

Running Head: Physical Activity

Maturational differences in physical self-perceptions and the relationship with  
physical activity in early adolescent girls

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## Abstract

This cross-sectional study examined the effect of physical self-perceptions and maturation on physical activity, and considered the influence of maturation and age on physical self-perceptions in early adolescent girls ( $n = 208$ ; mean age =  $11.83 \pm 0.39$  years). Participants completed the Physical Activity Questionnaire for Older Children, the Children's Physical Self-Perception Profile and the Pubertal Development Scale. Results indicated that the girls were relatively active and physical self-perceptions were significantly and moderately correlated with physical activity. There were no differences in physical activity between maturation stages. There was evidence of an inverse relationship between aspects of physical self-perceptions and maturation, but not with chronological age. This study has identified preliminary evidence for an interaction between maturation, physical self-perceptions and physical activity, but longitudinal research is required to examine this in more detail.

## Maturational differences in physical self-perceptions and the relationship with physical activity in early adolescent girls

Physical activity in girls drops considerably from age 10-15 years, and this increase in inactivity appears to track into adulthood (9). The consequences of inactivity on chronic disease are evident throughout the life stages (7). Therefore, it is important to understand why there is a decrease in physical activity as girls become older so that appropriate interventions can be developed to prevent this decrease in adolescent girls.

The reduction in physical activity seen in adolescent girls is coincident with the onset of puberty. Bradley (3) reported that pubertal status was a significant predictor of PA in girls aged 11 to 15, with more mature girls reporting greater sedentary activities. This finding has also been reported in UK adolescent girls (11). However, other studies have not found a relationship between physical activity and maturation (1). These inconsistent results could suggest that the relationship may be mediated by other variables.

Following a systematic review of 50 published papers, Biddle and colleagues (2) highlighted that physical self-perceptions are key correlates of physical activity in adolescent girls. Physical self-perceptions relate to the physical aspect of self-concept, and Fox and Corbin (8) proposed that physical self-perceptions can be conceptualized as a multi-dimensional and hierarchical model. Specifically, overall physical self-worth is super-ordinate to four sub-domains; sporting ability, physical condition, body attractiveness, and physical strength. The structure of this model has been supported by several studies in adults (8) and children (6). Although there is support for the positive relationship between physical self-perceptions and physical activity, there are only a handful of studies that examine this relationship in

adolescent girls. Further, few studies have examined how physical self-perceptions change through adolescence when physical activity decreases.

There is some evidence that there is a small decrease in physical self-perceptions with age in early adolescents (10). However, the influence of biological age on physical self-perceptions may be a more pertinent area of enquiry than the influence of chronological age, since the physical changes that accompany growth are more closely aligned with biological age and the tempo and timing of the maturational process varies widely between individuals of the same chronological age. During the process of physical maturation in girls there is an increase in adiposity from approximately 15% to 22% body fat that is not matched by an increase in lean body mass (12). This leads to reductions in power to weight ratios and changes in body shape and size that are generally opposed to competence in athletic events and participation in traditional forms of school and community based physical activities. Subsequently, as girls mature they may (accurately) perceive themselves to be less competent and have less positive physical self-perceptions (5). This maturity related decrease in physical self-perceptions may contribute to the documented reduction in physical activity in adolescent girls.

The current study is Phase 1 of an 18-month longitudinal study that aims to investigate the independent and interactive influence of maturation and physical self-perceptions on changes in physical activity in early adolescent girls. The hypotheses of this cross-sectional study are: i) physical self-perceptions will be positively related to physical activity; ii) physical activity will be related to maturation and more mature girls will be less active; iii) more mature girls will have less positive physical self-perceptions; iv) there will be a negative relationship between maturational status and physical self-perceptions and this relationship will be stronger than with exact age.

## Method

### *Participants*

Data were collected from 208 girls in their final year of elementary school (mean age =  $11.83 \pm 0.39$  years) from 17 local schools representing a range of socio-economic backgrounds. All girls and parents/guardians gave written informed consent and the institutional ethics committee approved the project. Age was calculated from the date of birth and the day of assessment.

### *Measures*

***Physical activity.*** Physical activity was assessed using the self-report Physical Activity Questionnaire for children (PAQ-C; 4). The PAQ-C is a 7-day recall instrument developed to assess general levels of PA during term time. From the nine items a measure of PA is calculated on the scale of 1-5 (1 = little or no activity and 5 = very high levels of activity).

***Maturation.*** Maturation was self-assessed using the self-report Pubertal Development Scale (PDS; 14). This is a five-item questionnaire that asks the girls to rate their development. An overall pubertal score was calculated as a mean of the five items and was treated as a continuous variable. It was also used to generate a three stage score of maturation, where a mean score of less than 2 suggested that the girl was showing no or only early signs of maturation (Stage 1), a mean score between 2 and 3 as suggesting that the girl was mid way through the maturation process (Stage 2) and a mean score of more than 3 suggesting the girls were in the late stages of, or had completed the maturation process (Stage 3).

***Self-perceptions.*** Physical self perceptions were assessed using the Children's Physical Self-Perception Profile (C-PSPP; 18), The C-PSPP consists of six subscales, four of which were designed to assess self-perceptions within sub domains of the

physical self (i.e., sport competence, physical condition, body attractiveness and physical strength) and a fifth subscale measures overall physical self-worth. A sixth subscale is included in the C-PSPP to assess global self-concept, but the results are not included in this study. Each scale contains six items in a structured alternative response format, whereby the participants firstly select which of two statements was most characteristic of them and then decide whether it is really true or somewhat true of them.

### ***Procedure***

The researchers met with each class at least 2-weeks prior to data collection in order to introduce the research project and staff. Each girl received an information sheet and parental and child consent form, and was asked to return the forms to the school. All girls completed the questionnaire in a group classroom setting and the questionnaire was split into sections so that a full explanation for each section could be provided and to allow a break between questionnaires. The C-PSPP has previously been criticized as being confusing for children (13), therefore considerable time was taken to fully explain the questionnaire and a flip-chart was used to illustrate an example.

### ***Data Analysis***

All data were double inputted into SPSS version 12 (SPSS Inc., Chicago, IL, USA Version 12). The data were subsequently screened and checked for inconsistencies between the two entries. Girls for whom there were any items of missing data were excluded, and this reduced the sample to 201 girls. Prior to further analyses, the data were tested for the assumptions of parametric tests. The C-PSPP data did not meet these assumptions and therefore, non-parametric tests were used with these variables. Descriptive statistics were determined for each of the variables.

Spearman correlations were undertaken to examine the relationship between the C-PSPP subscales and physical activity. A one-way ANOVA was used to compare the physical activity levels of maturation Stages 1, 2 and 3. A Kruskal-Wallis test was used to compare the three maturation stages on C-PSPP subscales. Follow-up Mann-Whitney-U tests with Bonferroni correction were used to detect where differences occurred between stages ( $p$  value readjusted to .017), and Cohen  $d$  effect sizes were calculated to examine the magnitude of any significant differences between the stages.

In order to compare the relationship between exact age and maturation with physical self-perceptions, maturation was used as a continuous variable and Spearman correlations were undertaken.

## Results

***Relationship between C-PSPP and Physical Activity.*** Spearman correlations indicated moderate and positive relationships between physical activity and sport competence ( $r = .41$ ;  $p < .01$ ), physical condition ( $r = .42$ ;  $p < .01$ ), physical strength ( $r = .35$ ;  $p < .01$ ), body attractiveness ( $r = .21$ ;  $p < .01$ ), and physical self-worth ( $r = .28$ ;  $p < .01$ ).

***Effect of maturation on physical activity and C-PSPP.*** Table 1 displays the mean scores for physical activity and C-PSPP subscales by maturation stage and for the total sample. A one-way ANOVA indicated that there were no significant differences between participants in maturation Stages 1, 2 and 3 on level of physical activity ( $F_{(2, 198)} = 1.35$ ,  $p > .05$ ).

Kruskal Wallis tests identified that there were significant differences between the 3 stages of maturation on body attractiveness ( $H(2) = 12.30$ ,  $p < .01$ ) and physical self-worth ( $H(2) = 6.43$ ,  $p < .05$ ) (Table 2). Follow-up Mann-Whitney U tests identified that Stage 1 had significantly more positive levels of body attractiveness

than Stage 2 ( $U = 2791, p < .017$ ), and the effect size was moderate ( $d = .46$ ).

Differences between the stages were not evident on physical self-worth when the more conservative significance value of .017 was used.

#### Table 1 here

Spearman correlations indicated that there were small significant negative relationships between body attractiveness and maturation ( $r = -.24; p < .01$ ) and between physical self-worth and maturation ( $r = -.18; p < .05$ ). There were no significant relationships between chronological age and any of the C-PSPP subscales.

### Discussion

This study examined the relationship between physical self-perceptions and physical activity in early adolescent girls, and the influence of maturation on physical activity and physical self-perceptions. Findings revealed that the girls in this study were achieving a medium level of physical activity, which is consistent with other studies using the same measure with similar samples (6, 17).

Sport competence, physical condition, body attractiveness, physical strength and physical self-worth were all moderately correlated with physical activity. This finding supports the first hypothesis, replicates previous research (15), and supports Biddle's (2) conclusion that physical self-perceptions are an important correlate of physical activity in adolescent girls. However, the cross-sectional nature of this study makes it difficult to draw causal inferences and further longitudinal research would be of value.

The second hypothesis was not supported because within the current sample there were no significant differences between the 3 stages of maturation on physical activity. This finding is in line with the results of some studies that have shown no relationship between maturational status and physical activity (1), but contradicts

other studies (3, 11). The lack of maturational differences in physical activity may be due to the relatively narrow range of moderate to high activity levels evident in the sample, which may change as the children move from elementary to secondary school.

Supporting the third hypothesis, there was some evidence of differences between the maturation groups on physical self-perceptions and specifically on the body attractiveness and physical self-worth subscales. In follow-up analyses, it was identified that Stage 1 girls had significantly more positive views regarding body attractiveness than Stage 2 girls, with a moderate effect size. Consistent with these findings and as expected, when the PDS was treated as a continuous variable there was evidence of a small negative relationship between maturation and the physical self-perception's body attractiveness and physical self-worth. These findings indicate that aspects of physical self-perception do become more negative as girls become more physically mature. There has been limited research examining the influence of maturation on physical self-perceptions, but these findings are consistent with studies that have demonstrated body dissatisfaction increases as girls become more mature (16). Finally, chronological age was not significantly related to physical self-perceptions supporting the fourth hypothesis and the suggestion that changes in physical self-perception are more likely to be related to biological age than chronological age.

In conclusion, the results of this study provide further support for a relationship between physical self-perceptions and physical activity in general, and specifically in early adolescent girls. Further, the results indicate that aspects of physical self-perceptions become less positive as girls become more mature. It was hypothesized that as physical self-perceptions decrease then this may contribute to the

evident decrease in physical activity during adolescence. However, in this cross-sectional study there were no differences between maturational groups on physical activity levels in early adolescence. Nevertheless, a number of studies have documented that the physical activity levels of girls decrease throughout adolescence and the impact of changes in physical self-perceptions on physical activity may become more evident over time, and in a high school environment where there are greater opportunities to opt into or out of physical activity. The results of this study also provide some support for focusing on biological age rather than chronological age when considering how physical self-perceptions change throughout adolescence, however replication is required. The cross-sectional nature of this study is a limitation and longitudinal data would provide further insight and more conclusive evidence of how changes in maturation and physical self-perceptions independently and interactively influence physical activity over time.

### References

1. Armstrong, N., J. Balding, P. Gentle, and B. Kirby. Patterns of physical activity among 11 year old to 16 year old British children. *Brit Med J.* 301:203-205, 1990.
2. Biddle, S.J.H., S. Whitehead, T.M. O'Donovan, and M.E. Nevill. Correlates of participation in physical activity for adolescent girls: A systematic review of the recent literature. *J Phys, Activity and Health.* 2: 423-434, 2005.
3. Bradley, C.B., R.G. McMurray, J.S. Harrell, and S. Deng. Changes in common activities of 3<sup>rd</sup> through 10<sup>th</sup> graders: The CHIC study. *Med Sci Sport Exer.* 32: 2071-2078, 2000.
4. Crocker, P.R., D.A. Bailey, R.A. Faulkner, K.C. Kowalski, and R. McGrath. Measuring general levels of Physical Activity: Preliminary evidence for the PA questionnaire for older children. *Med Sci Sport Exer.* 29(10):1344-1349, 1997.

5. Crocker, P., C. Sabiston, S. Forrester, N. Kowalski, K. Kowalski, and M. McDonough. Predicting change in physical activity, dietary restraint and physique anxiety in adolescent girls. *Can J Public Health.*, 94: 332-337, 2003.
6. Crocker, P.R., R.C. Eklund, and K.C. Kowalski, Children's physical activity and physical self-perceptions. *J Sport Sci.* 18(6): 383-94, 2000.
7. Department of Health. *At least five a week: Evidence on the impact of physical activity and its relationship to health.* Department of Health, UK. 2004
8. Fox, K.R. and C.B. Corbin, The Physical Self-Perception Profile: Development and preliminary validation. *J Sport Exercise Psy.* 11: 408-430, 1989.
9. Gordon-Larsen, P., M.C. Nelson, and B.M Popkin. Longitudinal physical activity and sedentary behaviour trends: Adolescence to adulthood. *Am J Prev Med.* 27:277-283, 2004.
10. Hagger, M.S., S.J.H Biddle, and C.K.J. Wang. Physical self-concept in adolescence: Generalizability of a multidimensional, hierarchical model across gender and age. *Educ Psychol Meas.* 65:297-322, 2005
11. Henning-Brodersen, N., A. Steptoe, S. Williamson, and J. Wardle. Sociodemographic, developmental, environmental and psychological correlates of physical activity and sedentary behaviour at age 11 to 12. *Ann Behav Med.* 29: 2-11, 2005
12. Malina, R.M., C. Bouchard, and O. Bar-Or. *Growth, maturation and physical activity.* Human Kinetics: Champaign, Il, 2004.
13. Marsh, H. and P. Gouvenet, Multidimensional self-concepts and perceptions of control. Construct validation of responses by children. *J Educ Psychol.* 81:57-69, 1989.

14. Petersen, A., L. Crockett, M. Richards, A. Boxer. A self-report measure of pubertal status: Reliability, validity, and initial norms. *J Youth Adolesc.* 17(2):117-133, 1988.
15. Raudsepp, L., R. Liblik, and A. Hannus, A children's and adolescents' physical self-perceptions as related to vigorous physical activity and physical fitness. *Pediatr Exer Sci.* 14: 97-106, 2002.
16. Thompson, A.M., and K.E. Chad. The relationship of pubertal status to body image, social physique anxiety, preoccupation with weight and nutritional status in young females. *Can J Public Health.* 91(3): 207-211, 2000.
17. Welk, G.J., and B. Ecklund. Validation of the children and youth physical self-perception profile for young children. *Psychol Sport Exercise.* 6:51-65, 2005.
18. Whitehead, J.R., A Study of Children's Physical Self-Perceptions Using an Adapted Physical Self-Perception Profile Questionnaire. *Pediatr Exer Sci,* 7: 132-151, 1995.

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Table 1 Mean and standard deviation scores for physical activity and C-PSPP items by maturation stage and for total sample.

Variable (n= 208)	Stage 1 n = 102	Stage2 n = 76	Stage3 n = 23	Total n=201
PAQ-C total PA (max = 5)	3.03 (0.67)	3.08 (0.72)	3.30 (0.72)	3.08 (0.70)
PSPP-C – sport competence (max = 4)	2.79 (0.60)	2.72 (0.64)	2.76 (0.49)	2.76 (0.60)
PSPP-C – physical condition (max = 4)	2.78 (0.58)	2.82 (0.62)	2.73 (0.63)	2.79 (0.60)
PSPP-C – body attractiveness (max = 4)	2.66 <sup>**a</sup> (0.58)	2.32 (0.71)	2.32 (0.70)	2.49 (0.66)
PSPP-C – physical strength (max = 4)	2.49 (0.52)	2.53 (0.62)	2.57 (0.63)	2.51 (0.60)
PSPP-C - physical self worth (max = 4)	2.89 <sup>*</sup> (0.58)	2.64 (0.70)	2.57 (0.68)	2.76 (0.65)

<sup>\*</sup> significant difference between stages,  $p < .05$

<sup>\*\*</sup> significant difference between stage 1 and stage 2,  $p < .01$

<sup>a</sup> effect size = .46