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What do the parents perceive, and how it affects children's motor competence? An exploratory study in 5 to 11 years old south Brazilian children

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ABSTRACT

The present study examines sex differences regarding children's self-perceptions and motor competence (locomotor and object control subtests), parents' perceptions about their boys' and girls' competence, and the associations among these variables. Parents and their children (*N*= 77; *M*= 8.70, *SD*= 2.13) participated in the study. The children's motor competence was assessed using the Test of Gross Motor Development — Second Edition (TGMD-2). The children's self-perceptions were assessed using the Pictorial Scale of Perceived Competence and Social Acceptance and the Self-Perception Profile for Children, depending on the child's age. The parental perception of their children's motor competence was assessed using an adapted version of the children's perceptions of motor competence. Boys and girls were similar regarding the locomotor subtest; boys showed significantly higher scores for the object control subtest than girls. Parents' perceptions of children's motor competence were significantly related to the children´s motor competence and were the stronger predictor in the locomotor model and the second predictor in the object control subtest model; sex was the stronger predictor for the object control subtest. Our findings address new information regarding children's motor and parents' motor competence.

KEYWORDS: child; locomotor skills; manipulative skills; motor skills; perceptions.

INTRODUCTION

Childhood is one of the most critical phases of life, and during this period, motor competence (MC) is influenced by the immediate contexts that children attend (Duarte, Valentini, Nobre & Benda, 2022; Flôres, Rodrigues, Copetti, Lopes & Cordovil, 2019; Flôres, Rodrigues, & Cordovil, 2021). Within the home, parental interaction influences children's development by promoting or inhibiting their behaviour. Parents selectively structure children's contexts and organise their activities to promote action (Duarte et al., 2022; Määttä, Ray & Roos, 2014; Reed, 1996) that will allow children to develop new skills and achieve their full potential. Therefore, parents need an accurate perception of their child's MC to provide better opportunities to boost their development, learning, and competence (Silva, Flôres, Corrêa, Cordovil & Copetti, 2017).

MC describes the person's ability to be proficient in a wide range of motor skills and is considered fundamental for developing healthy lifestyles (Fransen et al., 2014; Luz, Rodrigues, Almeida & Cordovil, 2016). Thus, MC can influence and be influenced by children's engagement in different movement experiences (Barnett, Morgan, van Beurden &

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Beard, 2008; Barnett et al., 2022; Nobre, Nobre & Valentini, 2022), and it is related to a broad range of child characteristics (Barnett et al., 2022; Barnett, Ridgers, & Salmon, 2015; Clark, Moran, Drury, Venetsanou, & Fernandes, 2018; Spessato, Gabbard, Robinson & Valentini, 2013; Spessato, Gabbard & Valentini, 2013; Valentini, Nobre, Santayana de Souza & Duncan, 2020), family resources (Nobre, Valentini, & Rusidill, 2020; Valentini, Clark & Whitall 2015), school opportunities (Valentini, Nobre & Duarte, 2022; Valentini, Pierosan, Rudisill & Hastie, 2017), and environment factors (Duarte et al., 2022; Zeng, Johnson, Boles & Bellows, 2019).

Another relevant factor affecting competence across childhood is the child's self-perceptions (Barnett et al., 2022; Barnett et al., 2015; Nobre, Bandeira & Valentini, 2016; Spessato, Gabbard, Robinson & Valentini, 2013). Specifically, high perceptions of MC seem to positively influence the child's judgments regarding their ability to perform different tasks and the confidence to interact with the environment (Valentini, 2007). Children with high self-perceptions show more spontaneous engagement in motor tasks, more involvement in new motor challenges, and higher performance levels in different motor skills (Crane, Naylor, Cook & Temple, 2015). However, the strength of this association between MC and how children's self-perceptions has been reported to be low to moderate and invariant when age and sex are also examined (De Meester et al., 2020) or even non-significant related to MC across childhood (Valentini, Nobre, Santayana de Souza & Duncan, 2020). The literature has shown a lack of clarity on the relationship between MC and perceived motor competence in cross-sectional studies (De Meester et al., 2020) and insufficient evidence for a longitudinal relationship between these constructs (Barnett et al., 2022).

Furthermore, children's MC is also influenced by the parental perception of children's competence (Bridgeman & Hoover, 2008; Silva et al., 2017); and parental perceptions seem to be influenced by the time they devoted to participating in relevant activities with their children (Silva et al., 2017). Besides, parents seem to lack precision regarding children's competence, overestimates or underestimates have been reported regarding children's capacity to reach (Cordovil & Barreiros, 2010; Cordovil, Santos & Barreiros, 2012) and crawling (Mondschein, Adolph & Tamis-LeMonda, 2000), as well regarding overall motor skills (Silva et al., 2017). A sex trend is also observed; girls' MC is usually underestimated, whereas the MC of boys is frequently overestimated, even though MC is at equivalent levels (Mondschein et al., 2000). Thus, contrary to common sense, the parent's perception of children's MC can be inaccurate.

Despite the importance of parental perceptions, research is still scarce investigating parents' role in developing their children's MC. The present study examines sex differences regarding children's self-perceptions and MC (TGMD-2 locomotor subtest; TGMD-2 object control subtest; TGMD-2 Gross Motor Quotient), and parents' perceptions about their boy's and girl's competence, and the associations among these variables. It is expected that boys will present higher MC and perceptions of their MC compared to girls and inaccuracy regarding parental perceptions of their children's MC.

METHODS

Participants

This cross-sectional study enrolled 154 participants: 77 (children 41 girls and 36 boys, ranging from 5 to 11 years, *M*= 6.56, *SD*= 0.50) and 77 parents. All children were recruited randomly from six schools in southern Brazil. Data were collected before the COVID-19 outbreak (2018).

As an inclusion criterion, children had to be in school and not present any medical restrictions to perform the tasks; children with disabilities were not included in the present study.

Most of the families had a monthly income of R$2,000/€400 (42.9%), and most parents finished high school (62.3% of the mothers and 48.1% of the fathers); 62 (81%) families lived in houses and 15 (19%) in apartments; 9 (12%) children had no brothers or sisters, 27 (35%) had only one sibling; 31 (40%) had two siblings, and 10 (13%) had three or more brother and sisters.

Informed consent was obtained from parents, and verbal assent was obtained from each child before tasks began. The University Ethics Committee (CAEE: 76336117.0.0000.5346) approved the research, and the study protocol followed the Declaration of Helsinki guidelines.

Measures and procedures

Motor competence

The Test of Gross Motor Development, Second Edition (TGMD-2), validated for Brazilian children (Valentini, 2012), was administrated according to the manual guidelines. The TGMD-2 is an observational tool widely used to assess gross motor skills (locomotor and object control skills) for children between 3- to 10-years-old. The test assesses twelve motor skills organised into two subtests: locomotor subtest (i.e., run, leap, gallop, hop, jump, slide) and object control subtest (i.e., catch, strike, bounce, over and underhand throw, kick). The scores of TGMD-2 locomotor and object control subtests and the Gross Motor Quotient (GMQ) were used.

Self-perceptions of motor competence

Self-perceived motor competence was assessed using two versions of Harter's scales (Harter, 1982; Harter & Pike, 1984), depending on the child's age. The Pictorial Scale of Perceived Competence and Social Acceptance (Harter & Pike, 1984) validated for Brazilian children (Valentini, Bandeira & Rudisill, 2020) was used to assess non-literate children, 5- to 7-years-old children. The Self-Perception Profile for Children (Harter, 1982) validated for Brazilian children (Valentini, Villwock, Vieira, Vieira & Barbosa, 2010) was used to assess literate children. The motor subscales were used in the study, composed of six Likert items related to motor tasks such as skipping, running, and hopping. The range of scores for each item is from 1 (low competence) and 4 (high competence) - the scales portray figures of competent and not competent children performing those tasks. The pictures were shown to each child, and then the child was asked to choose which figure represented the most how they did on the task.

Parental perception of their children's motor competence

Parents were assessed using the perceived MC subscales adapted version from the self-perception profiles (Harter, 1982; Harter & Pike, 1984) validated for Brazilian children (Valentini, Bandeira et al., 2020; Valentini et al., 2010). The motor subscale was explained and presented to the parents, and they were asked to estimate their child's perceptions using the same Likert scale. Two trained researchers conducted the assessments. Children were assessed first using the SPMC; then, we conducted the motor assessment using the TGMD-2. Parents were individually assessed in a separate room using the PPCMC.

Statistical analysis

Descriptive analysis, including mean, standard deviation, and confidence interval (95%), was used to characterise the data. The Kolmogorov-Smirnov test confirmed the data normality, as the Levene test confirmed all statistical assumptions. Pearson correlations were used to analyse the associations between the Pictorial Scale of Perceived Competence and Social Acceptance with the TGMD-2 subtests. Point biserial correlation coefficient of Pearson's was used for the associations between a continuous variable (Perceived competence and TGMD-2 scores) and a categorical variable (sex), the significance assumption was for two tails. Correlations coefficients < 0.30 were considered weak, those between 0.30 and 0.70 were considered moderate, and coefficients > 0.70 were considered strong (Field, 2005). One-Way ANOVA was used to examine the differences in the outcomes concerning sex. Partial Eta-squared (η^2) was used as the index of effect size for the One-way ANOVA (η^2 small= 0.01, moderate= 0.06, large= 0.14). Linear regressions were conducted to examine the relationship among children's SPMC, parents' PCMC, and sex. The outcomes for the regression were the TGMD-2 locomotor and object control subtests and the Gross Motor Quotient; standardised values will be provided. The statistical significance level was set at $p< 0.05$ using the SPSS 27.0 software.

RESULTS

The one-way ANOVA results showed non-significant differences for girls and boys regarding age ($F_{(1,75)}= 0.00$ $p= 0.936$), child perceptions of MC (PCMC: $F_{(1,75)}= 0.18$, $p= 0.672$), child' TGMD-2 locomotor subtest ($F_{(1,75)}= 0.21$, $p= 0.649$), and GMQ ($F_{(1,75)}= 0.07$, $p= 0.798$). The one-way ANOVA showed that parents' perceptions of children MC for boys and girls were also non-significant (PPCMC: $F_{(1,75)}= 0.77$, $p= 0.385$). The only significant differences between sex were found for child TGMD-2 object control subtest scores ($F_{(1,75)}= 15.21$, $p< 0.0001$), boys showed higher scores with a very large effect size. Table 1 provides the means and

Table 1. Means, standard deviation, and results for sex comparisons.

Perceptions & TGMD-2 Subtests and GMQ	Girls (*n*= 41)	Boy (*n*= 36)	ANOVA p & η^2	
	M (SD; 95%CI)	M (SD; 95%CI)	p	η^2
Age	6.59 (0.50; 6.41–6.73)	6.53 (0.51; 6.36–6.79)	0.936	0.003
Child SPMC	19.46 (3.59; 18.34–21.51)	19.78 (2.78; 18.92–20.67)	0.672	0.002
Parents PCMC	18.22 (2.84; 17.34–19.10)	17.61 (3.26; 16.61–18.76)	0.385	0.010
GMQ	79.00 (8.77; 76.29–81.56)	79.50 (8.19; 76.92–82.08)	0.798	0.001
Locomotor	31.98 (5.69;30.15–33.78)	32.56 (5.39; 30.92–34.33)	0.649	0.003
Object Control	24.88 (4.56; 23.44–26.27)	29.31 (5.40; 27.53–31.00)	< 0.0001	0.169

CI: confident interval; η^2: partial Eta-squared; SPMC: Self-Perception of Motor Competence; PPCMC: Parental Perception of their Children's Motor Competence; GMQ: Gross Motor Quotient.

standard deviation for all variables and the statistical results for sex comparisons.

To examine the associations between the children's SPMC, parents' PCMC, TGMD-2 locomotor and object control subtests, and TGMD-2 GMQ, we used Pearson bivariate correlations and point biserial correlation; moderate correlations were found for parents and child perceptions, parents' perceptions and children motor skills, and object control skills and sex. Results are provided in Table 2.

The linear regressions were conducted having as outcomes TGMD-2 locomotor subtest, TGMD-2 object control subtest, and the GMQ; no variables collinearity was found in locomotor and object control models (VIF values 1.0 to 1.1).

The results indicated that the model for TGMD-2 locomotor subtest as outcome, children SPMC, parents PCMC, and sex was significant, R^2= 0.11, $F_{(3,73)}$= 3.05, p= 0.034. In the TGMD-2 locomotor subtest model, parental PCMC (standardised β= 0.31; p= 0.009) was the strongest predictor, explaining 31% of the variance in the TGMD-2 locomotor subtest. Children SPMC (standardized β= 0.05; p= 0.688) and sex (standardized β= 0.08; p= 0.464) were non-significant.

The results also showed that the model for TGMD-2 object control subtest as outcome, children SPMC, PPCMC, and sex was also significant, R^2= 0.27, $F_{(3,73)}$= 9.09, p< 0.0001. In the TGMD-2 object control subtest model, sex was the strongest predictor (standardised β= 0.44; p< 0.0001), followed by the PPCMC (standardised β= 0.32; p= 0.004), explaining 44 and 32%, respectively, of the variance in the TGMD-2 object control subtest. Children's SPMC (standardised β= 0.02; p= 0.843) was non-significant.

The results also showed that the model for the TGMD-2 GMQ as the outcome, the regression has. children SPMC, PPCMC, and sex was non-significant, R^2= 0.08, $F_{(3,73)}$= 2, p= 0.121. Furthermore, the only significant predictor in the non-significant regression was the parents' PCMC (β= 0.25; p= 0.036), explaining 25% of the variance in the TGMD-2 GMQ score. Children SPMC (β= 0.05; p= 0.644) and sex (β= 0.05; p= 0.645) were non-significant predictors.

DISCUSSION

The present study examines sex differences regarding children's self-perceptions and MC (TGMD-2 locomotor and object control subtests; GMC), parents' perceptions about their boy's and girl's competence, and the associations among these variables. Regarding sex comparisons, no differences between boys and girls for self-perceptions and TGMD-2 locomotor subtests were found; parents' perceptions of the motor competence of boys and girls were similar.

Regarding sex comparisons, the results showed no differences between boys and girls for self-perceptions, like previous studies with school-aged children in Brazil (Almeida, Valentini & Berleze, 2009; Berleze & Valentini, 2021; Nobre, Valentini & Nobre, 2018; Valentini, 2002) Holland (Noordstar, van der Net, Jak, Helders & Jongmans, 2016) and China (Chen et al., 2004); girls felt confident as boys in their motor competencies despite received less social reinforcement for being athletic (Almeida et al., 2009; Piek, Baynam & Barrett, 2006). It is vital to notice that no consensus in the literature has been found; some studies have reported a higher perception of competence among boys (Ridgers, Fazey & Fairclough, 2007; Robinson, 2011; Villwock & Valentini, 2007). Self-perception is a complex construct affected by children's cognitive development, significant adults in the child's life, and previous cultural experiences of the child (Harter, 2012). Therefore, the nonsimilar results portray these multifactorial influences on the perceived competence of children.

Regarding gross motor skills, we did not find differences between sex for the overall GMQ scores. Gross motor skills differences concerning sex have been reported to be controversial in the literature (Bjørndal, Ronglan & Andersen, 2017; Flôres, Rodrigues, Luz & Cordovil, 2021). In fact,

Table 2. Correlations between scores of the children SPMC, parents PCMC, and TGMD-2 locomotor and object control subtests, TGMD-2 GMQ, and sex.

	Perceptions		TGMD-2		
	Child SPMC	Parents PCMC	Locomotor Subtest	Object Control Subtest	GMQ
Parents PCMC	0.30**	-	-	-	-
GMQ	0.13	0.26*	-	-	-
Locomotor	0.15	0.32**	-	-	-
Object Control	0.14	0.28*	0.19	-	-
Sex[#]	0.05	-0.10	0.05	0.41**	0.03

[#]Point biserial correlation coefficient of Pearson's was used for the associations **between sex and continuous variables**; *p< 0.050; **p< 0.010; SPMC: Self-Perception of Motor Competence; PPCMC: Parental Perception of their Children's Motor Competence; GMQ: Gross Motor Quotient.

boys are reported to achieve higher overall motor scores than girls (Flôres, Rodrigues & Cordovil, 2021; Spessato, Gabbar, Valentini & Rudisill, 2013; Valentini et al., 2016); this trend was not observed in the present study considering the GMQ scores. Our results showed that the only difference between sex was found for the object control subtest (i.e., strike, bounce, kick, and throw), with boys outperforming girls, aligning with previous literature (Flôres, Menezes & Katzer, 2016; Flôres, Rodrigues, Luz & Cordovil, 2021; Nobre et al., 2018; Soares, Rodrigues, Lourenço & Flôres, 2021; Spessato, Gabbard & Valentini, 2013). A plausible explanation for the higher object control scores for boys is related to boys being more active than girls of the same age (Goodway, Robinson & Crowe, 2010; Lourenço, Rodrigues, Flôres & Soares, 2022) and engaging in sports-related motor tasks (Barnett et al., 2016), what may explain our results. Thus, these results indicate that parents and school physical education teachers need to generate opportunities to promote different skills and competence across childhood, especially for girls to acquire ball skills. Therefore, our findings demonstrate that it is crucial to seek new strategies to improve girls' participation in physical activities and reduce their disadvantages and increase girls' MC, and maybe consequently, physical activity engagement and satisfaction.

Small to moderate correlations were found between children's and parents' perceptions of their child's locomotor and object control skills competence; parents' perceptions were also moderately associated with children's perceptions of competence. The regression analysis showed a significant model for locomotor subtest outcome having children SPMC, parents PCMC, and sex as variables. However, parents' PCMC was the only significant predictor, explaining 31% of the variance for locomotor scores. Besides, although non-significant, the GMQ models also showed that parents' PCMC was the only significant predictor of 25% of the variance in the overall gross motor skills scores. The model for the object control subtest with children SPMC, parents PCMC, and sex was significant – the most robust model (R^2= 0.27) with the strongest predictors. Parents' PCMC explained 32% of the variance in the TGMD-2 object control scores, and, different from the locomotor model, sex was the strongest predictor, explaining 44% of the model's variance.

Previous studies suggested that parents' perceptions have an essential role in influencing children's MC (Reed, 1996; Silva et al., 2017; Zeng et al., 2019) by directly and indirectly encouraging children to play sports (Määttä et al., 2014), the present study did not assess parents' effect on children MC, a recommendation for further studies. Besides, parents' perception of their child's MC in this sample was moderately related; no over- nor under-estimation of the child's MC was observed. This finding disagrees with the current literature that suggests parental overestimation (Cordovil & Barreiros, 2010; Silva et al., 2017) and underestimation of girls' competence despite showing equivalent levels of MC to boys (Silva et al., 2017). To organise optimal children's environments, parents need an accurate perception of their child's MC. Parents who have time to interact, play, and respond to their child's needs probably have more opportunities to develop accurate perceptions and provide appropriate conditions for their children to develop gross motor skills. Therefore, it is also crucial for future studies to investigate parents' beliefs besides perceptions. Nevertheless, parents' level of education plays a role in this process (Zeng et al., 2019), and it is also a recommendation for further studies.

Sex also explained the object control scores model's variance in the regression analysis. Our results, along with the literature, support the Barnett et al. (2016) systematic review findings showing sex as a stronger predictor of children's object control performance; and a previous study (Saraiva, Rodrigues, Cordovil & Barreiros, 2013). However, contrary to recent studies in Brazil with no associations in regression and structural equation models between sex and object control skills (Nobre et al., 2016; Valentini, Bandeira, et al., 2020). The differences in sample characteristics need to be considered for the contradictory factor, such as children's socioeconomic background. For example, in the Nobre et al. (2016) and Valentini et al. (2020) studies, children were predominantly from low socioeconomic families, which is different from the present study.

Besides, although entered the model, children's SPMC fails to remain a significant predictor. Our results are aligned with previous studies conducted in Brazil in that children's self-perceptions of MC were not significantly related to locomotor or object control scores (Nobre et al., 2016; Spessato et al., 2013), even with large samples (Valentini et al., 2020). We believe that self-perceptions and possible correlates need to be investigated, considering the contextual characteristics of the samples. For example, the Brazilian studies provided no evidence for this association, although results from other countries found a relationship between cultural factors related to child-rearing and parental beliefs (Nobre et al., 2022; Nobre et al., 2020) and socioeconomic resources (Nobre et al., 2018) are the possible explanation for such diverse results and may be considered in future research.

Despite our meaningful results, the present investigation presents some limitations. First, the activities that parents enrolled the child in are the ones they consider relevant — these activities seem to be fine and ball skills, not locomotor

(Lira et al., 2019); it was not assessed parental beliefs and context, which could provide further knowledge of how parents judge children competence in several tasks. Second, the literature lacks instruments to assess parents' perceptions of their children's MC; the development of reliable tools for assessing parents is a recommendation for further research. Third, the present study relied on a sample from south Brazil, which does not represent the whole country. Therefore, the results can be generalised only to a similar sample.

CONCLUSIONS

The present manuscript findings may have relevant educational implications; parents' perception is a predictor of children's MC. We addressed an important issue of parental perceptions of children's MC, showing that controversially to previous studies, parents have an accurate perception of their child's competence, and children's motor self-perceptions were not related to MC. Boys outperformed girls in object control skills. These findings depicted different contextual opportunities and child-rearing, and these issues still lack investigation. Nevertheless, future research should consider not only the parent's perceptions but also how parent support and parent-child dyads can enhance children's perceptions and actual MC.

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