



## Sport, physical activity and physical education experiences: Associations with functional body image in children

Chloe P. Allen<sup>a</sup>, Rohan M. Telford<sup>b</sup>, Richard, D. Telford<sup>b</sup>, Lisa S. Olive<sup>a,\*</sup>

<sup>a</sup> School of Psychology, Deakin University, Locked Bag 20001, Geelong, Victoria, 3220, Australia

<sup>b</sup> Research Institute for Sport and Exercise, University of Canberra, University Dr, Bruce, ACT 2617, Australia

### ARTICLE INFO

#### Keywords:

Sports club participation  
Moderate-to-vigorous physical activity  
Embodied image scale  
Accelerometers  
PE attitude questionnaire

### ABSTRACT

The relationship between functional body image and children's experiences in differing physical activity contexts, including physical education, sports club participation and habitual physical activity, and gender differences, was investigated. Participants were 300 grade-six students (150 girls), who were assessed for functional body image (Embodied Image Scale), attitude toward physical education, sports club participation (questionnaires) and physical activity (accelerometers). General-linear-mixed-modelling was used to investigate relationships between functional body image and the three physical activity contexts. Results indicated that children who held more positive attitudes towards physical education and those who were a member of a sports club had better functional body image; and that a positive effect of moderate-to-vigorous physical activity on behavioral functional body image was evident among boys only. Our data suggest that future interventions aiming to improve children's functional body image may benefit from focusing on physical education in schools and encouraging participation in organized sports clubs.

Body image can be described as the subjective view individuals hold of their own body, including their thoughts, feelings and perceptions (Cash & Pruzinsky, 2005; Schilder, 1950). Among children, poor body image has been associated with both mental and physical health outcomes, including increased depressive symptoms, low self-esteem, eating disorders, obesity and being overweight, physical inactivity and low fitness (Cecon, Franceschini, Peluzio, Hermsdorff, & Priore, 2017; Durso, Latner, & Ciao, 2016; Olive, Byrne, Cunningham, & Telford, 2014). Body image research to date has primarily focused on aesthetic dimensions of body image (e.g. the appearance of the body/body as object), which include how individuals perceive their own body size, shape and appearance and how they perceive it to be viewed by others (Fredrickson & Roberts, 1997; Jiménez-Flores, Jiménez-Cruz, & Bacardí-Gascón, 2017a,b). More recently, researchers have begun to examine further dimensions of body image with a focus on body functionality, or what is often termed functional body image (Abbott & Barber, 2010; Alleva, Martijn, Jansen, & Nederkoorn, 2014; Mulgrew & Marika Tiggemann, 2018; e.g. body as process). While both the aesthetic and functional body dimensions are presumed to contribute to overall body image, for whom and under what contexts these contributions are made is yet to be fully elucidated, particularly in reference to functional body image dimensions.

Functional body image has been described as an individual's perception of their body's 'functional' capabilities, including how the body moves and how biological systems function (Abbott & Barber, 2010; Rubin & Steinberg, 2011). Like aesthetic body image, functional body image is thought to be multidimensional, occurring across affective, behavioral and cognitive domains. Abbott and Barber (2010) conceptualize these domains in the following ways: affective - relates to the evaluations made regarding how satisfied an individual is with their body (e.g. feeling good about one's physical ability); cognitive - relates to the value an individual places on aspects of their body (e.g. believing it's important to take care of the body); and behavioral - describes the investment individuals dedicate to maintaining aspects of their body (e.g. Participating in physical activities often). In the current study, Abbott and Barber's conceptualization of functional body image forms the basis for our investigations.

Functionality of one's body is one quality that has emerged as an important influencing factor in the positive body image literature (Wood-Barcalow, Tylka, & Augustus-Horvath, 2010). With this shift away from solely focusing on the negative aspects of body image that are salient when viewing body image through an aesthetic lens, researchers have begun to investigate whether placing a greater value and investment on the functional aspects of the body can result in positive

\* Corresponding author. School of Psychology, Deakin University, Locked Bag 20001, Geelong, Victoria, 3220, Australia.

E-mail addresses: [chloe.allen@deakin.edu.au](mailto:chloe.allen@deakin.edu.au) (C.P. Allen), [rohan.telford@canberra.edu.au](mailto:rohan.telford@canberra.edu.au) (R.M. Telford), [dick.telford@canberra.edu.au](mailto:dick.telford@canberra.edu.au) (R.D. Telford), [lisa.olive@deakin.edu.au](mailto:lisa.olive@deakin.edu.au) (L.S. Olive).

<https://doi.org/10.1016/j.psychsport.2019.101572>

Received 6 September 2018; Received in revised form 23 July 2019; Accepted 6 August 2019

Available online 07 August 2019

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body image outcomes. It is thought that by directing attention to body functionality (i.e. what the body can do, how the body systems function), individuals will have a more adaptive and potentially more positive means of valuing and perceiving their body, which will result in more positive body image overall. This is in contrast to the negative effects commonly found when viewing the body as a passive object, with a focus on the aesthetic qualities of body parts, often in relation to idealized models perpetuated by Western cultures. To date, preliminary evidence has mostly focused on women and has demonstrated that valuing, investing and focusing on body functionality results in a range of positive body image outcomes including body appreciation and lower levels of self-objectification (e.g.; Alleva, Martijn, Van Breukelen, Jansena, & Karos, 2015; Wasylkiw & Butler, 2013). However, more recent work in women by Mulgrew and Marika Tiggemann (2018) has also indicated that these positive effects may be context specific, and seem to cease when women are exposed to images of idealized models displaying physical competence, which may increase dissatisfaction with functional body image.

While taking this newer evidence into account, a shift in emphasis toward body functionality may provide a healthier alternative to the appearance-focused culture that so strongly influences body image (Carey, Donaghue, & Broderick, 2013; Williams & Ricciardelli, 2014), and may provide a novel target for interventions aiming to improve body image. To our knowledge, no research has been undertaken into functional body image in children to date, with only a few studies being published in adolescent and adult populations (Abbott, Barber, & Dziurawiec, 2012; Alleva et al., 2014; Mulgrew & Marika Tiggemann, 2018). Given the developmental differences between childhood, adolescence and young adulthood, both socially, biologically and psychologically, it would be erroneous to assume that findings arising from adolescents and young adults could be generalized to children. Hence, there is a need to research this younger age-group further. One area that provides a good context for exploring functional body image in children is physical activity.

The exercise and self-esteem model (Sonstroem & Morgan, 1989) provides a framework for which to explore the effect of physical activity on functional body image. The model theorizes that as an individual increases confidence in their abilities performing a physical task (physical self-efficacy), their general evaluation of the self as possessing overall physical fitness increases (physical competence), which promotes satisfaction with the parts of the body involved (physical acceptance) and leads to increases in self-esteem. We know that self-esteem has been linked to overall body image (Furnham, Badmin, & Sneade, 2002; Kostanski & Gullone, 1998), and the influence of self-esteem on functional body image has also been identified (Serto, Doganavsargil, & Elbi, 2009), so theoretically, increases in physical activity will promote physical acceptance and a more positive functional body image, which will lead to increased self-esteem.

We know that physical activity can influence body image in both adults and youth (Olive, Byrne, Cunningham, & Telford, 2011; Pop & Pop, 2017). Indeed, in children, it has been shown that the positive effect of physical activity on body image remains even after adjusting for percent body fat (Olive et al., 2011), indicating that the links between physical activity and body image may exist beyond an actual change in body size and composition; that is, to extend to functional body image. Physical education (PE) provides another context in which children's attention is drawn to their bodies. While the influence of PE on children's functional body image may depend on the skill of the teacher and the quality of the lesson, it has been shown that well-delivered PE can provide an environment where children feel empowered and more positive about their physical abilities and body image in general (Bailey, 2006; Koff & Bauman, 1997). Similarly, children who enjoy PE or hold a positive attitude toward the subject have been found to have more positive overall body image (Koff & Bauman, 1997), and this may be due to increased physical self-efficacy, as per the exercise and self-esteem model (Sonstroem & Morgan, 1989). Yet, exactly how

contemporary PE practice affects functional body image in children is unknown.

Participation in sport is also often advocated among youth, due to its positive influence on psychological and social factors (Eime, Young, Harvey, Charity, & Payne, 2013). Female adolescents who participate in sport have been found to possess higher functional body image, including a higher value placed on different physical aspects of their bodies and higher behavioral-investment made to maintain these aspects, than those who do not participate in sport (Abbott & Barber, 2011), but, this relationship has not been investigated in boys. However, boys tend to have higher participation rates in sport than girls (Australian Bureau of Statistics, 2012; Breuer, Hallmann, & Wicker, 2011), and it has been suggested that males place a higher regard on the functionality of their bodies than females do (Davis, Elliot, Dionne, & Mitchell, 1991; Franzoi, 1995), making functional body image an important avenue of investigation.

Taking a multidimensional approach, exploring the behavioral, cognitive and affective domains of functional body image, this study aims to investigate the relationships between functional body image and each of habitual physical activity, PE experiences and sport participation in both boys and girls. It is hypothesized that children with, 1) higher rates of moderate to vigorous physical activity (MVPA), 2) more positive attitudes towards PE, and 3) who are a member of a sports club will have greater functional body image across affective, behavioral, and cognitive dimensions. It is further hypothesized that the effect of physical activity participation, attitude towards PE, and sport club participation on affective, behavioral and cognitive functional body image will depend on gender, with stronger relationships seen for boys.

## 1. Method

### 1.1. Participants

Participants consisted of 300 children (150 boys, 150 girls) aged 9 to 12-years ( $M$  age = 11.30 years,  $SD$  = 0.58). Twenty-five schools in the Greater Geelong region, Australia, were approached to participate and school principals were provided with a description of the study. Sixteen schools agreed to take part, with all year six students invited to participate. From this, 345 children provided consent and of this, 300 students were available to participate on the day study measures were completed (86% response rate), the remaining students being absent on the day of testing.

### 1.2. Functional body image

To measure functional body image, the Embodied Image Scale (EIS) was used (Abbott & Barber, 2010). The EIS is designed to measure multiple dimensions of body image including cognitive, affective and behavioral dimensions. While the EIS consists of subscales of both functional body image and aesthetic body image, this study only assessed functional body image. The functional body image scale of the EIS consists of three subscales, each with three items. The subscales are: Functional Satisfaction, assessing the affective dimension of functional body image (e.g. *I feel really good about what I can do physically*), Functional Behavioral-Investment, assessing the behavioral dimension of functional body image (e.g. *I participate in physical activities whenever I can*), and Functional Values, assessing the cognitive dimension of functional body image (e.g. *One of the most important reasons people should take care of their bodies is so that they can be physically active*). Participants were asked to rate on a 5-point Likert scale (1 = *Very untrue for me*, 2 = *Sort of untrue for me*, 3 = *Neither*, 4 = *Sort of true for me*, 5 = *Very true for me*) how true or untrue each statement was for them and items are averaged to form the subscale score. While the EIS is a relatively new measure, preliminary evidence has shown it to be a valid and reliable measure of functional body image among 12 to 17-year-olds (Abbott & Barber, 2010). Consistent with previous studies, the

functional body image scale of the EIS showed adequate internal consistency in the current study, with each subscale showing sound-to-good to adequate internal consistency (Cronbach's  $\alpha$ : affective = 0.88; behavioral = 0.78; cognitive = 0.59). Although the cognitive subscale in this study has a poor Cronbach's  $\alpha$  of 0.59, a Cronbach's  $\alpha$  greater than 0.5 has been supported as an acceptable measure of reliability (Gliem & Gliem, 2003; Nunnally et al., 1967), with past research also qualifying this value as sufficient (Taber, 2018). This suggests that the cognitive subscale may be interpreted, however it needs to be interpreted with some caution.

### 1.3. Physical activity

Accelerometers (ActiGraph GT1M, Pensacola, FL, USA) were used to assess moderate-to-vigorous physical activity (MVPA). Participants were asked to wear the accelerometer on a belt, around the waist in line with their right knee for eight consecutive days. To minimize any potential reactivity, the first day of data was discarded. To measure MVPA (average minutes per day), daily accelerometer counts were used and cut off points for MVPA were defined based on published recommendations as greater than 2297 counts per minute (Evenson, Catellier, Gill, Ondrak, & McMurray, 2008). Accelerometer data were collected on both weekends and weekdays, and at least three days' data comprising at least two weekdays and one weekend day, were required for inclusion in the analyses. If there were 10 h or more of activity in a day the accelerometer data were included, an hour being considered invalid if there were 60 min of non-wear time and 1–2 min of tolerance based on previous recommendations (Troiano, 2007). An epoch length (the frequency at which data were recorded) of 15 seconds was used. The number of valid days worn were recorded and data were averaged across these days when calculating the average MVPA per day. Of the 300 children who received accelerometers, 260 met the inclusion criteria and were included for analyses.

### 1.4. Attitude towards PE

In the current study, attitudes towards PE (PE attitude) were measured via self-report. The 15-item PE attitudes questionnaire was designed to measure both the affective (emotional response toward an attitude object) and cognitive (beliefs toward an attitude object) components of PE attitudes and has been shown to be a valid and reliable measure of PE attitudes in children aged 7-to-12 years (Olive & Telford, 2011). Participants are asked to rate on a 5-point Likert-type scale (1 = *Disagree a lot*, 2 = *Disagree a little*, 3 = *Neither*, 4 = *Agree a little*, 5 = *Agree a lot*) how much they agree or disagree with each statement. Three items are reverse scored (*It is easy to get bored in PE*, *I get embarrassed doing PE*, and *I sometimes get teased during PE classes*) to allow scoring direction to remain consistent. Total scores range from 15 to 75 with higher scores indicating a more positive attitude toward PE. Consistent with previous studies (Olive & Telford, 2011), the PE attitudes scale showed sound internal consistency in the current study (Cronbach's  $\alpha$  = 0.83).

### 1.5. Sports club participation

Sports club participation, which also included dance class participation, was self-reported by participants, who were asked as part of the larger student survey; 'Were you a member of a sport or dance club last year? Yes/No.'

### 1.6. Body mass index

Height was measured with an accuracy of 0.1 cm by portable stadiometer (Charder HM-200P Portstad, Charder Electronic Co Ltd, Taichung City, Taiwan) and weight, by electronic weight scale (A&D Precision Scale UC-321; A7D Medical, San Jose, CA) whilst wearing

light clothing without shoes, to an accuracy of 0.1 kg. Height and weight values were used to calculate body mass index (BMI). Weight status was characterized through the International Obesity Task Force's age and sex adjusted BMI growth-reference (Cole, Bellizzi, Flegal, & Dietz, 2000).

### 1.7. Procedures

Ethics approval for the current study was obtained from the Deakin University Human Research Ethics Committee, and the Victorian Department of Education and Training Ethics Committee. The research described has been carried out in accordance with The Code of Ethics of the World Medical Association. After informed consent was provided, researchers attended each school to conduct student assessments, which took place in class groups. When conducting questionnaire assessments, students were advised that there were no right or wrong answers and that they should complete the questionnaire privately. Each questionnaire was read aloud to children to account for variation in reading abilities, and researchers supervised students to ensure comprehension and to keep participants on task, answering any student queries as they arose. Questionnaire assessments took approximately 30 min to complete. Accelerometers were distributed on the same day questionnaires were completed and students were given verbal and written instructions on how to wear the accelerometer, which included wearing the device at all times, except when sleeping or when they could get wet (e.g. swimming, showering). Participants were instructed to hand them back in eight days' time. Of the 300 children who received accelerometers, 260 met the inclusion criteria and were included for analyses. Height and weight were assessed on an alternate day. Assessments of each school group were completed within a 3.5-week period.

### 1.8. Statistical analysis

Data were analyzed using the Statistical software package R (R Core Team, 2014). Three separate general linear mixed models using the R Lme4 package (Bates, Mächler, Bolke & Walker, 2015) were employed for each outcome variable (affective, behavioral and cognitive functional body image) to examine relationships with sex, BMI, sports club participation, PE attitudes and MVPA as fixed factors and in order to account for school level clustering, a random intercept for School was included. This approach fits within the general framework of general linear mixed models (Galwey, 2006). General model checking procedures were routinely used to identify aberrant data and to check the model assumptions.

## 2. Results

### 2.1. Participant characteristics

The means and standard deviations of scores for each variable are presented in Table 1. Most participants were members of a sports club (74% boys, 80% girls). Only 36% of participants met the Australian recommended guidelines for MVPA of at least 60 min of MVPA per day (Australian Government Department of Health, 2014). On average, girls had lower scores than boys across the physical activity and psychological variables; however, these differences were not significant (all  $p > .05$ ) with the exception of cognitive functional body image ( $t(300) = 3.260, p = .001$ ) and MVPA ( $t(283) = 8.200, p = .000$ ). Body mass index was significantly associated with affective functional body image (all  $p < .05$ ) but not the behavioral or cognitive domains of functional body image.

A Pearson's correlation analysis was run and the results are presented in Table 2. Correlations were mostly in the expected direction, for example more positive attitude towards PE was associated with more positive functional body image across all three domains.

**Table 1**  
Descriptive statistics of boys, girls and all participants combined for functional body image dimensions and physical activity domains.

Variable	Gender				Combined	
	Boys		Girls		M	SD
	M	SD	M	SD		
Body mass index	19.47	3.57	19.89	3.44	19.70	3.48
Affective	13.08	2.70	12.65	2.64	12.83	2.70
Behavioral	12.69	2.67	12.45	2.38	12.57	2.55
Cognitive	12.58	2.14	11.76	2.23	12.16	2.21
MVPA mins/day	66.81	24.35	46.23	17.54	56.48	23.49
PE attitude	67.36	7.57	65.80	7.40	66.51	7.57
Sport club participation	78%	-	83%	-	80%	-

Note. Affective = Affective functional body image; Behavioral = Behavioral functional body image; Cognitive = Cognitive functional body image; MVPA = Average moderate to vigorous physical activity per day; PE attitude = Attitude towards physical education. Sports club participation represents % of children who are members of a sports club.

**Table 2**  
Intercorrelations for variables.

Variable	1	2	3	4	5	6	7
1. Affective	-						
2. Behavioral	.67*	-					
3. Cognitive	.37*	.49*	-				
4. MVPA	.10	.21**	.09	-			
5. PE attitude	.55**	.63**	.42**	.22**	-		
6. Sport club participation	-.28**	-.33**	-.18*	-.09	-.20**	-	
7. Sex	-.08	-.09	-.18*	-.26**	-.10	-.06	-
8. Body mass index	-.27*	-.17*	-.07	-.22*	-.19*	.09	.06

Note. \* $p < .01$ . \*\* $p < .001$ . Affective = Affective functional body image; Behavioral = Behavioral functional body image; Cognitive = Cognitive functional body image; MVPA = Average moderate to vigorous physical activity per day; PE attitude = Attitude towards physical education. Sports club participation was coded as 1 for sports club participant and 2 for non-participant. For sex, boys were coded as 1 and girls 2.

2.2. Effect of sports club participation, PE attitude, and MVPA on children's functional body image

A summary of the effects for each model (functional body image affective, behavioral and cognitive) are presented in Tables 3-5 respectively. All models included adjustments for BMI and sex. We also tested for the interaction between each candidate predictor variable (e.g. sports club participation, MVPA and PE attitude) and sex. Where interaction terms have no effect, we present the simplest model, which produced the best fit for our data. Firstly, we investigated affective functional body image and found a significant effect for PE attitudes

**Table 3**  
Summary of effects for affective functional body image.

	Estimate	df	t	SE	p
Sex	-0.411	222	-0.164	2.502	0.870
BMI	-0.136	222	-3.317	0.041	0.001
MVPA	-0.007	222	-0.799	0.008	0.425
PE attitude	0.161	222	6.366	0.025	0.001
Sport club member	-0.816	222	-1.667	0.489	0.097
MVPA x Sex	-0.015	222	-1.071	0.014	0.285
PE attitude x Sex	0.018	222	0.489	0.037	0.626
Sport club member x Sex	-1.428	222	-1.875	0.762	0.062

Note. MVPA = Average moderate to vigorous physical activity per day; PE attitude = Attitude towards physical education. Sports club participation was coded as 1 for sports club participant and 2 for non-participant. For sex, boys were coded 1 and girls 2. ICC for school cluster random effect = 0.001

**Table 4**  
Summary of effects for behavioral functional body image.

	Estimate	df	t	SE	p
Sex	1.833	222	0.828	2.214	0.409
BMI	-0.031	221	-0.518	0.036	0.388
MVPA	0.020	219	2.654	0.007	0.008
PE attitude	0.195	219	8.711	0.022	0.001
Sport club member	-1.116	222	-2.579	0.433	0.011
MVPA x Sex	-0.032	222	-2.580	0.012	0.010
PE attitude x Sex	0.002	217	0.076	0.033	0.508
Sport club member x Sex	-0.447	222	-0.664	0.674	0.940

Note. MVPA = Average moderate to vigorous physical activity per day; PE attitude = Attitude towards physical education. Sports club participation was coded as 1 for sports club participant and 2 for non-participant. For sex, boys were coded 1 and girls 2. ICC for school cluster random effect = 0.053

**Table 5**  
Summary of effects for cognitive functional body image.

	Estimate	df	t	SE	p
Sex	-0.577	222	-1.929	0.299	0.055
BMI	0.007	222	3.977	0.039	0.854
MVPA	0.003	222	0.500	0.006	0.618
PE attitude	0.092	222	5.214	0.018	0.001
Sport club member	-0.795	222	-2.238	0.355	0.026

Note. MVPA = Average moderate to vigorous physical activity per day; PE attitude = Attitude towards physical education. Sports club participation was coded as 1 for sports club participant and 2 for non-participant. For sex, boys were coded 1 and girls 2. ICC for school cluster random effect = 0.001

( $p < .001$ ,  $\beta = 0.161$ ), indicating that children holding more positive attitudes toward PE also had better affective functional body image; and a trend for an interaction effect between being a sports club member and sex ( $p = .062$ ,  $\beta = -1.428$ ), reflecting that the negative effect of not being a sports club member on affective functional body image is stronger for girls.

In our second model, investigating behavioral functional body image, we found a significant interaction between MVPA and sex ( $p = .010$ ,  $\beta = -0.032$ ), indicating that the positive effect of MVPA on behavioral functional body image differed between boys and girls. As seen in Figure 1, for boys there appears to be an association between MVPA and behavioral functional body image that is not reflected in the girls data. To investigate this difference, we fitted separate models for boys and girls and found a positive association between MVPA and behavioral functional body image for boys ( $t(110) = 2.279$ ,  $\beta = 0.018$ ,  $p = .020$ ) and no association for girls ( $t(112) = -1.342$ ,  $\beta = -0.012$ ,  $p = .182$ ). We found further significant effects for sports club participation ( $p = .011$ ,  $\beta = -1.116$ ), whereby children who were a member of a sports club were more likely to invest (behavioral) in their functional body image; and PE attitude ( $p < .001$ ,  $\beta = 0.195$ ) with those children holding more positive attitudes toward PE also reporting greater investment in their functional body image.

In our final model, investigating cognitive functional body image, it was found that children with more positive attitudes towards PE ( $p < .001$ ,  $\beta = 0.092$ ) and those who were a member of a sports club ( $p = .026$ ,  $\beta = -0.795$ ) also held more positive cognitions toward their functional body image. No significant effects were found for MVPA ( $p = .906$ ,  $\beta = -0.002$ ), nor did we find any significant interaction effects between sex and our candidate predictor variables (sports club  $p = .957$ ,  $\beta = -0.039$ ; PE attitude  $p = .233$ ,  $\beta = -0.042$ ; MVPA  $p = .906$ ,  $\beta = -0.002$ ), which were not included in our final model as these did not improve the quality of our model.

3. Discussion

Our data provide the first evidence, to our knowledge, that children

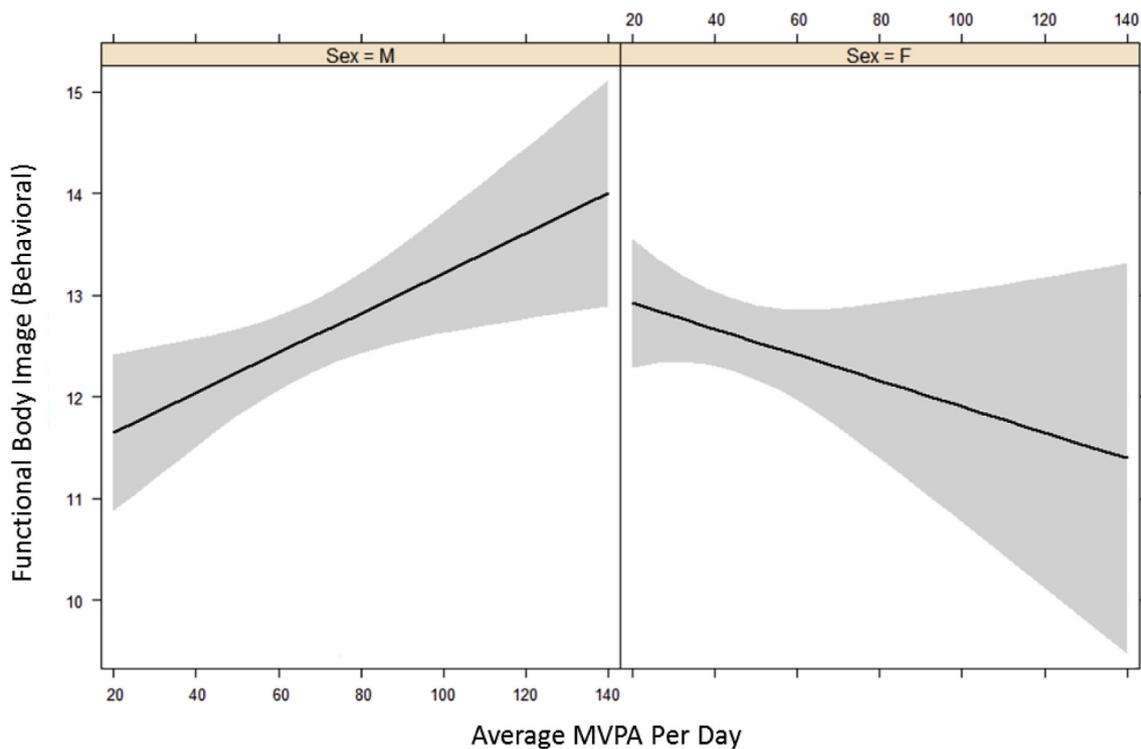


Fig. 1. MVPA  $\times$  sex interaction effect for functional body image behavioral.

with a more positive attitude to PE and those who belong to a sports club also have better (more positive) functional body image. Somewhat contradictory, a child's level of MVPA was not related to their functional body image (cognitive or affective domains), with the exception of behavioral functional body image, where any positive effect of MVPA on behavioral functional body image was evident among boys only. An interaction trend was also observed for sports club participation, which was positively associated with affective functional body image and this was especially the case for girls, meaning that girls who were not members of a sports club were worse off in terms of their affective functional body image than their male non-sports club member counterparts.

Our evidence that children who enjoy and perform better in PE have more positive functional body image across all domains (behavioral, cognitive and affective) preclude any conclusions regarding the direction of this relationship (i.e. whether a child who develops skills and competencies in their physical abilities will in turn develop positive functional body image, or whether a child who holds a positive sense of their bodies functional ability will more readily engage in and enjoy participating in PE). However, these findings do suggest that PE might be an important vehicle through which to improve functional body image in children. Of note is the finding that the relationship between functional body image across all domains and attitude towards PE was not dependent on gender, despite prior research indicating that girls often report more negative experiences in elementary school PE compared to boys (Avery, Girolami, & Humbert, 1998). Our findings are consistent with the broader body image literature, which also suggest there is a relationship between people's attitudes around physical activity and their body image (Koff & Bauman, 1997; Slater & Tiggemann, 2011). In our study, this relationship might be explained in that children with more positive attitudes towards PE experience greater enjoyment and greater participation during PE activities, which in turn, may work to maintain or improve their physical capabilities and so their functional body image across the behavioral, affective and cognitive domains.

The current study provides further evidence that children who are

members of a sports club are likely to be more satisfied with their body's function (cognitive functional body image) and invest more in maintaining their body's capabilities (behavioral functional body image) than children who are not a member of a sports club. This finding may be due to sports club participation providing more opportunities for children to experience their bodies performing successfully, functioning well, and possibly experiencing feelings of increasing confidence and competence in front of others, nourishing a positive feedback cycle (Fredrickson & Roberts, 1997; Weiss, 2000). Most interestingly was the trend we found, indicating a positive effect of sports club participation on functional body image, particularly for girls. While there was less difference between boys who were sports club members and non-sports club members in terms of their functional body image, this difference was more pronounced among girls. While sports participation rates in the current study were high compared to the national average, particularly for girls (Australian average participation rates: 73% boys vs. 59% girls, our study: 74% boys vs. 80% girls), it seems that some girls may still be losing an important opportunity to positively engage with their functioning body, and in turn, develop a more positive affective functional body image, including feelings of satisfaction and happiness about their physically functioning body.

With higher levels of MVPA significantly related to more positive behavioral functional body image in boys, it is surprising that, while just a trend, girls who participate in increased MVPA have a trend towards lower behavioral functional body image. As girls increase their levels of MVPA, they might develop higher aspirations for how their body functions and how they perform physically. Interestingly, simply participating in higher amounts of MVPA was found to have no significant influence on one's *evaluation* of their functional body image (cognitive domain), nor impact on how they *feel* about their functional body image (affective domain). These lack of findings may indicate that both content and context is important when it comes to influencing how one thinks and feels about their functional body image in relation to physical activity participation. For example, simply being more active in the absence of self-reflection of the affective experience or any interpretation of the value of that behaviour (circumstances often

afforded in contexts such as PE and sport) appear to have limited effects on both cognitive and affective domains. Therefore, simply getting children to be more physically active could improve the behavioral aspect of functional body image but might not be an effective means of enhancing the affective or cognitive dimensions, something that should be considered by those aiming to improve children's functional body image. This finding is supported by previous research that influences on functional body image may be context-specific (Mulgrew & Marika Tiggemann, 2018).

Overall, boys and girls scored differently on cognitive functional body image, reinforcing previous research suggesting that males place higher regard on the functionality of their bodies than females do (Davis et al., 1991). However, these findings need to be interpreted with some caution, in light of the lower internal consistency observed for this subscale. Also, interestingly, the higher volume of MVPA in boys did not appear to be very influential, with the exception of the positive effect seen in behavioral investment in functional body image (behavioral) for boys only. This is perhaps not surprising, given the differences in physical characteristics and capabilities occurring with the onset of puberty, including changes in accumulation and location of body fat and muscle mass (Telford, Telford, Olive, Cochrane, & Davey, 2016), and this difference is likely to widen during adolescence.

Although body functionality and ability are often rewarded in sporting contexts, some sports highlight the aesthetic ideals of society and social norms, including ballet and gymnastics for girls (Slater & Tiggemann, 2011). Societal expectations and social norms are placed on boys and girls feeding into the idea that one should be a certain body shape, such as the thin-ideal for girls (the concept of a slim female with small waist and feminine physique; Thompson & Stice, 2001) and the muscular ideal for boys (Thompson & Cafri, 2007). Although participating in a sports club and having more positive PE experiences were shown to be protective factors of functional body image in the present study, this could be context specific as highlighted by Mulgrew and Marika Tiggemann (2018). Past research has also found that aesthetic-focused sports (such as ballet) may limit sport as a protective factor for functional body image disturbance (Abbott & Barber, 2010), with participants of aesthetic-focused sports found to have poorer functional body image and poorer aesthetic body image than those who participate in non-aesthetic focused sports. Whether it is possible to create an environment that promotes process over appearance should be an aim for future research, with interventions that focus on making PE an environment where girls are equally as comfortable as boys, with just as many chances of success.

As for theoretical implications, our findings support the theory proposed by the exercise and self-esteem model (Sonstroem & Morgan, 1989). Although, based on the findings from the present study, we cannot draw the conclusion that any increase in physical activity will lead to increases in self-esteem, we have identified that contexts where children are likely to receive positive feedback for their physical abilities, such as in sports clubs and physical education classes, may explain their increased confidence in performing a task and an increased self-evaluation of physical fitness. These effects, in turn, promote satisfaction with the parts of the body involved and lead to increases in self-esteem. Whereas, when less focus is placed on the body's abilities and movement, such as during habitual daily physical activity, this effect may not be as easily observed.

A number of strengths and limitations exist in the current study. Firstly, the cross-sectional design limits the ability to determine temporal sequence, therefore, it is not possible to know the direction of the relationships investigated. This begs the questions - do children who have more positive functional body image go on to join sports clubs and have positive experiences in PE, or do children have better functional body image as a result of their participation across these physical activity contexts? Longitudinal studies, or better still, randomized controlled trials measuring children's functional body image both before and after participating in specialized PE or sporting clubs, with an

appropriate control group, are necessary to more fully elucidate these relationships with functional body image, and to help answer this question. A further limitation was that while all attempts were made to encourage students to answer honestly, including reminding them of the confidential nature of the questionnaire, response bias such as social desirability as an artefact cannot be entirely ruled out. Although this study was multi-disciplinary with multiple physical activity settings, one aspect we did not assess was aesthetic body image. The inclusion of aesthetic body image would have provided rich information to supplement the findings on functional body image. We can consider there might be an interaction between aesthetic and functional body image, and this is an area worthy of further research, particularly in the context of enhancing PE lessons in schools that can positively promote functional body image across all domains. A particular strength of the current study is the use of accelerometers as an objective measure of MVPA, which offers the opportunity to directly measure intensity of physical activity, which other methods such as self-report questionnaires or pedometers do not afford (Reilly et al., 2008).

#### 4. Conclusion

The current study provides new evidence on the positive association between functional body image and a range of physical activity contexts, namely children's perceived experiences in PE, sports club participation, and MVPA, which was previously lacking in the literature. In particular, this study has identified a number of novel avenues through which functional body image may be improved. These include the potential of well-developed physical education classes in elementary school to have a positive impact across all domains of functional body image, as well as promoting sport club participation early in childhood, particularly among girls. While further research is needed to more fully elucidate these potential effects, both physical activity contexts may prove potentially beneficial for improving the functional body image in pre-adolescent children.

#### Funding

This work was supported by the following industry partners: The Department of Education and Training Victoria, the Australian Sports Commission and Cricket Australia, and by a Deakin University Faculty Grant.

#### Declarations of interest

None.

#### Acknowledgements

We would like to thank the time and effort given by the students, teachers and administration staff from participating schools, as well as the Victorian Department of Education and Training.

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