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"Am I able? Is it worth it?" Adolescent girls' motivational predispositions to school physical education: Associations with health-enhancing physical activity

ABSTRACT

The study purpose was to investigate predictive associations between adolescent girls' motivational predispositions to Physical Education (PE) and habitual physical activity. Two hundred girls (age 13.1 ± 0.6 years) completed the Physical Education Predisposition Scale and, the Physical Activity Questionnaire for Older Children. ANCOVAs revealed that girls with the highest Perceived PE Worth and Perceived PE Ability scores were the most habitually active groups ($p < .0001$). Significant predictors of physical activity identified by hierarchical regression were Perceived PE Ability and body mass index, which accounted for 17% and 3% of variance, respectively. As Perceived PE Ability was strongly associated with physical activity, the correlates of this construct should be further established to inform future school and PE-based interventions.

KEY WORDS

Motivations, adolescent girls, health, physical education, physical activity

INTRODUCTION

Regular physical activity during youth is associated with reduced risk of overweight (Trost, Kerr, & Pate, 2001) and chronic disease risk factors (Ekelund, et al., 2007). Typically, adolescent physical activity levels are lower in girls than boys (Butcher, Sallis, Mayer & Woodruff, 2008; NHS Information Centre, 2009), and physical activity declines with increasing age among adolescents of both sexes (McMurray, Harrell, Bangdiwala, & Hu, 2003). Furthermore, adolescent girls generally exhibit lower cardiorespiratory fitness than boys (McMurray, et al., 2003). As a consequence of these sex-related differences adolescent girls may be at greater risk of physical inactivity and subsequent hypokinetic conditions, and as such are a target population for physical activity intervention.

School-based interventions are purported to be effective for increasing youth physical activity, particularly when multi-component designs are used (van Sluijs, McMinn, & Griffin, 2007). School physical education (PE) is one such component that is highlighted as an important setting for promoting physical activity among adolescent girls (Stratton, Fairclough, & Ridgers, 2008). PE is an academic course included in the normal school curriculum (Trudeau & Shephard, 2005), and in most developed countries is mandatory for all or part of secondary education. Consequently, PE has the potential to reach the majority of the adolescent population by engaging them in sufficiently intense physical activity to confer health benefits, and by developing knowledge, skills, and attitudes to enable lifetime habitual physical activity (Trudeau & Shephard, 2005). In practice though, pedagogical factors dictate that student physical activity levels in PE are typically variable, and sometimes quite low (Stratton, et al., 2008). Thus, the main benefit of PE may be equipping students with knowledge, skills, and confidence to be independently active outside of the

school curriculum. This contribution of PE to youth physical activity is tempered however, by the low frequency of lessons and absence of PE classes out of term-time (Stratton, et al., 2008).

For PE to have an impact on out of school physical activity it should strive to influence factors in adolescents' lives that are related to physical activity and amenable to change. Such factors are conceptualised in the Youth Physical Activity Promotion Model (YPAPM; Welk, 1999). The YPAPM utilises a social-ecological framework, recognising that physical activity participation is influenced by various predisposing, enabling, reinforcing, and personal demographic factors. Predisposing factors are highlighted as significant predictors of physical activity participation (Rowe, Raedeke, Wiersma & Mahar, 2007), which include self-evaluative constructs (e.g., perceived competence) and a cognitive assessment of the perceived outcomes of activity (Welk, 1999). These factors are conceptualized as two fundamental questions that young people ask themselves when deciding whether to participate in physical activity, namely *Am I able?* and *Is it worth it?* (Welk, 1999). *Am I able?* encapsulates how individuals feel and think about their abilities in the physical domain, and include perceived competence, self-efficacy and physical self-worth (Welk, 1999). *Is it worth it?* addresses the cost-benefit assessment of participating. This is a similar concept to the effort-benefit ratio (Fox & Biddle, 1988), which includes attitude cognitive (i.e., beliefs about the physical activity), and attitude affective (i.e. degree of emotional attraction or feeling towards physical activity). It is postulated that young people who answer ''yes'' to both questions are more likely to lead active lifestyles and engage in regular physical activity (Rowe et al., 2007; Welk, 1999).

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Self-evaluative constructs and cognitive assessment of the perceived outcomes of activity are often represented by perceived competence and enjoyment, respectively, which are among the most consistent correlates of young people's physical activity (Sallis, Prochaska, & Taylor, 2000) because they are strongly associated with intrinsic motivation. Furthermore, both are central to Deci and Ryan's (1985) self-determination theory, which suggests that when people are intrinsically motivated, they experience interest and enjoyment and are more likely to persist in a given behaviour. In the PE context intrinsic motivation can positively predict students' intentions to be physically active after leaving school (Ntoumanis, 2001), whereas PE enjoyment (Vallerand, Deci, & Ryan, 1987) and perceived competence are positively associated with students' habitual physical activity (Carroll & Loumidis, 2001). PE plays a key role in influencing these predisposing correlates via teachers' influence on adolescents' PE attitudes, enjoyment, self-efficacy, and perceived competence through the delivery of developmentally appropriate lessons. Previous research with adolescent girls has shown that social interaction can facilitate PE enjoyment (Grieser, et al., 2008) and perceived competence in PE is promoted when teachers give praise, non-verbal support, and show empathy (Nicaise, Bois, Fairclough, Amorose, & Cogerino, 2007). To this end, Wallhead and Buckworth stated, "If physical educators are able to increase students' perceived competence and subsequent enjoyment of their experiences in PE, these affective outcomes of PE will transfer into motivation to adopt a physically active lifestyle out of school" (2004, p. 286). Little empirical evidence exists examining these theoretical relationships between predisposing factors in PE and adolescent girls' habitual physical activity. Thus, the study purpose was to investigate the predictive association between of adolescent girls' PE predispositions and their habitual physical activity levels.

METHODS

Participants and Settings.

Girls were recruited from three north-west England secondary schools, where the number of enrolled students ranged from 512 to 1650, and 11-26% of students were eligible for free school meals. Each school followed the English PE National Curriculum, which includes a combination of games, dance, gymnastics, aquatics, athletics, and outdoor and adventurous activities (Department for Education and Employment / Qualifications and Curriculum Authority, 1999). Games, gymnastics, and dance activities were most prevalent at the time of the research. All 568 girls in Years 8 and 9 (age 12 to 14 years) were invited to participate in the study, and 209 provided written parental informed consent and student assent (response rate = 36.8%). The project received ethical approval from the University Ethics Committee.

Measures and procedures.

Socio-economic status was represented by deprivation scores, which were derived from the girls' home postcodes using the National Statistics Postcode Directory database (Census.ac.uk, 2008). Stature and sitting height were measured to the nearest 0.1 cm using a portable stadiometer (Leicester Height Measure, Seca, Birmingham, UK). Leg length was calculated by subtracting sitting height from stature. Body mass was measured to the nearest 0.1 kg using calibrated scales (Seca, Birmingham, UK). All anthropometric measurements were taken by trained research staff. Somatic maturity status was estimated by determining years from attainment of peak height velocity (APHV) using gender-specific regression equations that included stature, sitting height, leg length, body mass, chronological age and their interactions (Mirwald, Baxter-Jones, Bailey, & Beunen, 2002).

Motivational predispositions to PE were assessed using the Physical Education Predisposition Scale (PEPS) (Hilland, Stratton, Vinson, & Fairclough, 2009). The PEPS consists of 11 items measured on a 5-point Likert scale anchored by *Strongly disagree* (1) and *Strongly agree* (5). *Perceived PE Worth* is calculated from the mean of six items representing the cost-benefit assessment of participating in PE, which reflect attitude affective and attitude cognitive (Welk, 1999), (e.g., *The things I learn in PE are useful to me; The things I learn in PE make PE lessons interesting for me*). *Perceived PE Ability* is derived from the means of the remaining five items, which are indicative of perceptions of competence and self-efficacy in PE (e.g., *I have the confidence to take part in PE; I am satisfied with my performance in PE).* Higher Perceived PE Worth and Perceived PE Ability scores reflect more positive predispositions to PE, while lower scores indicate less positive predispositions. The PEPS has previously demonstrated acceptable construct validity, internal consistency (Perceived PE Worth: α = .91; Perceived PE Ability: α = .89), and test-retest reliability (proportion of students recording individual item test-retest differences within ±1.0 = 92.7% to 99.3% ($M \pm SD$ = 96.2 ± 2.3%)) with adolescent boys and girls (Hilland, et al., 2009). The PEPS was administered before PE classes commenced in each of the schools, and the students were instructed to answer all questions reflecting on PE in general.

Habitual physical activity was assessed using the Physical Activity Questionnaire for Older Children (PAQ-C) (Crocker, Bailey, Faulkner, Kowalski, & McGraith, 1997). The PAQ-C has demonstrated validity and reliability as a measure of general moderate-to-vigorous physical activity (Crocker, et al., 1997), and is considered a suitable and feasible tool for youth physical activity surveillance (Biddle, Gorely, Pearson, & Bull, 2011). It includes nine items assessing physical activity at

various times of the week. Each statement is scored on a five point scale ranging from low (1) to very high levels of activity (5), with the overall PAQ-C score calculated as the mean of the nine physical activity items. Both questionnaires were administered to the girls in their classrooms by the second author.

Data analysis.

Preliminary checks of the data distribution and variance were conducted using Kolmogorov-Smirnov and Levene's tests, respectively. As these were satisfactory, descriptive statistics ($M \pm SD$) were calculated for all variables. Perceived PE Worth scores were ranked and tertiles generated to represent girls with high, average, and low perceptions of Perceived PE Worth. The same procedure was repeated with the Perceived PE Ability scores. One-way ANOVAs were then conducted to assess any differences in descriptive variables between the Perceived PE Worth and Perceived PE Ability tertiles. PAQ-C inter-item reliability was also assessed to establish the instrument's degree of internal consistency. Age and BMI were included as covariates in the respective analyses as there were significant differences in these variables in the initial comparison between Perceived PE Worth and Perceived PE Ability tertiles. To investigate differences in self-reported physical activity between high, average, and low Perceived PE Worth, and Perceived PE Ability groups, two separate ANCOVAs were computed. Hierarchical multiple regression was then used to establish whether Perceived PE Worth or Perceived PE Ability most strongly predicted self-reported physical activity. The predictor variables were entered into the analysis in separate blocks in the following order: Perceived PE Ability, Perceived PE Worth, BMI, age. Self-reported PAQ-C score was the outcome variable. Effect sizes (d) were calculated where appropriate, using the weighted pooled estimate of the standard

deviation (Hedges, 1981). All analyses were conducted using SPSS v.15 (SPSS Inc, Chicago, IL), and alpha was set to $p < .05$.

RESULTS

Inspection of the data revealed that nine girls had incomplete data due to partially completed questionnaires, or refusal to participate in the anthropometric measures. As a result the final sample size was 200. The mean chronological age was 13.1 ± 0.6 years and the girls were 0.9 ± 0.7 years from APHV. Mean BMI was in the healthy weight range according to the International Obesity Task Force age and sex-specific BMI cut-points (Cole, Bellizzi, Flegal, & Dietz, 2000), but 18% and 7.5% of the girls were classified as overweight, and obese, respectively. Descriptive data were analogous across the respective Perceived PE Worth (Table 1) and Perceived PE Ability tertiles (Table 2), though the average Perceived PE Worth group was significantly older than the others ($p = .045$), and there was a significant difference in BMI between the girls with high and low Perceived PE Ability ($p = .015$).

TABLES 1 AND 2 HERE

Internal consistency of the PAQ-C was satisfactory (Cronbach's $\alpha = .79$). ANCOVA revealed that when the effects of age were controlled, girls with highest perceptions of PE Worth were significantly more active than peers in the average and lowest Perceived PE Worth groups (F (2, 196) = 9.35, $p < .0001$, d = 0.56 - 0.64; Figure 1). Comparison of Perceived PE Ability groups revealed significant differences in self-reported physical activity (adjusted for BMI) between the groups with high and average perceptions, high and low perceptions, and average and low perceptions (F (2, 196) = 18.76, $p < .0001$, d = 0.31 - 0.92; Figure 2).

FIGURES 1 AND 2 HERE

To establish the relative importance of Perceived PE Worth and Perceived PE Ability on the girls' physical activity, hierarchical regression analysis was undertaken. In the final model significant predictors of self-reported physical activity were Perceived PE Ability and BMI, which accounted for 17% and 3% of the variance, respectively (Table 3).

TABLE 3 HERE

DISCUSSION

This study investigated differences in adolescent girls' self-reported physical activity based on their motivational predispositions to PE. Those girls with the most positive perceptions of PE Worth reported significantly higher habitual physical activity than those with average and low Perceived PE Worth. The cognitive aspect of PE attitude is an important component of the Perceived PE Worth construct. There is however, little research available describing the relationship between the cognitive aspect of PE attitude and physical activity, possibly because diverse definitions and conceptualizations of attitude exist (Silverman & Subramaniam, 1999). One study reported the association between attitude towards PE and physical activity in over 400 American and Taiwanese high school students (Chung & Philips, 2002). Though gender-specific associations were not reported, the correlation between PE attitude and self-reported physical activity was weak to moderate, with attitude accounting for less than 10% in physical activity variance (Chung & Philips, 2002). Other research suggests that negative feelings towards PE, which include aspects of attitude cognitive (e.g., meaningfulness of PE) may influence youth to refrain from physical activity participation out of school, particularly when the PE curriculum is sport based (Ennis, 1996).

The affective element of attitude to PE was the other component of Perceived PE Worth. A much larger body of research focuses on this element of PE attitude, which is commonly conceptualized as enjoyment or fun, and is a consistent and strong correlate of youth physical activity (Sallis, et al., 2000). The LEAP intervention study aimed to promote enjoyable and successful PE experiences among adolescent girls through modifications to the PE environment, such as increased choice of activities, girl-only classes, inclusion, and small group interaction (Dishman, et al., 2005). The authors concluded that this approach increased girls' enjoyment of PE, which resulted in higher levels of daily physical activity (Dishman, et al., 2005). On the strength of the relationship between PE enjoyment and physical activity out of school, it is suggested that enjoyment of PE classes should be a health-related goal of PE (Sallis, Prochaska, Taylor, Hill, & Geraci, 1999). PE enjoyment is reported to be greatest during the early years of middle school (Barr-Anderson, et al., 2008), which highlights the importance of early adolescent girls valuing the relevance of PE and physical activity programs, before the number of perceived barriers to participation increases with advancing age (Sherar, et al., 2009). Enjoyment of PE can be facilitated by the role of significant others including teachers and peers (Grieser, et al., 2008). Differences in PE enjoyment have been observed between students receiving different types of teacher encouragement and feedback, with those receiving positive feedback reporting the most enjoyment (Viciana, Cervello, & Ramirez-Lechuga, 2007). Alternatively, adolescent girls' PE enjoyment may be influenced more by the opportunities for social interaction with friends than enjoyment of physical activity in general (Grieser, et al., 2008). The fact that habitual physical activity does not always occur with friends in a structured setting may partly explain why Perceived PE Worth was not a significant predictor of physical activity in our study.

Perceived PE Ability was greatest among the most active girls, and lowest among the least active ones. Furthermore, this variable had the strongest association with self-reported physical activity, accounting for 17% of variance. The construct of Perceived PE Ability is derived from feelings of self-efficacy and perceived competence in relation to PE. Both variables have previously demonstrated strong associations with habitual physical activity (Sallis, et al., 2000). Self-efficacy however, has less commonly been reported in relation to PE participation, possibly due to the absence of PE-specific self-efficacy measures (Hilland, et al., 2009). Perceived competence in PE is positively related to habitual (Carroll & Loumidis, 2001), and structured physical activity (Barr-Anderson, et al., 2007), and sport and exercise out of school (Papaioannou, Bebetsos, Theodorakis, Christodoulidis, & Kouli, 2006). These relationships are based on social-cognitive theories of motivation whereby higher perceptions of ability keeps expectations for success high and provides motivation for continued involvement and participation (Papaioannou, et al., 2006). Moreover, it has been reported how adolescents' perceived PE competence was related to perceived autonomy, which in turn was associated with physical activity intentions and behaviours (Shen, McCaughtry, & Martin, 2007). Using a self-determination theory framework Shen and colleagues suggested that perceived PE competence may increase through the mediating role of enhanced student choice in terms of activity content, selection of peers during group work, and other elements of decision-making. Furthermore, student perceptions of teacher feedback may significantly influence perceived ability in PE. To optimize adolescent girls' perceived competence in PE it is advocated that teachers should provide increased praise for good performances and effort, provide non-verbal support, spend time with

the girls when giving feedback, and be empathetic to their needs and capabilities (Nicaise, et al., 2007).

The other significant predictor of habitual physical activity was BMI, which is a measure of body size that is commonly used to describe weight status It is well known that BMI is confounded by lean mass and so should be used cautiously as a measure of overweight and obesity, particularly among peri-pubertal youth. The positive direction of the relationship between BMI and physical activity was unexpected, principally because BMI was highest among the low Perceived PE Ability group who were also the least active. Additionally, previous research has reported lower activity levels among overweight and obese adolescents compared to leaner peers (Trost, et al., 2001). One potential explanation for the positive association is that overweight adolescent girls may overestimate their self-reported physical activity, possibly because of socially desirable responses (McMurray, et al., 2008). Moreover, the relative energy cost and therefore perceived effort of physical activity may be greater for overweight girls compared to leaner peers, and this may also contribute to overestimated self-reported activity (Spadano, Must, Bandini, Dallal, & Dietz, 2003). Further inspection of our data lends support to this hypothesis as the highest proportion of overweight and obese girls (41.2%) were in the low Perceived PE Ability tertile.

A strength of this study was that it was underpinned by a socio-ecological conceptual framework, and validated measures were used to assess physical activity and psychological perceptions of PE within a known target population for physical activity intervention. Additionally, our findings add to the limited body of evidence demonstrating associations between school PE and habitual physical activity. For some time PE has been highlighted as an important vehicle for promoting health-

enhancing physical activity. Evidence though suggests that it is not effective in this role (Trost, 2004), possibly because research has seldom investigated associations between known outcomes of PE and habitual physical activity. The use of self-reported physical activity data was a limitation, which may have resulted in overestimated PAQ-C values. Accelerometers would have provided a more objective method of the girls' physical activity levels but cost prohibited their use in this study. Moreover, accelerometers underestimate some forms of habitual physical activity (e.g., non-weight bearing exercise, upper body movements, water-based activities; Dollman, Okely, Hardy, Timperio, Salmon, & Hills, 2009), and low compliance to monitoring protocols among adolescents has previously been reported (Pearson, Atkin, Biddle, Gorely, & Edwardson, 2009). Where viable, accelerometers are preferable in school-based studies but strategies to promote compliance among adolescents are required (Trost, McIver, & Pate, 2005; Sirard & Slater, 2009). The PAQ-C though is a well established and validated instrument, which is appropriate for adolescents (Biddle, et al., 2011; Dollman, et al., 2009), and our PAQ-C data demonstrated strong internal consistency. The majority of physical activity variance however, was unexplained, which reinforces the need to investigate multidimensional correlates of physical activity. Efforts to establish these correlates in relation to PE should be encouraged so effective PE interventions can be designed. The cross-sectional study design precludes any claims of cause and effect, and the sample was randomly selected from three schools within a limited geographical area, which diminishes the generalisability of the findings to other adolescent populations.

In conclusion, the self-reported physical activity of north-west English adolescent girls was greatest among those with more positive motivational predispositions to PE. Furthermore, a significant proportion of physical activity

variance was predicted by the girls' Perceived PE Ability. Future work should verify these findings with larger and more demographically diverse samples using objective physical activity assessment methods. Moreover, as Perceived PE Ability is strongly associated with physical activity, the correlates of this construct should be further established to drive the design and content of school and PE-based interventions. This could be explored through mixed-method approaches to investigate students' perceptions of their teachers, PE environments, and curricula, which have direct relevance to teacher pedagogy. To promote adolescent girls' physical activity through PE, teachers should focus on improving perceptions of PE Ability and Worth through perceived competence and self-efficacy, as well as enjoyment. Strategies for achieving this include delivery of differentiated and choice-based PE lessons taught in a supportive and cooperative environment with specific, positive teacher feedback. PE lessons which focus on the motivational predispositions of adolescent girls are more likely to promote physical activity engagement in PE and beyond.

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Table 1.

Comparison of descriptive data by Perceived PE Worth tertiles (M ± SD)

Variable	High (n = 74)	Average (n = 68)	Low (n = 58)	p
Age (years)	13.0 ± 0.6	13.2 ± 0.6	13.0 ± 0.6	.045
Stature (kg)	159.2 ± 7.6	159.2 ± 6.3	158.5 ± 7.2	.59
Body mass (cm)	52.7 ± 12.8	53.5 ± 11.9	54.0 ± 15.7	.84
BMI (kg/m^2)	20.6 ± 4.1	20.9 ± 4.0	21.3 ± 5.1	.70
Years from APHV (years)	0.9 ± 0.7	1.0 ± 0.5	0.9 ± 0.7	.26
Deprivation score	39.7 ± 19.8	38.0 ± 23.1	34.5 ± 22.3	.40

Table 2.

Comparison of descriptive data by Perceived PE Ability tertiles (M ± SD)

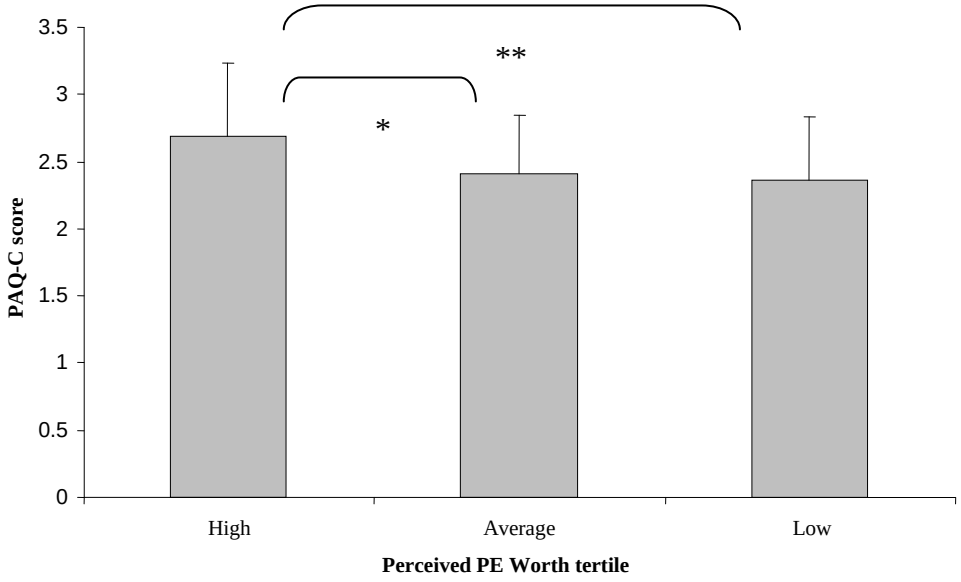
Variable	High (n = 93)	Average (n = 52)	Low (n = 55)	*p*
Age (years)	13.1 ± 0.6	13.0 ± 0.6	13.1 ± 0.6	.69
Stature (kg)	159.5 ± 7.4	159.6 ± 6.03	158.2 ± 7.3	.46
Body mass (cm)	51.2 ± 11.6	54.6 ± 12.7	55.7 ± 16.1	.11
BMI (kg/m^2)	20.0 ± 3.6	21.3 ± 4.3	22.1 ± 5.3	.015
Years from APHV (years)	0.9 ± 0.7	1.0 ± 0.6	0.9 ± 0.7	.86
Deprivation score	37.9 ± 20.4	35.2 ± 21.1	39.3 ± 24.4	.61

Table 3.

Hierarchical multiple regression analyses assessing the predictive associations between Perceived PE Ability, Perceived PE Worth, BMI, age, and self-reported physical activity.

	B	*SE*	R^2	ΔR^2	*p*
Model 1					
Constant	1.09	0.22			
Perceived PE Ability	0.37	0.06	.17	.17	<.0001
Model 2					
Constant	0.95	0.25			
Perceived PE Ability	0.31	0.07			<.0001
Perceived PE Worth	1.0	0.07	.18	.01	.20
Model 3					
Constant	0.44	0.31			
Perceived PE Ability	0.36	0.07			<.0001
Perceived PE Worth	0.08	0.07			.30
BMI	0.02	0.01	.21	.03	.007
Model 4					
Constant	0.81	0.77			
Perceived PE Ability	0.36	0.07			<.0001
Perceived PE Worth	0.08	0.07			.30
BMI	0.02	0.01			.007
Age	-0.03	0.06	.21	.001	.60

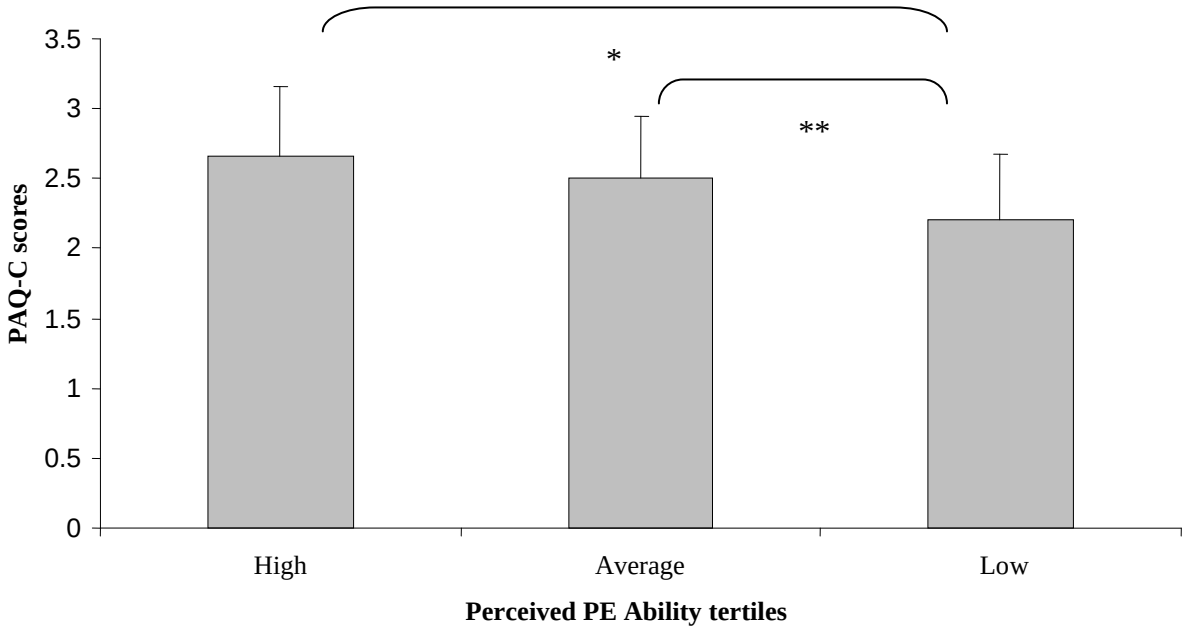
Figure 1. Differences in self-reported physical activity between Perceived PE Worth tertiles.



* *High > Average, p = .001, d = 0.56*

** *High > Low, p < .0001, d = 0.64*

Figure 2. Differences in self-reported physical activity between Perceived PE Ability tertiles.



*High > Low, $p < .0001$, $d = 0.92$

**Mid > Low, $p = .001$, $d = 0.67$