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The ATLAS school-based health promotion program: Does a need-supportive learning context help to motivate adolescent boys?

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Abstract

Adolescent boys living in disadvantaged communities are considered a vulnerable group at risk for developing obesity and associated health problems, such as cardiovascular disease, hypertension and Type-2 diabetes. While short-term health promotion programs often produce effective results during the implementation of the intervention, according to Self Determination Theory (SDT), changes in autonomous motivation are required if programs are to have sustained effects on health behaviours. This article describes the ATLAS (Active Teen Leaders Avoiding Screen-time) program, based on SDT, which was developed to engage adolescent boys from low socio-economic backgrounds in physical activity, reduce their consumption of sugar sweetened beverages and limit recreational screen-time. The article reports a post-hoc analysis of the perceptions and experiences of a representative group of ATLAS participants to investigate whether the boys' general impressions of the program reflected the need-supportive teaching strategies on which the program was based. The results of this analysis suggested that students' comments about increased feelings of autonomy, competence and relatedness were often linked to corresponding need-supportive teacher behaviours. The findings suggest that embedding health promotion programs in a need-supportive context can help to foster the motivation and self-regulation that is required to maintain newly adopted healthier behaviours.

Keywords

Health promotion, autonomous motivation, Self-Determination Theory, physical activity, adolescents, resistance training, secondary school

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Introduction

The teenage years mark a period of increased self-reliance in which independent decision-making influences health and health-related behaviours. Adolescence is a period of life during which physical activity begins to decline and poor dietary patterns increase (Belanger et al., 2011). Health behaviours established during adolescence continue into adulthood and so it is an important stage for introducing health promotion strategies (Currie et al., 2012). Increasing physical activity, limiting recreational screen-time and reducing consumption of sugar-sweetened beverages (SSBs) have been identified as key strategies for promoting healthy lifestyle patterns in adolescents (Tremblay et al., 2011).

Recent estimates indicate that around 80% of adolescents do not meet the recommended physical activity guidelines of 60 minutes of moderate-to-vigorous physical activity (MVPA) each day (Hallal et al., 2012). Compounding the deficit in physical activity is the amount of time that adolescents spend in sedentary behaviour. Sedentary behaviour refers to activities that require minimal energy expenditure, and screen-based recreation (e.g. computer, television, on-line social networking) has been identified as the predominant sedentary behaviour among youth (Salmon et al., 2011). High levels of screen-time have been associated with overweight and poor mental health among youth (Costigan et al., 2013). In Australia, 83% of adolescent boys exceed the limit of two hours per day as recommended in international guidelines (Morley et al., 2012).

Poor dietary choices also tend to increase during adolescence, particularly the high consumption of SSBs including carbonated soft drinks, cordials, and refined fruit juices (Bere et al., 2008). A systematic review has revealed a strong association between high consumption of SSBs and obesity, and has recommended the introduction of public health strategies to discourage consumption of sugary drinks (Malik et al., 2006).

Schools are a logical place to influence adolescents' health behaviours because they offer access to almost all young people, and provide the facilities and personnel required to deliver dietary advice and physical education activities (Hills et al., 2015). School-based interventions that tackle multiple health-behaviours simultaneously and which are based on a relevant theoretical framework are recommended for promoting personal change in adolescents (Owen et al., 2014).

Motivation is a crucial aspect in the success of school-based health promotion programs because adolescents first need to adopt healthy behaviours and then maintain these behaviours into adulthood. Ryan and Deci's (2000) Self-Determination Theory (SDT) provides a strong theoretical basis for understanding what motivates people to initiate and sustain certain behaviours. According to SDT, motivation ranges on a continuum from amotivation (an absence or lack of motivation), through controlled motivation to autonomous motivation. Controlled motivation refers to behaviours that are performed because of either external or internal pressures (Ryan and Deci, 2002). Externally regulated behaviour is apparent when an individual engages in a behaviour in order to meet external demands or gain rewards (which for a teenager could come from a teacher or parent). Introjected regulation refers to behaviours that are governed by the person's own feelings, but these feelings are usually motivated by a desire for social recognition or to avoid an aversive consequence (such as feelings of shame or guilt) (Sullivan and Strode, 2010). Internalised motivation, on the other hand, is evident when individuals engage in a behaviour because it is personally important to them (identified regulation) or when the behaviour is successfully integrated with other aspects of their true selves (integrated regulation) (Deci and Ryan, 2008). Intrinsic motivation forms the most self-determined type of internalized motivation and means that a person willingly engages in a particular behaviour because it is inherently interesting and satisfying. In studies investigating students' motivation for physical activity, these three types of internalised motivation are often

combined to form a composite score representing autonomous motivation (Van den Berghe et al., 2014). Autonomous motivation means being independent from external pressure and acting from our own volition, and is thus important for continued adherence to new healthier behaviours once an intervention to promote physical activity has ended (Krapp, 2005).

SDT highlights the importance of three innate psychological needs that are the basis for autonomous motivation. These three needs are autonomy, competence and relatedness. *Autonomy* refers to ‘the desire to be self-initiating and to have a sense of acting in accord with one’s own sense of self’ (Deci, 1998: 152). *Competence* means feeling efficacious and believing one is able to attain a valued outcome (Deci, 1998). Assor et al. (2002) noted that people are unlikely to independently continue an activity unless they believe they are capable of successfully accomplishing the activity. *Relatedness* refers to having a sense of belonging and feeling connected to and accepted by significant others (Krapp, 2005: 386). In order to move from controlled to autonomous regulation, it is necessary for all three needs to be satisfied (Ryan and Deci, 2007). The role of the teacher in creating a supportive classroom context that satisfies these three basic needs is increasingly being recognised as a significant factor in promoting student engagement in academic activities and participation in physical education (Van den Berghe et al., 2014).

Three ‘need-supportive’ aspects of teacher behaviour have been identified (Aelterman et al., 2014). These include autonomy-supportive actions, such as: incorporating students’ interests and preferences; providing challenging and fun activities; explaining the relevance of activities; using non-controlling or inviting language; displaying interest in learners preferences; and creating opportunities for choice, leadership and initiative-taking (Van den Berghe et al., 2014). Competence-supportive practices aim to build students’ feelings of success and confidence, and include a focus on the structure the teacher provides both before and during learning activities, such as: communicating clear and understandable guidelines and

expectations; teacher demonstration or modelling of the required skill; providing help and encouragement during an activity; providing positive, individualised feedback aimed at improving task performance; and avoiding criticism or negative comparisons (Haerens et al., 2013). Finally, teacher practices which foster relatedness in the classroom include: teacher passion and enthusiasm about the lessons; positive, friendly and warm teacher-student interactions; peer teaching and peers as role models; and team building and co-operative activities (Nichols, 2006). There is much research to show that teachers and classrooms with these characteristics foster students' autonomous motivation for physical activity and physical education (Owen et al., 2014; Van den Berghe et al., 2014).

This article describes the theoretical underpinnings of a school-based health promotion intervention for adolescent boys, Active Teen Leaders Avoiding Screen-time (ATLAS) (Smith et al., 2014a) and interprets the boys' perceptions of the ATLAS program with reference to SDT.

The ATLAS program

The methods of the ATLAS randomized control trial have been published previously (Smith et al., 2014a). Adolescent boys from 14 secondary schools located in areas of social disadvantage in New South Wales, Australia were recruited. Boys were considered eligible for the ATLAS program if their self-reported behaviours indicated at least one of the following: less than 60 mins of MVPA/day or more than two hours of recreational screen-time per day. A total of 361 boys in their first year of secondary school (Year 7) met this criteria. The mean age of the sample at baseline was 12.7 years. Follow-up assessments were conducted with both groups, eight months after the program commenced.

The ATLAS program was designed to increase adolescent boys' autonomous motivation to adopt and adhere to four key messages relating to energy balance-related behaviours (walk whenever you can; get vigorous physical activity on most days; reduce

recreational screen-time; and drink more water and fewer sugary drinks). The program was a multi-component intervention that included teacher-led physical activity sessions, a smartphone application (app) and website with pedometers provided for self-monitoring, lunchtime physical activity peer-mentoring sessions, and teacher professional development. The program components and targeted motivational elements are described in Smith et al. (2014a); however, because the teacher-led physical activity sessions and the teacher professional development are the main focus of the current article, these aspects are described in detail here.

Teacher-led physical activity sessions. These sessions were delivered by one or two Physical Education (PE) teachers who volunteered to deliver the program during school time in addition to the regularly scheduled PE lessons. There was a total of nine volunteer teachers and all were male. The physical activity sessions were conducted over two school terms (20 weeks in total) and were delivered as one 90-minute session per week. The teacher-led physical activity sessions involved resistance training skills and CrossFit-style challenges³. The sessions focused on teaching the correct techniques for the CrossFit-style challenges and resistance training skills which targeted the core and lower and upper body. Illustrated guides were provided to assist teachers and students in the correct performance of each skill. Three different levels of challenge (easy, moderate and hard) were provided for each activity. The students selected which activities they would target and were provided with guidance and suggestions for their choice of skills. The boys were also taught how to set SMART goals (Specific, Measureable, Attractive, Realistic and Timely) according to their current levels of performance. The teacher-led sessions followed a structured researcher-designed format

³ The CrossFit-style workout involved short duration, high intensity fitness challenges performed individually with the aim of completing the workout as quickly as possible. Students selected their own combinations and number of repetitions of aerobic and resistance-based exercises. For example: Gymstick squat presses; push-ups; abdominal crunches; 10-metre shuttle runs; and 20-metre bear crawls.

comprising introduction, warm-up, skill development, skill application, and closure. Four observations of the teacher-led physical activity sessions were conducted and adherence levels were relatively uniform across the schools at each time point, increasing over the observation period (61%, 58%, 90% and 96%).

Teacher professional development. This component consisted of two full-day workshops (pre- and mid-program) designed and delivered by the research team. At the first workshop the teachers were introduced to the SAAFE (Supportive, Active, Autonomous, Fair and Enjoyable) teaching principles which embody the need-supportive practices advocated in SDT (Smith et al. 2014a). These principles were integrated into the delivery of the ATLAS teacher-led physical activity sessions to ensure that the sessions: were conducted in a Supportive environment; involved a high level of Active student participation; fostered Autonomy by including elements of choice; promoted Fairness by providing all students with an opportunity to experience success; and were designed to be Enjoyable for all students. At the second workshop teachers explored the ways in which the SAAFE teaching principles supported students' three basic psychological needs of autonomy, competence and relatedness and discussed the relationship between need satisfaction, self-determined behaviour and autonomous motivation. Ryan and Deci's (2000) SDT continuum was introduced and the teachers evaluated reasons for student participation in physical activity as well as their own attendance at the workshop in terms of intrinsic, integrated, identified, introjected or external regulation. The teachers also analysed the self-determination *Checklist and Action Guide for Teachers* (Gibbons et al., 2010) and devised additional strategies they could implement in their physical activity sessions to meet students' needs for competence, autonomy and relatedness.

In terms of primary outcomes, there were no significant intervention effects for BMI, waist circumference, percent body fat or for overall activity (Smith et al., 2014b). However,

there was a significant intervention effect for reduced screen-time, upper body muscular endurance and resistance training skill competency. The current analysis interprets the boys' perspectives on the program in order to understand possible reasons for these positive secondary effects.

Method

Focus groups

Using stratified random sampling a total of 42 students was selected from the 139 boys remaining in the ATLAS program at the 8-month follow-up, to participate in focus groups at their schools. Each focus group consisted of six participants. In order to ensure a balance of views was represented, each group comprised three participants who failed to meet MVPA guidelines and three participants who achieved MVPA guidelines. Because data from the 8-month evaluation were not available at the time the focus groups were conducted, baseline MVPA criteria were employed. It is possible that previous activity levels may have influenced the boys' responses to the program. A MANOVA was conducted to examine differences between focus group participants and the other participants in the intervention and control groups. There were no significant differences between groups ($F(10, 345)=.99, p=.454$; Wilks' Lambda =.97; partial eta squared=.03) for any of the SDT constructs at baseline (e.g., autonomous/controlled motivation, basic need support and perceptions of autonomy support in PE). Thus, the focus group participants can be considered representative of the study sample.

The focus group sessions ranged from 42 to 58 minutes and were carried out during school hours by a research assistant who was not involved in the delivery of the ATLAS program. A structured discussion framework reflecting a group interview format was developed by the research team to facilitate discussion and reflection around the boys' general experience and perceptions of the ATLAS program as well as any perceived effects of the program on the boys' attitudes and behaviours relating to physical activity and nutrition. A

group interview format with structured questions (see Appendix) was adopted because the researchers' previous experience with focus groups involving teenage boys indicated that some boys could be reticent in unstructured formats, while others may dominate the conversations.

The focus groups were conducted in a separate classroom so there were no other distractions. The students sat at desks arranged in a semi-circle with the interviewer sitting opposite and a recording device in the middle of the table. The focus groups commenced with the research assistant introducing herself and inviting each boy to say their name and something about themselves. The questions were repeated for each student to answer individually. Prompts were used as needed to explore topics in depth. Every student had the opportunity to talk and answer and occasionally spontaneous discussion erupted among the students.

Qualitative data analysis

The focus group discussions were digitally recorded and transcribed verbatim by a research assistant who had no involvement with the study intervention. A previous analysis of the focus group data focused solely on the boys' perceptions of the smartphone app (Lubans et al., 2014). Although the focus group questions were designed to elicit feedback on all components of the program, the majority of feedback provided by the participants related to the teacher-led physical activity sessions. The current article interprets the as yet unanalyzed focus group data with reference to SDT. The computer program (NVIVO 10) was used to assist with the organisational aspects and thematic analysis (Braun and Clarke, 2006) was used to interpret the data.

As recommended by Braun and Clarke (2006), two major groups of comment were initially identified and coded as *need-supportive practices* and *self-reported effects*. *Need-supportive practices* encompassed the implementation of the program, primarily teacher behaviours and the way the teacher-led physical activity sessions were run, while *self-reported effects* included the boys' comments about changes in their health-related knowledge, attitudes

or behaviour. The next phases of analysis involved identifying, defining and naming the themes and sub-themes within each major category (Braun and Clarke, 2006). The resulting thematic map is provided in Table 1.

INSERT TABLE 1 AROUND HERE

The analysis of the need-supportive practices was guided by the categorization of strategies outlined by Gibbons et al. (2010) under the themes of autonomy-supportive, competence-supportive, and relatedness-supportive. The analysis of the comments about *self-reported effects* revealed six sub-themes including: self-initiated behaviour; self-regulation and persisting in healthy behaviours; knowledge and self-awareness; developing skills and sense of progress; confidence; and feeling connected to the teacher and peers. These were aligned to the themes of autonomy, competence and relatedness. The codes and themes were developed, mapped and cross-checked for consistency by the first and last authors.

Results

A combination of analyst narrative and illustrative data extracts (Frith and Gleeson, 2004) was used to interpret the themes and sub-themes. Illustrative quotes are identified by a four-digit numeral where the first two digits represent the school and the last two digits represent a student's unique ID. A + or - sign is added to the end of each identifier to indicate those who passed MVPA guidelines at baseline (+) and those who did not (-).

Autonomy-supportive practices

Interest/enjoyment. The boys were asked what they liked about the program, so it was expected that they would mention enjoyable aspects; however, there was also frequent unsolicited positive comment about the program. The word *fun* was mentioned 106 times across all seven focus groups. The physical activity sessions and particularly the CrossFit-style challenges were the most frequently mentioned 'fun' components of the program. For example: 'I enjoyed all of it but mainly the Cross-Fit things - they were good' (Student 1205-).

Novel activities within the teacher-led physical activity sessions, such as the games and boxing activities, were also identified as being highly enjoyable. The boys especially liked the Gymsticks because this kind of equipment was not usually available in their regular physical education classes. As one boy commented: ‘Like using the - um - Gymsticks and that - they were a lot of fun’ (Student 0419+).

The peer-led physical activity sessions, where the Year 8 ATLAS boys took responsibility for teaching and mentoring Year 7 boys, were also reported as being an enjoyable feature. The Year 8 leaders said it was fun to help others and to be in charge. For example:

I lead with a Year 7 mate and - um yeah - I enjoyed that and would take him around the course and showing him the correct way to do it before he done it and if he wasn’t doing a push up right I’d show him how to do it and fix it up. (Student 1209-)

Variety/choice. The boys appreciated variety in the settings where the physical activity sessions were conducted. They particularly enjoyed undertaking the physical activities at outside locations, such as at the beach or on the school oval. The novelty of the ATLAS activities appeared to act as an incentive to motivate and engage the boys at the beginning of the program. However, as the program continued the boys felt that they were repeating the same activities and games and their comments suggested they were becoming bored with the program and less interested in improving their techniques in skills they had been practising for several weeks. A greater variety of activities was suggested by at least one boy in most focus groups, but the ‘tedium’ of the repeated activities was especially evident in one school where one boy commented: ‘The exercises were a bit too repetitive, they were the same activities you were doing’ (Student 1129+).

Competence-supportive practices

Structure. The boys noted that the teacher-led physical activity sessions were different to their regular physical education (PE) classes because there were clear learning goals and predictable routines. This was in contrast to what some boys perceived as unstructured ‘play’ in PE:

In PE it’s just fun. The ATLAS system was fun, but the ATLAS [program] teaches fitness well. PE is just like dodge ball and games. (Student 0902+)

In our normal PE lessons it’s just we play a game and in the ATLAS sessions it was very organised and we had different stations to go to. (Student 1202-)

Most of the boys reported that their teacher gave clear explanations at the start of each session which helped the students understand what was expected. The organised structure and explicitly stated behavioural expectations appeared to add to the boys’ enjoyment of the sessions, and perhaps enhanced their engagement and willingness to participate. One boy commented: ‘He [the teacher] ran it well cause he was strict, but we had fun’ (Student 0809-).

Constructive feedback. With the exception of one school, the boys in the focus groups reported that their teacher gave them helpful advice and constructive feedback. The boys typically chose their own sequence of activities and levels of task difficulty, while the teachers observed the boys techniques and then demonstrated or gave individualised feedback as to how the skills could be improved. One boy explained how his teacher was available for advice and support:

He explained if we didn’t know what to do we would just go up to him and he would explain it till we got it, and he would watch us do it properly, so if we weren’t doing it properly he would watch us and make us do it properly. (Student 0905+)

Challenge. The boys were asked to set challenging goals for themselves which they thought they could achieve during the program. Apart from one boy who said the activities were ‘too easy’ (Student 0804-), most of the boys felt challenged by the CrossFit-style challenges. One

boy described his satisfaction about achieving improvements in his times and fitness levels. 'Probably just the challenges that came with the CrossFit and like beating my previous times and the feeling of exactly beating your own times and it just made me feel a little better I guess' (Student 1215+).

Some boys suggested that the teacher-led sessions should be held more frequently, because they felt they would make better progress if they could do the activities more often. One boy made the request to: 'Do it more regularly, not once a week, do it twice or three times a week' (Student 0913+).

Despite the fact that the ATLAS program was specifically designed around co-operative rather than competitive activities, some boys commented that it was fun to beat a friend. One student felt dispirited by either overt or perceived peer pressure to perform at the same pace and level as others. 'They [the exercises] were all right just got a lot of pressure from everyone else to try to do them like go really fast and everything' (Student 1414-).

Relatedness-supportive practices

Co-operative activities. With one or two exceptions, most of the boys commented that they appreciated the group games and opportunities to interact with peers or friends. This was often what made the program fun for them. For example: 'It was really cool how we all got to do it together and like we got to do it with our friends' (Student 0108-).

When asked more specifically what the boys liked about working together with peers in the teacher-led physical activity sessions, they described how they could motivate each other to start or continue the training activities. As one boy commented: 'Having a training partner, having someone beside you to slap you across the back of the head and tell you to get up and stop being lazy' (Student 0809-).

There were some negative comments from three schools, concerning the behaviour of boys who were disrupting the sessions. One boy complained: 'Some of the bits I didn't like

were some of the kids were just mucking around and not taking it seriously or anything, so that kind of ruined it and took some time out of the exercise' (Student 1414-). One boy, from a different school, observed that his teacher persisted with trying to engage such students. 'He [the teacher] tried, yeah, to get them [disruptive boys] active as well' (Student 0913+).

Comfortable and respectful environment. As well as developing a greater camaraderie within their physical activity groups, the boys' appeared to appreciate the respectful and pleasant environment that the teachers had created. In general the boys' descriptions of the physical activity sessions indicated that the teachers provided a supportive and predictable environment where the boys listened to the teacher, respected the teacher and each other, and had fun as they worked hard to achieve their goals.

It was really different compared to PE cause - like - its more physical and that and like in PE - you basically run around and muck up - but when Mr [X] ran it we all listened and had fun (Student 0419+).

Some boys made comments about the facilities they liked or disliked during the program. Most of the favourable comments were made in relation to the visit to the university. During this visit, the boys participated in group games such as tug-of-war, outdoor physical activity sessions, and personal challenges embedded in whole group exercises. This visit gave them a sense of a broader connection to their local community and a vision of a future which they could possibly achieve or strive towards. One boy commented: 'I enjoyed the university better than any other activities, learn new stuff, see how big it is and how little our school feels' (Student 0410+).

Boys from two focus groups observed that their school's sports facilities were uncomfortable and unsatisfactory. One group complained that the gym-room where the physical activity sessions were conducted was too hot. This made exercising uncomfortable and discouraged the boys from exerting themselves. The boys in another focus group

commented that their physical activity sessions were held in a small, crowded room which impaired their ability to train effectively. Again these boys found the inadequate facilities demotivating.

Self-reported effects

As well as talking about their experiences in the ATLAS program, the boys were asked about the effects of the program on their knowledge of the four key messages and whether they had made any changes in the targeted behaviours. Six sub-themes were identified and are discussed next. In the Discussion section these themes are interpreted with reference to the need-supportive teacher practices and students' feelings of autonomy, competence and relatedness (See Table 1).

Self-initiated behaviour. Self-initiated behaviour was evident in the three targeted behaviours of physical activity, screen-time, and diet. Most boys reported that they were more conscious of getting some physical exercise every day. Some boys had established regular daily fitness routines, while others acted more spontaneously. One boy described his increased energy:

I don't work out but I do get a lot more activity in since the ATLAS program, like I'll be sitting at home and just decide to go for a bike ride which I would never do cause I was lazy before. (Student 0814-)

Typically, the increases in physical activity coincided with a reduction in sedentary behaviour, and some boys reported replacing screen-time with exercise or outdoor activities. For example:

I was more of an inside guy playing a lot of video games and that until I got introduced to ATLAS then I started playing a lot of outside games. (Student 0410+)

I definitely spend less screen-time now that I've done the ATLAS program because - um - if I was bored I would just - like - sit down and watch TV or just play a game, but now if I'm bored I'm - like - go outside - kick the soccer ball around - take the dog for a walk. (Student 0108-)

Comments related to self-initiated changes to diet were almost equally divided between sugary drinks and food. One third of the boys reported drinking less SSBs and replacing these beverages with water. About half of the focus group boys also reported cutting back on junk food and replacing unhealthy snacks with fruit or vegetables.

Self-regulation and persisting in healthy behaviours. Usually the boys who reported they had maintained their healthy behaviours described ongoing self-regulation. This was evident in relation to the routines that the boys commenced during the program to embed physical activity into their daily schedule. One boy commented: ‘It [the program] helped me to keep a regime so I can get stuff done and all that... waking up, getting ready for school, doing workouts and getting to school’ (Student 1415+). As is evident in the preceding comment, self-regulation also appeared to have generalised to other school-related behaviours such as organization, punctuality and concentration. For example:

I’m more focused and you see how important it is that they [the ATLAS teacher and the researchers during the university visit] put that message across... (Student 0805+)

Schooling, doing well in school, and yeah - concentration. (Student 0913+)

When the boys were asked about their reasons for continuing to engage in physical activities they said they wanted to become fitter and stronger. A number of boys also mentioned that these changes will benefit their longer-term health. The following comments suggest that these boys have internalised the ATLAS key messages.

I reckon it would be good for me to use later in life so I’m healthier and live longer. (Student 0413-)

I found all of the information they gave us was pretty useful and I took it away and used it for my life. (Student 1411-)

Some boys also appeared to be motivated to persist in physical activity because they found it intrinsically enjoyable. ‘Yes [I will continue with physical activity], cause I find it very amusing, like fun as a work out, work outs are normally boring and stuff and it’s not though, not this one’ (Student 0806+). However, others indicated any ongoing changes in behaviour would be regulated by their parents. As one boy commented: ‘I don’t really have a choice on the screen-time changes since my parents will keep that up - so they are going to keep the screen-time limits up’ (Student 0815+).

Knowledge and self-awareness. Knowledge about the key messages appeared to promote self-awareness and enable the boys to distinguish between healthy and unhealthy behaviours. Armed with knowledge and self-awareness the boys were able to make informed and deliberate choices about their actions. Most comments were made in relation to diet, especially on the benefits of drinking fewer SSBs. One boy indicated he had changed to drinking more water now that he was aware of the bad health effects caused by consuming SSBs.

I’m much bigger on water than I used to be back in the day and - um yeah - just I didn’t really like Coke before but now you know how bad it is I don’t drink it at all any more cause you know how bad it is for you. (Student 0913+)

Developing skills and a sense of progress. While knowledge and self-awareness appeared influential in changing dietary choices, in the area of physical activity, increased competence also seemed to be required. In their reflections on the program many boys reported acquiring new skills, learning correct techniques and mastering the use of unfamiliar equipment. Once the boys were given opportunities to develop and practise new skills and capacities then they experienced a sense of progress, and thus increased their feelings of competency. Most frequently mentioned was feeling fitter, stronger and healthier as a result of the program. One boy described how his increased fitness level impacted more broadly on his life and activities.

Overall my life is a lot better. I'm healthier. I can do more physical activity. I can run around with my dog. I can run around with the kids I babysit and not just sit down and get tired. (Student 1415+)

The personalised goal setting and incremental increases in challenge levels and skill intensity appeared to contribute to the boys' sense of progress. One boy described how he continued to improve his stamina and strength through constantly adjusting the skill difficulty level.

The CrossFit challenges - it depends how many times you do them, like the first time it's a bit easy but if you keep doing them over and over it gets a bit harder as you go, then eventually it gets easier because you're improving. (Student 0101+)

Some boys reported performing better than they expected and were surprised with what they achieved. This experience led to feelings of competence and ongoing improvement which fueled their motivation to persist with the activities. For example:

At first, I just wanted to see how far I could go and see what I could do and I surprised myself. I just kind of expected to maybe do a couple of activities and maybe thought I wasn't near as fit as a lot of the other people there but I found I could do almost anything they could do - I just had to try. (Student 1415+)

Confidence. In all but one focus group at least one boy mentioned feeling more confident. This was apparent in comments such as 'having more confidence', 'being mentally stronger', 'being proud of myself', and 'feeling better about yourself'. These comments suggest this increased confidence was not confined to physical prowess. As one boy explained:

Well before I started ATLAS I didn't have real much self confidence in myself, cause I was a very shy person but I think it's really helped me develop. (Student 1402+)

Feeling connected to teacher and peers. Many boys stated that their relationship with their teacher had improved. Some boys described their relationship as being like a friendship and one reported that he now regarded his teacher as a confidant:

Before I didn't know Mr [teacher] whenever he used to walk past I would be - like - he's big, but now that he knows me and everything - like - its good - like - to know a teacher who is a friend but also who can help you out with stuff that you need, and - like - he just always helped out with the ATLAS group, and if you were in trouble he would help out or if you were scared he would help out. (Student 0415-)

One boy commented that he had a poor relationship with his teacher and felt that this contributed to his lack of progress. This same boy also made more negative comments about the program than other boys in his focus group.

The boys reported they greatly enjoyed the group activities and 'working out' with their peers. The co-operative nature of the physical activity sessions appeared to strengthen existing friendships and broaden peer networks. As one boy said: 'I've got to know a lot more people in the group that I really didn't talk to that much and got even closer to the people I did talk to' (Student 0104+).

Discussion

The aim of this article was to identify whether the comments obtained from a representative group of ATLAS participants about their perceptions of the program and its effects, reflected the SDT foundation on which the program was based. Unanalyzed focus group data were subjected to a post hoc thematic analysis and interpretation to investigate whether there was evidence of need-supportive teaching strategies and if and how such strategies may have contributed to the boys' feelings of autonomy, competence and relatedness. While the three SDT constructs are discussed here as distinct elements, they are interrelated and often function as a whole (Vallerand and Ratelle, 2002).

Autonomy

The comments of the boys in this study suggest that their ATLAS teachers and the ATLAS program incorporated a number of autonomy-supportive teaching practices. Prominent among the boys' perceptions was that they had fun during the program. The boys particularly enjoyed the teacher-led physical activity sessions and using novel equipment such as the Gymsticks. Enjoyment not only satisfies a sense of autonomy, but can in itself have an influence on intrinsic motivation (Schneider and Kwan, 2013). Research has shown that positive emotions associated with physical activity predict hours per week of exercise in adult males (Frederick-Recasino, 2002). Teacher support, in combination with the information given in class and via the app, about the benefits of healthy exercise and eating patterns, helped the boys understand the value of engaging in physical activity and limiting sedentary behaviour and SSB consumption. While not all boys reported maintaining healthier behaviours, many described that they were now embedding regular exercise into their daily routines, or at least were more conscious of participating in some form of physical activity every day. Previous research has suggested that an autonomy-supportive context promotes self-regulation (Smit et al., 2014).

Teachers appeared to provide opportunities for individual choice in the physical activity sessions, by allowing the boys to set goals and plan their own training sequences. However, variety was less evident in the boys' comments and many expressed a desire for a greater range of physical activities and for the training sessions to be conducted in different locations, particularly outdoors. It would seem that along with opportunities for making choices, novelty and variety may be important elements to keep adolescents engaged and interested in physical activity programs. This is particularly relevant for youth from low socio-economic backgrounds whose limited access to a diversity of sports and sport facilities impedes their participation in physical activities outside of school (Dagkas and Stathi, 2007).

Competence

The boys' comments suggested that a competence-supportive environment was created by the teachers through the provision of structure, achievable and individualised challenges and constructive feedback. The ATLAS program was based on each participant setting personal challenges and working towards individual goals, and the boys expressed their appreciation of the structure and guidance that the teachers provided. The boys reported that the teachers established predictable routines in the teacher-led physical activity sessions and gave clear instructions and helpful feedback. Students feel more secure and competent when they understand what is planned for a lesson and know exactly what is expected of them (Van den Berghe et al., 2014). Because students were allowed to select the difficulty level for the CrossFit-style challenges, they could experience cumulative improvement in their strength and fitness throughout the program. This ongoing cycle of goal setting and goal achievement appeared to enhance their feelings of competence. Overcoming challenges and successfully achieving short-term goals leads to increased feelings of confidence, competence and self-belief and these attributes are necessary for personal change and a commitment to persist with long-term goals such as new lifestyle habits (Bandura, 2004).

The teachers' individualised, constructive feedback appeared to scaffold the boys' sense of improvement. Because the emphasis during the resistance training activities was on demonstrating the correct technique, the teachers were always able to have a positive focus, either endorsing and encouraging the correct technique or providing guidance in ways to improve the technique. Previous research has suggested that this kind of 'mastery-based orientation' enhances student motivation for sport (Hastie et al., 2014) while constructive, personalised feedback on task performance enhances a student's feelings of competence (Smit et al., 2014). De Meester et al. (2016) note that developing adolescents perceived motor competence is crucial to stimulating motivation and engagement in physical activity, particularly among adolescents with low levels of actual motor competence.

Relatedness

As well as providing a clear structure for the learning activities and expectations for behaviour, the teachers were credited with making the program fun and engaging. The majority of focus group participants expressed a strong regard for their ATLAS teacher, with the exception of one boy. It is interesting to note that this one student attributed his lack of interest and motivation to the poor relationship he had with his teacher. Relatedness with teachers is positively associated with student engagement and wellbeing (Ryan and Deci, 2000).

The boys indicated that being able to exercise with their peers and participate in co-operative activities and group games made the program fun. Some mentioned that having a training partner motivated them to be more active. Having fun and making social connections with friends can positively influence physical activity outside of school (Chen, 2014). This was evident in the comments of some boys about their new habits of regularly going outside during leisure-time to play with neighbours or siblings. In the ATLAS program, much of the credit for the strong peer relationships goes to the teachers who created a comfortable and respectful classroom climate. A safe, caring and co-operative learning environment where mutual respect is modelled and encouraged by the teacher enhances motivation and engagement (Gano-Overway and Guivernau, 2014). The physical environment also appeared to be an important factor influencing adolescent motivation to participate in physical activity, with students noting that small, crowded or hot spaces were not conducive to strenuous training. These findings concur with other studies indicating that adolescents are more likely to engage in physical activity when peer relationships are positive and rewarding (Salvy et al. 2012) and when the sporting facilities are spacious and accommodating (Niven et al., 2014).

Limitations

There are four main limitations to this study relating to the conduct and composition of the focus groups. First, the conventional guidelines for conducting focus groups (e.g. Krueger and

Casey, 2009) were not followed. The lack of a moderator and the use of structured interview questions could have influenced the boys' responses. Second, the focus groups were not homogeneous, as boys who met baseline MVPA guidelines and those who did not participated in the same focus group. It is possible that boys who were less active before the program commenced could have experienced the program differently, and being included in the same focus group with more active boys might have suppressed their inclination to offer less positive opinions. Third, because baseline accelerometer data were used, the boys in the focus groups were not selected according to how much progress they made. There are likely to be differences in the perceptions of boys who made progress compared to those who did not. Finally, boys who dropped out of the program early were not invited to give feedback about their experiences. The views of these boys could have provided helpful insights into reasons why the program failed to engage or motivate them.

Conclusion

The ultimate aim of school-based health-promotion programs is to motivate students to adopt and maintain healthy patterns of daily behaviour. The current analysis of student perceptions of the ATLAS program suggests that a need-supportive learning context helped to increase students' awareness of the importance of regulating their daily dietary intake, screen behaviour and physical activity. While our interpretations are only speculative, these changes in attitude and awareness could be indicative of increased feelings of autonomy, competence and relatedness, which would help to promote the autonomous motivation required for maintaining healthier choices in the future. In order to create the kind of learning environment that promotes autonomous motivation, researchers and teachers need to take into account the context in which a program is delivered (Mouratidis et al., 2015). The findings contribute to a growing body of literature focused on translating SDT into educational practice (Stroet et al., 2015) and suggest that school-based health promotion programs should incorporate training

for teachers in implementing need-supportive practices and delivering learning activities that aim to promote students feelings of autonomy, competence and relatedness.

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Appendix

Focus Group Interview Questions

Program experiences

- Tell me about your experience in the ATLAS program.
 - What did you learn from the ATLAS program?
 - What did/didn't you enjoy/like/find useful?
 - What are some of the key messages you have taken away?
 - What did you think of the ATLAS app?
- Tell me about your experience in the physical activity sessions in ATLAS?
 - What did /didn't you enjoy/like/find useful?
- Did you lead some activities with other students? – how did you like this role?

ATLAS at home

- Have you used any of the ATLAS program at home? What has worked and not worked for you?
- Has the ATLAS program changed your approach to:
 - Physical activity? How? Why?
 - Nutrition? How? Why?
 - Screen-time? How? Why?
- Do you think you will continue with any of these changes now the program has finished?
- Apart from your physical activity, nutrition and screen-time have you changed in any other ways?

School context

- Has your attitude to school changed since participating in ATLAS? – In what ways?
- How well did your teacher run the ATLAS sessions? – How were these sessions different to your usual PE lessons?
- Has your relationship with your teacher changed since the ATLAS program started?
 - In what ways?
- Has your relationship with your peers changed since participating in the ATLAS program? – In what ways?

General

- Did you achieve what you set out to achieve when you started ATLAS?
- What has been the greatest challenge for you?
- In your opinion what is the greatest strength of the ATLAS program?
- What could be changed to make ATLAS a better program?
- Do you have any further comments that were not covered in the questions?