a special person who is around when I am in need.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>There is a special person with whom I can share my joys and sorrows.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>My family really tries to help me.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I get the emotional help and support I need from my family.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I have a special person who is a real source of comfort to me.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
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</thead>
<tbody>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>My friends really try to help me.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
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</table>

<table>
<thead>
<tr>
<th>I can count on my friends when things go wrong.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I can talk about my problems with my family.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>I have friends with whom I can share my joys and sorrows.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>There is a special person in my life who cares about my feelings.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>My family is willing to help me make decisions.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I can talk about my problems with my friends.</th>
<th>Very Strongly Disagree</th>
<th>Very Strongly Agree</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>
The Satisfaction with Life Scale (SWL) 5

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>In most ways my life is close to my ideal</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>The conditions of my life are excellent</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>I am satisfied with life</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>So far I have gotten the important things I want in life</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>If I could live my life over, I would change almost nothing</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

General Health Questionnaire (GHQ) 12

We want to know how your health has been in general over the last few weeks. Please read the questions below and each of the four possible answers. Select the response that best applies to you. Thank you for answering all the questions.

Have you recently:

1. **Been able to concentrate on what you're doing?**
   - better than usual
   - same as usual
   - less than usual
   - much less than usual
   - [ ]

2. **Lost much sleep over worry?**
   - not at all
   - no more than usual
   - rather more than usual
   - much more than usual
   - [ ]

3. **Felt that you are playing a useful part in things?**
   - more so than usual
   - same as usual
   - less than usual
   - much less than usual
   - [ ]

4. **Felt capable of making decisions about things?**
   - more so than usual
   - same as usual
   - less than usual
   - much less than usual
   - [ ]

5. **Felt constantly under strain?**
   - not at all
   - no more than usual
   - rather more than usual
   - much more than usual
   - [ ]

6. **Felt you couldn't overcome your difficulties?**
   - not at all
   - no more than usual
   - rather more than usual
   - much more than usual
   - [ ]
7. Been able to enjoy your normal day to day activities?

<table>
<thead>
<tr>
<th>more so than usual</th>
<th>same as usual</th>
<th>less than usual</th>
<th>much less than usual</th>
</tr>
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</table>

8. Been able to face up to your problems?

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<th>more so than usual</th>
<th>same as usual</th>
<th>less than usual</th>
<th>much less than usual</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

9. Been feeling unhappy or depressed?

<table>
<thead>
<tr>
<th>not at all</th>
<th>no more than usual</th>
<th>rather more than usual</th>
<th>much more than usual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

10. Been losing confidence in yourself?

<table>
<thead>
<tr>
<th>not at all</th>
<th>no more than usual</th>
<th>rather more than usual</th>
<th>much more than usual</th>
</tr>
</thead>
<tbody>
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<td></td>
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</tbody>
</table>

11. Been thinking of yourself as a worthless person?

<table>
<thead>
<tr>
<th>not at all</th>
<th>no more than usual</th>
<th>rather more than usual</th>
<th>much more than usual</th>
</tr>
</thead>
<tbody>
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</table>

12. Been feeling reasonably happy, all things considered?

<table>
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<th>more so than usual</th>
<th>same as usual</th>
<th>less than usual</th>
<th>much less than usual</th>
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</tbody>
</table>

Demographics Questionnaire

What is your age? ______________________

Are you? Male  Female  (please circle)

In which area of NSW do you live?
- Far West
- Hunter New England
- Mid North Coast
- Murrumbidgee
- Northern NSW
- Southern NSW
- Western NSW
- Other (including other states)_____________________

What is your travel distance to the nearest large rural centre (25,000-99,999)?
- 0-24km
- 25-49km
- 50-100km
- 100-200km
- >200km

What is your travel distance to the nearest small rural centre (10,000-24,999)?
- 0-24km
How would you classify yourself? (please circle)
Caucasian/White
Aboriginal/Torres Strait Islander
Asian/Pacific Islander
Arab
Black
Hispanic
Multiracial
Other (please specify) _________________________

What is your current marital status? (please circle)
Single
Married
Divorced/Separated
Living with another
Widowed
Other (please specify) _________________________

What is the highest level of HIGH SCHOOL you completed?
Did not got to high school
Year 8 or below
Year 9 or equivalent
Year 10 or equivalent
Year 11 or equivalent
Year 12 or equivalent

What is the highest level of POST-SCHOOL qualifications that you have completed? (please circle)
Certificate I or II
Certificate III or IV (e.g. trade certificate or apprenticeship)
Associate or advanced Diploma
University Bachelor Degree
University Postgraduate Degree
Other (please specify) _________________________

Which of the following best describes your occupational status? (please circle)
Employed
Unemployed
Student
Retired
Homemaker
Other (please specify) _________________________

How many hours on farm have you worked in the past week? _____________

How many hours on farm would you work in a typical week? ______________

Do you have any off-farm income?___________
If yes (off-farm income) how many hours a week does this take?__________

Do you think there is a future in farming?
Not at all  Very Much
○ ○ ○ ○ ○ ○

Are you currently experiencing any financial hardships?
Not at all  Severe
○ ○ ○ ○ ○ ○ ○

Which of the following commodities is the main income of your farm?

<table>
<thead>
<tr>
<th>Farmer type</th>
<th>Primary income of my land</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad acre cropping for grain production (e.g. Wheat, barley, sorghum, rice)</td>
<td>☐</td>
</tr>
<tr>
<td>Broad acre cropping for fodder production (e.g. Lucerne and hay production)</td>
<td>☐</td>
</tr>
<tr>
<td>Cotton grower</td>
<td>☐</td>
</tr>
<tr>
<td>Fruit/Vegetable growing</td>
<td>☐</td>
</tr>
<tr>
<td>Sheep meat production</td>
<td>☐</td>
</tr>
<tr>
<td>Sheep wool production</td>
<td>☐</td>
</tr>
<tr>
<td>Dairy Cattle</td>
<td>☐</td>
</tr>
<tr>
<td>Beef Cattle</td>
<td>☐</td>
</tr>
<tr>
<td>Fisheries production</td>
<td>☐</td>
</tr>
<tr>
<td>Other</td>
<td>☐</td>
</tr>
</tbody>
</table>
Appendix F: Author Guidelines for Journal of Rural Studies
JOURNAL OF RURAL STUDIES
25 Years of Excellence in Rural Research

TABLE OF CONTENTS

- Description p.1
- Audience p.1
- Impact Factor p.1
- Abstracting and Indexing p.2
- Editorial Board p.2
- Guide for Authors p.3

DESCRIPTION

The Journal of Rural Studies publishes cutting-edge research that advances understanding and analysis of contemporary rural societies, economies, cultures and lifestyles; the definition and representation of rurality; the formulation, implementation and contestation of rural policy; and human interactions with the rural environment. The journal is an interdisciplinary publication and welcomes articles from diverse theoretical perspectives and methodological approaches, which engage with and contribute to the rural social science literature, as broadly defined by the disciplines of rural geography, rural sociology, agricultural and rural economics, planning and cognate subjects. The coverage of the journal is global in scope and solicits articles based on empirical research in any part of the world that is of relevance and interest to international readers. The primary audience of the journal are social science researchers, teachers and students interested in contemporary rural issues, processes and experiences.

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AUDIENCE

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Automatic Subject Citation Alert
Current Contents
Environmental Periodicals Bibliography
GEOBASE
PAIS Bulletin
Social Sciences Citation Index
Social Services Abstracts
Scopus

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GUIDE FOR AUTHORS

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To find out more, please visit the Preparation section below.

INTRODUCTION
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Before preparing a manuscript for submission authors are asked to study carefully the following Notes. Papers which do not conform to the conventions of the Journal may be returned to the authors for amendment, with consequent publication delay.

The normal maximum length for a contribution is 10,000 words. However, all papers should be written as concisely as possible. Papers which, in the opinion of the Editor, can be shortened without sacrifice of clarity or to scientific content will be referred back to the author for modification. Exceptionally long papers extending to 20,000 words will be considered if they are of great academic importance to an international readership.

Manuscripts must be double-spaced with a wide margin (2.5cm or 1 inch). Please consult a recent issue of the journal to become familiar with layout and conventions.

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style or format as long as the style is consistent. Where applicable, author(s) name(s), journal
title/book title, chapter title/article title, year of publication, volume number/book chapter and the
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will be applied to the accepted article by Elsevier at the proof stage. Note that missing data will be
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Methods, Results, Conclusions, Artwork and Tables with Captions.
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Divide the article into clearly defined sections.

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Please ensure the figures and the tables included in the single file are placed next to the relevant
text in the manuscript, rather than at the bottom or the top of the file.

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file of the entire article. Keep the layout of the text as simple as possible. Most formatting codes will be
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Subdivision - numbered sections
Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1
(then 1.1.1, 1.1.2, ...), 1.2, etc. (the abstract is not included in section numbering). Use this
numbering also for internal cross-referencing: do not just refer to 'the text'. Any subsection may be
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State the objectives of the work and provide an adequate background, avoiding a detailed literature
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Provide sufficient detail to allow the work to be reproduced. Methods already published should be
indicated by a reference: only relevant modifications should be described.

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Results should be clear and concise.

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This should explore the significance of the results of the work, not repeat them. A combined Results
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