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What motivates girls to take up exercise during adolescence? Learning from those who succeed.

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Abstract

Objectives: The present study explored factors that underpin increased internalization (i.e., perceived autonomy) in motivation towards exercise over a one year period in adolescent girls.

Design: A mixed methods prospective study.

Methods: 107 girls (mean age = 13.28 years) reported their exercise behaviour, exercise goals and a multi-dimensional measure of motivation towards exercise on two occasions, one year apart. Ten girls reporting increased autonomous motivation were then interviewed.

Results: Two themes were extracted; growing up and seeking challenge. Most participants reported being more interested in exercising for their health as a result of growing up, through having greater understanding of the health-behaviour link and willingness to act now for future health gain. However, their motivation appeared to be only partially internalized, as health was still viewed primarily as a value promoted by respected others (parents, teachers, media). Furthermore, as many girls conflated being healthy with being thin, health for appearance-related weight control was experienced as an extrinsic (controlling) goal. The second theme was more suggestive of autonomous motivation; girls reported valuing exercise for the opportunity it provides to set and achieve personally meaningful challenges, facilitating a sense of competence and achievement.

Conclusions: The findings may have a useful application in suggesting how exercise settings could be manipulated to increase enjoyment and participation during adolescence. In particular, the findings suggest that means of increasing the salience of the rewarding nature of setting and reaching personal challenges in an exercise setting are investigated.

Physical inactivity during adolescence poses a significant threat to public health (Hallal, Victora, Azevedo & Wells, 2006). Activity levels are particularly low in girls; in the UK approximately 52% of girls at age 11 are sufficiently active for health (i.e., 60 minutes per day, five days a week) compared with 75% of boys, dropping to 35% by young adulthood (Department of Health, 2004). Numerous interventions have been designed specifically to promote physical activity in sedentary girls, including changes to the curriculum (e.g., Jamner, Spruijt-Metz, Bassin & Cooper, 2004), reducing the emphasis on competitive sports (e.g., Pate, Ward, Saunders, Felton, Dishman et al., 2005), and changing sports kit requirements to allow clothes that reveal less of the body (e.g. Neumark-Sztainer, Story, Hannan & Rex, 2003). However, such interventions have largely failed to bring about lasting meaningful effects (Sharma, 2006).

The basis for the content of many recent interventions has been in removing barriers to exercise (e.g. Gyurcsik, Spink, Bray, Chad & Kwan, 2006). However, objectively measured barriers do not always differentiate between active and inactive adolescents (e.g. Kimm, Glynn, McMahon, Voorhees, Striegel-Moore et al., 2006), and previous work suggests that some adolescent girls are able to maintain high levels of exercise despite the presence of objective barriers such as low peer social-support and perceived ability *if* they remain motivated to do so (Gillison, Osborn, Standage & Skevington, 2009). As such, understanding the determinants of engagement rather disengagement with exercise over time may provide a useful means of exploring new ideas for promoting wider participation.

One determinant of exercise that has been shown to positively predict objectively-assessed participation is the quality of motivation (Standage, Sebire & Loney, 2008). According to self-determination theory (SDT; Deci & Ryan, 1985; Deci & Ryan, 1991), an individual's level of motivation resides along a continuum of relative autonomy ranging from amotivation (i.e., lacking the motivation to act) through extrinsic motivation (i.e., acting to

attain a separable outcome), to intrinsic motivation (i.e., acting for inherent interest and enjoyment). The SDT framework predicts that the more autonomous a person's motivation, the more adaptive the behavioural, cognitive and affective outcomes of that behaviour will be (Ryan & Deci, 2000). That is, a person engaging in exercise as a result of autonomous motivation would be more likely to enjoy it, find it interesting, and to persist over the longer term. SDT can therefore be of particular benefit in aiding and enhancing our understanding of the development and maintenance of new exercise motives or habits during adolescence by providing insight into the mechanisms and processes that support more volitional types of exercise engagement.

Research in schools has shown that adolescents are able to take in and personally endorse initially external motives for an activity under the right conditions, which reflects their development towards more adult-like cognitions (e.g., Ntoumanis, 2005; Standage, Duda & Ntoumanis, 2005). Behaviour can move along the motivational continuum to become more autonomous through the process of *internalization* (Deci, Eghrari, Patrick & Leone, 1994). The most central of the factors that promote internalization is support for three basic psychological needs; autonomy (i.e., perceiving oneself to have choice, and be the origin of one's actions), competence (i.e., perceiving oneself to be effective and to have the opportunity to demonstrate efficacy) and relatedness (i.e., a sense of belonging and being valued by others). Need satisfaction and behaviour itself may be further impacted by the content of a person's goals for exercise (Deci & Ryan, 2000). Intrinsic goals are defined as those that stem from a person's core values, and are likely to result in need satisfaction (Kasser & Ryan, 1996). Conversely, extrinsic goals orient a person towards external indicators of worth, and as they stem from external pressures are less likely to support psychological needs (Kasser & Ryan, 1996). In an exercise setting, social affiliation, health management and skill development have been classified as intrinsic goals, and image enhancement and social

recognition extrinsic goals (Sebire, Standage & Vansteenkiste, 2009a). Activities may be driven by multiple goals, one or more of which may be intrinsic, and one or more extrinsic (e.g., exercising both for fun and weight control). Examining the content and profile of adolescents' goals in addition to their motivation may facilitate the analysis of an association between changes in behaviour and changes in global goals and priorities during adolescence.

Guided by tenets within SDT and via the use of a mixed methods approach, the present work aimed to investigate factors that underpin or stimulate the internalization of motivation towards exercise and its increased participation over one year of adolescence. By investigating the motivational mechanisms by which positive change is supported, this research adds rich and novel data to the extant literature as well extends knowledge relating to the barriers and determinants of physical activity participation within a sample of adolescent girls

Method

Design

The study took a mixed methods design incorporating a preliminary repeated-measures questionnaire survey to identify participants who reported increasing activity levels and/or autonomous motivation towards exercise over one year, followed by semi-structured interviews. This approach aimed to promote trustworthiness by providing the opportunity for interviewees to review and comment on the meaning behind their questionnaire responses, and reducing potential ambiguity by using questionnaire items to provide concrete examples of the constructs under discussion (i.e., types of motivation).

Participants

The sample comprised a cohort of 107 girls in Year 8 (Mean age = 13.28 years, SD = 0.28) at a co-educational secondary school in south west England. At both Time 1 (baseline) and Time 2 (one year later) all students completed a short questionnaire regarding their exercise

participation and motivation. Based on their questionnaire responses 11 girls meeting all the criteria were invited for interview, 10 of whom took part. Criteria for selection were:

- (i) engagement in regular exercise at Time 2,
- (ii) a motivational profile indicative of the internalization of motivation,
- (iii) reported change in exercise frequency or type (e.g., sport based to fitness based).

Only participants reporting a positive change in motivation and/or behaviour were included as the primary focus of the study was in investigating facilitators of change, rather than maintenance of health-related exercise behaviour.

Measures

Exercise

Exercise participation was assessed using the Physical Activity Questionnaire for Adolescents (PAQ-A) (Kowalski, Crocker & Faulkner, 1997; Kowalski, Crocker & Kowalski, 1997). Change in exercise was calculated by subtracting scores at Time 1 from scores reported at Time 2.

Motivation

Motivation for exercise was measured using the Behavioural Regulation for Exercise Questionnaire (BREQ-2) (Markland & Tobin, 2004). The BREQ-2 consists of 19-items measuring five motivational regulations identified within SDT (i.e., amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation). Responses were recorded on a five point Likert-type scale anchored from 0 (not true for me) to 4 (very true for me). Adequate factorial validity and reliability has been previously reported for responses to the BREQ-2 in a sample of 404 UK adolescents (M age = 13.25 years) (Gillison & Standage, 2005).

The Goal Content for Exercise Questionnaire (GCEQ) (Sebire, Standage & Vansteenkiste, 2008) was used to assess the intrinsic and extrinsic content of participants'

exercise goals. The GCEQ consists of 20 items corresponding to 5 domains. The domains of social affiliation, health management and skill development are categorised as intrinsic goals, and the domains of image and social recognition as extrinsic. As the GCEQ has not previously been used with adolescents, Cronbach alpha statistics were computed to assess the internal consistency of each subscale. All alpha values were considered acceptable (range .80 to .92).

Responses were judged to be indicative of internalization if they demonstrated a relative reduction in external regulation, and/or extrinsic goal content, and a relative increase in identified regulation and intrinsic goal content. As introjected regulation represents the first step in the process of internalization, but is not itself an autonomous regulation, increased introjected regulation was judged to be adaptive only when accompanied by a decrease in external regulation.

Procedure

The study was approved by the local institutional Research Ethics Committee. One week prior to the first data-collection session, letters were sent home to parents providing information about the study, and seeking passive consent. The study was then introduced to students by the researcher at the start of a physical education (PE) lesson, following which baseline questionnaires were completed. At Time 2 (one year later), the protocol was repeated. In line with school procedure, the parents of participants who met the interview criteria and agreed to be interviewed were contacted to provide written consent. Students also provided written consent obtained on the day of the interview, which was conducted at school, by an experienced female interviewer.

The semi-structured interviews were based around four key topics; 1) current reasons for exercise participation, 2) factors promoting exercise participation, 3) reasons for change in motivation and/or exercise, and 4) future intentions. To avoid potential bias in the early

stages of the interview, open questions were asked first leaving more specific theory-based questions to the end of the interview (Gillham, 2000). Interviews were recorded using a digital voice recorder, and transcribed verbatim.

Data Analysis

Transcripts were downloaded into the NVivo 8 software program (NVivo, 2008) to facilitate a systematic analysis process. In line with common practice for thematic analysis, meaning units within the transcripts were coded and grouped into preliminary themes inductively (i.e., not constrained to *a priori* theoretical constructs). To promote trustworthiness, the first two authors initially coded key phrases or content within the first four transcripts independently, organising them into preliminary low level themes. Interpretations were then compared, and instances in which there was a divergence of opinion were discussed. The aim of this process was not to arrive at a unanimous interpretation of the interviews, but to (i) ensure the basis for each interpretation was fully scrutinised with respect to whether it was backed up by meaningful units from within the interview text (i.e., a phrase, sentence or paragraph could be identified to represent each concept or theme), and (ii) open a discussion of alternative interpretations. The remaining transcripts were then coded by the first author and organized into higher- and lower-order themes, which were checked again by the second author to ensure that these were a fair reflection of the issues raised within and across participants.

Results

Questionnaire responses for the interview group, and remaining cohort were compared to provide contextual information for use in the interpretation of the results. There were no between-group differences in physical activity and motivational responses between the interview group and remaining cohort at Time 1. This indicated that the interview group reflected those whose motivation had changed relative to their peers, rather than those who

differed at the outset (Table 1). By Time 2 the interview group reported significantly higher intrinsic and identified motivation, significantly greater intrinsic exercise goals for health, and engaged in significantly more exercise per week than other students. The differences reflected a significant decrease in physical activity levels for the non-interview group, and increased autonomous motivation in the interview group.

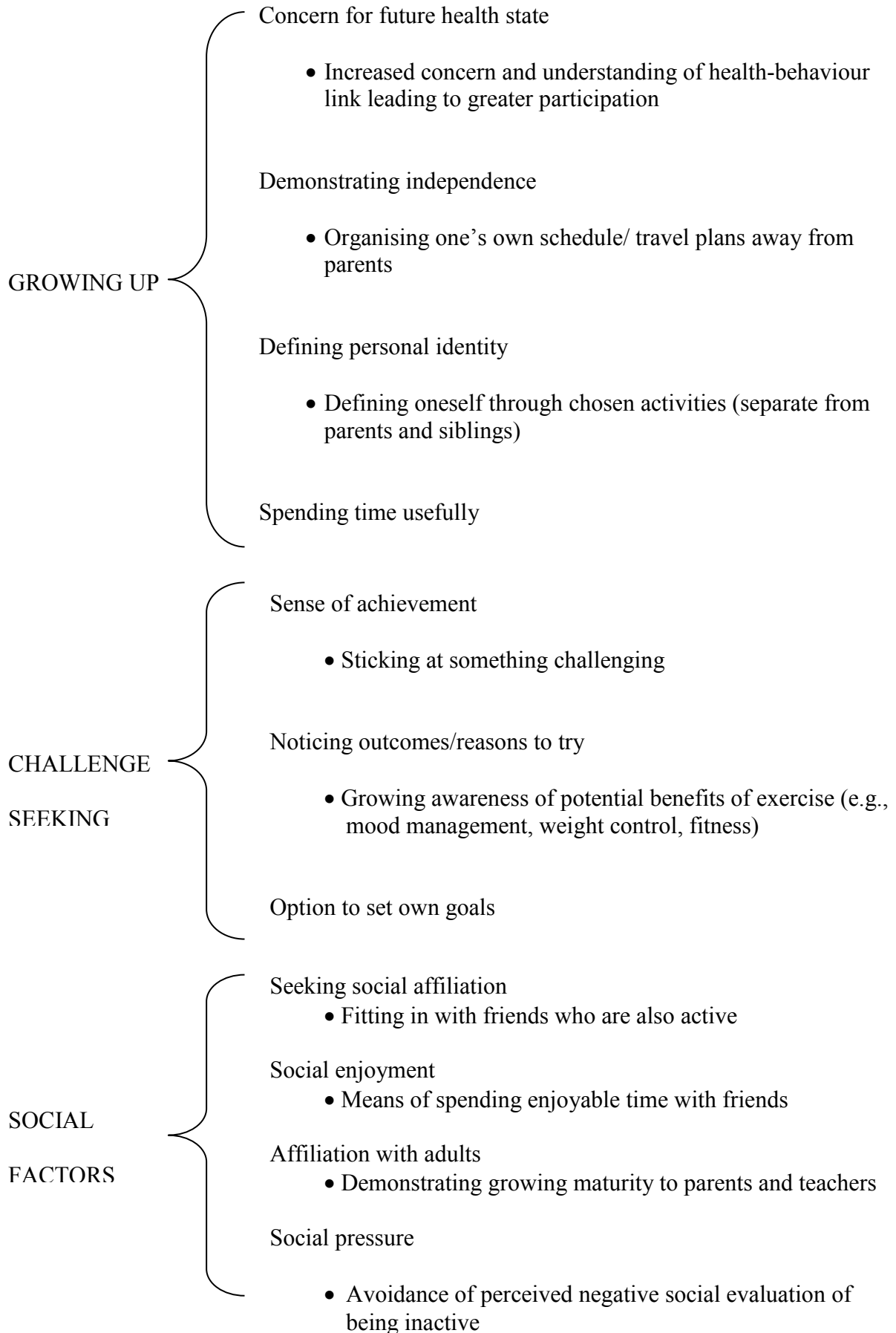
Table 1: Characteristics of interview group compared with remaining cohort

	Interview group (N=11)		Remaining cohort (N=96)		Difference between groups at Time 2 (Z scores)
	Time 1 ^a	Time 2	Time 1	Time 2	
<i>Motivation</i>					
Intrinsic	3.39 (1.15)	4.48 (.48) ^b	3.31 (1.17)	3.45 (.88)	-3.71***
Identified	3.06 (1.04)	3.98 (.70) ^b	3.28 (.84)	3.35 (.80)	-2.69**
Introjected	2.48 (1.29)	2.27 (1.17)	2.27 (1.06)	2.36 (.98)	-0.48
External	1.73 (.72)	1.39 (.50)	1.69 (.65)	1.64 (.57)	-1.67
Amotivation	1.27 (.39)	1.14 (.30)	1.28 (.48)	1.32 (.52)	-1.26
<i>Exercise goals</i>					
Health	3.53 (.82)	4.34 (.45) ^b	3.52 (1.00)	3.49 (.79)	-3.59***
Social affiliation	2.63 (.72)	2.32 (.59)	2.73 (1.01)	2.58 (.88)	-0.92
Image	3.29 (1.24)	3.26 (1.38)	3.21 (1.08)	3.26 (.95)	-0.07
Social recognition	2.33 (.93)	2.18 (.98)	2.43 (1.04)	2.34 (.95)	-0.49
skill	3.53 (.99)	4.09 (.63)	3.18 (1.25)	3.24 (.97)	-2.92**

<i>Total exercise</i>	2.83 (.88)	2.92 (.37)	2.66 (.58)	2.51 (.55) ^b	-2.54*
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Notes: * $p < .05$, ** $p < .001$, *** $p < .001$; ^a there were no significant between-group differences at Time 1; ^b indicates significant ($p < .05$) within-group (i.e., Time 1 to Time 2) change over time. While three themes emerged from the data analysis; *growing up*, *seeking challenge* and *social factors* (Figure 1), social support will not be presented as it did not provide new insights beyond the importance of social support for promoting exercise in youth that is already well established (Allender, Cowburn & Foster, 2006; Sallis, Prochaska & Taylor, 2000; Smith, 2003).

Figure 1: Themes and sub-themes generated by the thematic analysis



Theme 1: Growing up

Participants attributed much of the change in their motivation and attitudes towards exercise to getting older. Girls considered that this had brought about a better understanding of the link between exercise and health, and exposure to health messages from family, school and the media;

P1: I just think as you get older you just realise more how important exercise is and stuff so you just you realise like how key it is to keep your body in shape and stay healthy.

P4: I think that [science lessons] also plays a big part in it as well by telling you what stuff is healthy for you and which stuff isn't. So I think that's more important now, because when I was younger I didn't really used to watch a lot a TV, so I didn't really see the adverts. But now that I've seen the adverts it's made me more worried about doing it [exercise].

Participants also reported having more concern for protecting their future health than they had done previously, which again they considered to be a sign of having grown up;

P3: I think because I'm getting older and like I want to keep myself fitter more like for the future. 'Cause I think now I've got like more interested in it, and more confidence in myself so I can do it more.

P9: There's a lot of things like adverts and stuff, they say that you should get out and do more exercise or you'll get fat when you're older and stuff.

While health is usually considered to be an intrinsic goal for exercise, some of the phrasing that the participants used suggested that health messages are still perceived to be somewhat controlling. This is indicated by phrases such as teachers and the media "wanting you" to be healthy, or feeling one "should" exercise more. Such statements indicate that although girls are volitionally engaging in exercise for health reasons (i.e., they have moved some way

along the motivational continuum), they still see health as someone else's value rather than their own. Lack of full internalization was also demonstrated through the anxiety related to sticking to recommendations that one does not wholeheartedly endorse or understand, as described by some students;

P10: You know you get all those things which is like "children should be doing an hour of exercise every day". And that sort of worries me because I know I'm doing no way near that, and so like, I try and put in extra stuff. But like as long as I'm making an effort I think it's gonna be alright.

A further suggestion that motivation for exercise was still partially motivated by external pressures came from comments made by many participants that they considered *being* physically fit to be synonymous with *appearing* visibly fit (i.e., thin). For these girls, reporting an increased interest in being healthy also reflected an increased desire to be thin, which led to potential conflicts in what they wanted to get out of exercise;

P1: I really like my food and I really don't want to stop eating my food and go like anorexic or anything, but I just want to stay fit and healthy. I think that's the main important thing for me doing exercise.

P2: I suppose I care more about my appearance than I did a few years ago, but I'm not one of those girls that will go on stupid diets and try and change everything.

P9: I don't know, its just everyone really is [skinny] at the moment so you just wanna keep fit really and that's what, like its nice to be skinny and stuff, so that's what I try to be.

Finally, girls believed that more general changes in their thinking that had taken place as a result of growing up had an impact on their exercise behaviour;

P1: I just think now I look at exercise more as a long term [activity] rather than just before going on holiday doing a few sit ups or something (*laughs*) which is what I used to do. But just now I think more of like a steady thing, just keeping fit all the time.

P9: I don't think I was as confident [last year] as I am now, when I just thought people would look at me and be like "well she don't exercise, like that's not good". But now I don't, like now we're older it's not as immature as that like, personalities have changed a lot they don't really care if you do exercise or not.

Theme 2: Seeking challenge

Both girls who engaged in competitive sports and those who took part in fitness-based activities found the sense of achievement that working towards exercise goals could provide, and perceiving progress, to be highly motivating. Those girls engaged in sport described how noticing improvements in their level of skill and performance had encouraged them to continue.

P4: Well, I've like had write ups in the newspapers and stuff about it, and the fact that I've got such a great team and that I'm like gaining in my achievements and everything, getting better at it, getting more confidence, and just improving. It's a wonderful thing to be part of to be honest, it's just great fun.

P10: Like I started, when I started doing like clubs after school and that sort of thing it was mostly because I wanted to meet new people and make new friends and like try things. And then like I sort of realized that, "Oh, like, I'm getting good".

Although signs of progress could either be communicated through external markers of success which may be perceived to be controlling, if the feedback contains information (i.e., why improvement has been made) this may still promote internalization through promoting competence (Deci & Vansteenkiste, 2004). More commonly, participants associated internalization of their motivation to result from occasions when they had been able to monitor their own progress through setting and achieving self-selected targets;

P9: I think [my exercise has increased] because I've got used to doing it now, that I just do enjoy it, and that I know that there's something gonna come out of it for doing it. So I

enjoy like, chasing targets, like doing a target and just achieving stuff, so I think it is better.

P10: [I am motivated to keep going] 'cause like, if you see like "Oh I've burnt off like 200 calories in an hour", then like you feel kind of good. 'Cause you're like "Oh I actually have made a difference". Like, I can see that there's a difference on the screen.

While challenge itself may represent an adaptive intrinsic goal in line with the basic tenets of SDT (Deci & Vansteenkiste, 2004), as raised in Theme 1, the focus of the targets that girls set were often related to the extrinsic goals of weight and appearance. However, it was noteworthy that in most cases the achievement of a long-term goal did not appear to be necessary for motivation to be sustained. Instead, the process of setting an action plan and sticking to it was itself sufficient even when girls had little belief in their exercise activities ultimately improving their body shape:

P2: I've been trying to eat healthily but it's not really working, I don't really mind that much, it's just no, I don't really exercise to try and change how I look, I just do it because I want to.

P9: Well it [taking regular exercise] gives you the confidence, like you do feel like you're not letting yourself down. You do feel like you're doing something so it makes it better. And then I don't know, it makes me feel more confident to go out and stuff because I know that I've done something to make me look skinnier, or make me look nicer.

Overall, girls reported experiencing a sense of achievement from striving for and reaching a range of different exercise goals. Even if weight loss was not achieved, it appeared that knowing they had done some exercise helped girls to cope with perceived pressure to control their weight.

Discussion

Two primary themes were extracted from interview discussions relating to girls explanations of why their motivation towards exercise had become more autonomous over the previous year. The findings will be discussed from a theoretical perspective to both address the initial research question of what factors contribute to the process of internalization in this age group (Deci & Vansteenkiste, 2004), and to investigate the extent to which the SDT framework may provide insight into the mechanisms supportive of positive behaviour change for further investigation.

SDT proposes that internalization is facilitated by the provision of support for three basic needs (i.e., for autonomy, competence, and relatedness) from the social environment (Deci & Ryan, 1985). There were numerous references to how all three basic needs were being met for the girls involved in the study: Within the theme of growing up girls reported a growing sense of autonomy, articulated through their awareness of changes in their thinking and views on health and exercise which they clearly attributed to internal development (e.g., increased knowledge and understanding) rather than external processes (e.g., pressure from others). This suggests that while changes in their knowledge and priorities may well have resulted from input from parents, teachers or the media, this had been facilitated through autonomy supportive means of communication, such as the provision of information and rationales that were meaningful to them. As such, the girls were able to feel that the decision to exercise was still their own. In addition, some participants reported that their growing maturity had resulted in them being less susceptible to the views and influence of their peers when making decisions about their exercise behaviour.

However, although the girls appeared to perceive that they were acting autonomously for health reasons, it was apparent that their behaviour was not fully internalized. For example, girls described adverts or teachers as “telling” them to be healthy, and reporting that

being thin was something that they felt they “should” be. As such they appeared to have adopted these instructions because they trusted the source of the information, rather than showing true understanding of the rationales presented (indicative of partial internalization). According to theory, despite the rationale of exercising for health not being fully endorsed, girls can feel autonomous in taking these others’ values on board if they feel a sense of relatedness to them (Deci & Vansteenkiste, 2004). The trust that the girls placed in the views of teachers and parents may be indicative of a sense of relatedness, although this was not explicitly articulated in the interviews. These findings are consistent with past work with adults that suggests that people commonly hold multiple simultaneous motives for behaviour that collectively determine the overall quality of motivation (Ryan & Deci, 2007). Encouragingly, further work has shown that exercise outcomes are robust to controlling forms of motivation and/or extrinsic goals where autonomous regulations are also present (Sebire, Standage & Vansteenkiste, 2009b). However, these findings caution against relying solely on the attractiveness of the person communicating health messages (such as in contemporary approaches using well known sports men and women to promote health messages) without promoting understanding, awareness, and personal relevance; motivation that is only partially internalised (i.e., introjected regulation) in this manner is likely to lead to short-term and poorer quality behaviour changes (e.g., Gillison, Standage & Skevington, 2011). Future research would do well to examine (i) who and how significant others within the adolescent females’ environment provide support for their relatedness and (ii) the degree to which such supports facilitate the internalization and integration of exercise motivation so as to support exercise behaviour.

Support for the need for competence came across strongly within the theme of seeking challenge. From an SDT perspective, seeking ongoing optimal challenges at any stage of life is related to ones natural growth tendencies (Deci & Ryan, 1985; Deci & Ryan,

1991). A key characteristic of competence as defined within SDT is that it not only constitutes feeling effective at what you do, but also that you have the opportunity to demonstrate the extent of your abilities (i.e., succeed in activities that challenge you) (Deci & Vansteenkiste, 2004). Exercise appeared to provide a forum for girls to obtain direct competence feedback relating to their skills and fitness, and also to experience success at meeting challenges. The finding that exercise is a context well suited for setting and meeting optimal challenges mirrors past research with older adults (Beck, Gillison & Standage, 2010), and is consistent with work in relation to the motivating effects of feedback (Mouratidis, Vansteenkiste, Lens & Sideridis, 2008). Given that very often during adolescence challenges are not tailored to individual ability (e.g., sitting national exams), opportunities to feel competent and successful in other domains may be limited, and experiencing success through completing self-selected exercise tasks may be particularly valuable.

While there was much discussion of facilitators of internalization such as intrinsic goals for exercise, the extrinsic exercise goals of weight and appearance were highly prevalent. Despite some reports that autonomous motivation is robust to the presence of additional extrinsic goals (e.g. Sebire et al., 2009b), some degree of attenuation of internalization of motivation would be expected in these cases. This may have contributed to the overall impression gained from the interviews that exercise motivation had only been partially internalized for the majority of girls. Weight concern is known to be a key motive for exercise throughout adolescence (e.g. Allender et al., 2006; Neumark-Sztainer, Paxton, Hannan, Haines & Story, 2006), so the prevalence of weight concern within this active subgroup is not surprising. However, the lack of differentiation that girls made between *being* healthy and *looking* healthy (synonymous to them with having a low body weight) makes it difficult to separate the assessment of the impact of intrinsic from extrinsic goals. This is similar to findings of a blurring of health and weight constructs in past work with similar age

groups (e.g., Whitehead & Biddle, 2008), and suggests that ‘health’ is not a sufficiently specific term to use when exploring reasons for exercise among adolescents as it may not be understood in the same way as it would be in adults. An increase in the perceived importance of appearance and body shape is expected at around the time of puberty (Wardle, Waller & Fox, 2002), and therefore the internalization of a health rationale for exercise may also reflect girls’ internalization of societal expectations of appearance (i.e., to be thin). However, while the ‘thin ideal’ may drive behaviour in the short-term, unless this motive becomes more integrated and valued, it is unlikely to support long-term behavioural persistence (Deci et al., 1994).

The potential impact of cognitive development

Developmental literature suggests that objective changes in cognitive, brain and social maturation occur during this phase of adolescence, resulting in changes such as improved reasoning and decision-making skills, greater self-regulation and more self-directed behaviour (Blakemore & Choudhury, 2006; Steinberger, Jacobs, Raatz, Moran, Hong et al., 2005). Several explanations that girls gave for the changes in their exercise motivation or participation appeared to align with such expected developmental changes, and therefore some of the factors found to be facilitative of internalization in the present study may relate to girls’ cognitive development, rather than a particular change in the exercise environment. This is important for the interpretation and application of the present findings.

Three girls considered that their ability to make rational decisions in the face of competing priorities had improved over the past year. For example, three girls reported that they had come to accept that although they may not achieve their goal for exercise of becoming thinner, their effort was still worth it for other health benefits. Others reported being better able to cope with social anxiety when exercising as they now accepted that their concerns of being under constant critical judgement by others were most likely unfounded.

Such comments are indicative that the interviewees possessed an increased cognitive ability to integrate new information with their existing knowledge and priorities. Consistent with literature suggesting that the ability to conceptualize future states, and to assess risk and make decisions emerge during puberty (Steinberger et al., 2005), a further sub-group of girls reported having a greater future-time perspective, whereby they had come to consider the protection of their future health as a meaningful goal for current behaviour. However, in each of these processes there may also be a role for increased socialization through increased exposure to the values of respected others and broader society (Niemic, Lynch, Vansteenkiste, Bernstein, Deci et al., 2006). Both cognitive ability and socialization hypotheses are indicators that adolescents are able to act through integrated regulation, which may provide an indication of the mechanism of the effect reported within SDT literature that internalisation becomes more pronounced with increasing age (Sheldon & Kasser, 2001).

Limitations

The present study was conducted with a small group of girls, all of a similar age, socio-economic group and ethnicity (White British), and as such the findings may not generalise to other age and demographic groups. However, this restricted group was purposefully selected in order to study behaviour change during adolescence, as it is argued that the social, cognitive and biological changes experienced this group mean they warrant separate research approaches. Firmer conclusions could be drawn through incorporating a larger number of participants, and extending the study to a wider group of adolescents including those who maintain (rather than increase) as well as those that show a decrease in their exercise involvement.

Conclusion and future directions

The results suggest that the internalization of girls' motivation towards exercise was associated with adopting health reasons for exercise from respected sources, and exercising

as a means of seeking and meeting personal challenges. They highlight the importance of not only what information is communicated to adolescents, but how and by whom it is communicated. This is the first study that we are aware of to show that adolescent girls not only recognise the sense of achievement that can be obtained through regular exercise, but that this consciously forms part of the basis for their ongoing involvement. Furthermore, it was also suggested that the achievement of short-term targets (e.g., exercising for longer, burning more calories) within a single exercise bout could be inherently rewarding even when such targets do not lead to anticipated long-term gains (e.g., weight loss).

Although exercising for health and challenge are typically considered to be intrinsic goals (and are therefore theoretically aligned with need satisfaction and the internalization of motivation), one outcome of the present mixed methods approach was to suggest that brief questionnaires are not sufficient to accurately classify exercise goals as intrinsic or extrinsic in adolescents. In the present study being healthy was widely conflated with being thin, and health was considered to be something that could be judged by appearances. However, as has been found in recent applied research, in the presence of intrinsic goals and autonomous motives such extrinsic orientations do not appear to undermine the internalization of motivation, at least over a one year period (Niemic, Ryan & Deci, 2009; Sheldon, Ryan, Deci & Kasser, 2004; Vansteenkiste, Simons, Soenens & Lens, 2004).

Future directions

By framing the present study within SDT, the present findings have greater potential for practical application by drawing on past work that suggests how exercise settings can be manipulated to increase autonomous exercise participation in (e.g., Standage & Ryan, in press). Furthermore, further research would be worthwhile in investigating how the salience of the rewarding nature of setting and reaching challenges in an exercise setting could be promoted to adolescents who do not perceive this spontaneously, to promote support for

adolescents' need for competence. One strategy that may be useful in orienting adolescents towards achievement of exercise related tasks, and that has been found to reliably promote health behaviour change in adults, is self-monitoring (Michie, Abraham, Whittington, McAteer & Gupta, 2009). Simple techniques for self-monitoring are readily available from the wider sport and exercise research setting, and include the use of objective exercise monitors such as pedometers (Conwell, Trost, Spence, Brown & Batch, 2010) in addition to less costly self-completion techniques such as activity diaries and scheduling (Conwell et al., 2010; Venditti, Elliot, Faith, Firrell, Giles et al., 2009). If exercise is perceived to be an activity that makes a positive contribution to an adolescent's wider goals in life, rather than competing with them or being irrelevant to them, then it may be possible to establish the basis for it as an enduring lifelong habit. A SDT approach provides the potential to extend and develop research in this area by explicitly setting out a number of empirically supported conditions in which self-monitoring techniques may be implemented in a way that supports autonomy, and therefore has the greatest chance for promoting long-term persistence of the changes in behaviour achieved.

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