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Actual competence, rather than perceived competence, is a better predictor of physical activity in children aged 6 – 9 years.

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Abstract

There is a limited understanding about the relative importance of perceived and actual competence on emergent physical activity levels in children and whether there is a difference in their development and strength between boys and girls.

This study used a single-cohort, multiple age group design to monitor physical activity, actual motor competence (AMC) and perceived competence (PC) on four occasions over 18 months in 6-to 9-year-old boys and girls (N=201). Physical activity was measured by 7-day daily step counts (pedometer) and activity diary. AMC was assessed by mastery of skill criteria for 4 motor skills; run, overhand throw, standing broad jump, and line walk. PC was measured with the Self Description Questionnaire-I.

Linear Mixed Model analysis revealed that AMC, Gender and School significantly impacted physical activity levels longitudinally in these children. AMC made a greater contribution (9%-30%) to physical activity levels than PC (0%-5%), and at an earlier age in boys (7 years) than girls (9 years). The need to acknowledge these developing distinctions in considering emergent physical activity levels has important implications for childhood learning environments and physical activity interventions.

Keywords: physical activity, actual motor competence, perceived competence, children, longitudinal

Introduction

In early childhood a number of key contributors to physical activity levels have been identified which are important for the optimal development of many physical, educational, social and psychological functions (Bauman, Bellew, Vita, Brown, & Owen, 2002). However, the influence of these contributors may vary at different times in a child's development (Hands, Parker, & Larkin, 2001; Sallis et al., 1992). The interaction between these factors at various stages of development may support or alternatively, constrain physical activity levels. Physical activity is a learned and modifiable behaviour (Sallis et al., 1992), and understanding the relationships between determinants is important. In 1999, Lindquist, Reynolds, and Goran, developed a hierarchal framework of factors that affect children's physical activity behaviour at four levels: physiological factors such as age, gender and actual motor competence (AMC); psychological factors such as motivation and perceptions of competence (PC); socio-cultural factors such as parents and family structure; and ecological factors such as the physical environment.

AMC is defined as the mastery of physical skills and movement patterns that enable enjoyable participation in physical activities (Castelli & Valley, 2007). In movement development, the acquisition of proficient fundamental motor skills in early childhood serves as a foundation for building complex motor skills later in life. Early development of competence in motor skills has the potential to establish a healthy habit of physical activity participation (Garcia, Garcia, Floyd, & Lawson, 2002). PC is an individual's awareness and belief of their movement capabilities (Rudisill, Mahar, & Meaney, 1993). Feelings of perceived competence are experienced when performance outcomes are positive and an individual's perception of their own competence towards a task or activity serves to motivate the individual and increase persistence (Harter, 1978; Ulrich, 1987; White, 1959).

Previous research has examined the role that AMC and PC play in males and females engaging in physical activity. Evidence suggests that in younger children AMC rather than PC may lead to increased physical activity behaviour across the lifespan, (Lloyd, Sanders, Bremer, & Tremblay, 2014)For example, Robinson, Wadsworth, and Peoples (2012) reported that locomotor skills, rather than perceived competence, accounted for 21% of the variance in school time physical activity in pre-schoolers. In a group of 8 year old Iranian girls, Khodaverdi, Bahram, Khalaji, and Kazemnejad (2013) also found that motor skill competence had more influence on physical activity than perceived competence. Among a sample of 8 year old children from Australia, greater locomotor and object control skills were associated with increased total, lunchtime, recess, and after-school moderate-to-vigorous physical activity (Cohen, Morgan, Plotnikoff, Callister, & Lubans, 2014). With regards to gender differences, Logan, Webster, Getchell, Pfeiffer and Robinson's (2015) review article suggested that overall the evidence remained unclear regarding how motor competence relates to physical activity in boys and girls separately and that further research is required to examine if and why these differences exist.

Perceptions of competence have also been linked to physical activity, with age and gender playing significant moderators but more so in older children and adolescents (Babic et al., 2014). Children and adolescents ranging from 10 to 16 years who have higher perceived competence participate in more physical activity, than those with lower perceived competence (Crocker, Eklund & Kowalski, 2000).. In longitudinal associations in tracking children from 11 – 15 years of age, Inchley, Kirby, and Currie (2011) found that perceived competence was significantly correlated with physical activity and that there were gender differences in self-perceptions, with boys reporting more positive perceived competence scores. They reported that for boys in early adolescence, higher self-perceptions increased the odds of being active by 3.8 times, whilst for girls with higher self-perceptions these odds improved to 5.2. Davison, Symons Downs, and Birch (2006) also found that higher perceived competence in girls at 9 years of age, predicted higher levels of perceived competence and physical activity levels at 11 years of age. Stodden et al.'s (2008) conceptual model proposed that with increasing age perceptions of competence moderated the relationship between physical activity and motor competence. Barnett et al. (2011; 2008) have also supported the integral role that perceived sports competence may play in mediating the relationship between physical activity and motor competence. We wanted to continue to explore these associations in younger children and examine this evolving relationship between PC, AMC and physical activity levels.

The focus of the current study was to investigate the contributions of AMC and PC to physical activity in younger 6-to 9 year old children over time. It was hypothesised that AMC would significantly predict physical activity in younger children, and PC would emerge as a predictor in the 9 year olds, however the development and strength of these relationships may differ for boys and girls.

Method

A single-cohort, multiple age group design was employed. This design allowed for separate assessments of effects for age, time of measurement and cohort. The data from multiple cohorts collected at the same age can be combined to increase sample size and analytic power, particularly when there are time constraints in research (Nicholson, Sanson, Rempel, Smart, & Patton, 2002). The sample was recruited and followed forwards for 18 months across four data collection periods at approximately 6 month intervals.

Participants

The participants were 201 children aged 6- to 8-years (89 females and 112 males) recruited from primary schools located across a geographic spread of the Perth metropolitan area in Western Australia. Based on Socio Economic Indices for Areas (SEIFA) (Australian Bureau of Statistics, 2004), 20 schools from middle socio economic areas (to control for a potentially confounding factor) were invited to participate in the study with 55% acceptance (11 schools). Small numbers of 4 (minimum) to 8 (maximum) participants were drawn from any one classroom to minimise the cluster effect. Children were ineligible if they were medically unfit or suffered from any ill health that prohibited them from participating in physical education classes at school.

Attrition was low (2.5%) however the sample size for each data collection cycle varied slightly depending on school attendance on the testing day. Complete data sets for each participant for the physical activity measure depended on diligence in returning pedometer diaries. Physical activity records were less complete than AMC and PC data. Ethical clearance to conduct the study was granted by University of Notre Dame Australia Human Research Ethics committee, with permission from school principals, and voluntary informed consent from the parents or guardians of children.

Measures

Physical activity.

Pedometers (Yamax SW-200) were used to record daily step counts over a 7 day period and have been shown to be a reliable measure in young children (Bassett et al., 1996; Hands, Parker, & Larkin, 2006) with good construct and convergent validity (Tudor-Locke, Williams, Reis, & Pluto, 2004). Pedometers were sealed by parents each morning to discourage tampering by participants. Participants only removed the pedometer when swimming, bathing or sleeping. Parents and children completed a diary at the end of every day about the type and frequency of activities before school, recess, lunch, after school, any physical education or fitness classes and the number of steps recorded (Hands, Glasson, Brinkman, & Read, 2004) to provide important contextual information not recorded by the pedometer (Hands et al., 2006; Tudor-Locke et al., 2004). Parents also noted the amount of time the children did not wear the pedometer and why. In cases where the child was involved in an activity where wearing a pedometer was not possible or advisable (such as swimming), the response times were converted into steps and added to the daily step count. All conversions were based on activity duration (minutes) x 120 steps (Tudor-Locke, Kasse, Williams, & Reis, 2002). If participants were missing data for 4 or more days, they were excluded from the analysis for that data collection. Daily step counts that were recorded below 1,000 steps and above 30, 000 steps were excluded from the analysis (Rowe et al., 2004), and as a result only two cases of outliers (0.3%) across the four data collection cycles were removed. For each data collection period, there was no evidence of reactivity between the first two days of wearing the sealed pedometer and the last two days (p = .10 – p = .798).

Actual motor competence (AMC).

AMC was measured by the observed motor skill performance criteria using four skill observation records from the Fundamental Movement Skills Teacher Resource Manual (EDWA, 2001). The four skills comprised one explosive locomotor skill (standing broad jump), a continuous locomotor skill (50m sprint run), an object control skill (over-arm throw), and a body management skill (line walk). These four skills represented the basic movement patterns that underpin the more specialised skills required for many recreational, competitive, and daily living activities (Gallahue & Ozmun, 2006)

Participants were videoed performing each skill on school grounds to facilitate performance analysis and maximise reliability. Participants completed the run and line walk in one trial and completed the jump and throw across three trials. The lead author administered all test procedures, then reviewed and scored all video footage following each data collection period to maximise scoring reliability. A score of 1 was recorded for each criterion successfully demonstrated and a 0 recorded if mastery of the criterion was not displayed. For the jump and throw, mastery of the criterion had to be present in 2 out of 3 trials to be recorded as a score of 1. The run observation record comprised six criteria, the over-arm throw comprised seven criteria, the standing broad jump comprised eight criteria, and the line walk comprised five criteria (McIntyre, 2009) resulting in a total possible AMC score of 26. The construction of a composite score to represent motor competence has been used in previous Australian research in the assessment of motor skills (Harten et al., 2008; Okely, Booth, & Patterson, 2001a, 2001b). A small pilot study validated the use of the composite score in Australian children. Scores from a Fundamental Movement Skill Quotient (which was derived from the composite score of observed mastery of 4 motor skills) and the McCarron

Assessment of Neuromuscular Development (MAND) were compared. The correlation between the two measures was moderate (r = .35, p = .013) and the level of agreement using the Bland Altman method was acceptable (Hands & McIntyre, 2015).

Perceived competence (PC).

The Self Description Questionnaire-I (SDQ-I) (Marsh, 1988; Marsh, 1990) was used to measure PC. The SDQ-I assesses three areas of academic self concept (Reading, Mathematics, and General School self concept), four areas of non-academic self concept (Physical Ability, Physical Appearance, Peer Relationships, and Parent Relationships) and General Self Concept scale. The SDQ-I factor structure is stable across ages and across sex (Marsh, 1988) and has proven reliable and valid with Australian children aged 5- to 8 years old (Marsh, Craven, & Debus, 1991). For the current study, three subscales of non-academic self concept were used, Physical Ability, Physical Appearance and Peer Relationships. The use of these selected subscales within the SDQ-I is acceptable (H. Marsh, personal communication, 19 December, 2004). The Physical Ability subscale of the SDQ has been used in previous research examining perceived competence (Inchley et al., 2011; Khodaverdi et al. 2013). Given the importance of peers and physical appearance to perceptions of competence in physical activity contexts across childhood (Smith, 2003) we also included the Physical Appearance and Peer Relationships subscales. Participants answered verbally to closed questions in the form of scaled responses based on a Likert-type scoring system of 1 (No, Always) to 5 (Yes, Always) and a total score out of 120. The same researcher asked and recorded participant responses at each data collection period.

Procedure

Where possible, the order in which school visits occurred was replicated through each data collection period (6 months ± 2 weeks). Data collection for PC and AMC was undertaken during a school day. On that day the participants were also provided with a pedometer and physical activity diary and instructions for use. The researcher then returned to the school after 7 days to collect the pedometers and completed activity diaries.

Data Analysis

The statistical software IBM SPSS version 24 (SPSS) was used for all statistical processes. Outlying scores were identified and treated. Initially, 33.2% of the data sets had missing physical activity step counts across the four data collection periods. Data for participants who were missing more than two data collection cycles of pedometer data were deleted and participants who were missing data in one or two collection cycles had their data individually replaced using the individual's mean step count for those missing only one or two data points (Rowe et al., 2004). This process was followed for 107 cases (14.9%). There were 129 cases removed (from 718), resulting in a complete data set of 589 cases (82%) used for analysis across the four data collection periods.

Missing data accounted for 3.3% of PC scores and 1.8% of AMC scores and data for individuals with more than two collection cycles missing were removed from further analysis. For the perceived and actual motor competence descriptive analyses, 711 cases of a possible 804 cases had full data sets.

Normality for variables was assessed using Shapiro-Wilk test separately for males and females within age groups and found to be within acceptable limits ($p>.05$).

Standard linear multiple regression analysis was used to assess the relationship between physical activity (dependent variable) and PC and AMC (independent variables). The data collection cycles (DC1, DC2, DC3, DC4) were combined to investigate the contribution of perceived and actual motor competence to boys' and girls' physical activity at different ages. The 6-, 7-, and 8-year-old boys and girls became 7-, 8- and 9-year-olds between DC2 and DC3, therefore the 7- and 8-year-old age groups are represented across all four data collections. In comparison, 6-year-olds are represented from DC1 and DC2, and the new age group of 9-year-olds are represented from DC3 to DC4.

For the longitudinal analysis, a Linear Mixed Model (LMM) assessed changes in physical activity longitudinally, whilst examining the effects of age, gender, school, PC and AMC**.** Age was used as a proxy for time. The LMM allowed for the inclusion of time-varying factors as well as the time measurement (age).

Results

At baseline, there were 57 six year olds (boys = 32), 61 seven year olds (boys = 35), and 67 eight year olds (boys = 36). Physical activity data decreased across data collections as the children did not always return pedometers and diaries. Complete data for PC and AMC remained relatively high as the assessment took place at school over two days on each data collection occasion.

When examining descriptive data for the key variables across the four data collections, AMC scores increased for both boys and girls, whilst physical activity mean daily step counts and PC remained relatively stable (Table 1). Post hoc analyses revealed that for boys and girls, AMC scores at DC 3 and 4 were significantly higher than AMC scores at DC 1. Overall there were minimal differences at 6 month intervals between data collections but significant increases in motor competence evident after 12 and 18 months for boys and girls (DC 3 and 4). There were no significant differences across data collections for PC and physical activity. Boys had significantly higher step counts and AMC scores than girls at every age, however there were no significant gender differences in PC scores (data not reported).

Table 1

Mean scores for Physical Activity (step counts), Actual Motor Competence (AMC, max 26) and Perceived Competence (PC, max 120) for all boys and girls across data collection cycles (DC).

	Girls				Boys			
DC	1	2	3	4	1	2	3	4
Mean age (yrs)	7.2	7.8	8.3	8.8	7.2	7.6	8.1	8.5
n	64	62	43	50	77	76	68	58
PA mean daily step count	12,250	11,553	11,850	11, 785	14,134	15,189	14,761	14,645
SD	3, 041	4, 750	3, 067	2, 775	3, 531	7, 054	3, 689	3, 472
n	82	83	72	75	103	102	99	100
AMC	15.6[a]	16.5	17.0[ab]	17.3[ac]	17.7[a]	18.4	19.0[ab]	19.2[ac]
SD	2.3	2.4	2.1	2.0	3.2	2.5	2.6	2.6
n	80	83	72	73	103	100	98	99
PC	97.2	97.5	98.0	97.5	99.3	97.2	96.7	96.9
SD	13.1	13.8	13.5	14.5	13.2	13.0	14.3	14.5

AMC mean scores with different letters are significantly different across data collections; AMC scores for boys and girls in DC 1 are significantly less than DC 3 and DC 4.

(Tukey, $p \leq .05$)

For girls at 6 years, only 6% of the variance of physical activity was accounted for by both PC and AMC. Neither AMC nor PC significantly predicted physical activity for girls at either 6, 7 or 8 years of age. However, among the 9 year old girls, AMC made a significantly unique contribution to physical activity levels accounting for 9% of the variance in physical activity. The role of PC was not significant (Table 2).

For 6-year-old boys, neither PC nor AMC was significant in the regression model. At 7 years, AMC explained 12% of the variance within the model, whilst perceived competence was insignificant. For boys at 8 years of age, only 5% of the variance of physical activity was explained by both independent variables. AMC made a statistically significant unique contribution, although it explained only 4% of the variance in the overall model. At 9 years of age, 37% of the variance in boys' physical activity was explained by both PC and AMC, the highest value for boys and girls at any age. Actual motor competence remained as a stronger, significant contributor to physical activity, explaining 30% of the variance within the model (Table 2). Perceived competence was not significant for boys. There were no significant interactions between AMC and PC for boys and girls at any age.

Table 2

The Contribution of Perceived (PC) and Actual Motor Competence (AMC) to Physical Activity for Boys and Girls across age.

	Girls				Boys			
	Age (years)				Age (years)			
	6	7	8	9	6	7	8	9
n	42	76	97	53	58	117	105	41
R^2	.06	.01	.04	.11*	.05	.12**	.05	.37**
PC *(β)*	-.25	.05	.14	-.03	.06	.03	.03	.05
95% CI for *β*	-142.4- 17.7	-47.6 -71.3	-17.4-94.2	-57.8-48.6	-72.3 -112.5	-50.2-67.8	-38.5-51.2	-50.6-72.4
AMC *(β)*	-.09	.07	.12	.35*	.21	.34**	.21*	.59**
95% CI for *β*	-690.4 – 384.4	-246.2 - 443.5	-136.4-505.5	45.9-804.8	-109.8-987.7	211.4-701.4	-2.1-498.0	456.5-1282.1

$*p \leq .05$ $**p \leq .00$

A LMM examined changes to physical activity longitudinally, whilst investigating the effects of gender, age, school, PC and AMC. Age (p = .940) and PC (p = .200) were not significant so were removed from the model. The final model showed gender, AMC and school were significant predictors of physical activity longitudinally (Table 3). There were no significant interactions (AMC-Gender, Gender-School, School-Gender) in the final model. Although the interaction between gender and AMC (p = .123) was not significant, females were less physically active than males.

Table 3.

Linear Mixed Model for Physical Activity over time: Estimates of Fixed Effects for parameters (gender, school and AMC)

Parameter	Physical Activity Estimate (β)	Standard Error (SE)	*p.*
Intercept	13, 682.35	1261.69	.01
AMC	136.18	58.51	.02
Gender – female	-2 670. 25	457.24	.01
Gender – males	0	0	
School			.01
School 1	-3 306.86	1, 055.77	.01
School 2	-1 635.69	802.47	.04
School 3	-1 194.02	783.92	.13
School 4	-2 196.28	851.18	.01
School 5	-2 912.87	764.72	.01
School 6	-1 159.09	1147.65	.31
School 7	-2 883.97	1200.46	.02
School 8	-2 708.79	881.40	.01
School 9	-2 857.03	1075.64	.01
School 10	517.08	1072.83	.63
School 11	0	0	

Discussion

The purpose of this study was to determine the effect of AMC and PC on younger children's physical activity levels across time. The results revealed that across the 18 month data collection period, AMC, gender and school significantly predicted physical activity in these young children. . Our prediction that eventually PC would significantly contribute to the development of physical activity behaviour was not supported in the results as AMC was more important for higher physical activity levels in younger children.

The significance of AMC to physical activity that was apparent much earlier for boys than for girls, an important gender difference for developmental literature involving motor competence and physical activity. Furthermore, these results support previous evidence that PC is not an important determinant of physical activity in younger children, unlike in later childhood (Crocker, Eklund, & Kowalski, 2000; L. Raudsepp, Liblik, & Hannus, 2002).

Consistent with other studies, these findings showed that PC may be inaccurate in childhood and remains relatively consistent up to 9 years of age, especially for boys (Crane, Naylor, Cook, & Temple, 2015). Young children may not have reached the operational stage of cognitive development when they are able to combine information from past experience, outcome difficulty, reinforcement by others and intrinsic motivation (Raudsepp & Liblik, 2002; Rudisill et al., 1993) to be able to realistically assess their own competence. In a group of 10- and 11-year-olds, Fairclough and Ridgers (Fairclough & Ridgers, 2010) also found that maturation status exerted an influence on differences in self perceptions which in turn may have impacted physical activity level at later stages of primary school. Stodden at al. (2008) proposed that perceptions of competence would not be strongly correlated with AMC or physical activity in early childhood as a result of high and inaccurate levels of self-perceptions. Younger children may equate effort with competency and this can also lead to unrealistic perceived competence scores. It is not until later childhood, when they begin to compare their abilities to their peers', that a more realistic sense of competence is developed. This could explain why PC was not an important predictor of physical activity in this study and the relationship was weak for boys and girls at every age. Another consideration is that PC may not be strongly correlated with physical activity in early childhood due to lack of congruency between perception and reality. The high self-perception scores do not appear to be closely linked or aligned to actuality in young children and the minimal contribution of PC to physical activity reported in this study adds weight to this hypothesis (Stodden et al., 2008).

Like others, this study supported that AMC was an important determinant of physical activity even in young childhood (Stodden et al., 2008; Robinson et al., 2015) and that this relationship strengthened over time, particularly in young boys. Review articles (Lubans, Morgan, Cliff, Barnett, & Okely, 2010); Holfelder & Schott, 2014) of the relationship between product and process-oriented AMC and physical activity has supported this association, however a lack of experimental data has limited a cause and effect conclusion (Robinson et al., 2015). Previous cross sectional studies reported a significant relationship between motor competency and physical activity in children and adolescents, although, in contrast to the present study with the findings for 9 year old boys, this relationship appeared weaker in younger children (Fisher et al., 2005; McKenzie et al., 2002; Okely et al., 2001a, 2001b; Saakslahti et al., 1999; Robinson et al., 2012). Other longitudinal studies have also provided support for the importance of AMC to physical activity over time. Barnett and colleagues found that object control skills in childhood accounted for 3.6% and 18.2% of participation in moderate-to-vigorous PA and organized PA, respectively, during adolescence. However, childhood locomotor skill competence was not related to adolescent PA. Additionally, Lopes, Rodrigues, Maia, and Malina (2011) found that children with high MC at age six sustained high self-reported levels of PA after three years compared to children of low and moderate AMC whom exhibited declines in PA over this time. Together, these findings confirm that competence in motor skills is an important indicator of typically developing childhood and has the potential to create a healthy habit of physical activity participation with maturity (Garcia, Garcia, Floyd & Lawson 2002). The findings of our study add support to the benefit of early motor competence in developing physical activity behaviours. Previous research has also established that children with low motor competence tend to be vigorously active less often, play less on large playground equipment and spend less time interacting socially with their peers (Bouffard et al., 1996; Butcher & Eaton, 1989). For these reasons, a timely progression of skills and competencies in early childhood is critical to support the development and commitment to physical activity.

Although gender was revealed as a significant predictor of physical activity over time, an interesting finding was that neither AMC nor PC influenced physical activity level in the younger 6- to 8-year-old girls in the current study. Future research is required to identify some of the other influences contributing to physical activity levels in younger girls. Different play patterns may play a role here, with boys tending to be play more vigorously, be more competitive and play sports in large groups, whilst girls tend to play passive, small group games in less space (Harten et al., 2008). The activities boys and girls choose or value may not only develop physical competencies, but also influence self-perceptions in terms of the social comparisons, and contexts in which they are learning. In the formation of future frameworks, consideration should be given to boys and girls developing physical activity behaviours differently, with determinants of physical activity having differing influences both within the same age for boys and girls and across time. Further, this study indicated that it may also be important to focus on the changing contribution of both AMC and PC on physical activity for gender independently, particularly in later childhood and adolescence where declining levels of physical activity become a more serious problem (Sallis, Prochaska & Taylor, 2000; Vedel-Kjelsas, Sigmundsson, Stensdotter & Haga, 2012).

Finally, the results from the linear mixed model indicated school was an important contributor to physical activity for this group of children. The impact of a child's school has been recognised as part of the environmental determinants in several conceptual models (Welk, 1999); Stodden et al., 2008) and previous evidence has reported the positive association between physical environment variables (access, programs, time and opportunities to exercise) and physical activity (Sallis, Prochaska, & Taylor, 2000). However there have been limited investigations into the specific features of school environments and physical activity (Ridgers, Stratton, & Fairclough, 2006;Ferreira, 2006). We attempted to reduce school variability through consistent socio economic index sampling, so a school effect was not expected. However school was significant, but there was limited information collected about the school-based factors, such as specialist Physical Education teachers, school facilities to be active, and links with community sport. Future studies within school settings should investigate which particular characteristics could influence physical activity behaviours. As school provides an important setting within which to develop physical competencies and influence behaviour, increased awareness of the influence of AMC and gender to physical activity, may be valuable in supporting children to develop skills and become physically active.

Limitations

The interactions between perceived and actual competence and physical activity in children requires further investigation as some degree of caution is necessary when interpreting the results of our study for a number of reasons. First, the measurement of the variables within this study is one of the key issues and challenges within developmental research of children.

For each of the three variables measured in the current study, a wide range of assessment tools are available. The use of certain subscales to capture PC may have been a factor in why this was not a significant predictor of physical activity and may not have truly captured perceptions related closely to motor proficiency. Recently the issue has been raised that construction and stronger alignment between perceived and actual competence measures may be important to fully understand the accuracy of children's perceptions. This is particularly important when examining the associations with each other and associations with physical activity behaviour and must be considered for future research (Barnett, Ridgers & Salmon, 2015; Barnett, Ridgers, Zask & Salmon, 2015).

The validity and reliability of physical activity measures in young children is always a challenge and needs to be taken into account when examining the findings (Hands, Parker & Larkin, 2006). Whilst the limitations of using pedometers include they may only detect ambulatory activity, are sensitive to tampering, reactivity and data loss (Clemes & Biddle, 2013), the cumulative record of daily steps is reported as a suitable marker to capture physical activity in children (McClain & Tudor-Locke, 2009). Another limitation is that we do not have information for those individuals who were missing more than two data collection cycles, the data was removed. It could be that the more skilled children were more likely to provide complete pedometer data. Therefore this may have impacted the observed changes in physical activity.

Furthermore, whilst the motor skills selected in the current study represented the basic movement patterns underpinning more specialised skills, we must acknowledge that assessing only four skills may limit generalisability of findings. As recruitment of individuals, rather than the potential of school influence was a focus at the beginning of the study, no school characteristics were recorded so plausible explanations of how the school setting might influence physical activity were not possible.

Conclusion

The outcomes of this study provided longitudinal evidence about the impact of both a physiological and psychological determinant on physical activity. If there is an understanding of the interactions between and relative contributions of perceived and actual competence and acknowledgement of the resulting differences among boys and girls, then evidence for education and health initiatives on what to base practice and provide direction for interventions, may support and encourage children’s lifelong commitment to physical activity. The findings from the current study lend weight to the importance of encouraging and teaching motor competence from a young age, as it appears critical to the ongoing development of physical activity engagement.

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Disclosures

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