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Motivation and self-perception profiles and links with physical activity in adolescent girls

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Abstract

Research shows a decline in participation in physical activity across the teenage years. It is important, therefore, to examine factors that might influence adolescent girl's likelihood of being physically active. This study used contemporary theoretical perspectives from psychology to assess a comprehensive profile of motivational and self-perception variables in 11–16 year old English girls ($n = 516$). A cross-sectional design was employed. Cluster analysis was conducted to (a) map cluster profiles and (b) test whether clusters differed in physical self-worth, global self-esteem, and physical activity. Results revealed a five-cluster solution depicting 40% of the sample as moderately motivated, 30% lowly motivated in two clusters, and 30% highly motivated, also in two clusters. However, differences between clusters on physical activity were quite small. Results show potential areas for intervention to enhance the motivation of adolescent girls for physical activity.

Keywords: Physical activity; Adolescent girls; Motivation; Physical self-perceptions; Self-esteem

1. Introduction

Regular participation in physical activity for young people can contribute to the enhancement of physical, psychological, and social well-being (Biddle, Sallis, & Cavill, 1998). Recent research evidence shows that there is a decline in participation in physical activity during the adolescent years and this decline is particularly obvious in girls (Pratt, Macera, & Blanton, 1999). It is

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therefore important to examine the factors that might influence adolescent's likelihood of being physically active. This area has been identified as a research priority (Sallis et al., 1992).

Sallis, Prochaska, and Taylor (2000) reviewed 54 studies investigating correlates of physical activity in adolescents and identified 48 different factors, including demographic, biological, psychological, behavioural, social and cultural, and physical environmental variables. Of 17 psychological constructs, only achievement orientation (+), perceived competence (+), intention (+), and depression (−) were consistently associated with physical activity.

The review by Sallis et al. (2000) suggests that achievement orientation and perceptions of competence are worthy of study. Indeed, the sport and exercise psychology literature over the past decade or so has shown that such constructs are important (Biddle, 1997, 1999; Duda & Whitehead, 1998). However, while studies have often investigated motivational constructs in isolation, less is known about the individual differences in patterns of key motivational indicators when looking across a comprehensive profile of scores. This is particularly so when combined with important self-perception variables which have, in their own right, been shown to be important indicators of motivation (Biddle & Mutrie, 2001).

The identification of groups, or clusters, of young people representing different patterns of motivation and self-perception might prove instructive. Homogenous groups may be identified and strategies developed to increase the effectiveness of interventions to promote physical activity in young people. In this present study, therefore, we chose to assess key contemporary motivational variables alongside those of physical self-perceptions and global self-esteem (GSE).

Current thinking in motivational research centres on a social-cognitive perspective, and this has been adopted in many domains of psychology, including social, educational, health, developmental, and sport psychology. Dominant perspectives have included the study of achievement goals through 'goal perspectives theory' (Nicholls, 1989), self-theories of ability beliefs (Dweck, 1999), and the Self-Determination Theory of Deci and Ryan (1985). Such approaches have been used to good effect in understanding motivation in the sport and physical activity domain.

1.1. Goal perspectives theory

Research investigating the motivation of children and youth in physical activity has shown the importance of determining how young people define success (Duda & Hall, 2001). Two major achievement goal orientations have been identified, namely task and ego goals. A task-oriented person is more likely to define success or construe competence in terms of mastery or task improvement. He or she tends to adopt personal criteria of evaluation. An ego-oriented person is more likely to define success or construe competence in normative terms, such as through winning or outperforming others. In sport and physical education, task orientation has been found to be positively associated with various indicators of motivation, including intrinsic motivation and positive affect (Biddle, 2001). The relationship between ego orientation and motivational indicators is less clear.

1.2. Theories of ability beliefs

Similar to the work on task and ego goals that shows that people define success in different ways, classroom research has shown children to also process ability-related information in

different ways. Dweck (1999) has discussed conceptions of ability by looking at how children view the nature of intelligence. She distinguishes between intelligence that is thought by some to be relatively fixed and intelligence thought to be changeable. Children believing in a more fixed notion of intelligence (an 'entity theory' of intelligence) were more likely to adopt an ego-oriented achievement goal and showed less adaptive responses to failure (Mueller & Dweck, 1998). Conversely, those believing that intelligence is changeable (an 'incremental theory' of intelligence) were more likely to adopt a task goal and show positive motivation (Hong, Chiu, Dweck, Lin, & Wan, 1999). Support for such propositions also exists in physical activity when conceptions of athletic ability are assessed (Jourden, Bandura, & Banfield, 1991; Biddle, Soos, & Chatzisarantis, 1999a). The study of how adolescents construe the changeable nature of sport ability, therefore, appears to be a promising line of research in the motivational domain.

1.3. Self-determination theory

Both goal perspectives theory and self-theories of ability beliefs demonstrate that certain 'styles' of motivation (e.g. a task orientation or incremental ability belief) might be associated with intrinsic motivation. To better understand such processes, one needs to study specific theories of intrinsic motivational processes. Self-determination theory (SDT) is an impressive theory of motivation and psychological functioning that accounts for psychological needs and motives (Deci & Ryan, 1985, 1991; Ryan & Connell, 1989; Ryan & Deci, 2000a, b). Specifically, there are different types of behavioural regulations central to self-determination theory, each one reflecting a qualitatively different 'reason' for acting out the behaviour in question. In addition to intrinsic motivation for a behaviour, there are three main types of extrinsic motivation expressed by adolescents. These are external, introjected, and identified forms of regulation.

External regulation refers to behaviour that is controlled by external means, such as rewards or external authority. Introjected regulation refers to behaviour that is internally controlled or self-imposed, such as acting out of feelings of guilt avoidance, and is characterized by feelings of internalized pressure, such as 'I ought to …'. For identified regulation the behaviour is self-determined according to one's choice or values. It is characterized by feelings of 'want' rather than 'ought' and reflects striving towards certain goals, hence, while it is more self-determined than introjection, it is still partly external in orientation. Finally, intrinsically motivated behaviour is that performed solely for its own sake or enjoyment. The four regulations form a continuum that characterizes the degree of internalization of the behaviour. This is indicated by the Relative Autonomy Index (RAI) calculated by weighting and summing each subscale. Positive scores indicate more autonomous (self-determined) regulation and negative scores indicate more controlling (less self-determined) regulation. Research has shown the motivational benefits of more self-determined behavioural regulation in physical activity contexts with youth (Biddle, Soos, & Chatzisarantis, 1999a, b; Wang & Biddle, 2001).

1.4. Amotivation

Amotivation is a lack of motivation where no contingency between actions and outcomes is perceived and there is no perceived purpose in engaging in the activity (Deci & Ryan, 1985).

Vallerand and Fortier (1998) suggest that the study of amotivation "may prove helpful in predicting lack of persistence in sport and physical activity" (p. 85).

1.5. Physical self-perceptions and GSE

In addition to constructs that reflect motivational perceptions, it is important to investigate how adolescents actually feel about themselves. Indeed, physical self-perceptions have been shown to be important indicators of motivation and psychological well-being (Fox, 1997a, b). Although researchers and practitioners in physical activity have stated for many years that participation in sport and related activities can boost self-esteem, it is only in the past decade or so that a more complete picture has emerged with the development of multidimensional and hierarchical models of physical self-perceptions (Fox, 1997a, b, 1998, 2000).

Such models depict global perceptions of self-esteem at the apex of a structure underpinned by ever-more differentiated perceptions of the self. For example, an important contributor to GSE is the perception of ones physical self-worth (PSW) which, in adults, according to Fox and Corbin (1989), is comprised mainly of perceptions of sport competence, body attractiveness, perceived strength, and physical condition. A similar structure has been noted in youth (Whitehead, 1995).

This suggests that PSW might be an important factor in participation in physical activity in young people. Logically, one might expect higher perceptions of sport competence or physical condition for those involved in active sports, for example. This depicts a 'motivational' view of self-perceptions whereby positive self-perceptions are motivators of behaviour. In addition, of course, one could argue that participation in sport and physical activity might bring about favourable changes in self-perceptions (Fox, 2000; Biddle & Mutrie, 2001).

The main purpose of the present investigation, therefore, was to examine the motivation and physical self-perception profiles, using cluster analysis, of secondary school girls in physical education. A second objective was to examine whether there were meaningful differences between the various clusters in perceived PSW, GSE and physical activity participation outside of required school physical education lessons. Physical education lessons were chosen because all girls are required to take part, thus allowing the study all motivational types. By studying activity outside of lessons allows a test of the generalizability of personal motivation and self-perceptions.

2. Method

2.1. Participants

Girls ($n = 516$) from 12 comprehensive (state) schools across all regions of England took part. The pupils were aged 11–16 years (mean = 13.69, S.D. = 0.93) with the majority attending classes in years (Grades) 7, 8 and 9 (97%). They were likely to be representative of diverse socio-economic backgrounds although such data were not formally assessed. Pupils were randomly sampled within age groups and were from schools taking part in a larger curriculum development project. No pupils refused to take part and questionnaires took between 25 and 40 min to complete. Informed consent and ethical procedures conformed with guidelines of the British Psychological Society.

2.2. Procedure and measures

Questionnaires were administered by trained research assistants in quiet classroom conditions. The following instruments were used:

2.2.1. Achievement goal orientations

Students' dispositional task and ego goal orientations were assessed with the established English (UK) version of the Task and Ego Orientation in Sport Questionnaire (TEOSQ; Duda & Whitehead, 1998). The stem for the 13 items was 'I feel most successful in sport and physical education when…'. Answers were given on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Example items include ' … I work really hard' (task) and '… I am the best' (ego).

Psychometric properties of the scale have been supported in numerous studies (see Duda & Whitehead, 1998), including a large-scale test of factorial validity using confirmatory factor analysis (Wang & Biddle, 2001). Cronbach's (1951) alpha coefficients for the present sample were satisfactory for task (0.84) and ego (0.87).

2.2.2. Sport ability beliefs

The English version of the 'Conceptions of the Nature of Athletic Ability Questionnaire, Version 2' (CNAAQ-2) (Wang & Biddle, 2001; Biddle, Wang, Chatzisarantis, & Spray, in press) was employed to examine incremental and entity beliefs. Incremental beliefs were assessed through the two subscales reflecting 'Learning' (3 items, e.g. 'to be successful in sport you need to learn techniques and skills, and practice them regularly') and 'Improvement' (3 items, e.g. 'how good you are at sport will always improve if you work at it'). Entity beliefs were measured through two subscales reflecting 'Stable' (3 items, e.g. 'it is difficult to change how good you are in sport') and 'Gift' (3 items, e.g. 'to be good in sport you need to be naturally gifted'). Responses were made on 5-point scales, similar to the TEOSQ.

The scale was developed from that used by Sarrazin et al. (1996) and revised by Wang and Biddle (2001). Satisfactory psychometric properties have been documented, including a large-scale confirmatory factor analysis (Wang & Biddle, 2001; Biddle et al., in press). The internal consistency of incremental beliefs ($\alpha = 0.76$) and entity beliefs ($\alpha = 0.75$) were satisfactory using the present sample.

2.2.3. Relative autonomy index (RAI)

The Perceived Locus of Causality (PLOC) scale developed by Goudas, Biddle, and Fox (1994) was used to assess four types of behavioural regulation in the PE/sport context. The stem for all items was 'I take part in PE and sport …'. External regulation (e.g. 'because I'll get into trouble if I don't') and introjection (e.g. 'because I'll feel bad about myself if I didn't') were assessed through four items each. Identification (e.g. 'because I want to improve in sport/PE') and intrinsic motivation (e.g. 'because sport/PE is fun') were measured through three items each. An overall RAI was calculated by weighting each subscale to indicate the level of autonomy in the following way: $\text{external regulation} \times (-2) + \text{introjection} \times (-1) + \text{identification} \times (1) + \text{intrinsic motivation} \times (2)$. This serves as an indicator of a person's motivational orientation with positive scores indicating more autonomous (i.e. self-determined) regulation and negative scores more controlling regulation.

Satisfactory psychometric properties have been demonstrated (Wang & Biddle, 2001; Chatzisarantis, Hagger, Biddle, Smith, & Wang, 2003). Cronbach alphas for external regulation, introjection, identification, and intrinsic motivation were 0.84, 0.64, 0.80, and 0.86, respectively for the present sample.

2.2.4. Amotivation

Amotivation was assessed by three items modified by Goudas et al. (1994) from the Academic Motivation Scale (Vallerand et al., 1992, 1993). The stem for the items is 'I take part in physical education and sport …'. The three items are: 'but I really don't know why', 'but I don't see why we should have sport/PE', and 'but I really feel I'm wasting my time in sport/PE'. Answers were given on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale was internally consistent for the present sample ($\alpha = 0.76$).

2.2.5. Physical self-perception profile

The 36-item Physical Self-Perception Profile for Children (PSPP-C) (Fox & Corbin, 1989; Whitehead, 1995) was administered. The PSPP-C contains five subscales measuring aspects of PSW: perceived sport competence, body attractiveness, physical condition, and physical strength as four subdomains, and PSW as a higher order construct. In addition, GSE was also assessed. A forced-choice format was used whereby participants chose one of two statements that best describe themselves and then rate whether it is 'sort of true for me' or 'really true for me'. This produces a 4-point scale ranging from 1 to 4.

Cross-cultural research supports the PSPP-C structure in English, Hong Kong and Russian adolescents (Hagger, Biddle, Chow, Stambulova, & Kavussanu, in press). Internal consistency was satisfactory for all scales for the present sample: perceived sport competence ($\alpha = 0.78$), body attractiveness ($\alpha = 0.87$), physical condition ($\alpha = 0.80$), physical strength ($\alpha = 0.81$), PSE ($\alpha = 0.86$), and GSE ($\alpha = 0.74$).

2.2.6. Perceived importance profile (PIP)

In addition to the PSPP-C, the participants were also asked to rate the perceived importance of the four subdomains of the PSPP-C using the PIP. The format used was the same as the PSPP-C but with two items for each subdomain.

2.2.7. Physical activity participation

A 7-day recall physical activity questionnaire (Sallis & Saelens, 2000) was used to measure the pupils' involvement in physical activity outside school physical education lessons. A list of 27 activities including sports, games, exercise and dance was provided and pupils were asked to fill in any specific activities they participated in if they were not listed. The participants recalled whether they participated in the activity during the past week. If they did take part, they were then asked to recall the number of times they participated in the activity and the number of minutes per session per activity. Each activity was assigned a metabolic equivalent (MET) value (Ainsworth et al., 1993) that characterized the amount of energy that the body expends during the activity. To estimate how much energy was expended for one particular activity, the total duration in hours per week was estimated. The resulting value was then multiplied by the MET value

assigned for that activity. A total MET value was obtained when the MET expenditure of all the activities was summed.

3. Results

3.1. Descriptive statistics

The means and standard deviations of the overall sample are shown in Table 1. The girls had moderately high task orientation, high incremental beliefs, and were more likely to have identified or intrinsic regulation for participation in physical education/sport. In terms of physical self-perception, they had scores around the scale midpoint for most variables, with a slightly higher score for physical condition and a lower score for body attractiveness. They considered the four PSPP-C dimensions moderately important to them, with a slightly lower rating for physical strength. These girls had moderately high levels of perceived PSW and GSE. In terms of physical activity participation in MET hours, the distribution had high kurtosis (9.55) and skewness (2.55). Therefore, this variable was re-coded into categorical values (0 Met Hour = 1, > 0–14 = 2, > 14–28 = 3, > 28–49 = 4, > 49–70 = 5, > 70–140 = 6, > 140 = 7).

Table 2 shows the intercorrelations between variables. Task orientation was positively correlated with incremental beliefs and RAI, and negatively correlated with amotivation. Entity beliefs were negatively associated with RAI and positively associated with amotivation. RAI was negatively related to amotivation and positively associated with perceived sport competence,

Table 1
Descriptive statistics for overall sample

	Mean	S.D.
Task	3.85	0.67
Ego	2.34	0.93
Incremental	3.92	0.63
Entity	2.22	0.67
External regulation	2.34	0.97
Introjection	2.63	0.77
Identification	3.83	0.84
Intrinsic motivation	3.78	0.93
Amotivation	1.97	0.87
Perceived competence	2.55	0.58
Physical condition	2.61	0.58
Body attractiveness	2.30	0.63
Physical strength	2.44	0.52
Physical self-worth	2.56	0.62
Global self-esteem	2.81	0.69
Sport competence importance	2.53	0.68
Physical condition importance	2.62	0.58
Attractiveness importance	2.57	0.69
Strength importance	2.34	0.64
PA MET Hour	3.98	1.73

Table 2
Correlation matrix for all variables

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
1. Task																
2. Ego	0.12**															
3. Incremental	0.40**	0.09*														
4. Entity	−0.12**	0.10*	−0.16**													
5. RAI	0.52**	−0.03	0.25**	−0.36**												
6. Amotivation	−0.37**	0.01	−0.24**	0.42**	−0.68**											
7. Competence	0.26**	0.10*	0.13**	−0.21**	0.42**	−0.33**										
8. Attractiveness	0.05	0.09	0.08	−0.05	0.11*	−0.06	0.48**									
9. Conditioning	0.26**	0.11*	0.16**	−0.20**	0.37**	−0.26**	0.69**	0.47**								
10. Strength	0.19**	0.20**	0.14**	−0.07	0.23**	−0.20**	0.57**	0.38**	0.50**							
11. Comp Imp	0.10*	0.00	0.15**	0.01	0.26**	−0.21**	0.29**	0.09	0.31**	0.22**						
12. Attract Imp	−0.01	0.13**	0.03	0.05	−0.05	−0.04	0.00	0.01	0.12**	0.05	0.21**					
13. Cond Imp	0.10*	0.10*	0.19**	−0.02	0.24**	−0.24**	0.27**	0.09	0.29**	0.20**	0.50**	0.22**				
14. Strength Imp	0.02	0.04	0.08	0.01	0.09	−0.10*	0.09*	0.01	0.05	0.09	0.36**	0.39**	0.37**			
15. PSW	0.24**	0.11*	0.20**	−0.14**	0.30**	−0.24**	0.66**	0.74**	0.64**	0.50**	0.24**	−0.01	0.20**	0.02		
16. GSE	0.21**	0.10*	0.15**	−0.12**	0.19**	−0.14**	0.51**	0.55**	0.45**	0.39**	0.03	−0.13**	0.08	−0.15**	0.66**	
17. PA Met Hour	0.13**	−0.01	0.09*	−0.11*	0.22**	−0.22**	0.17**	−0.02	0.10*	0.07	0.13**	0.01	0.06	0.03	0.08	0.03

Note: PA = physical activity, Imp = importance, Comp = competence, Attract = attractiveness, Cond = conditioning.
*$p < 0.005$.
**$p < 0.001$.

physical condition and PSW. Amotivation was negatively correlated with perceived sport competence. As expected, perceived sport competence, body attractiveness, physical condition, and strength were positively correlated with each other, as well as with PSW and GSE. Subdomains of PSW were more highly correlated (0.50–0.74) with PSW than with GSE (0.39–0.55), supporting the hierarchical nature of the structure of physical self-perceptions proposed by Fox and colleagues (Fox & Corbin, 1989; Fox, 1990, 1997a, b).

3.2. Cluster analysis

The first purpose of this study was to examine the motivation and physical self-perception profiles of female secondary school students in the context of physical education and sport. We used SPSS (V9.0) to conduct a cluster analysis on 14 variables. Although this may appear rather large and unwieldy, it is logically defended on the grounds of (a) providing a comprehensive profile of female adolescent motivation, and (b) all variables could be categorized under only two major themes, as follows:

- Motivation: goal orientations (task and ego), implicit beliefs (incremental and entity), RAI, amotivation.
- Physical self-perception: four subscales of the PSPP-C and the four associated importance ratings.

We used a two-stage clustering procedure outlined by Hair, Anderson, Tatham and Black (1998). First, 43 cases with missing data were excluded. Next, all variables were standardized using Z scores (mean of 0 and a standard deviation of 1). This was because the RAI, PSPP-C and PIP utilized different scales compared to the other variables. Using standardized scores prevents variables measured in larger units contributing more towards the distance measured than those using smaller units (Everitt, 1993).

Ward's method was used in the hierarchical cluster analysis because it minimizes the within-cluster differences and to avoid problems with forming long, snake-like chains. The agglomeration schedule and dendrogram were used to identify the number of clusters. Both indicated a five-cluster solution to be suitable. Then, the centroid values obtained were used as the initial seed points in a k-means cluster analysis with five-clusters specified. This has the advantage of being less sensitive to outliers, the distance measures and inclusion of irrelevant variables (Hair et al., 1998). The cluster sizes, means, standard deviations, and Z scores of the final centroids are shown in Table 3. A one-way ANOVA was conducted and the results showed that all the clusters were distinct, with F values ranging from 12.64 to 124.42 ($p<0.001$).

To examine whether differences existed among the various clusters on perceived PSW and GSE, a one-way MANOVA was conducted with the clusters as levels of the independent variable. The results showed significant differences between the five clusters on the dependent measures [Pillai's Trace = 0.41, $F(8934) = 29.79$, $p<0.001$, $\eta^2 = 0.20$]. Table 4 shows the means, standard deviations and Z scores of the dependent variables for the five clusters. ANOVAs on each dependent variable were conducted as follow-up tests to the MANOVA. The ANOVA for PSW ($F(4467) = 77.40$, $p<0.001$, $\eta^2 = 0.40$) and GSE ($F(4467) = 35.00$, $p<0.001$, $\eta^2 = 0.23$) were significant. Post-hoc Tukey's Honestly Significant Difference (HSD) tests were conducted to examine the pairwise comparison between clusters. This will be reported in the next section (see Profiles of Cluster

Table 3
Cluster means, standard deviations, and Z scores for the five-cluster solution

	Cluster 1 ($N = 189$)			Cluster 2 ($N = 75$)			Cluster 3 ($N = 66$)			Cluster 4 ($N = 63$)			Cluster 5 ($N = 79$)		
	Mean	s.d.	Z	Mean	s.d.	Z	Mean	s.d.	Z	Mean	s.d.	Z	Mean	s.d.	Z
Task	4.00	0.48	0.23	3.25	0.76	−0.89	3.44	0.64	−0.61	4.37	0.41	0.77	4.08	0.49	0.34
Ego	2.27	0.86	−0.07	1.83	0.75	−0.55	2.82	0.86	0.52	2.47	1.04	0.14	2.53	0.92	0.21
Incremental	4.06	0.47	0.22	3.42	0.73	−0.79	3.66	0.64	−0.40	4.38	0.46	0.73	3.96	0.58	0.06
Entity	2.04	0.52	−0.26	2.36	0.64	0.21	2.92	0.66	1.04	1.99	0.57	−0.34	1.90	0.49	−0.47
RAI	5.11	2.68	0.26	0.61	3.56	−0.88	−0.37	2.97	−1.13	7.63	2.37	0.90	6.44	2.51	0.60
Amotivation	1.69	0.54	−0.33	2.61	0.75	0.74	2.94	0.87	1.12	1.37	0.51	−0.70	1.53	0.57	−0.51
Competence	2.40	0.38	−0.24	1.96	0.51	−1.01	2.40	0.45	−0.25	3.25	0.34	1.22	3.02	0.33	0.83
Comp Imp	2.54	0.56	0.03	2.17	0.63	−0.53	2.39	0.67	−0.21	3.29	0.55	1.12	2.29	0.58	−0.35
Conditioning	2.49	0.46	−0.20	2.06	0.46	−0.96	2.49	0.39	−0.21	3.34	0.43	1.26	2.95	0.36	0.59
Cond Imp	2.64	0.46	0.04	2.31	0.61	−0.53	2.45	0.56	−0.30	3.29	0.51	1.15	2.49	0.49	−0.23
Attractiveness	2.09	0.52	−0.33	1.81	0.55	−0.77	2.53	0.55	0.36	2.73	0.63	0.68	2.73	0.41	0.68
Attract Imp	2.62	0.65	0.08	2.33	0.75	−0.35	2.81	0.61	0.35	2.96	0.62	0.56	2.16	0.56	−0.60
Strength	2.29	0.40	−0.28	1.98	0.46	−0.88	2.45	0.46	0.03	2.91	0.46	0.90	2.82	0.34	0.73
Strength Imp	2.36	0.55	0.04	2.18	0.70	−0.25	2.45	0.69	0.18	2.83	0.60	0.76	1.97	0.45	−0.57

Table 4
Means, standard deviations, and Z scores of the dependent variables by cluster

Variable	Cluster 1 ($N = 189$)			Cluster 2 ($N = 75$)			Cluster 3 ($N = 66$)			Cluster 4 ($N = 63$)			Cluster 5 ($N = 79$)		
	Mean	s.d.	Z	Mean	s.d.	Z	Mean	s.d.	Z	Mean	s.d.	Z	Mean	s.d.	Z
Physical self-worth	2.42	0.51	−0.22	1.97	0.51	−0.96	2.55	0.49	−0.02	3.21	0.41	1.05	2.99	0.41	0.69
Global self-esteem	2.69	0.69	−0.18	2.31	0.70	−0.74	2.83	0.51	0.03	3.33	0.44	0.76	3.21	0.46	0.57
PA MET Hour	4.22	1.64	0.13	3.73	1.79	−0.15	3.46	1.71	−0.30	4.68	1.63	0.40	4.12	1.60	0.08

Groups). A separate ANOVA was conducted for physical activity MET Hours and showed significant differences between the clusters ($F(4459) = 5.43$, $p < 0.001$, $\eta^2 = 0.05$). This is also reported in the next section. There was no significant difference between girls from different year groups.

3.3. Profiles of cluster groups

Fig. 1 shows the cluster profiles for the five-cluster solution of the k-means cluster analysis. Z scores greater than ± 0.5 were used as criteria to describe whether a group scored relatively 'high' or 'low' in comparison to their peers. In most cases we have labelled the clusters based on their motivation and physical self profiles (i.e. the two measurement themes that are each underpinned by the individual variables). The first cluster is labelled *Moderate Motivation and Physical Self* with 40% of the sample represented ($N = 189$). None of the variables showed Z scores beyond

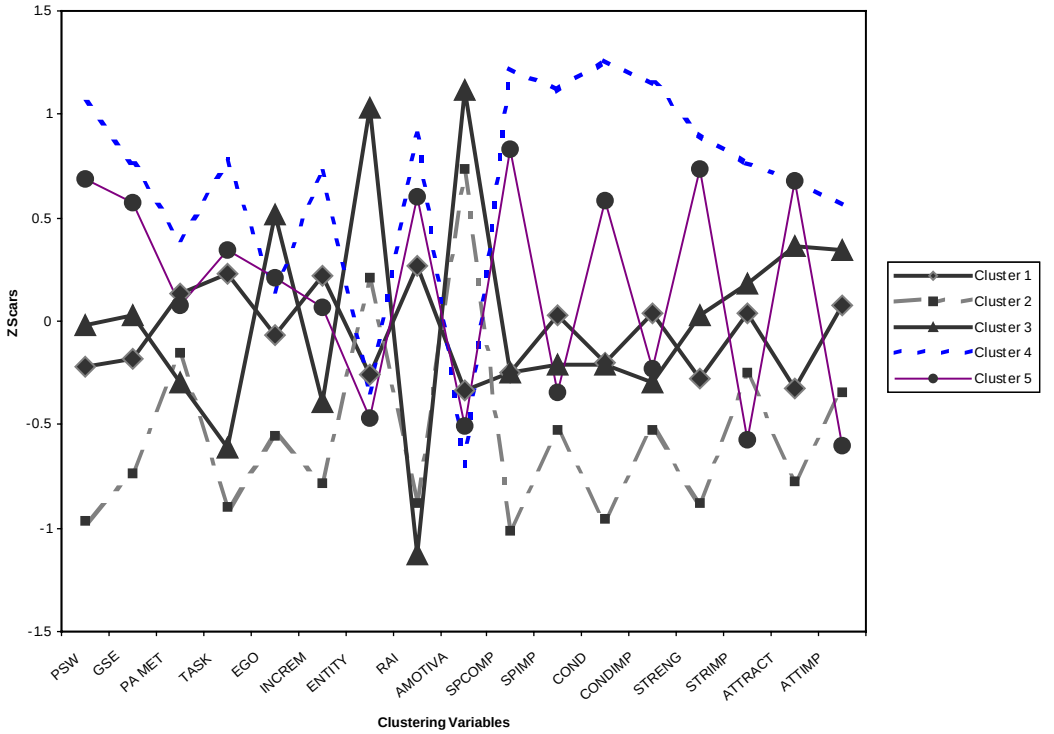

Fig. 1. Cluster profiles for the five-cluster solution of the k-means cluster analysis. All variables were input to form the clusters with the exception of PSW, GSE and PA MET. Key: PSW, physical self-worth; GSE, global self-esteem; Increm, incremental beliefs; Amotiva, amotivation; Spcomp, perceived sports competence; Spimp, importance of perceived sports competence; cond, perceived physical condition; condimp, importance of perceived physical condition; streng, perceived strength; strimp, importance of perceived strength; attract: perceived body attractiveness; attimp, importance of perceived body attractiveness.

± 0.50. These girls were moderately positive on task orientation, incremental beliefs, and RAI. They tended to have moderately low entity beliefs and amotivation. In terms of their physical self-perception, they were moderately low in perceived sport competence, physical condition, strength and attractiveness and they perceived these four dimensions to be of moderate importance to them. This group of girls had PSW, GSE, and physical activity scores within the 'average' range for the sample (i.e. ± 0.50 Z score).

Cluster 2, labelled *Very Low Motivation and Low Physical Self*, contained 75 girls (15.9%) who had the lowest task orientation, ego orientation, and incremental beliefs and were very low on RAI and high amotivation. Another feature of this cluster was that they had the lowest physical self-perceptions in terms of the four subdomains. Moreover, they considered these four dimensions as not important to them. Both PSW and GSE were low and were lower than all other clusters. These girls had slightly below average levels of physical activity participation.

Cluster 3 ($N = 66$; 14%) was labelled *Amotivated*. This cluster consisted of girls who had low task orientation and incremental beliefs, as in Cluster 2, but the highest ego orientation, entity beliefs and amotivation. In addition, they had very low self-determination (RAI). An interesting

characteristic of this group of girls was that they had moderately high perceptions of their body attractiveness and this dimension of self was quite important to them. These latter results may account for their moderate, rather than low, levels of PSW and self-esteem. This amotivated group was the least physically active.

The fourth cluster was labelled *High Motivation and Physical Self*. This consisted of 63 students (13.3%) who had the highest scores on task orientation, incremental beliefs, and RAI. They also lacked amotivation. This cluster had the highest physical self-perceptions in terms of sport competence, physical condition, strength and perceived body attractiveness and they also placed high importance on all four domains. This cluster of girls had the highest PSW, GSE and physical activity compared to other clusters.

Cluster 5 ($N = 79$; 16.7%) was labelled *Moderate Motivation and High Physical Self*. This cluster consisted of girls who showed moderate levels of task and ego orientation, but below a Z score of 0.50. They had high RAI and low amotivation as well as high physical self-perceptions, but with a tendency to perceive the four subdomains of the physical self as not being particularly important to them, at least in comparison to others. This group had an average physical activity score.

4. Discussion

The clear decline in participation in physical activity in girls is a cause for concern and therefore it is important to examine the factors that might influence the likelihood of being physically active. Consequently, the purpose of this study was to derive meaningful profiles of adolescent girls on the basis of their scores from validated and contemporary inventories reflecting motivation and self-perceptions. In addition, a physical activity score was derived from a 7-d recall instrument. By asking about perceptions of themselves in physical education and sport, we hoped to capture all types of individuals, even those who do not wish to take part but are compelled to do so through school lessons. Motivations and self-perceptions assessed in these contexts could then be assessed for their generalizability to other physical activity settings.

Results showed that the motivation of adolescent girls towards physical activity is complex. Five clusters reflected various combinations of motivation and physical self-perceptions with a tendency for the two sets of variables to be related. For example, girls in Cluster 1 showed moderate scores on both motivation and physical self-perceptions, while those in Cluster 2 were low in both and Cluster 4 high in both.

With 40% reflecting an 'average' profile (Cluster 1), it is of more interest to discuss the other 60%. These were distributed fairly evenly between two motivated and two less well motivated clusters. Those in Cluster 4 ('High Motivation and Physical Self'), for example, showed a positive profile through high scores on variables deemed motivationally adaptive, such as task orientation, incremental beliefs, and self-determination. They were also consistently high in all aspects of their physical self and this was reflected in their moderately high self-esteem.

Cluster 2, with low PSW and GSE, also showed low scores on task orientation, incremental beliefs, and self-determination. This is clearly a poorly motivated group of girls who participate in sport and PE for reasons of external coercion or lack of choice (e.g. 'have to'). Similarly, those in Cluster 3 ('amotivated'), showed low task orientation and self-determination scores alongside a

marked tendency to be amotivated. However, this group did not seem to suffer in terms of PSW or GSE.

In summary, the motivation and self-perception profiles showed 30% of the sample reflecting a more negative motivational profile, with another 30% being positive. However, one must be careful in concluding that 30% are actually low in motivation or disinterested in sport, PE, or physical activity. Cluster analysis reflects relative differences only. Inspection of the cluster means in Table 3 shows that Clusters 2 and 3 still have moderate, rather than low, scores on task orientation and incremental beliefs, and have only moderate scores on amotivation. Similarly, scores on RAI, although not reflecting high levels of intrinsic motivation, show a tendency towards introjection rather than external regulation. In summary, therefore, the absolute scores suggest that this sample of girls is less of a motivational 'problem' than the literature has suggested in the past. However, we are not able to say whether there are criterion scores necessary for 'high' or 'low' motivation. For example, it is common to find children of all ages and both sexes reporting high scores on task orientation and incremental beliefs (Duda & Whitehead, 1998; Wang & Biddle, 2001). The level at which task orientation, for example, reflects a genuine lack of interest is not known. Research, therefore, continues with within-group comparisons.

Of note, however, is that we have also assessed physical activity levels. No studies, to our knowledge, have attempted a comprehensive profile of motivation and self-perception measures alongside a detailed measure of physical activity. The clusters showed that the motivation and self-perception profiles were not reflected in large differences in physical activity levels. For example, while trends emerged, with the lowest activity levels shown in the amotivated group and the highest for the 'high motivation and physical self' group, all Z scores were within the range ± 0.5. One reason for this is that many of the motivation variables are assessed in relation to perceptions concerning physical education and sport. However, the physical activity measure allowed for any activity to be recorded, and may have included activities beyond these settings. Girls choosing to cycle to school or take part in dance, may do so for reasons unrelated to their motivation for PE and sport. Thus, the generalizability of perceptions centred on physical education to wider aspects of physical activity is relatively low. However, this requires further study even though we had the advantage of capturing girls who might otherwise not respond to some measures. For example, assessment of the self-determination constructs requires asking questions with the stem 'I participate because …'. This is not meaningful for leisure-time physical activity for girls who are inactive but is relevant when referring to school PE, due to its compulsory nature.

In conclusion, we have shown five profiles of adolescent girls in respect of their motivation and self-perception scores. These can be used to guide interventions to enhance motivation in a group that typically shows declining physical activity levels. However, smaller than expected differences in actual physical activity levels between clusters confirms the complexity of, and the need for further study in, this important area of health research. For example, while motivational and self-perception variables do differentiate groups differing in physical activity, there is a need to account for social and environmental variables that may affect physical activity levels. This would require extending the present research by assessing variables through an 'ecological' approach to adolescent health and physical activity (Sallis & Owen, 1996; Owen, Leslie, Salmon, & Fotheringham, 2000).

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