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Accuracy of Children's Perceived Skill Competence and its Association With Physical Activity

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Background: Perceived movement competence is important in the relationship between actual competence and physical activity (PA). This study examines the accuracy of children's perceptions and investigates the relationship between perceived competence (PC) and PA. **Methods**: Data collected were part of Project Spraoi, a PA and nutrition-based intervention. Participants (N = 419) were senior infant/first class (n = 202, mean age: 6.5 [0.6] y) and fourth/fifth class (n = 217, mean age: 10.4 [0.6] y) children from 3 schools in Cork, Ireland. The Test of Gross Motor Development-2 and Pictorial Scale of Perceived Movement Skill Competence for Young Children assessed actual and PC in 6 locomotor and 6 object-control fundamental movement skills. Moderate to vigorous PA levels were measured by accelerometry. Wilcoxon signed-rank tests assessed the accuracy of PC. Hierarchical regression analysis investigated relationships between PC and both actual competence and moderate to vigorous PA. **Results**: Children had greater perceived overall and object-control competence than actual. Among younger children, there was no difference between perceived locomotor and actual, while older children had lower perceived locomotor competence than actual. PC did not predict actual competence. Perceived object-control and total PC were significant predictors of moderate to vigorous PA. **Conclusions**: Children have inflated perceptions of their overall and object-control movement skill competency. Perceived object-control and total FMS is associated with PA and thus, interventions aimed at increasing PA among children should target PC.

Keywords: fundamental movement skill, locomotor skill, object-control skill, school children, motivation

Fundamental movement skills (FMS) are the foundation upon which more complex sport specific skills are based, facilitating greater participation in physical activity (PA) and sport.[1] They are often classified into 3 categories: locomotor skills involving the movement of the body from 1 location to another (eg, running and jumping); object-control skills involving the manipulation of an object (eg, throwing and kicking); and stability skills (eg, balancing and twisting).[2] The ability to perform FMS is associated with higher levels of habitual PA,[3] physical fitness,[2,4] and more efficient cognitive functioning and academic performance.[5] FMS proficiency is also inversely associated with weight status.[2,6]

Perceived movement competence, that is, one's belief regarding his or her movement abilities, also influences one's engagement in PA.[7] It is proposed that children with high perceived competence (PC) in an activity/skill will persevere and pursue mastery in that activity/skill, whereas those with low PC may disengage and lose interest in the activity/skill.[8,9] Evidence supports the existence of a positive association between PC and motivation to participate/continue participation in PA in children,[10] with PC suggested to have greater influence than actual competence.[11,12] In the conceptual model proposed by Stodden et al,[7] PC is situated as a mediator between actual motor competence and PA, a relationship which strengthens with age. Also, PC is a known determinant of PA in older children and adolescents.[13] It has been found to mediate the relationship between childhood object-control proficiency and subsequent adolescent PA and fitness[14] and is associated with a more favorable weight status among children.[15]

Perceived competence is formulated based on 4 psychological constructs: (1) past experiences, (2) difficulty associated with the task, (3) reinforcement and personal interaction with significant others, and (4) intrinsic motivation.[11] Young children (<7 y of age) do not possess the required levels of cognitive functioning to evaluate past experiences, task difficulty, or reinforcement from others.[16] They fail to accurately distinguish between actual competence and effort, commonly resulting in inflated levels of PC.[17] However, accuracy of perceptions increases as children age and cognitively develops during middle childhood (8–11 y of age).[17]

Consequently, the investigation into the relationship between actual and perceived movement competence among primary school-aged children (4–13 y) has yielded mixed results. Numerous studies have reported the existence of a positive relationship between actual competence and PC,[18–20] whereas others have found no associations.[21] However, few studies have used aligned assessment tools to evaluate PC and actual competence,[22–25] which is important if an accurate evaluation is to be obtained.[22,23] Studies using the Test of Gross Motor Development-2 (TGMD-2)[26] and the Pictorial Scale of Perceived Movement Skill Competence for Young Children (PMSC),[27] assessing actual and PC in 12 FMS, report weak positive correlations between perceived and actual object-control competence among cohorts of 4- to 8-year-old children[23] and 5- to 8-year-old boys.[22] However, no significant relationship was found between perceived and actual locomotor or total FMS competence by Liong et al.[22] Similarly, among 9- to 11-year-olds, Barnett et al[25] found no significant association when comparing perceived and actual competence in locomotor, object-control, or total FMS skills.

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A consistent positive association between perceived physical competence and PA in children has been reported in a recent systematic review and meta-analysis.[28] However, few studies have investigated the relationship between perceived FMS competence and PA levels.[23–25,29] Barnett et al[25] found no significant relationship between moderate to vigorous PA (MVPA) levels and perceived FMS competence among 9- to 11-year-olds, nor with perceived object-control (PC-OC) competence among 4- to 8-year-old Australian children.[23] Similarly, Slykerman et al[24] found perceived skill scores were not significant predictors of MVPA among 5- to 8-year-old Australian children. In contrast, a longitudinal study by Barnett et al[29] revealed that time spent in MVPA at 3.5 years predicted perceived FMS competence at 5 years of age, despite cross-sectional analysis at 5 years revealed no associations.

To date, there is limited research examining the relationships between (1) PC and actual competence and (2) PC and PA among children, using aligned measures of assessment. Furthermore, there is no published research examining these relationships in a European context. Understanding these relationships is important as an overestimation of FMS competence may positively influence participation in PA and engagement in activities/sports that improve actual FMS. Conversely, an underestimation of FMS competence may have the opposite effect, resulting in disengagement, and loss of interest in PA. Knowledge of the relationship between PC and actual competence may aid the development of motor skill interventions to increase actual FMS competence and motivation to promote participation in PA.

International comparisons reveal that Irish children have low PA levels and high levels of sedentary behavior,[30] with only 19% of primary school children reaching the recommended 60 minutes of MVPA daily.[31] Of 15 countries, worldwide to publish PA report cards, only Scotland received a lower grade than Ireland for overall PA.[30] In the developmental model developed by Stodden et al,[7] PA as well as motor competence (including FMS) and PC, are proposed as integral elements which interact and may impact weight status. In a recent study conducted by the World Health Organization, Ireland has been predicted to be the fattest of 53 European countries by 2030.[32] Thus, an investigation into children's ability to accurately perceive FMS competence, and the relationship between PC and PA may highlight PC as an underlying mechanism with the potential to promote improvements in actual FMS, PA levels, and weight status.

Therefore, the aim of this research was to determine if perceptions of skill competence align with actual competence or is competence overestimated or underestimated as well as to investigate the relationship between PC and PA levels among Irish primary school children. It is hypothesized that children will overestimate their competence, with older children's perceptions more closely aligned with their actual. Based on the conceptual model proposed by Stodden et al[7] as well as findings from a recent systematic literature review and meta-analysis,[28] a relationship between PC and PA is expected.

Methods

Participants

In September and October 2015, data were collected as part of Project Spraoi, a primary school-based PA and nutrition intervention,[33] by a team of trained evaluators. Ethical approval was obtained from Cork Institute of Technology Research Ethics Review Board. Children from senior infant, first, fourth, and fifth classes from 3 primary schools (1 rural mixed and 2 urban single sex: 1 boy and 1 girls) from a region in southern Ireland were invited to participate. Written informed parental consent for involvement in the study was obtained for 447 children (consent rate; 447/595; 75%). Only children present for actual competence and PC were included in the study (n = 419; 224 boys, 53.5% and 195 girls, 46.5%). Of these 419 children, 202 were from senior infant/first class (mean age: 6.5 [0.6] y) and 217 from fourth/fifth class (mean age: 10.4 [0.6] y).

Anthropometric Measurements

Anthropometric data were collected prior to actual and PC assessment, across 4 school days. Height and body mass testing stations were set up in a suitable room in each school. Children were brought in small groups (5–6 children) to the testing room where they rotated between testing stations. This ensured minimal interruptions to classes. Height was measured to an accuracy of 0.1 cm (using a SECA Leicester portable height scales; SECA, Birmingham, UK), and body mass was measured to an accuracy of 0.1 kg (using a Tanita WB100MZ portable electronic scale; Tanita Corporation of America, Inc, IL). Shoes and heavy clothing were removed for both measures.

Actual FMS Competence

Actual FMS assessment was conducted across the school week following the collection of anthropometric measurements. The TGMD-2 was used to assess FMS competence.[26] This process-oriented assessment tool has been found to be valid and reliable for use among 3- to 10-year-old children.[26] The TGMD-2 consists of 12 FMS: 6 locomotor skills (run, gallop, slide, leap, hop, and horizontal jump) and 6 object-control skills (kick, catch, overhand throw, strike, underhand roll, and dribble). Each child performed the skill 3 times, consisting of 1 familiarization trial and 2 test trials. All trials were recorded using a video camera and test trials were uploaded and analyzed retrospectively. Each FMS consists of between 3 and 5 behavioral components. If a component was performed correctly, a score of 1 was awarded. If it was performed incorrectly, a score of 0 was awarded. This procedure was carried out for 2 test trials, and scores were then summed to obtain a raw skill score.[26] Locomotor and object-control subset scores were calculated by summing the raw scores of the individual skills within each subset (locomotor score range: 0–48; object-control score range: 0–48). Subsequently, locomotor and object-control subset scores were summed to obtain a total FMS score (range: 0–96). The testing procedure replicated the protocol used and was previously described in detail .[34] Interrater and intrarater reliability was calculated for 10% of the sample, using the equation (agreements/[agreements + disagreements]) × 100. Interreliability (with a coder with extensive experience in FMS scoring)[35] and intrareliability was established, with scores across all FMS exceeding 85% agreement (range: 86%–99%).[36]

Perceived FMS Competence

The PMSC[27] was used to evaluate children's PC in the 12 FMS assessed in the TGMD-2. This scale has acceptable face and construct validity, good test–retest reliability, and internal consistency among children[27,37] and has been used in numerous countries.[25,38,39] The PMSC was conducted individually in each school during the week following the completion of the actual FMS assessment. For each skill, the children were shown 2 cartoon pictures, 1 of a child performing the skill competently and the other

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of a child performing the skill-less competently. They were instructed to choose the picture they felt they were more like. If the chosen picture was that of the child who was "pretty good," the child was asked whether they felt they were "really good at . . ." (assigned a score of 4) or "pretty good at . . ." (score of 3). If the chosen picture was that of the child who was "not so good," the child was asked whether they felt they were "sort of good at . . ." (score of 2) or "not so good at . . ." (score of 1). Following this procedure, a score between 1 and 4 was obtained for each skill. Perceived locomotor (PC-LOCO) and PC-OC scores were calculated by summing the scores of the individual skills within each subset (PC-LOCO range: 6–24; PC-OC range: 6–24). Subsequently, PC-LOCO and PC-OC scores were summed to obtain a perceived total FMS (PC-TOTAL) score (range: 12–48).[27]

PA Measurement

Physical activity levels were objectively assessed using triaxial ActiGraph GT3X+ accelerometers (ActiGraph, Fort Walton Beach, FL). Following actual FMS assessment, accelerometers were distributed to the children. Parents were reminded, via daily text messages, to ensure that children replaced their accelerometer each morning. Accelerometers were worn for 7 consecutive days on the right hip during all waking hours (except when swimming, showering/bathing, etc). ActiLife software (version 6.13.3; ActiGraph, FA) was used in the data analysis. Inclusion criteria required wear time of ≥3 days of the week, with ≥600 minutes recorded per day, which has been shown to give adequate reliability and power among children.[40] Of 228 children who received accelerometers, 182 (81%) met these requirements. A 5-second epoch length was used.[41] Periods of 20 minutes of consecutive zeros were indicated as nonwear time.[42] The first day of wear time was removed from the data set to allow for subject reactivity.[42] Cut points developed by Evenson et al[43] and validated by Trost et al[44] were used to compute average time spent in MVPA daily.

Data Analysis

Data were analyzed using IBM SPSS Statistics for Windows (version 22.0; IBM Corporation, Armonk). Children were divided into 4 sub-groups according to age and sex: 6-year-old boys, 6-year-old girls, 10-year-old boys, and 10-year-old girls. Mean (SD) were used to summarize the data. Wilcoxon signed-ranks tests were conducted to determine if a statistically significant difference existed between actual and PC scores in each subset (expressed as percentages of the maximum score possible for each test in Figures 1–3). Statistically significant results were supported with the effect size (ES; small = 0.1, medium = 0.3, and large = 0.5).[45]

Hierarchical regression analysis was conducted, adjusting for age and sex, determining the relationship between PC scores (PC-LOCO, PC-OC, and PC-TOTAL) and corresponding actual competence scores, respectively. Similarly, hierarchical regression analysis was conducted, adjusting for age and sex, investigating the proportion of variance in the PA levels (average daily MVPA) that could be explained by PC scores. The alpha level required for significance for all tests was $P < .05$.

Results

Table 1 presents anthropometric data, mean actual, and PC scores for each FMS subset as well as mean time engaged in MVPA for all subgroups.

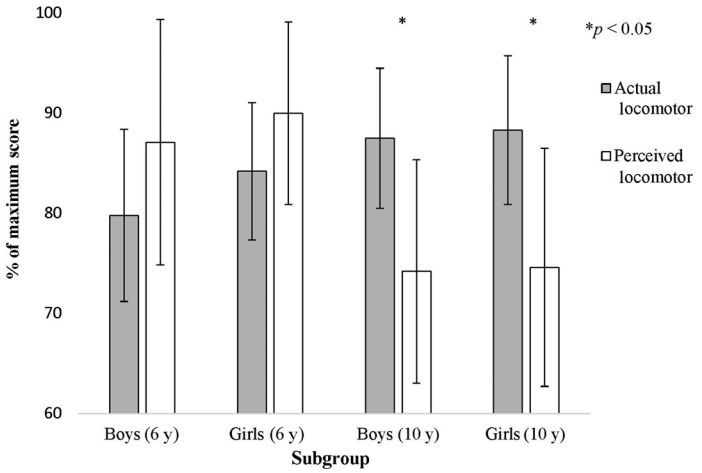

Figure 1 — Perceived and actual locomotor competence.

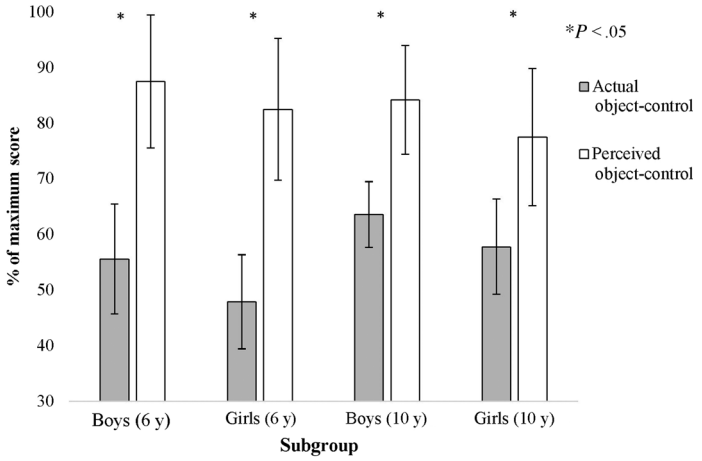

Figure 2 — Perceived and actual object-control competence.

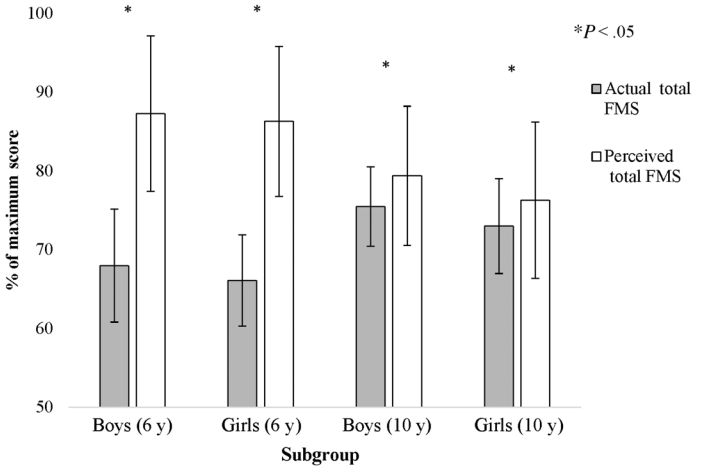

Figure 3 — Perceived and actual total FMS competence. FMS indicates fundamental movement skills.

Table 1 Characteristics, Actual, and Perceived Subset Scores and Time Spent in MVPA

	6-Year-Olds		10-Year-Olds	
	Boys (n = 105)	Girls (n = 97)	Boys (n = 120)	Girls (n = 97)
Age, y	6.5 (0.58)	6.4 (0.63)	10.5 (0.63)	10.4 (0.56)
Height, cm	119.7 (6.01)	118.3 (6.16)	143.6 (6.27)	142.6 (6.89)
Body mass, kg	23.4 (3.82)	22.8 (3.38)	38.2 (7.92)	37.3 (7.98)
Actual LOCO, 0–48	38.3 (4.13)	40.4 (3.29)	42.0 (3.36)	42.4 (3.57)
(% of scale)	79.8 (8.60)	84.2 (6.86)	87.4 (6.99)	88.2 (7.43)
Actual OC, 0–48	26.7 (4.73)	23.0 (4.07)	30.5 (2.82)	27.8 (4.11)
(% of scale)	55.6 (9.85)	47.9 (8.47)	63.6 (5.88)	57.8 (8.56)
Actual TOTAL, 0–96	65.3 (6.90)	63.5 (5.56)	72.5 (4.85)	70.1 (5.77)
(% of scale)	68.0 (7.18)	66.1 (5.79)	75.5 (5.05)	73.0 (6.01)
PC-LOCO, 0–24	20.9 (2.94)	21.6 (2.19)	17.8 (2.68)	17.9 (2.85)
(% of scale)	87.1 (12.25)	90.0 (9.13)	74.2 (11.17)	74.6 (11.88)
PC-OC, 0–24	21.0 (2.87)	19.8 (3.06)	20.2 (2.35)	18.6 (2.96)
(% of scale)	87.5 (11.96)	82.5 (12.75)	84.2 (9.79)	77.5 (12.33)
PC-TOTAL, 0–48	41.9 (4.74)	41.4 (4.57)	38.1 (4.24)	36.6 (4.76)
(% of scale)	87.3 (9.88)	86.3 (9.52)	79.4 (8.83)	76.3 (9.92)
MVPA, min	65.1 (22.10)	58.8 (16.17)	77.8 (21.79)	52.9 (16.85)

Abbreviations: actual LOCO, locomotor score; actual OC, object-control score; actual TOTAL, total FMS score; FMS, fundamental movement skills; MVPA, moderate to vigorous physical activity; PC-LOCO, perceived locomotor score; PC-OC, perceived object-control score; PC-TOTAL, perceived total FMS score. Note: Values are in mean (SD).

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Results from the Wilcoxon signed-ranks tests are presented in Table 2. Analysis revealed that both 6-year-old boys and girls had greater PC-LOCO than actual locomotor competence. However, no significant difference was found (6-year-old boys: $P = .05$; 6-year-old girls: $P = .08$). In contrast, there was a significant difference between PC-LOCO and actual locomotor scores among 10-year-old boys ($P < .001$, ES: 0.58) and girls ($P < .001$, ES: 0.57), with both groups underestimating actual ability (Figure 1).

Table 2 Differences in Perceived and Actual Competence

	n	Z	P	Effect size
Locomotor				
6 y				
Boys	98	1.955	.05	
Girls	97	1.765	.08	
10 y				
Boys	117	8.799	<.001	0.58
Girls	94	7.874	<.001	0.57
Object-control				
6 y				
Boys	101	8.344	<.001	0.59
Girls	95	8.248	<.001	0.60
10 y				
Boys	119	7.966	<.001	0.52
Girls	97	5.796	<.001	0.42
Total FMS				
6 y				
Boys	94	7.01	<.001	0.51
Girls	95	7.054	<.001	0.51
10 y				
Boys	116	2.346	.02	0.15
Girls	94	3.258	.001	0.24

Abbreviation: FMS, fundamental movement skills. Note: Effect size: small = 0.1, medium = 0.3, and large = 0.5.

For object-control competence, significant differences were found between PC-OC and actual competence ($P < .001$ for all), with all subgroups: 6-year-old boys (ES: 0.59), 6-year-old girls (ES: 0.60), 10-year-old boys (ES: 0.52), and 10-year-old girls (ES: 0.42) overestimating object-control proficiency (Figure 2).

For total FMS, the 6-year-old subgroups had significantly greater PC-TOTAL than actual competence ($P < .001$, ES: 0.51 for both). Similarly, the 10-year-old sub-groups also had significantly higher PC-TOTAL than actual (10-year-olds boys: $P = .019$, ES: 0.15, 10-year-old girls: $P = .001$, ES: 0.24) indicating an overestimation of overall FMS competence (Figure 3).

Tables 3 and 4 present the results of the hierarchical regression models for both actual FMS competence scores and MVPA as outcome variables, with measures of PC as independent variables (adjusting for age and sex). Results revealed that, whereas age (in favor of the older children) and sex (in favor of boys) were significant predictors ($P < .001$) for actual competence (locomotor, object-control, and total FMS), accounting for almost 29% of the variance, corresponding PC scores were not (PC-LOCO: $P = .54$, PC-OC: $P = .74$, PC-TOTAL: $P = .57$, in their respective models). Similarly, the investigation of the relationship between PC-LOCO and MVPA also revealed that while age ($P = .05$) and sex ($P < .001$) were significant predictors in the model, PC-LOCO was not a significant predictor ($P = .07$) of time engaged in MVPA. In contrast, PC-OC ($P = .005$) as well as sex (in favor of boys; $P < .001$) were significant predictors, accounting for 19.5% of the variance in MVPA. This model predicts that for each unit increase in PC-OC, there would be a 1.5-minute increase in MVPA. Likewise, PC-TOTAL ($P = .02$) as well as age (in favor of older children; $P = .03$), and sex (in favor of boys; $P < .001$) were found

Table 3 Summary of Hierarchical Regression Analyses for Actual FMS Subscales and Total FMS

	Beta (SE)	Standardized beta	*P* value	Adjusted R^2
Model 1				
Outcome: actual LOCO*				
Age	6.71 (0.68)	0.49	<.001	.29
Sex	–2.06 (0.58)	–0.15	<.001	
PC-LOCO	–0.07 (0.11)	–0.03	.54	
Model 2				
Outcome: actual OC*				
Age	6.90 (0.59)	0.51	<.001	.29
Sex	–2.14 (0.60)	–0.16	<.001	
PC-OC	–0.03 (0.10)	–0.02	.74	
Model 3				
Outcome: actual TOTAL FMS*				
Age	6.778 (0.64)	0.50	<.001	.29
Sex	–2.13 (0.58)	–0.16	<.001	
PC-TOTAL	–0.04 (0.06)	–0.03	.57	

Abbreviations: actual LOCO, locomotor score; actual OC, object-control score; actual TOTAL, total FMS score; FMS, fundamental movement skills; PC-LOCO, perceived locomotor score; PC-OC, perceived object-control score; PC-TOTAL, perceived total FMS score. Note: age: 6-year-olds coded as 0 and 10-year-olds as 1; sex: Boys coded as 0 and Girls as 1.
*$P < .001$ for model 1, 2, and 3.

Table 4 Summary of Hierarchical Regression Analyses for MVPA (in minute per day)

	Beta (SE)	Standardized beta	*P* value	Adjusted R^2
Model 4				
*Outcome: MVPA**				
Age	7.41 (3.71)	0.17	.05	.17
Sex	–17.32 (3.01)	–0.40	<.001	
PC-LOCO	1.06 (0.58)	0.15	.07	
Model 5				
Age	4.901 (3.10)	0.11	.12	.20
Sex	–15.35 (3.09)	–0.35	<.001	
PC-OC	1.52 (0.54)	0.20	.01	
Model 6				
Age	7.57 (3.46)	0.17	.03	.20
Sex	–16.46 (3.04)	–0.37	<.001	
PC-TOTAL	0.94 (0.34)	0.21	.01	

Abbreviations: MVPA, moderate to vigorous physical activity; PC-LOCO, perceived locomotor score; PC-OC, perceived object-control score; PC-TOTAL, perceived total FMS score. Note: Age: 6-year-olds coded as 0 and 10-year-olds as 1; Sex: Boys coded as 0 and Girls as 1.
*$P < .001$ for model 4, 5, and 6.

to be significant predictors of MVPA, also accounting for 19.5% of the variance. In this model, for every unit increase in PC-TOTAL, there would be an increase of almost 1 minute (.942 min) of MVPA.

Discussion

The purpose of this study was to ascertain if 6- and 10-year-old children accurately perceive skill competency or do they overestimate/underestimate their overall, locomotor and/or object-control competency. It was found that 6-year-olds (boys and girls) overestimated their overall FMS and object-control proficiency, indicating their inability to form accurate perceptions of their movement competence. In contrast, although PC-LOCO was higher than actual for both 6-year-old subgroups, no significant difference was found suggesting the ability of this cohort to accurately perceive their locomotor capabilities. However, the relatively high actual competence demonstrated by the 6-year-olds in the current study may have contributed to the accurate perceptions observed.[25]The overestimation of overall FMS and object-control proficiency is supported by other studies using the PMSC and TGMD-2, which report no association among 9- to 11-year-olds,[25] or only a weak positive association between perceived and actual object-control competence among 5- to 8-year-olds.[22,23] As suggested by previous research conducted on cognitive capacity, it is possible that this overestimation may result from children's

limited cognitive capacity and inability to differentiate between effort, enjoyment, and actual competency.[17] The accurate perceptions of locomotor ability observed among the 6-year-old groups in the current study contrasts the findings of Liong et al[22] and Barnett et al,[25] who found no significant associations between perceived and actual locomotor competence in Australian children. These studies were the only studies to assess the direct relationship between perceived and actual locomotor competence using the PMSC and TGMD-2. However, other studies using misaligned assessment instruments, have found a relationship between PC and actual competence in preschool[18,19] and 6- to 7-year-old children,[20] suggesting a positive association may exist in young children. Therefore, further investigation is warranted using aligned assessment tools to attain a more accurate understanding of this relationship.

In contrast, the 10-year-olds in this study underestimated their locomotor capabilities. However, similar to the 6-year-olds, object-control and overall FMS proficiency was overestimated. Our findings are supported by those of Barnett et al,[25] the only other study to assess this relationship among children in middle childhood using the PMSC, also found no association among 9- to 11-year-olds. As the accuracy of children's perceptions is proposed to increase with age and cognitive development,[17] it was not expected that the 10-year-old children would underestimate competency. As children cognitively develop, they begin to formulate perceptions based on past experiences, task difficulty, motivation, and also reinforcement and interaction with significant others, including their peers.[11,16] It is possible that children may have felt they were "good"/competent in performing a skill (s) but may have responded "pretty good" as opposed to "really good" due to the belief/awareness that others have superior ability[25] and thus did not receive a score of 4 (indicating competency). The underestimation may also be due to children's reluctance to admit their true perceptions for fear of boasting or overestimating in the presence of the tester or the lack of understanding that "really good" corresponds to the perception of competence in the skill.

Alternative approaches in using the PMSC include administering a written/electronic version of the assessment, as well as explaining to older children, the individual skill components required, which may help them select their competence level based on the scores/pictures with greater accuracy. The overestimation of object-control competence among 10-year-olds (and consequently overall FMS competence) may be due to their interpretation of the actual motor outcome, for example, successful contact with the ball (which may not have occurred during the locomotor skills), as opposed to reflecting on the qualitative aspect of the movement.[25]

Among the current sample, regression analysis revealed, there were no associations between any of the measures of PC (PC-LOCO, PC-OC, or PC-TOTAL) and their respective measures of actual competence, after adjusting for age and sex. Previous studies, also using the PMSC and TMGD-2, have reported similar findings with no association found between PC-LOCO and actual locomotor competence[25] or between PC-OC and actual object-control competence.[22,25] These findings are in contrast to those reported by Barnett et al,[23] who found that perceptions of object-control competency did align with actual competence among 4- to 8-year-old children. Likewise, LeGear et al[19] and Robinson[18] also report significant association between perceived physical competence and actual competence. However, both of these studies did not use aligned measurement tools and were conducted among preschool children. The lack of association in this study between perceived and actual competence provides further evidence that children are unable to accurately perceive their skill competence.

There was also no significant association found between PC-LOCO and MVPA. Other studies carried out among children have reported similar findings, with no significant relationship observed between perceived FMS competence and MVPA among children,[23–25,29,46] using both aligned[23–25] and unaligned[46] measures of PC and actual skill competence.

In contrast, PC-OC and PC-TOTAL were found to be significant predictors of MVPA in this study, after adjusting for age and sex. Similar findings are reported among preschool children, using an overall measure of perceived physical competence.[18,19] These findings are supported by the systematic literature review by Babic et al,[28] suggesting that higher self-perception is associated with higher PA levels in children, a relationship also proposed by the conceptual model of Stodden et al.[7] The relationships identified are important as those with greater PC-OC will have greater motivation for sport and PA,[10] thus providing greater opportunities to develop actual competence, enabling continued PA participation. Therefore, interventions aimed at increasing children's PC (in particular object-control) as well as actual competence are warranted from an early age to help improve actual skill competence and also PA levels among children. It is possible that those with higher PA levels engage primarily in organized sport, most popular of which in Ireland include ball-related sports (ie, Gaelic Football, hurling/camogie, soccer, and rugby among boys),[31] thus encouraging the development of PC-OC and actual object control competence. Future research examining the relationship between these measures and the sports children participate in may provide further insight into these relationships. Interestingly, previous research[22–24,47] and findings in this study have reported that boys have been shown to exhibit greater perceived and actual object-control proficiency as well as higher PA levels than girls. With this in mind, particular emphasis to improve girls' perceived (and actual) object-control proficiency is needed to promote increased skill competence and PA levels among girls. Although strength of this study includes objectively measured PA, the sample assessed was significantly reduced due to limited accelerometer availability, and therefore, further analysis of these relationships is warranted among a larger cohort of children. Other limitations of this study include the relatively small sample size, with only 3 schools recruited for inclusion. Although a small sample was involved in the current study, a wide range of the existing school types in Ireland participated, which included rural, urban, mixed sex, single-sex girls, and single-sex boys schools. Further investigation using a greater sample size across a wider geographical area in Ireland may provide further support. Also, as this study is cross-sectional in design, a longitudinal study investigating these relationships over time may provide further support and insight into these associations.

Conclusions

The overestimation of competence by the 6-year-olds and 10-year-olds (object-control and overall FMS) has the potential to drive the acquisition of FMS, as those with higher PC have higher motivation, exert greater effort, and attempt tasks to challenge their ability.[9,46] This will lead to sustained (or possibly increases in) PC and PA levels. However, on the contrary, the underestimation of actual competence (locomotor skills among 10-year-

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olds) is worrying as low PC may negatively affect motivation[10] and interest in PA. As PC has been found to track into adolescence,[14] low PA levels may result. The positive association observed between PC-OC (and PC-TOTAL) and MVPA also highlights and indicates the importance of promoting PC among young children, especially girls, to increase actual competence and PA levels.

These findings highlight the need for the implementation of regular, well-designed movement skill programs during the primary school years to promote the development of actual and perceived movement competence. It is imperative that such programs include quality instruction, feedback as well as opportunities for practice.[1] Evidence also suggests that the use of a mastery learning environment (in which children have the opportunity to individually improve and succeed) assists the promotion of actual and perceived FMS competence.[18,48] As numerous health benefits are associated with actual and perceived movement competence, the successful implementation of such programs during the early years may help combat the declining PA levels and rise in obesity evident worldwide.

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