Exploring the relationship between motor development and entrepreneurial traits in childhood

Explorando la relación entre el desarrollo motor y las características emprendedoras en la infancia

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Abstract

Introduction: Children's motor development is growing, with several studies seeking to understand its process, causes, and effects. The field of entrepreneurship has also experienced significant growth.
Objective: Recognizing the importance of both areas, this research aims to verify the relationship between a child's motor development and entrepreneurial traits. Methodology: This is an exploratory case study using mixed methodologies. 37 students from the 1st and 3rd grade participated in this study. The Test of Gross Motor Development - 2 was used to determine the children's motor development. To assess entrepreneurial traits in children, observation and audio recording were conducted in three contexts: structured play, enriched recess, and storytelling. The observation was based on a script constructed according to the literature review.
Results: When relating motor development to entrepreneurial traits, it was concluded that children with better motor development in the total raw score and object control motor skills tend to be those in the 3rd grade and those with lower propensity for inverse behaviour of "Self-Confidence" and "Persistence/Resistance to Failure." It was also found that children with better raw scores in locomotion motor skills are also those who, in the context of recess, have a greater tendency to exhibit positive behaviour of "Risk-taking," such as considering risks before acting or not being afraid of failure.
Conclusion: Schools should integrate entrepreneurial education and motor skill development into curricula to prepare students not just for jobs, but to take initiative, solve complex problems, and adapt to changing circumstances throughout their lives.

Keywords

Children; entrepreneurial traits; motor development; play; recess; storytelling.

Resumen

Introducción: El desarrollo motor en los niños es un área en crecimiento con varios estudios que buscan comprender su proceso, causas y efectos. El área del emprendimiento también ha experimentado un crecimiento significativo.
Objetivo: Verificar la relación entre el desarrollo motor niños y sus características emprendedoras.
Metodología: Se trata de un estudio de caso exploratorio que utiliza metodologías mixtas. Participaron en este estudio 37 estudiantes de primer y tercer grado. Se utilizó el Test de Desarrollo Motor Grueso - 2 para determinar el desarrollo motor. Para evaluar las características emprendedoras, se realizaron observaciones y grabaciones de audio en tres contextos: juego estructurado, recreo enriquecido y cuentos. La observación se basó en un guion construido según la revisión de literatura.
Resultados: Se concluyó que los niños con un mejor desarrollo motor en el puntaje total de las habilidades de control de objetos tienden a ser aquellos en tercer grado y aquellos con menor propensión al comportamiento inverso de "Autoconfianza" y "Persistencia/Resistencia al Fracaso". También, los niños con mejores puntajes en habilidades de locomoción son también aquellos que, en el contexto del recreo, tienen una mayor tendencia a exhibir un comportamiento positivo de "Tomar riesgos", como considerar los riesgos antes de actuar o no tener miedo al fracaso.
Conclusiones: Las escuelas deberían incluir la educación emprendedora y el desarrollo motor en sus planes de estudio, para preparar a los estudiantes no solo para el empleo, sino también para que sean proactivos, resuelvan problemas y se adapten a los cambios.

Palabras clave

Características emprendedoras; desarrollo motor; juego; narración de historias; niños; receso.

Introduction

Human beings are born to move, develop, and become independent therefore, motor learning occurs continuously and gradually, promoting the individual skills that allow them to overcome the challenges of a constantly evolving world (Gallahue & Ozmun, 2005). The process of motor development involves continuous modifications at the level of motor skills throughout an individual's life (Gallahue & Ozmun, 2005; Hadders-Algra, 2018; Haywood & Getchell, 2009; Weiss, 2020). As it is a gradual process influenced by several factors, promoting motor development is crucial from a young age, being the quantity, quality, and diversity of motor stimuli provided to children are particularly important (Gallahue & Ozmun, 2005).

Movement, inherent in play and games, not only helps reduce the negative effects of sedentary lifestyles prevalent in childhood (Nery et al., 2023; Wahyuni et al., 2024) but also enhances children's motor performance (Betancur & Argollo, 2024; Gallahue & Ozmun, 2005). Additionally, it plays a pivotal role in developing dexterity, physical strength (Ortiz-Sanchez et al., 2023), and a range of essential skills. These include expressive language, fundamental mathematical abilities such as number sense, reasoning, and problem-solving (Cankaya et al., 2023, Garaigordobil et al., 2022), creativity, and imagination (Cankaya et al., 2023; Garaigordobil, 2022; Mihaela, 2013).

Moreover, engaging in movement-based activities promotes taking risks, facing fears, building resilience, and overcoming challenges (Brussoni et al., 2020; Collin et al., 2021). It stimulates the creation of something new, encourages discovery and critical thinking (Campbell et al., 2018), and contributes to aspects of body perception, self-efficacy, self-esteem, and psychological well-being (Burson & Castelli, 2022; Méndez-Giménez & García-Rodríguez, 2024; Schulz, 2015). The movement also enhances skills such as negotiation, teamwork, and cooperation among peers (Schulz, 2015; Sohrabi, 2021), and fosters values like dialogue, respect for others, and adherence to rules (Sohrabi, 2021).

On the other hand, the absence of play can restrict both the body and motor development, potentially influencing various personality traits, including perception, cognition, emotions, speech, and socialization (Garaigordobil et al., 2022). Play is a ubiquitous activity for children, fostering happy and enjoyable memories. For younger children, play is characterized by creativity, unpredictability, spontaneity, and fun, making it an effective avenue for learning and contributing to their holistic development (Mihaela, 2013). One of the most common settings for play is the playground, a vital component of a child's educational experience. Beyond providing an outlet for physical activity and promoting active lifestyles, the playground offers opportunities for developing essential life skills. These include communication, cooperation, sharing, respect for rules, understanding the value of compromise, and the resolution of conflicts and problems (Garaigordobil et al., 2022). Moreover, it helps children comprehend their limits and assess the risks associated with their surroundings (Brussoni et al., 2020).

Following this literature review, it is evident that the skills fostered through play and recreation in children align with several traits commonly associated with entrepreneurs. The most frequently referenced traits in the literature include risk assumption, self-confidence, creativity/innovation, identification of opportunities, leadership/decision-making, organization/planning, persistence/resistance to failure, and interpersonal relationships (Collins et al., 2021; Reis et al., 2021; Tittel & Terzidis, 2020).

Entrepreneurship has been extensively studied across various disciplines, including economics, engineering, management, marketing, and others, with notable emphasis (Neck & Greene, 2011). Neumann (2021) asserts that entrepreneurship is recognized as a means of confronting new challenges, be they economic, social, or environmental. This recognition is reflected in self-directed individual behaviour, with the ability to implement ideas identified as the key competence for entrepreneurial success (Seikkula-Leino, 2011). Dolabela (2008) posits that entrepreneurship is a skill that anyone can learn, as every individual harbors entrepreneurial potential. Like any other, this potential requires stimulation for effective development and utilization (Jayawarna et al., 2014; Rodrigues, 2023). Dolabela (2008) advocates for learning through practical experience, embracing mistakes, learning from them, and fostering creativity.

Entrepreneurs possess the unique ability to transform ideas into reality, not only for their gain but also for the benefit of society. This involves harnessing creativity, energy, imagination, and perseverance to evolve a simple and unstructured idea into something substantial and successful (Broccia et al., 2022). Entrepreneurs are deeply concerned about the well-being and satisfaction of everyone with whom they work or interact (Dolabela, 2008; Verma et al., 2022).

In fostering a thriving enterprise, an entrepreneur engages in dialogue to communicate effectively, comprehends the needs of employees, presides over change, and commits to its realization (Verma et al., 2022). They infuse their enterprise with imagination, motivation, passion, commitment, integrity, teamwork, and vision. In navigating challenging situations, entrepreneurs make decisions despite doubts and contradictions (Feng & Chen, 2020). They willingly assume the risk of failure, investing time and dedication to pursue success (Ferreira et al., 2010).

Blankesteijn et al. (2021) contend that entrepreneurial education is a cultural matter that can either instill or inhibit entrepreneurial capacity, and they advocate for its commencement from an early age. Jayawarna et al. (2014) support this perspective by asserting that all fundamental skills required throughout life are acquired in the initial years of education. Consequently, the stimulation of entrepreneurial skills should also be initiated in early childhood.

Hence, this study aims to verify the relationship between a child's motor development levels and their entrepreneurial traits.

Method

This research is a mixed-methods case study (Yin, 2003).

Participants

The study was conducted in a public primary school in the urban area of Braga, in the northern region of Portugal. Thirty-seven students participated, including 18 from a 1st-grade class (9 girls and 9 boys) and 19 from a 3rd-grade class (9 girls and 10 boys), aged between 6 and 9 years (7.2±1.1). The majority of students come from families with a middle socioeconomic level. Only 51.4% engage in extracurricular physical activities.

Instruments

The Test of Gross Motor Development-2 (TGMD-2) test battery developed by Ulrich (2000) was employed to assess the children's motor development. The TGMD-2 is a test referenced by criteria and standard, which evaluates children's motor development by measuring fundamental motor skills in children aged 3 years and 0 months to 10 years and 11 months of age. The test comprises twelve fundamental motor skills categorized into two subdomains: locomotion motor skills (running, galloping, stepping, one-foot jumping, horizontal jumping, and lateral running) and object control motor skills (hitting, dribbling, receiving, shooting, throwing over the shoulder, and rolling). Each motor skill, whether locomotion or object control, is evaluated based on 3 to 5 motor execution criteria, assessing the child's competence in the specific skill. These criteria are established according to mature standards referenced in the literature (Gallahue & Ozman, 2005).

As of now, there are no identified instruments for assessing entrepreneurial traits in children. Consequently, categories and subcategories for observation were delineated based on the literature review, forming the foundation for the construction of the observation guide (table 1). Three analysis contexts were used: structured game, enriched recess, and recreated storytelling.

The game was designed and organized in such a way that it was possible to verify entrepreneurial traits in children. Ten children participated in the game, divided into two self-defined teams. The game consists of choosing one of three existing routes, which must be considered as the routes are scored according to their difficulty. All routes feature barriers measuring 121 centimetres (cm), spaced 110 cm apart.

The game consists of three routes with barriers at varying heights—15.5 cm for the easiest (Route 1), 31.5 cm for the medium level (Route 2), and 46.5 cm for the hardest (Route 3). Each route has a scoring

box at the end, with different points allocated: 1 and 2 points for the easiest, 2 and 3 points for the medium, and 3 and 4 points for the most difficult.

In the first variant, the objective for children is to overcome the barriers by crossing them from above, in the second variant from below, and the third by interspersing from above and below. They were given 2 to 3 minutes to decide, among the team, the starting order of each of their members. When the time is up, one team at a time and, individually, each student, runs the chosen route, takes out a paper corresponding to the score, opens it, reads it aloud, and places it in the box assigned to their team at the end of the route, then runs as quickly as possible along the side designated for this purpose and touches the hand of the colleague who leaves immediately, and so on for three minutes. At the end of 3 minutes the game ends, they sit down and it starts again for the opposing team. After both teams finish the game, they meet to count the points achieved. The researcher audited the point count, displaying the points to all participants. All team members then verbally added up the points.

The achieved scores for each team were documented on a paper at the end of the count. Finally, after the activity concluded, all scores were tallied to determine the winning team. The entire game is recorded using a Sony DCR-SR36 video camera.

In the enriched recess context, various materials were used, including a rugby ball, a bow, four plastic hockey sticks, a plastic hockey ball, a bosu, four clubs, a small sandbag, a pair of stilts with a rope, three strings, two beach rackets with respective balls, and two rubber rings. Two Sony DCR-SR36 cameras were employed to record videos of the school playground, providing dual perspectives to enhance visibility.

The recreated storytelling was developed from the ground up, centring around the theme of pirates and the pursuit of treasure. By selecting this theme, we intended to encourage children to immerse themselves in an imaginary world, free from preconceived values and ideas that might influence their choices and responses. Opting for a focus group was crucial, especially considering that 'Interpersonal relationships' is one of the characteristics under evaluation, and group collaboration plays a fundamental role in its assessment. The story is dynamic, concluding each stage with a challenge or question for the students. Data collection was conducted using a Sony DCR-SR36 video recording camera.

Table 1. Category system defined according to the literature review

Categories	Subcategories
Risk Taking	In a given situation, consider the consequences of the risk and only then move forward. Accept new challenges with optimism. Not afraid of failing
Self-confidence	Do not be intimidated even if there is the possibility of being confronted with different opinions. Has a positive and confident attitude
Creativity / Innovation	Promotes new ideas or new ways of doing something Proposes new strategies to solve a problem
Identification of opportunities	Is curious, explores the unknown He is attentive to his surroundings.
Leadership / Decision Making	Conveys ideas clearly Knows how to listen Guides the group towards the path they believe is most correct Makes decisions for the group Knows how to encourage the group to achieve the final goal
Organization / Planning	Can delegate tasks Plan future actions Can anticipate possible obstacles and outline solutions
Persistence / Resistance to Failure	In the face of failure, maintain a positive and overcoming attitude Do not become discouraged when faced with criticism.
Interpersonal Relations	Able to work in a team He is sociable, interacts easily with others. Takes into account the ideas and objectives of the group members

Procedure

To initiate the study, we obtained all required authorizations, including those from schools, teachers, students, and their guardians. We sought approvals from the National Data Protection Commission, the General Directorate of Innovation and Curricular Development, and the Ethics Committee for Social

Sciences at the University of Minho for the study's application in schools; The children were also invited to participate in the activity, and the objective of the study was explained to them. Additionally, children were invited to participate in the activity, and the study's objectives were explained to them.

In a second moment, the TGMD–2 test battery was administered in the school's gymnasium by three researchers, following the protocol outlined in Ulrich's (2000) evaluator's manual. Two film cameras were arranged in the multipurpose facility, one on the front and one on the side to record each test. Individually, children were summoned to the classroom and then guided to the gymnasium. Before executing the motor skills, each child received verbal guidance accompanied by a demonstration. Every child had three attempts for each skill, with the first considered experimental. However, an additional experimental attempt was provided for those who demonstrated initial incomprehension of the task after the first attempt. The application of the test battery took approximately 20 minutes for each child.

In the third phase, the children were observed in their school playground to assess the presence of entrepreneurial traits in an enriched context. The observation was conducted through deferred video recording, while information was simultaneously collected during recess in a field diary. It is noteworthy that the researchers adopted a non-participant intervention approach to minimize any influence on the student's behaviour. Two classes were observed, one for 30 minutes before and the other for 30 minutes after the regular morning recess. Due to unfavorable weather conditions, the activity took place in the school's covered space. Two film cameras were strategically positioned to capture most of the space where the children would engage in activities. In the center of the space, various materials were placed to encourage exploration, with students informed that they had the break to themselves and could utilize the space as they wished. This process was recorded for 30 minutes, corresponding to the duration of the recess.

In a fourth moment, on the agreed-upon date, students, organized in randomly selected groups of 10 members each, conducted the activity in a designated location. Adjustments to the number of participants were necessary due to the odd total number of students. The teams were self-defined. Following team formation, the participants were briefed on the activity, including its procedures and rules. They were then given time for reflection to strategize as a team. After a demonstration by the researcher, each child had the opportunity to experience the route in their way before each variant. Subsequently, the team initiating the game was instructed to establish the starting order for each member and position themselves for the game's commencement. Meanwhile, the opposing team sat waiting for their turn. The game commenced, and after its conclusion, all students were escorted back to the classroom.

In a fifth moment, our attention turned to the storytelling context. For each stage of the story, specific categories were defined. The description of each category determined the challenge, allowing for evaluation. In this manner, we integrated the eight categories into the narrative, assessing the presence or absence of entrepreneurial traits through the children's actions, reactions, and expressions.

During the storytelling, the students assumed the roles of characters, provided reasoned suggestions for the plot, and made choices among several options proposed by the researcher. Throughout the storytelling session, students actively engaged with the narrative, assuming roles as characters, offering reasoned suggestions regarding the path to follow, and making choices among various options suggested by the researcher. The decision was made to narrate the story in the first person, aiming to enhance student engagement and foster more enthusiastic participation. A pilot study was conducted with 1st and 3rd-year classes at a school in Braga to validate this approach.

Data analysis

Regarding the statistical treatment of TGMD-2 data, the Kolmogorov-Smirnov test was applied to assess the normality of the data. The test results determined the use of non-parametric tests, specifically Pearson's Chi-Square test, to determine the association between the variables.

Each student was meticulously observed through video recording, with all behaviours related to the defined subcategories carefully documented. Following the observation guide, whenever a specific behaviour was observed in a student, it was meticulously recorded, including a description of the situation and the corresponding minute in the video. These recorded behaviours were then categorized into one or more predefined subcategories. After the analysis, regardless of age, all positive, inverse, and

unobserved behaviours were tallied. This observation task was carried out by three researchers to enhance the reliability of the observed data, following recommended practices for research validity (Yin, 2003). The situations noted in the field diary were also taken into consideration.

To ensure anonymity, the children's names were coded using letters defined by the research team. To triangulate the non-parametric data, a bivariate Spearman correlation was conducted to examine the relationships between variables associated with entrepreneurial traits across the three evaluation contexts. Subsequently, exploratory factor analysis (Maroco, 2007) was employed to identify distinct profiles of children with entrepreneurial traits.

Results

Regarding the TGMD-2, the standard values established by the test are subdivided into seven categories resulting from the motor quotient: "Very Poor," "Poor," "Below Average," "Average," "Above Average," "Good," and "Very Good." The results show that all students, regardless of age, are at average, above-average, good, or very good motor performance level, with no negative performances.

Concerning age, the results revealed a statistically significant relationship between age and motor performance ($p<0.05$). Interestingly, students aged 6–7 demonstrated superior motor performance compared to their peers aged 8–9.

For entrepreneurial skills within a structured play, "Risk-Taking," "Opportunity Identification," and "Interpersonal Relationships" had over 50% positive behaviours. "Risk-Taking," "Self-Confidence," and "Interpersonal Relationships" showed the highest inverse behaviours. "Creativity" and "Organization and Planning" exceeded 50% of non-observed behaviours. Subcategories of "Leadership and Decision-Making" showed mostly non-observed behaviours, warranting further context-specific observations.

In enriched recess, the most positively observed categories were "Self-Confidence," "Opportunity Identification," and "Interpersonal Relationships." The highest inverse behaviours were seen in "Self-Confidence," "Persistence/Resilience to Failure," and "Interpersonal Relationships." "Organization and Planning" had over 50% non-observed behaviours. Subcategories from "Risk-Taking," "Creativity/Innovation," and "Leadership and Decision-Making" were rarely observed, suggesting further study in varied contexts.

In recreated history, five of eight categories exceeded 50% positive behaviours, particularly "Self-Confidence" and "Interpersonal Relationships," with over 60%. "Persistence/Resilience to Failure" showed the highest inverse behaviours (40%). Non-observed behaviours were prominent in "Leadership/Decision-Making" and "Organization and Planning." Several subcategories in "Risk-Taking," "Opportunity Identification," and "Leadership and Decision-Making" were mostly non-observed, indicating the need for broader contextual observations.

The categories "Self-Confidence" and "Interpersonal Relationships" consistently emerged in both positive and inverse forms across all contexts, highlighting their relevance and need for targeted intervention to reduce inverse behaviours.

Regardless of the context, targeted interventions are necessary to address inverse behaviours, as their presence reflects outcomes contrary to the desired entrepreneurial aims.

Concerning entrepreneurial skills, initially, to understand the association between variables related to entrepreneurial traits in different contexts, triangulating the data, we calculated the correlation between them. Specifically, we highlighted positive and negative correlations with coefficients above 0.50. Our analysis focused solely on correlations between different contexts to ensure the consistency of results. The estimated correlations between entrepreneurial traits and various contexts appear relatively low, with only four observed correlations between the same variable in different contexts.

The positive behaviours related to the Leadership/Decision-Making characteristic showed a positive correlation between the game context and recess (.613) and between recess and the story (.534). The same occurred in inverse behaviours with a positive correlation between the game and recreation (.634). The inverse behaviour related to the Interpersonal Relations characteristic showed a positive correlation between the game context and story (.666).

These correlations indicate that the observed behaviours, whether positive or inverse, in a given variable, were identical between contexts. However, as there were only four correlations and none between the three contexts, we concluded that the data were not triangulated, demonstrating that each of the contexts can reveal, in children, different behaviours in terms of the characteristics evaluated.

Factor analysis

In Table 2, the relational structure between variables related to entrepreneurial traits and motor performance is presented, obtained through exploratory factor analysis using the principal component analysis method. This analysis considered factors with an eigenvalue above 1.0 and utilized the VARIMAX rotation method (Maroco, 2007).

Table 2. Factor weights of each of the variables depending on the factors generated

		Factors											
		1	2	3	4	5	6	7	8	9	10	11	12
	Age	-,371	,333	-,290	-,281	,476	-,105	-,342	,127	,116	,134	,142	-,199
Tgmd-2	Total Raw Score	,207	-,070	-,072	,012	,852	-,139	,032	,188	,287	,127	-,039	-,022
	Object Control Raw Score	,245	,109	-,017	,107	,823	-,204	-,194	-,068	-,301	,000	,040	,061
	Locomotion Raw Score	,001	-,218	-,078	-,106	,216	,044	,265	,332	,731	,172	-,099	-,098
Recreated story	Risk Taking– IB	,198	-,750	,012	,190	-,355	-,113	,183	-,166	,018	,005	-,078	,006
	Risk Taking– PB	-,065	,864	,131	,188	-,091	-,152	-,015	,041	,105	-,124	-,093	,056
	Self-confidence – IB	,117	-,877	-,061	-,010	-,087	,099	,167	-,178	,141	-,075	,000	-,126
	Self-confidence – PB	-,303	,820	,038	,103	-,049	-,135	-,184	,069	-,093	,074	-,018	,113
	Creativity/Innovation – IB	,775	-,144	,021	,090	,207	,297	,154	,040	,023	,124	-,111	-,020
	Creativity/Innovation – PB	-,492	,477	,161	,032	-,175	,033	,078	,277	-,018	,105	,031	,391
	Id. of opportunities – IB	,497	-,110	-,111	,434	-,094	,191	,010	,119	-,245	-,069	,117	-,438
	Id. of opportunities – PB	-,240	,262	-,032	-,120	,044	,030	,098	,145	-,037	,070	-,037	,831
	Leadership/D. Making–IB	,640	-,271	-,123	,019	,184	,179	-,054	-,038	-,116	-,365	,206	,063
	Leadership/D. Making–PB	-,251	,370	,317	,056	-,318	-,137	-,070	,076	,092	,588	-,061	,312
	Organization/Planning–PB	-,054	,616	,100	,318	-,063	,109	,295	-,116	,200	,494	-,067	-,047
	Persistence / R. Failure–IB	-,210	,105	,097	,220	,120	-,090	-,203	,004	,062	-,053	-,782	,160
	Persistence / R. Failure-PB	,445	-,247	,008	-,177	-,030	,407	,135	,156	,198	,182	,036	-,057
	Interpersonal Relations–IB	,870	-,307	-,028	-,183	-,039	,004	,077	-,051	-,001	,030	,036	-,036
	Interpersonal Relations-PB	-,830	,299	,118	,149	,079	-,097	,034	,066	,068	-,011	,055	-,048
Structured game	Risk Taking – IB	,132	-,090	-,244	-,081	-,172	,865	-,017	-,175	,147	-,107	,055	,056
	Risk Taking – PB	-,071	,055	,109	,138	,184	-,834	-,025	,198	-,075	,165	-,026	,027
	Self-confidence – IB	,131	-,131	-,154	-,675	-,033	,452	-,146	-,125	,072	-,158	-,037	-,010
	Self-confidence – PB	-,038	,326	,201	,589	,016	-,443	-,007	,065	,051	,302	,055	,008
	Creativity / Innovation–PB	,017	-,059	,342	,066	,101	-,163	,095	-,003	,093	,678	,152	,065
	Id. of opportunities – IB	,279	-,121	,043	-,008	-,115	,197	,089	-,743	-,044	-,052	,028	,152
	Id. of opportunities – PB	,143	,213	,272	,013	,138	-,187	,121	,704	-,001	-,151	-,002	,249
	Leadership/D. Making –IB	,735	-,005	-,366	-,035	-,101	-,124	-,198	-,261	-,096	-,043	-,128	-,223
	Leadership/D. Making –PB	-,295	-,003	,444	,273	-,062	-,040	-,180	,540	,096	,217	,298	,217
	Organization/Planning-PB	,314	,231	,163	,207	,094	-,096	-,039	,500	,170	,411	,192	,157
	Persistence /R. Failure –IB	,366	,013	-,009	-,807	-,203	-,005	,019	,045	-,017	-,019	-,002	-,042
	Persistence /R. Failure -PB	-,111	,292	-,087	,616	-,081	-,252	-,030	-,056	,327	,032	,005	-,317
	Interpersonal Relations-IB	,887	-,011	,082	-,167	,155	-,080	-,140	-,006	,084	-,109	,042	-,086
	Interpersonal Relations-PB	-,862	,005	-,169	,143	-,147	,077	,202	,003	-,074	-,010	-,106	,111
Recess	Risk Taking – IB	-,032	,183	-,458	-,137	-,111	,004	-,183	,547	-,260	-,034	-,207	,109
	Risk Taking – PB	,156	-,080	,280	,357	,188	,103	-,094	-,288	,682	,061	,059	-,138
	Self-confidence – IB	,090	-,090	,164	-,361	-,565	,136	,086	-,073	-,117	,100	-,420	-,336
	Self-confidence – PB	-,082	,066	,020	,304	,389	-,025	,064	-,095	,202	,018	,710	,182
	Creativity/Innovation-IB	-,085	-,029	-,827	-,134	,045	,233	-,166	-,058	-,037	-,168	,048	,021
	Creativity/Innovation-PB	-,003	,114	,887	-,021	,004	-,098	,103	,056	,050	,135	-,054	-,106
	Id. of opportunities – IB	,111	,153	-,049	-,014	,060	-,020	-,908	,082	-,212	-,051	-,122	-,030
	Id. of opportunities – PB	-,079	-,164	,136	-,012	-,146	,007	,894	-,014	,099	,107	,069	,092
	Leadership/D. Making – IB	,656	,054	-,399	,107	-,070	,303	,073	,006	-,108	-,075	-,131	-,160
	Leadership/D. Making –PB	-,339	,108	,614	,146	,062	-,091	,005	,088	-,121	,360	,348	,206
	Organization/Planning-IB	,293	-,180	-,703	,053	,311	,021	,049	,020	-,085	-,059	,146	-,114
	Organization/Planning-PB	,010	,020	,196	,120	,232	-,151	,440	,072	-,197	,567	-,078	-,219
	Persistence / R.Failure –IB	,501	-,031	-,046	-,193	-,469	,176	,193	-,208	-,160	,060	-,401	,288
	Persistence / R.Failure -PB	-,383	-,087	,114	,474	,055	,214	-,014	,187	,024	,224	,492	-,181
	Interpersonal Relations-IB	,438	,096	,356	-,077	,046	,331	-,025	,113	-,260	-,391	-,227	-,297
	Interpersonal Relations-PB	-,441	-,094	-,432	,272	,119	-,139	,002	-,107	,228	,360	,369	,288
	Eigenvalue	11,139	5,287	4,911	4,486	2,939	2,798	2,232	1,992	1,874	1,531	1,465	1,189
	% variance	22,279	10,575	9,821	8,971	5,878	5,596	4,465	3,983	3,749	3,063	2,929	2,378
	% cumulative variance	22,279	32,854	42,675	51,647	57,524	63,121	67,586	71,569	75,318	78,381	81,310	83,688

Note: IB – Inverse Behaviour; PB – Positive Behaviour

The raw scores from the TGMD-2 test battery were employed as they are continuous variables that allow for better differentiation of children's motor performance levels. According to the standard values generated by the test, all participants exhibited motor performance levels categorized as "average," "above average," "good," or "very good."

Since there was no triangulation of entrepreneurial traits across contexts, the characteristics from all three contexts were included as analysis variables. Twelve factors were generated, explaining 83.7% of the data variance (table 2). The weighting of each factor exceeded 0.469, as Hair et al. (2010) recommend considering values close to 0.50. Regarding the commonality of variables, none had a value below 0.60, the minimum value considered by Hair et al. (2010). Therefore, no variables were excluded.

Discussion

Regarding the data from the TGMD-2, specifically the standard scores, a statistically significant association was observed between motor performance levels and age ($p<0.05$). That is, younger students aged 6/7 years achieved better motor performance levels compared to older students aged 8/9 years. These findings align with the research by Hashim and Baharom (2014) and Hurtado-Almonacid et al. (2024). However, they contradict the majority of studies in this area (Mohammadi et al., 2017; Spessato et al., 2012), which have found that motor performance tends to improve with age progression.

Promoting motor development is fundamental to a child's harmonious growth and the adoption of healthy habits. This development should be supported by appropriate stimuli, particularly during fundamental motor skill phases like early childhood and the first years of elementary school (Gallahue & Ozmun, 2005). Schools have a crucial role and responsibility in facilitating this development, offering environments where children can practice essential motor skills in a supportive context (Aminpour et al., 2020; Sánchez & Vidal-Conti, 2020).

The factors are described to create profiles of children with entrepreneurial characteristics and their association with variables related to motor performance. Profiles 5 and 9 are highlighted.

Factor 5 groups the total raw score and object control score, the third year of schooling, and negatively, the inverse behaviour of Self-Confidence and Persistence/Resistance to Failure in an enriched recess context. The factor was called “Self-knowledge”. This factor determines that children with better motor performance in terms of total raw score and object control motor skills, tend to be those who attend the 3rd year of schooling and those who show less propensity for inverse behaviour of self-confidence and persistence/resistance to failure, it can therefore be said that they tend to be self-confident and resilient.

As observed, older students, from the 3rd year of schooling, performed better in the total raw score and object control motor skills. This result is corroborated by Lin and Yang (2015), who found that object control motor skills improve with age and Martins et al., 2020 who report that mastery of object control skills tends to occur later. This enhanced performance in 3rd-year students is negatively associated with the inverse behaviours of Self-Confidence and Persistence/Resistance to Failure.

Recesses are spaces for free activity where there is generally no adult intervention, and the child has the opportunity to choose. Its use can promote skills such as cooperation, sharing, communication, conflict resolution, respect for rules, self-discipline, knowledge, and other cultures (Aminpour et al., 2020; Bundy et al., 2017). Therefore, positive and confident attitudes are associated with recess due to the possibility of choosing an activity. The interaction between peers allows the child to learn to negotiate, share, resolve conflicts, and accept defeat, maintaining an attitude of overcoming challenges and not becoming demotivated in the face of criticism. Although the positive behaviours of Self-Confidence and Persistence/Resistance to Failure are not positively associated with the total raw score and object control motor skills, the inverse behaviours are negatively associated.

Thus, a higher level of motor performance may be associated with lower inverse behaviours of Self-Confidence and Persistence/Resistance to Failure, leading to a decrease in intimidation, and negative, and defeatist attitudes. This result is particularly important for phenomena such as bullying. Victims of bullying are generally insecure students with a passive attitude, less sociable, and few friends (Nery et al., 2023). Therefore, the use of recess, in addition to contributing to the improvement of children's motor performance, can also help detect and prevent behaviours associated with phenomena like bullying.

Factor 9 positively combines the raw locomotion score and positive risk-taking behaviour in a recreational context. This factor was thus named "Risk-taking Ability." In this profile, students who achieved a better raw score in locomotion motor skills are also those who, in the context of recess, have a greater tendency to consider risks before acting and are not afraid of failure. Risk-taking is an essential characteristic of entrepreneurship and is one of the most recognized traits in entrepreneurs (Collin, 2021; Milteer & Ginsburg, 2012). However, according to Tang et al. (2024), the fear of failure is a major obstacle preventing most people from implementing their ideas.

Considering that students with a greater tendency to perform better in locomotion motor skills are also those with a greater inclination to take risks during recess, we believe that recess, in addition to enhancing motor performance, especially in locomotion motor skills, can also enhance this characteristic of risk-taking, which is crucial in the profile of an entrepreneur and for the success of any enterprise.

Regardless of the context, there seems to be a tendency for these characteristics to aggregate into different profiles. Therefore, in entrepreneurship education programs, it is essential to promote emotional competencies with equal importance alongside strategic components. Improving confidence in one's abilities is crucial to maintaining a positive and confident attitude in the face of criticism or failure. This is important for the subsequent creation of one's employment, business valuation, or the creation of something valuable for society.

Reflecting critically on the promotion of entrepreneurial skills and motor development in schools, it is essential to recognize that children learn best through experiential learning engaging in activities where they can tackle problems, overcome obstacles, and explore solutions. This approach nurtures entrepreneurial thinking and encourages continuous questioning, adaptability, and resilience, which are crucial for personal and professional growth in a complex, globalized world.

While the current cultural context emphasizes personal achievement, the belief in higher education, and stable, lifelong employment, there is a growing recognition that these values need to evolve. Instead, educators should prioritize fostering autonomy, independence, and responsibility among young people. Research supports this shift, arguing that cultivating these skills—alongside critical thinking, creativity, and resilience is crucial for young people's success in the modern workforce and global economy.

This paradigm shift calls for schools to integrate entrepreneurial education and motor skill development into their curricula, not just to prepare students for employment, but to empower them to take initiative, solve complex problems, and adapt to rapidly changing circumstances throughout their lives. Schools can play a key role in equipping students with the competencies they need to thrive as adults by focusing on these skills.

Conclusions

The present study highlights the significant complexity inherent in exploring entrepreneurial traits in children, particularly due to the variability in behaviours observed across different contexts. This variability suggests that divergent environments may elicit distinct behaviours in children. Thus, while children may exhibit positive or contrary behaviours associated with certain characteristics in one context, these behaviours might not be stable or consolidated enough to reflect a consistent personality trait across all situations.

Similarly, in the domain of motor development, its promotion is crucial for fostering a child's harmonious growth and encouraging healthy lifestyle habits. This development largely depends on the stimuli provided during the foundational phase of motor skill acquisition. As such, schools, particularly in preschool education and primary school, carry both the duty and responsibility to create environments that nurture these skills effectively.

The study has several limitations. First, the sample size is small and should be expanded to include participants from diverse contexts, such as public and private schools. Furthermore, the adoption of an exploratory case study approach implies that the findings are specific to the analysed cases and cannot be generalized to broader populations. Another limitation concerns the categories and subcategories used in constructing the observation guide, which were primarily defined based on a literature review focused on adult populations. As a result, some subcategories may not fully align with the realities of childhood, as reflected in the study's findings. It is therefore essential to revise these subcategories to represent children’s experiences better and validate them to ensure their reliability as a tool for observing entrepreneurial traits in children.

Finally, longitudinal studies are critical for tracking motor development and the evolution of entrepreneurial traits in children across different contexts. Such studies are fundamental for

understanding how these traits develop over time and identifying the factors that influence their progression.

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