Development and construct validation of a questionnaire for measuring affordances for motor behavior of schoolchildren

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Abstract

Environments where children move about provide affordances that play a significant role in their development. This research presents the Affordances for Motor Behavior of Schoolchildren (AMBS) assessment tool, which aims to assess the interdependent systems, such as home, school, and sports activities, that can influence 6 to 10-year-old children's motor development, motor learning, and motor competence. After establishing face validity, 259 south Brazilian families completed the questionnaire. We assessed construct validity on the whole sample with Confirmatory Factor Analysis. The model testing showed a very good fit, and the structural model presented significative loading coefficients from the identified variables to the theoretically specified latent variables (factors). Significant correlation values were found between factors: Home and Materials (r = 0.77), Home and School (r = 0.41), and Materials and School (r = 0.56). Our results suggest that the AMBS can assess the opportunities for action provided to children by their home, the materials in it, and their school.

Introduction

Children's motor development is affected by different levels of environmental influences ranging from proximal (immediate) to distal ones. Bronfenbrenner (1979) considered these ecological settings as interdependent systems, where each one fits inside the other, and termed them from a micro to a macro level, starting from the child and family environment to the cultural influences specific of different countries. The first level of influence is the microsystem, which corresponds to the child's immediate surroundings (e.g., home, neighborhood, daycare center, school, sports environments), where proximal processes occur. These proximal interactional processes of development relate also directly to the Gibsonian ecological approach. To Gibson (1979), each environment has materials, spaces, surfaces, actions, events, and people that provide the child possibilities for action (i.e., affordances), according to his or her action capabilities. Consequently, the perception of the environment and its features guides the child's movements and, reciprocally, action facilitates the detection of those features, specifying other affordances (Adolph & Hoch, 2019; Flôres et al., 2019; Heft, 2012). These affordances exist on the child's microsystems, but they are affected by the other layers of environmental influence. For example, culture (as a macrosystem) influences the parental practices and perceptions about what children need, which constrain, among other things, the type of toys that parents buy (Bradley & Corwyn, 2005).

As children grow, their immediate surroundings expand and the interactional activity in and with those environments progressively becomes more complex (Bronfenbrenner & Evans, 2000; Bronfenbrenner & Morris, 2006). After entering primary school, children begin regularly to attend places other than home. Thus, other environments, such as the school, home of close friends, neighbors, or sports environments become important microsystems, and their opportunities for promoting children's development should be analyzed (Fathirezaie et al., 2021; Flôres et al., 2019; Lewallen et al., 2015; Nobre et al., 2020). Even though the importance of different microsystems is widely accepted in the literature (e.g, Bronfenbrenner, 2005; Bronfenbrenner & Ceci, 1993; Flôres et al., 2019), few researchers have tried to assess what these contexts afford to school-aged children (e.g, Dias et al., 2017; Gubbels, Van Kann, & Jansen, 2012;

Kjønniksen, Anderssen, & Wold, 2009; Monsur, Mansur, & Islam, 2017; Mota et al., 2005; Nettlefold et al., 2011; D. Ward et al., 2008).

The major focus of research has been in infancy and early childhood and in the home setting, as we can notice when analyzing the different tools that have been developed to evaluate the affordances present children's environments, namely the HOME (Bradley & Caldwell, 1984), the AHEMD-SR (Rodrigues et al., 2005), the AHEMD-IS (Caçola et al., 2011), and the AHEMD-IS to daycare setting (Müller et al., 2017). Unlike the HOME inventory, which is not specifically focused on affordances for motor development, the AHEMD-SR and the AHEMD-IS use a comprehensive inventory to assess the existent physical affordances that are conducive to enhancing motor development in the home environment. Some other tools were developed to analyze separate contexts of the child's life. The System for Observing Fitness Instruction Time (SOFIT), which was designed to assess different variables associated with children's activity levels and opportunities to become physically fit in physical education (McKenzie et al., 1992; Pope et al., 2002); the Nutrition Physical Activity Self-Assessment for Child Care (NAPSACC), which aimed to analyze the school environment about the physical structure, food and educational policies (Ward et al., 2008); and the Physical Activity Neighborhood Environment Scale (PANES), which was developed to assess the neighborhood environment walkability and recreation facilities, related to the support physical activity for children (Sallis et al., 2010).

Although the above-mentioned tools cannot capture all affordances that exist in children's microsystems, they have proved to be valuable to assess the opportunities for action offered by different environments. As Gibson stated, the richest and most elaborate affordances are provided by other people (Gibson, 1979) and this type of affordances (i.e., social affordances) is difficult to be captured by inventory-type tools. In fact, to capture all the affordances that exist in a child's microsystems is a massive task, because affordances depend not only on the features of the environment but also on the child's characteristics, so they are dynamic, they might arise and dissolve over time and along with development. Thus, our purpose was to build a tool capable of capturing a specific part of the affordances that exist in different children's microsystems (i.e., those provided by the physical environment) as detected by the children's families.

As far as we know, there is a lack in the literature related to an assessment tool capable of analyzing the 6-to 10-year-old children's physical affordances in different microsystems. Thus, our work represents an extension of previous tools (Rodrigues et al., 2005; Caçola et al., 2011) to an older age group contextual settings, aiming to create and establish the validity of a parental self-reporting research questionnaire, named Affordances for Motor Behavior of Schoolchildren (AMBS), which assesses the quality and quantity of the physical affordances in the 6- to 10- year-old children microsystems. Specifically, we intend to validate the AMBS as a reliable tool to analyze the home (and its materials) and school environments, with the purpose of better understanding the potential of those environments for optimizing children's motor behavior.

Method

Participants

Pilot study – For the initial construction of the AMBS, there was the need to pilot a first version of the inventory. A convenience sample of 20 south Brazilian families was recruited using the University website and Facebook page. These 20 families represented a variety of socioeconomic, and educational levels.

Validation of the AMBS - Participants were recruited from twelve schools in south Brazil. Four hundred and fifty-three (n = 453) families with children aged 6- to-10 years old (7.94 ± 1.23) were invited to participate in the study and two hundred and fifty-nine (n = 259) consented to participate and completed the questionnaire (143 boys and 116 girls). This number of participants is adequate according to a rule of thumb of 10 cases per variable (Byrne, 2016; Nunnally & Bernstein, 1967), and accommodates a power of 0.89 for a model such as ours (Wolf et al., 2013).

All parents received a letter explaining the purpose of the study and asking for the signed informed consent for their participation. Parents answered through an online version of the AMBS, in which all the answers were sent directly to the cloud database. The research was approved by the university ethics committee.

A total of 259 parents answered the final version of the AMBS, 72 (27.80%) were from families with children aged between 6 and 7 years, 56 (21.62%) were from families with children aged between 7 and 8 years, 67 (25.87%) were from families with children aged between 8 and 9 years, and 64 (24.71%) were from families with children aged between 9 and 10 years. Regarding the monthly income of families, 9.30% earned R$1000 or less (under $10000 per year), 19.30% earned between R$1001 and R$2000 (between $10001 and $15000 per year), 17.4% earned between R$2001 and R$3000 (between $15001 and $25000 per year), 8.50% earned between R$3001 and R$4000 (between $25001 and $35000 per year), 7.70% earned between R$4001 and R$5000 (between $35001 and $5000 per year), and 37.8% earned R$5001 or more ($50001 or more). Most parents that participated in the study (57.9% of fathers and 44.8% of mothers) had completed high school or less. Most children attended school in the afternoon (n = 132; 51,0%), 25.8% (n = 67) attended it in the morning, and 23.2% (n = 60) attended full-time school. Regarding the type of housing, 59.1% of the children (n = 153) lived in houses and 40.9% (n = 106) lived in apartments. Table 1 shows the data regarding extracurricular activities that children attend to. Twenty families were asked to complete the AMBS twice with a 1-week interval to establish reliability.

Table 1
Data regarding extracurricular activities that children attend to.

Extracurricular activities	Days						
	0 (%)	1(%)	2 (%)	3 (%)	4 (%)	5 (%)	6 or plus (%)
Team sports	112 (43.2%)	49 (18.9%)	46 (17.8%)	25 (9.7%)	10 (3.9%)	7 (2.7%)	10 (3.9%)
Individual sports	140 (54.1%)	49 (18.9%)	37 (14.3%)	11 (4.2%)	8 (3.1%)	5 (1.9%)	9 (3,5%)
Combat sports	226 (87.3%)	16 (6.2%)	9 (3.5%)	2 (0.8%)	1 (0.4%)	3 (1.2%)	2 (0.8%)
Outdoor activities	73 (28.2%)	65 (25.1%)	38 (14.7%)	22 (8.5%)	14 (5.4%)	19 (7.3%)	28 (10,8%)
Music activities	188 (72.6%)	44 (17%)	14 (5.4%)	5 (1.9%)	6 (2.3%)	1 (0,4%)	1 (0,4%)
Cultural and/or artistic activities	136 (52.5%)	84 (32.4%)	23 (8.9%)	7 (2.7%)	3 (1.2%)	3 (1.2%)	3 (1.2%)

Procedures

The present study was developed in separate phases, concerning the initial development of the assessment tool, and the construct validity of the AMBS.

Initial Development of the AMBS

Stemming from the previous work that has focused on the influence of specific environments on children's development (Abbott & Bartlett, 1999; Bradley et al., 2000; Gabbard et al., 2008; Rodrigues et al., 2005; Sallis et al., 2010), and grounded on the assumption that the child's development is influenced by multiple contexts or systems, particularly as children grow older (Bronfenbrenner, 1995; Lerner, 2006), an extensive literature search was undertaken (Flôres et al., 2019). This review of literature aimed at characterizing the availability of affordances for motor development in the microsystem's settings that 6- to 10-year-old children frequently attend (i.e., home, school, and leisure environments). As a result, an initial version of the AMBS was created in Portuguese, as a parent self-report assessment tool with seven sections, and 111 questions or items.

To assess content validity, the questionnaire was sent to three experts in child motor development (agreed participation) for critical review to assess the main sections and questions. The experts (two Portuguese and one Brazilian) were instructed to express their opinion regarding the wording and the relevance of the questions, recommending changes in questions and sections when needed. Experts' suggestions for change in the formulation of the questions were included, and only questions and sections positively rated by all experts were considered in the next version of the AMBS. Suggested new questions or sections made by any of the experts were again rated by the other experts on a second and final round.

After the contribution of the experts, one section was removed (i.e., general data), one was added (i.e., characterization of house items), and two were renamed (i.e., house and house items to home characterization; and sports environments to extracurricular activities). Likewise, of the 111 questions in the initial version, 45 were deleted (e.g., parents' general data, number of garages, number of classmates, number of dance rooms, Pilates classes, etc.), and seven new ones were added (e.g., number of cars or motorcycles, number of computers, etc.) resulting on a revised version of the AMBS with 73 questions grouped in 7 sections.

This AMBS revised version was then piloted to assess face validity with 20 south Brazilian families, representing a variety of socioeconomic, and educational levels. Parents or guardians were asked to answer the questionnaire while pointing out difficulties or making suggestions for corrections. They were also asked about other opportunities for action that could be missing in the present form of the AMBS. All items were classified as having a good comprehension by all parents, but due to the suggestions made in this pilot study, the authors refined the wording of 2 items and changed 1 picture in the questionnaire.

The final version of the AMBS questionnaire consists of 73 questions organized in seven sections: Child Characteristics (7 questions), Extracurricular Activities (6 questions), Family characterization (7 questions), Home characterization (10 questions), House Items (7 questions), Child Play Materials (22 questions), and School (14 questions). The questionnaire contains dichotomous questions, Likert-type scales, and description-based queries (used to collect general information to characterize the sample and participants). When relevant, figures were used in Likert scales to illustrate the alternatives (e.g., type of play materials) (see http://www.questionarioambs.com/ambs20/calculadora/).

An AMBS application (App) for Android, IOS and computer, was built to allow digitally answering the questionnaire. All answers of the submitted questionnaires on the different platforms are saved on an online database.

A first exploratory analysis of the 259 families' data aimed to aggregate the items (questions) into meaningful variables that could represent specific types of motor affordances. Forty-eight of the 73 questions were grouped according to common content into 11 variables grouped in three categories or factors and representing the characteristics of the school and home environments that children attend. The remaining questions (25) were used to collect information regarding the child characterization (7 questions), extracurricular activities (6 questions), family characterization (7 questions), and school characterization (4 questions). The correlation matrix for the 48 items was inspected for consistency and discrimination properties according to intended common content. The allocation of the items into group variables was changed if it was not positively correlated with the other questions within the variable or if it had a higher relationship to other variable questions. As a result of this process, three questions were reallocated to a different variable. The 11 variables were then tentatively associated with one of three broad categories or factors (Home, Materials, and School) according to a derived theoretical model for motor behavior affordances of school children (see Table 2). Reliability was established by the analysis

of the intraclass correlation coefficient (ICC) for the variables. The results ranged from 0.79 to 0.90, providing support for use of the self-report version of AMBS as a reliable tool (see Table 3).

Table 2
Descriptive values of the items and variables.

			Items		Variables	
Categories	Variables	Items	Median	Range	Median	Range
Home	Inside space A	-Apartment / House (9)	1	1–2	6	3–12
		-Number of bedrooms (10)	2	1–5		
		-Number of living rooms (11)	1	1–3		
		-Number of kitchens (12)	1	1–2		
		-Number of offices (13)	0	0–2		
	Inside space B	-Number of playrooms (14)	0	0–2	0	0–3
		-Number of fitness rooms (15)	0	0–1		
	Outside space	-Number of green areas (16)	1	0–6	1	0–8
		-Number of swimming pools (17)	0	0–2		
		-Number of playgrounds (18)	0	0–2		
Materials	Sedentary Materials	-Number of books (20)	6	1–6	13	2–28
		-Number of computers (21)	1	0–6		
		-Number of blu-rays or DVD players (22)	1	0–5		
		-Number of smartphones (23)	2	0–6		
		-Number of tablets (24)	1	0–6		
		-Number of TVs (25)	2	0–6		
	Pretend play toys	-Action figures (26)	4	0–6	14	0–34
		-Dolls (27)	6	0–6		
		-Remote control toys (28)	1	0–6		
		-Miniature cars (29)	6	0–6		
		-Dollhouse (30)	0	0–6		

Note: Item number reference in parenthesis

			Items		Variables	
		-Costumes (42)	2	0–6		
	Educational toys	-Board games (31)	3	0–6	18	0–42
		-Card games (32)	1,5	0–6		
		-Puzzles (36)	4	0–6		
		-Legos (37)	2	0–6		
		-Educational toys (38)	0	0–6		
		-Toys that encourage reading and writing (39)	6	0–6		
		-Musical instruments (40)	1	0–6		
	Manipulative materials	-Foosball table or ping-pong table (33)	0	0–4	4	0–16
		-Balls (34)	3	0–6		
		-Rackets (35)	0	0–6		
		-Videogames (41)	1	0–3		
		-Basketball tables and volleyball or badminton nets (46)	0	0–6		
	Stability materials	-Bicycles, scooters, skates (43)	2	0–6	2	0–15
		-Trampolines (44)	0	0–2		
		-Slides (45)	0	0–3		
		-Pogo stick, stilts (47)	0	0–6		

Table 2 continued.

			Items		Variables	
Categories	Variables	Items	Median	Range	Median	Range
School	Space for movement	-Space for outdoor or gym activities (52)	2	0–6	4	0–14
		-Natural grass or synthetic turf field (53)	0	0–4		
		-Athletics track (54)	0	0–2		

Note: Item number reference in parenthesis

			Items		Variables	
		-Space for sports classes, inside the school (55)	1	0–6		
	Free space for movement	-Open spaces for free play and recreation (56)	1	0–6	2	0–8
		-Space with ping-pong or foosball tables (57)	0	0–3		
	Sedentary space	-Music room (58)	0	0–6	3	0–13
		-Game room (59)	1	0–4		
		-Computers room (60)	1	0–6		
		-Library (61)	1	0–4		

Note: Item number reference in parenthesis

Table 3
Intrarater reliability for the AMBS categories

Variables	Intrarater reliability	Sig
	ICC (n = 19)	
	95%CI	
Inside space A	.972 (.926 – .989)	.000
Inside space B	.864 (.802 – .911)	.001
Outside space	.906 (.757 – .964)	.000
Sedentary materials	.997 (.992 – .999)	.000
Pretend play toys	.978 (.943 – .991)	.000
Educational toys	.985 (.959 – .994)	.000
Manipulative materials	.985 (.962 – .994)	.000
Stability materials	.934 (.828 – .975)	.000
Space for movement	.963 (.905 – .986)	.000
Free time for movements	.867 (.848 – .912)	.021
Sedentary free time	.959 (.895 – .984)	.005
Home	.947 (.886 – .980)	.000
Materials	.936 (.927 – .989)	.000
School	.789 (.746 – .872)	.003

Data Analysis

The structural validity of this theoretical model of the AMBS was tested by robust confirmatory factor analysis (CFA) using the maximum likelihood estimation method, performed in AMOS software version 24.0. According to the theoretical argument, variables' unique loadings into latent factors (categories), and full correlational paths between latent factors were specified. The model goodness of fit was assessed by the index Chi-Square/df, the Comparative Fit Index (CFI), Tucker Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). Values of Chi-Square/df < 2, CFI and TLI ≥ 0.90, and an RMSEA ≤ 0.06 are considered indicative of good model fit (Brown, 2006; Hu & Bentler, 2009). Modification indices (MI) were analyzed, and variables were considered for modification from their initial path to another factor, or for deletion when MI suggested that such procedure resulted in a significant improvement of the model fit within the theoretical framework.

Results

Descriptive values for all items and variables are shown in Table 2. As seen in Fig. 1, the diagram of the structural model included paths from Home to the Inside Spaces and Outside space; to the Materials to Sedentary materials, Pretend play toys, Educational toys, Manipulative materials, and Stability materials; and to the School to the Space for movement, Free time for movements, and Sedentary free time. The testing of this AMBS model returned a Chi-Square of 91.24; $p < .000$, showing a very good fit to data, as assessed by the index Chi-Square/df = 2.225, CFI = .956; TLI = .942 and RMSEA = .059. The structural model showed significant loading coefficients ranging from 0.51 to 0.89 from the identified variables to the theoretically specified latent factors. Furthermore, significant correlation values were found between factors: Home and Materials ($r = 0.77$), Home and School ($r = 0.41$), and Materials and School ($r = 0.56$). Analysis of the modification indices did not result in any change of the model specification that could enhance model fit, showing a good adherence of the theoretical model to the real data.

Discussion

Our starting premise was that different immediate contexts (or microsystems) (Bronfenbrenner, 1995; Bronfenbrenner & Ceci, 1993) and their objects, places, surfaces, events, and other people (Gibson, 1979) can invite, permit, or inhibit progressively more complex child-environment interactions. These opportunities for action, or affordances, are intimately tied to the features of the environment, but also to the child's action capabilities, which change along with the development. Ward (1978, p.85) points out that “children will play everywhere and with anything” during their childhood, and “they will play wherever they happen to be”, thus a city (and all their available microsystems) needs to make the whole environment accessible to them, because “whether invited to or not, they are going to use the whole environment”. Nowadays, these thoughts continue to be important in the study of the environmental contexts experienced by children. Thus, our goal was to create a parental self-reporting research assessment tool to assess the quality and quantity of the characteristics (affordances) in the home, school and extracurricular activities for children ranging from 6-to 10- years.

The current study revealed that the AMBS was able to detect a common structured organization of potential affordances in the children's microsystems comprising different groups of categories: Home, Materials, and School, representing a meaningful structure associated with the children's environment. This is a relevant finding because it is the first time that a shared structure for motor affordances provision is detected between the home and the school environment, probably meaning that decisions and characteristics of the opportunities for children engaging in motor challenges are also bonded at a community level. The AMBS seems to have the potential to evaluate and discriminate among different community profiles, according to the theoretically-driven organization for motor affordances. The hypothetical theoretical configuration seems to be promising in representing movement affordances available for children in their microsystems, resulting in the validation of the AMBS construct.

The AMBS intends to detect affordances for movement in the different settings. These affordances detections are mediated by the family’s intentional evaluation of the conditions and materials according to the knowledge of their child's motor competence (Silva et al., 2017). In fact, it is this working ecological

fit between the existing settings or materials and the child's motor behavior that allows identifying the motor affordances as significant ones. According to our results, affordances perceived by families in the home, school, and the materials provided to children are related to each other (see Fig. 1). The strongest correlation was found between Home (its physical characteristics) and the available Materials as it would be expected, but there is a moderate and significant relationship between School and Materials, and School and Home. This relationship probably shows a community-linked association regarding the organization of spaces and the provision of movement affordances, both in-home and school settings, but also can be indicative of how families are stable when detecting movement opportunities for their children. The fact that the variables-factor coefficients for School are high but not perfect, shows that affordances provided in the school differ from school to school, but they can also differ within the same school depending on the perception of the physical settings as meaningful affordances for the child.

Within the Materials category, all the different variables show a high and positive loading into the latent factor, showing that the different materials are provided within the home family. Nevertheless, educational toys and manipulative materials showed the strongest loading values indicating that these specific types of materials are the ones more present in all the houses, probably because parents feel that affordances that are conducive to stimulating fine motor skills are particularly important for school-aged children. Also, for the School factor, the relevance of Space for Movement is lowest than the other two, meaning that this characteristic varies more from school to school.

Potential Use Of The Ambs

The prospective use of the AMBS in children's motor behavior and development studies seems promising, particularly because although previous studies have assessed the importance for motor development of the different contexts that children attend, usually, only a setting is studied at a time. Miquelote, Santos, Caçola, Montebelo, and Gabbard (2012) found that home provides great resources to promote motor and cognitive skills in young children, and it is associated with gross and fine motor performance. Despite the positive results, the authors do not report the importance of other environments experienced by children, such as the home of grandparents (or relatives in general) and daycare centers. Ferreira et al. (2019) investigated the association between sport participation and motor competence in 6-to 10-year-old children. The results showed that sports participation was associated with motor competence and play a relevant role in this process. Again, the authors cannot explain the role of other environments, such as home or school, in the development of motor competence. Despite that, most of the research that studied the school period focused on physical activity during recess, playgrounds, or physical education classes, not taking into account the materials, people, and other affordances provided (Dowda et al., 2005; Frago-Calvo et al., 2017; Mills & Burnett, 2017). Goyen and Lui (2009) aimed to determine the prevalence of developmental coordination disorder (DCD) in “apparently normal” extremely premature or extremely low birthweight schoolchildren at 8 years of age. The results showed that “apparently normal” infants are at risk of motor dysfunction in their school years. Nevertheless, there was not an assessment of the environments and contexts experienced by these children. Several other research follows the same

pattern (Flôres et al., 2015; Goyen & Lui, 2002; Herrmann, Heim, et al., 2019; Herrmann, Seelig, et al., 2019; Logan et al., 2014). Thus, a more contextualized perspective can provide investigations beyond the child's immediate context to examining the influence of wider environments and the opportunities offered for the children (Gabbard & Krebs, 2012; Nobre et al., 2020).

The AMBS shows the potential to evaluate and discriminate affordances among different microsystems that children attend to. Future studies that use both the AMBS and a validated assessment of motor development or motor competence can help us to increase our understanding of the relationship between children's regular microsystems and motor behavior. Furthermore, our results suggest that AMBS is a reliable and valid tool to be used as an inventory for assessing affordances in the proximal settings, with clinical and research applications.

AMBS future research should examine the different contexts that children attend to, and further relate them to their levels of motor learning, motor competence, and motor development. That is, relating AMBS results to motor competence or motor development assessments (e.g., Motor Competence Assessment, Test of Gross Motor Development – 2) should provide a better understanding of how children are developing, learning, and acquiring lifespan motor competence within the environment. Information from the AMBS may be particularly beneficial to supplement motor information for children with lower levels of motor competence since this assessment tool might help to identify areas of strength and weakness in the environments the child attends to, which can help to develop appropriate interventive strategies.

Limitations

While our results suggest that the AMBS can be a valuable tool to inform about the opportunities for action provided to children by their home, the materials in the home, and their school, it still has some limitations. First, all families participating in this study were from southern Brazil, so the country's cultural diversity might not be fully represented. Second, the AMBS is answered by parents (self-report), which means that the physical environments could not be verified. This fact implies that the responses provided are related to parental perception and, sometimes, can have a discrepancy between the real environment and the perceived (Silva et al., 2017). Third, although an effort was made to assess the affordances in different microsystems, it is quite difficult to have an assessment tool that evaluates all the environments the child attends. For example, in the AMBS, the extracurricular activities are only identified (see Table 1), but no detailed assessment is made regarding the opportunities for action that exist in those environments. Even within each microsystem, the full range of affordances is difficult to capture. For instance, social affordances that emerge from the interaction with other people are not captured by the AMBS. To minimize this limitation, the AMBS also collects information about the family structure (e.g., number of children and adults in the household). Finally, although the AMBS assesses the opportunities for action provided by different environments, it does not allow for assessing the child's real interaction within those environments, since children might not always use the affordances that are available to them.

Conclusion

The results of this study support the idea that the AMBS is a valid tool to assess the affordances for motor behavior in different microsystems of the child's life. After an initial part composed of items that allow gathering descriptive data regarding the child's and family characteristics, as well as the attendance of extracurricular activities, the questionnaire considers three latent categories: home (physical characteristics); materials (house items and child play materials) and school (school spaces). These three categories are represented by 11 variables and 52 items. We suggest that the AMBS can be used to identify strengths and weaknesses in the studied environments, complementing the information about children's levels of motor learning, motor competence, and motor development assessed by other instruments, and to inform about interventive strategies when needed. Furthermore, the use of the AMBS as a useful and available evaluation tool for families and educators is warranted by the AMBS App that can be freely used, and that will give information to the user about the quality and quantity of affordances for motor behavior.

Declarations

The authors declare no competing interests.

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Figures

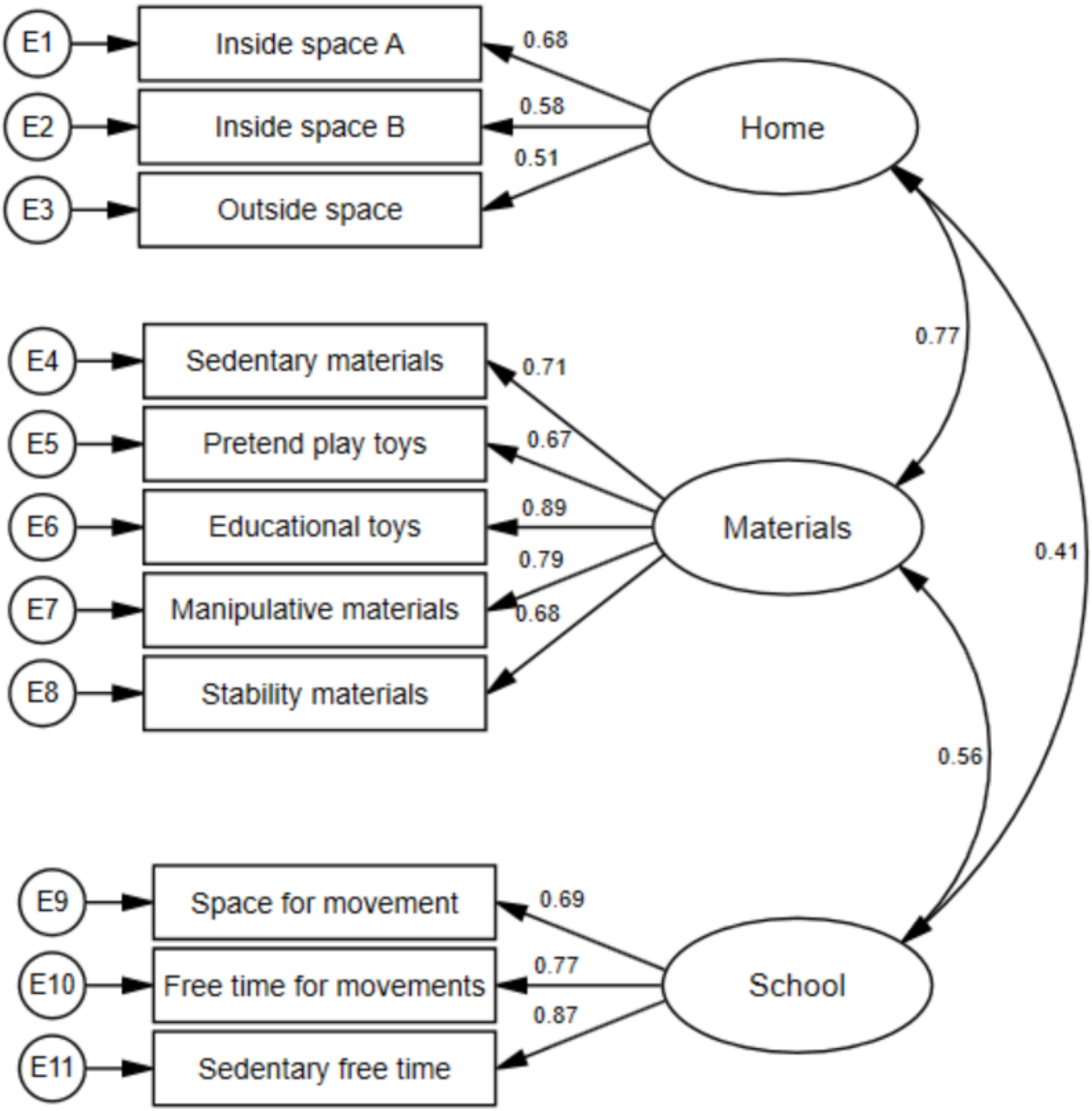

Figure 1

Path diagram of the confirmatory factor analysis with the completely standardized values.