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Configurations of actual and perceived motor competence among children: associations with motivation for sports and global self-worth

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Abstract

The present study used a person-centred approach to examine whether different profiles based on actual and perceived motor competence exist in elementary school children. Multilevel regression analyses were conducted to explore how children with different motor competence-based profiles might differ in their autonomous motivation for sports and global self-worth. Validated questionnaires were administered to 161 children (40% boys; age = 8.82 ± 0.66 years) to assess their perceived motor competence, global self-worth, and motivation for sports. Actual motor competence was measured with the Körperkoordinationstest für Kinder. Cluster analyses identified four motor competence-based profiles: two groups were characterized by corresponding levels of actual and perceived motor competence (i.e., low-low and high-high) and two groups were characterized by divergent levels of actual and perceived motor competence (i.e., high-low and low-high). Children in the low-low and high-low group displayed significantly lower levels of autonomous motivation for sports and lower levels of global self-worth than children in the low-high and high-high group. These findings emphasize that fostering children's perceived motor competence might be crucial to improve their motivation for sports and their global self-worth. Teachers and instructors involved in physical education and youth sports should thus focus on both actual and perceived motor competence.

Introduction

Promoting physical activity in children is considered an important strategy to address the issue of overweight and obesity (Robinson et al., 2015; Stodden et al., 2008). Several underlying factors that promote engagement in games, sport and other types of physical activity have been identified in previous research (e.g., Babic et al., 2014; Bailey, Cope, & Pearce, 2013; Logan et al., 2014; Sterdt, Liersch, & Walter, 2014). One of these is motor competence (Clark & Metcalfe, 2002; Gallahue, Ozmun, and Goodway, 2012). *Motor competence* refers to the ability to execute diverse motor tasks in a skilful manner, which includes the coordination of both gross and fine motor skills (Gallahue, Ozmun, & Goodway, 2012; Haga, 2008). The role of motor competence in children's physical activity levels has been conceptualized in a theoretical model by Stodden et al. (2008; recently revised by Robinson et al. in 2015). Numerous studies have confirmed the proposed positive relationship between children's motor competence and their physical activity levels (e.g., Holfelder & Schott, 2014; Logan et al., 2014; Lubans, Morgan, Cliff, Barnett, & Okely, 2010).

Stodden and colleagues also stipulated that the reciprocal and developmentally dynamic relationship between motor competence and physical activity is mediated by factors such as health-related fitness and perceived motor competence across childhood. The identification of perceived motor competence as a crucial intervening factor, explaining how actual motor competence impacts children's physical activity, has led to recent literature investigating the relationships between actual and perceived motor competence during childhood. For instance, studies of Barnett et al. (2015) and Liong et al. (2015) found a positive association between actual and perceived motor competence in early (4-5 years) and middle (7-8 years) childhood. Given that children who are less competent and have low perceived competence, are less likely to be physically active (Khodaverdi, Bahram, Stodden, & Kazemnejad, 2015), it is imperative to further examine the interrelationship

between these factors from different perspectives to inform future intervention programs in terms of program goals and instructional approach, and thus bring forth positive changes to engagement in physical activity.

Previous studies investigating relationships between actual and perceived motor competence mainly used a variable-centred approach. Such an approach describes the associations between these variables (Magnusson, 1988) and thus provides an overall picture of the average relationship between actual and perceived motor competence (e.g., Barnett, Morgan, van Beurden, & Beard, 2008; Khodaverdi, Bahram, Khalaji, & Kazemnejad, 2013). However, a variable-centred approach does not indicate whether, and to what extent, some children have divergent levels of actual and perceived motor competence. Although many children start to perceive their motor competence more accurately as they shift from early to middle childhood (Harter, 1999), correlations between actual and perceived motor competence in previous studies are far from perfect (e.g., Fliers et al., 2010; Khodaverdi et al., 2015; Raudsepp & Liblik, 2002) suggesting that for some children, there might be a misalignment between their actual and perceived motor competence. In this respect, a person-centred approach, which identifies groups of individuals who share particular attributes or relations among attributes (Magnusson, 1988), may provide new insights. To this date, only two studies (De Meester et al., 2016; Weiss & Amorose, 2005) have adopted this approach to detect profiles based on similar levels of actual and perceived motor competence. Weiss and Amorose (2005) identified five profiles of children who differed in age, actual and perceived competence, and accuracy of their perceived competence; two profiles (33% of the total sample) were characterized by overestimation of motor competence (i.e., relatively higher levels of perceived motor competence than actual motor competence) and three profiles (67%) were characterized by accurate estimation of motor competence (i.e., corresponding levels of perceived and actual motor competence) in a sample of American 8- to 14-year olds. De Meester

et al. (2016) found similar results in their study among Belgian 13- to 15-year olds with two overestimation profiles (51%) and two accurate estimation profiles (49%). Underestimators (i.e., relatively lower levels of perceived motor competence than actual motor competence) were identified in neither one of these studies. With the exception of a part of the sample in the study of Weiss and Amorose, a person-centred approach has not yet been used to determine whether motor competence-based profiles exist in elementary school children.

Another important underlying factor in physical activity and sports participation that can contribute to a better understanding of the dynamic relationship between motor competence and physical activity, is *motivation*. Indeed, numerous studies have already demonstrated the importance of optimal motivation in terms of continued participation in physical activity and sports (Pannekoek, Piek, & Hagger, 2013; Teixeira, Carraca, Markland, Silva, & Ryan, 2012), yet relationships with actual motor competence have less frequently been investigated. In the current study, the concept of motivation was approached from the perspective of Self-Determination Theory (SDT, Deci & Ryan, 2000), a well-known and commonly used theory in various research areas such as education, health care and sports. SDT distinguishes between different types of motivation. Autonomous motivation involves the regulation of behaviour with the experiences of volition, psychological freedom, and reflective self-endorsement and is considered the most optimal form of motivation (Vansteenkiste, Niemiec, & Soenens, 2010). The second type of motivation is controlled motivation, which refers to the pressured engagement in an activity. Autonomous motivation and controlled motivation are contrasted with amotivation, which exists when people lack intentionality or engage in behaviours for unknown reasons (Deci & Ryan, 2000). According to SDT, perceived competence is one of three basic psychological needs (apart from autonomy and relatedness) that is to be satisfied in order to obtain optimal motivation (Deci & Ryan, 2000). Several studies in the psychological literature indicated a positive relationship

between perceived motor competence and motivation for sports (e.g., Bagoien & Halvari, 2005; Klint & Weiss, 1987), indicating that children who feel more competent, will accordingly have higher levels of autonomous motivation for sports. In contrast, far less research has looked into the relationship between actual motor competence and motivation for sports. De Meester et al. (2016) found that Belgian eighth-grade adolescents (mean age = 14 years old) with low levels of both actual and perceived motor competence had significantly lower levels of autonomous motivation for physical education than adolescents with higher levels of actual and/or perceived motor competence, yet studies among younger children are lacking.

Prior studies furthermore demonstrated that, apart from motivation, children's *global self-worth* (Noordstar, van der Net, Jak, Helders, & Jongmans, 2016; Rose, Larkin, & Berger, 1997; Schoemaker & Kalverboer, 1994) might also be an important factor to consider in relation to their participation in physical activity (Babic et al., 2014). Global self-worth is defined as the overall evaluation of how much one likes oneself as a person and is happy with the way one is leading one's life (Harter, 2012). Rose et al. (2002) found that, in a sample of Australian 8-12 year old children, perceived motor competence contributed to the prediction of global self-worth among children with high levels of actual motor competence but not among children with low levels of actual motor competence. Piek et al. (2006) found somewhat different results in their sample of Australian 7-15 year old children with perceived motor competence contributing more to global self-worth in children with low levels of actual motor competence than in children with high levels of actual motor competence. More research is needed to gain more insight into the interrelationship among actual motor competence, perceived motor competence and global self-worth, and profile analyses can shed light on this issue.

In summary, the *first aim* of the current study was to use a person-centred approach to examine whether different profiles in terms of actual and perceived motor competence exist in

elementary school children. Based on the developmental model (Stodden et al., 2008) and previous studies (De Meester et al., 2016; Weiss & Amorose, 2005), we expected to find several profiles characterized by different combinations in levels of actual and perceived motor competence (i.e., low-low, high-high, low-high and high-low). The *second aim* was to investigate whether and how various actual and perceived motor competence-based profiles differently relate to autonomous motivation for sports. It was hypothesized that children with profiles characterized by relatively high levels of perceived motor competence would display higher levels of autonomous motivation for sports (irrespective of their level of actual motor competence) while children with relatively low levels of both actual and perceived motor competence were expected to display the lowest levels of autonomous motivation (De Meester et al., 2016). Based on previous studies (De Meester et al., 2016), it was furthermore hypothesized that children combining high levels of actual competence with low levels of perceived competence would not differ from children combining low levels of actual competence with high levels of perceived competence. The *third aim* of this study was to explore differences in global self-worth between children with different actual and perceived motor competence-based profiles. Based on previous research (Rose et al., 1997; Schoemaker & Kalverboer, 1994), it was hypothesized that children with a profile with relatively high levels of perceived motor competence would display higher levels of global self-worth than children with a profile with relatively low levels of perceived motor competence. A similar relationship was expected between children's actual motor competence and their global self-worth (Rose et al., 1997). In consequence, we expected the highest levels of self-worth among children with high levels of both actual and perceived competence, while the opposite was expected for the group with low levels of both. Given the conflicting results of previous studies (Piek et al., 2006; Rose et al., 2002), we also examined in a more explorative fashion whether children combining

low levels of actual competence with high levels of perceived competence indeed had lower levels of global self-worth.

Methods

Participants and procedure

A total of 161 children (65 boys; 40.37%) from the third and fourth grade with a mean age of 8.82 years ($SD = 0.66$, range 7.83-10.58 years) participated in this cross-sectional study. A convenience sample was used to recruit children from six primary schools of different provinces in Flanders (the Dutch-speaking northern part of Belgium). Children's actual motor competence was assessed in the school facilities by a group of trained assessors. Children wore light sport clothes and performed the tests barefooted to ensure the uniformity of the test conditions. Four weeks later, children filled out questionnaires on self-perception and autonomous motivation for sports in their classroom. The administration of the questionnaire was verbally guided by one researcher to ensure that children understood each item. All assessments were conducted during school hours. A written informed consent was provided for each child by a parent or legal guardian. The study protocol was approved by the Ethics Committee of Ghent University Hospital.

Measures

Actual Motor Competence

The Körperkoordinationstest für Kinder (Body Coordination Test for Children, KTK, Kiphard & Schilling, 1974; Kiphard & Schilling, 2007) was used to assess children's motor competence. The KTK is a product-oriented test battery suitable for 5- 15-year old children. It is a standardized instrument with good psychometric properties, excellent test-retest and inter-rater reliability (all r -values ≥ 0.85), and good-to-excellent intra-rater reliability ($0.80 \leq r \leq 0.96$) (Kiphard & Schilling, 1974; Kiphard & Schilling, 2007; Vandorpe et al., 2011). Construct and

content validity, and concurrent validity with the Movement Assessment Battery for Children have also been established (D'Hondt et al., 2013; Smits-Engelsman, Henderson, & Michels, 1998). The administration of the KTK takes approximately twenty minutes per child and involves the completion of four subtests: (1) walking backwards along balance beams of decreasing width (6.0 cm, 4.5 cm, 3.0 cm), (2) moving sideways on wooden boards during 20 seconds, (3) jumping sideways over a slat for 15 seconds, and (4) hopping over foam obstacles with increasing height in consecutive steps of 5 cm. The raw performance score on each subtest was converted into a standardized motor quotient adjusted for age (all four subtests) and sex (the third and fourth subtest) (Kiphard & Schilling, 1974; Kiphard & Schilling, 2007). An overall motor quotient was then calculated by adding up the standardized scores of each subtest. This overall motor quotient was used in the analyses as a measurement of children's actual motor competence.

Self-Perception

Children's physical self-perception was measured with the Dutch version of the Self-Perception Profile for Children (SPPC, Harter, 2012). The SPPC is a highly reliable (internal consistency reliability of $0.71 \leq r \leq 0.91$ for the different subscales) and valid instrument to assess different dimensions of self-perception among third- till eighth-grade pupils (aged 8-13 years, Harter, 2012). Similar to previous studies (e.g., Barnett et al., 2008; Weiss & Amorose, 2005) the athletic competence subscale (6 items; $\alpha = 0.71$) was used to assess children's perceptions of their athletic ability and their ability to learn sports skills while the global self-worth scale (6 items; $\alpha = 0.80$) was used to measure children's general perceptions of their self. Answering categories for all 12 items consist of a four-choice structured alternative format. The child is first asked to decide with which kind of child he or she identifies most, the one(s) described in the first part of the sentence or the one(s) described in the second part of the sentence (e.g., 'Some children do very

well at all kinds of sports *but* other children don't feel that they are very good when it comes to sports.'; "Some children are very happy being the way they are *but* other children wish they were different."). Once having made this decision, the child next decides whether the description in the part of the sentence he/she chose is "really true" or "sort of true" for him/her. Each item is accordingly scored from 1 (lowest perceived competence or adequacy) to 4 (highest level of competence or adequacy).

Autonomous motivation for sports.

Children's autonomous motivation for sports was measured with the Dutch version of an adapted form of the Behavioral Regulations in Exercise Questionnaire (BREQ, Markland & Tobin, 2004; Sebire, Jago, Fox, Edwards, & Thompson, 2013). The adapted BREQ was validated in previous research (Sebire et al., 2013) and compared to the original BREQ, it contains fewer items to reduce participant burden and to keep the main focus on measuring the quality of children's motivation. Six items starting with the stem "I participate in sports because..." were used to measure autonomous motivation ($\alpha = 0.84$; e.g., "I participate in sports because I enjoy participating in sports."). Participants responded to each of the items via a 5-point Likert scale from 1 (*not at all true for me*) to 5 (*very true for me*).

Analyses

IBM SPSS Statistics 22.0 was used for preliminary descriptive analyses.

We conducted cluster analyses to examine whether subgroups could be identified based on children's actual and perceived motor competence. After standardizing the scores of actual and perceived motor competence, univariate and multivariate outliers were sought since they can substantially perturb cluster solutions (Garson, 2014). Univariate outliers (values of more than three standard deviations above or below the mean) were not found, but six multivariate outliers

(as identified using the Mahalanobis distance measure) had to be removed, resulting in a final sample of 155 children.

Next, a two-step procedure (Gore, 2000) was applied in SPSS 22.0 to conduct a cluster analysis. In the first step, Ward's hierarchical clustering method (Everitt, Landau, & Leese, 2001) was used to conduct a hierarchical cluster analysis. In a stepwise fashion, clusters that were similar in terms of squared Euclidean distance were combined, resulting in three-, four-, and five-cluster solutions. As the explained variance in both actual and perceived motor competence of each cluster solution was at least 50% (Milligan & Cooper, 1985), all the cluster solutions were retained for the following step in which the cluster centres were used as non-random initial cluster centres in an iterative, non-hierarchical k-means clustering procedure (Asendorpf, Borkenau, Ostendorf, & Van Aken, 2001). The resulting cluster solutions were evaluated based on interpretability and parsimony (von Eye & Bogat, 2006).

To examine the stability of the various cluster solutions, we then implemented a double-split cross-validation procedure (Breckenridge, 2000) by randomly splitting the total sample into halves and applying the two-step procedure (Ward and k-means) in each subsample. Next, the participants in each half of the sample were assigned to new clusters based on their Euclidean distances to the cluster centres of the other half of the sample. These new clusters were then compared for agreement with the original clusters by means of Cohen's kappa (K). The two resulting kappa's were averaged and a Cohen's kappa of at least .60 (good agreement) was considered acceptable (Asendorpf et al., 2001). Stability and replicability were acceptable for all cluster solutions. Since the four-cluster had a higher kappa (.76) than the three-cluster solution (.60) and the five-cluster solution (.62) and explained 74.1% and 62.6% in variance in actual and perceived motor competence respectively, it was decided to use the four-cluster solution for further

interpretation. Figure 1 represents the final four-cluster solution, which accounted for 74% of the variance in actual motor competence and 63% of the variance in perceived motor competence.

To control for the hierarchical structure of the data, with 155 children being nested within 18 classes nested within 6 different schools, multilevel regression analyses were conducted with the iterative generalized least squares estimation method in MLwiN (version 2.35) to investigate differences in autonomous motivation for sports and global self-worth between the four clusters. Two separate three-level models (school, class, student) were estimated for autonomous motivation and global self-worth, including age and sex as covariates and cluster membership as predictor. To obtain coefficients for each of the clusters, we repeated the regression equations several times for each outcome by changing the reference category.

Significance level was set at $p < 0.05$ for all statistical analyses.

Results

Descriptives

The means and standard deviations of the variables, as well as the correlation coefficients among these variables, are presented in Table 1. Participants had a mean motor quotient of 105.52 (SD=13.63), which is slightly above average (M=100). Furthermore, they scored relatively high on perceived motor competence (M=3.16 on a 4-point scale, SD=.58) and autonomous motivation for sports (M=4.35 on a 5-point Likert-scale, SD=.75) and reported high levels of global self-worth (M=3.28 on a 4-point scale, SD=.69).

Identifying clusters

As shown in Figure 1, four clusters could be retained based on cluster analyses. The clusters were labelled based on relative actual motor competence (high vs. low) and perceived motor competence (high vs. low), respectively. Cluster 1 (n=32; 20.6%) was characterized by children

who had, relative to children belonging to the other clusters, low levels of actual motor competence and low levels of perceived motor competence and was labelled the ‘low-low’ cluster. Cluster 2 (n = 27; 17.4%) was characterized by children who had, relative to children belonging to the other clusters, high levels of actual motor competence but low levels of perceived motor competence and was labelled the ‘high-low’ cluster. Cluster 3 (n = 46; 29.7%) was characterized by children who had, relative to children belonging to the other clusters, low levels of actual motor competence but high levels of perceived motor competence and was labelled the ‘low-high’ cluster. Finally, Cluster 4 (n = 50; 32.3%) was characterized by children who had, relative to students belonging to the other clusters, high levels of actual motor competence and high levels of perceived motor competence and was labelled the ‘high-high’ cluster. Chi-square analyses revealed a proportionate sex representation within the clusters ($\chi^2[3]=6.68$; $p=.08$).

As intended by performing cluster analyses, significant differences in actual motor competence were found between the four clusters (χ^2 values = 29.68 – 396.23; all p values <0.001; see Table 2). The high-high cluster had the highest mean score for actual motor competence (M=119.54, SD=.96), followed by the high-low cluster (M=110.70, SD=1.31), the low-high cluster (M=98.76, SD=1.00) and the low-low cluster (M=88.94, SD=1.20) respectively. With respect to perceived motor competence, significant differences were found between the high-high (M=3.50, SD=0.5) and the low-high cluster (M=3.59, SD=.05) on the one hand and the low-low (M=2.52, SD=.06) and the high-low cluster (M=2.57, SD=.06) on the other hand.

Differences between clusters in terms of autonomous motivation for sports and global self-worth

Children in the low-low cluster ($\beta_0=3.88$, SE=.15) and the high-low cluster ($\beta_0=4.07$, SE=.15) displayed significantly lower levels of autonomous motivation for sports than children in

the low-high cluster ($\beta_0=4.55$, $SE=.12$) and the high-high cluster ($\beta_0=4.43$, $SE=.12$; χ^2 values = 4.70 - 17.45; p values = <0.001 - 0.03; see Table 1). A similar result was found for global self-worth (χ^2 values = 4.20 - 7.15; p values = 0.01 - 0.04) with children in the low-low cluster ($\beta_0=2.93$, $SE=.14$) and the high-low cluster ($\beta_0=2.98$, $SE=.14$) having significantly lower levels of global self-worth than children in the low-high cluster ($\beta_0=3.31$, $SE=.12$) and the high-high cluster ($\beta_0=3.33$, $SE=.11$).

Discussion

The aim of the current study was threefold: to investigate how actual and perceived motor competence align in elementary school children by using a person-centred approach (*aim 1*) and to explore how children with different types of motor competence-based profiles might differ in terms of autonomous motivation for sports (*aim 2*) and global self-worth (*aim 3*).

Cluster analyses identified four motor competence-based profiles: two groups were characterized by corresponding levels of actual and perceived motor competence with approximately one fifth of all children (20.6%) having relatively low levels of both actual and perceived motor competence (i.e., low-low) and almost one third (32.3%) having relatively high levels of both (i.e., high-high). In addition, two groups with divergent levels of actual and perceived motor competence were identified. A minority of children (17.4%) had relatively high levels of actual motor competence but low levels of perceived motor competence (i.e., high-low) while a fairly large group (29.7%) displayed a combination of relatively low levels of actual motor competence and high levels of perceived motor competence (i.e., low-high). With almost half of the children displaying divergent levels of actual and perceived motor competence, these results confirm that young children often lack the cognitive capability to correctly assess their competence (Goodway & Rudisill, 1997; Harter & Pike, 1984). Conclusions based on previous research that

only included measurements of perceived motor competence (in contrast to measurements of both actual and perceived motor competence) should thus be interpreted with caution.

While previous studies among adolescents that applied a person-centred approach (De Meester et al., 2016; Weiss & Amorose, 2005) did not identify a group with relatively lower levels of perceived motor competence than actual motor competence, the current study identified a small group of children with such a profile. This finding is somewhat surprising given that young children are often believed to rather easily overestimate their competence, when compared to adolescents. When exploring the absolute mean scores of this group of ‘underestimators’, it was found that the discrepancy between actual and perceived motor competence was rather small (at least for some children) with a group mean for actual motor competence of 110.70 (SD=1.31), which is considered moderate to high compared to other children in this age group (Kiphard & Schilling, 2007) and a group mean for perceived motor competence of 2.57 (SD=0.06), which is the average of the 4-point scale, representing an average perceived motor competence (Harter, 2012). Most children in the current sample display high levels of perceived motor competence (M=3.16, SD=.58), which is in line with previous research among elementary school children (Rose et al., 1997; Khodaverdi et al., 2015),.

Multilevel regression analyses showed that children in groups with relatively low levels of perceived motor competence (i.e., the low-low group and the high-low group), had significantly lower autonomous motivation for sports than children in groups with relatively high levels of perceived motor competence (i.e., the low-high group and the high-high group), independent from whether this was combined with high or low actual motor competence levels. Moreover, in spite of having high levels of actual motor competence, children with low levels of perceived motor competence (i.e., high-low) demonstrated lower levels of autonomous motivation for sports than children with low actual motor competence and high perceived motor competence (i.e., low-high).

These findings are in agreement with previous studies among adolescents which indicated that perceived motor competence is positively related to motivation for sports (Bagoien & Halvari, 2005; Klint & Weiss, 1987), and suggest that perceived motor competence may be even more crucial than actual motor competence in terms of autonomous motivation and that children need to feel competent in order to be motivated to engage in sports and physical activity. In addition, the current results indicate that the relative ‘underestimation’ of competence is unfavourable as well. To this end, perceived competence should be taken into account when designing and implementing movement programs and interventions.

Similar differences between clusters were found with respect to global self-worth: children with low levels of perceived competence (i.e., the low-low and the high-low group) had a significantly lower self-worth than children with high levels of perceived motor competence (i.e., the low-high and the high-high group). These results confirm our hypothesis that children in the groups with relatively high levels of perceived motor competence would display higher levels of global self-worth (Rose et al., 1997; Schoemaker & Kalverboer, 1994) than children in the groups with relatively low levels of perceived motor competence. While it was expected that the group with high actual motor competence (but low perceived motor competence, i.e., high-low) would also display high levels of global self-worth (Rose et al., 1997), the current results show that a high actual motor competence is only positively related to global self-worth when combined with a high perceived motor competence. These findings indicate that low levels of perceived motor competence can have a negative impact on children’s global self-worth in spite of them having high levels of actual motor competence. The combination of high actual and low perceived motor competence is as undesirable as the combination of both low actual and low perceived motor competence in terms of global self-worth. These findings further highlight that children’s perceived motor competence needs to be addressed in movement programs and interventions to increase

global self-worth and motivation for sports and to promote (continued) engagement in physical activity and sports.

Limitations, strengths and future research

This study is not without limitations. For instance, the present investigation includes a relatively small sample size ($N = 159$). Although there was sufficient data to perform cluster-analyses (Breckenridge, 2000), differences between clusters must be critically interpreted as group sizes were not equal, ranging from 27 to 50. A larger sample would enable further separate analyses for boys and girls, and the examination of age differences in the alignment of actual and perceived motor competence.

Furthermore, the cross-sectional design does not allow one to determine any causality between motor competence on the one hand and motivation for sports and global self-worth on the other hand. In this respect, longitudinal or experimental studies could provide more insight on the directionality of these relationships. Another recommendation is that future studies also include measurements of fundamental motor skills (such as running, kicking and throwing) to have a more complete measurement of actual motor competence, as the more general tasks of the KTK that measures the gross motor coordination and dynamic balance do not align very well with the items in the athletic competence subscale of the SPPC (Harter, 2012). Alternatively, measurements of perceived competence could more closely correspond to actual motor competence measurements.

The main strength of this study is the use of a person-centred approach to identify motor-competence profiles and to examine differences between profiles in autonomous motivation for sports and global self-worth. Another strength is the procedure that was followed to administer the questionnaires in the classrooms. Each question was read out loud by the researcher and children had the opportunity to ask for any clarification if needed. Future motor skill intervention research

should also target perceived motor competence in order to improve motivation for sports and global self-worth and promote physical activity. Additionally, future studies should include a longitudinal approach to investigate the dynamic relationship between motor competence and physical activity and the mediating role of perceived motor competence as described in the conceptual model of Stodden et al. (2008). In view of the present findings, we suggest expanding the conceptual model of Stodden et al. (2008) and include motivation as a mediating factor between actual and perceived motor competence on the one hand and physical activity on the other.

Conclusions

This study among elementary school children revealed two motor-competence profiles with corresponding levels of actual and perceived motor competence and two with divergent profiles. In addition, the results showed that children with low perceived motor competence are less autonomously motivated for sports and have a lower global self-worth than children with high perceived motor competence, even if they have high actual motor competence. These findings emphasize that fostering children's perceived motor competence might be crucial to improve their motivation for sports and their global self-worth, two factors that are crucial in the promotion of lifelong physical activity. If children perceive themselves as more competent, they are not only more autonomously motivated to engage in sport and physical activities, it is also beneficial for their global self-worth. As such, physical education and youth sports programs should target both actual and perceived motor competence through autonomy supportive teaching and differentiated instruction in order to help children become competent and motivated movers.

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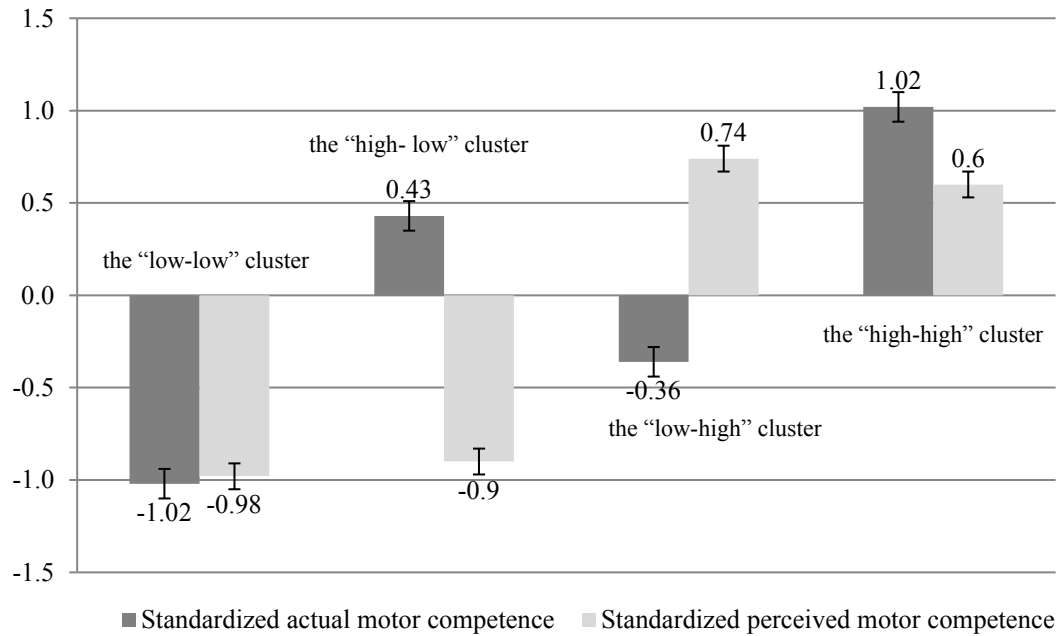


Figure 1: Four cluster solution based on z-scores for actual motor competence and perceived motor competence.

Table 1: Descriptive statistics and correlations among variables.

<i>Variables</i>	<i>M</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
1. Actual motor competence (MQ)	105.52	13.63	69.00	133.00				
2. Perceived motor competence (1-4 scale)	3.16	.58	1.83	4.00	.28***			
3. Autonomous motivation (1-5 scale)	4.35	0.75	1.00	5.00	0.13	.34***		
4. Global self-worth (1-4 scale)	3.28	0.69	1.00	4.00	0.03	.26**	.27**	
5. Age (years)	8.82	0.66	7.83	10.58	-0.2	.12	.06	.17*

Note. $N = 155$ children. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 2: Mean scores and cluster comparisons for the four clusters ($N=155$).

Variable	Cluster			
	Cluster 1: Low-low n=32 7 boys, 25 girls 20.6%	Cluster 2: High-low n=27 14 boys, 13 girls 17.4%	Cluster 3: Low-high n=46 19 boys, 27 girls 29.7%	Cluster 4: High-high n=50 23 boys, 27 girls 32.3%
Cluster dimensions (z-scores)				
Actual motor competence	-1.02 (0.08) ^a	0.43 (0.09) ^c	-0.36 (0.07) ^b	1.02 (0.06) ^d
Perceived motor competence	-0.98 (0.09) ^a	-0.90 (0.10) ^a	0.74 (0.08) ^b	0.60 (0.07) ^b
Cluster dimensions (raw scores)				
Actual motor competence	88.94 (1.20) ^a	110.70 (1.31) ^c	98.76 (1.00) ^b	119.54 (0.96) ^d
Perceived motor competence	2.52 (0.06) ^a	2.57 (0.06) ^a	3.59 (0.05) ^b	3.50 (0.05) ^b
Child outcomes				
Autonomous motivation	3.88 (0.15) ^a	4.07 (0.15) ^a	4.55 (0.12) ^b	4.43 (0.12) ^b
Global Self-worth	2.93 (0.14) ^a	2.98 (0.14) ^a	3.31 (0.12) ^b	3.33 (0.11) ^b

Note. Values in parentheses are standard errors. A cluster mean is significantly different from another mean if they have different superscripts. Different superscripts between parentheses indicate a trend to significance. Differences between the four clusters were tested by repeating the equations several times and changing the reference category. As such, coefficients for each cluster were obtained, which enabled pairwise comparisons.

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