HEALTH LITERACY IN CHILDREN - CASE STUDY IN A PRIVATE SCHOOL CONTEXT

Literacia em saúde infantil - estudo de caso em escola privada

Alfabetización en salud en niños - estudio de caso en una escuela privada

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ABSTRACT

Background: health literacy in childhood is crucial for consolidating health-promoting behaviors and preventing risks throughout life. Areas such as vaccination, physical exercise, and nutrition are fundamental, with the school setting representing a privileged context for this promotion. **Objective** to assess the levels of health literacy among children in the second cycle of basic education regarding vaccination, physical exercise, and healthy eating, within a private school context. **Methodology:** a quantitative, observational, descriptive, and cross-sectional study was conducted with 106 students (5th and 6th grades) from a private school in the Leiria region. Data were collected through a classroom-based questionnaire and analyzed using descriptive and inferential statistics (non-parametric tests) with IBM SPSS software. **Results:** most children demonstrated "Excellent" or "Very Good/Good" levels of health literacy across all three domains. A statistically significant correlation was observed between physical exercise and healthy eating. No significant differences were found according to age or sex. **Conclusion:** children exhibit high levels of health literacy, although vaccination shows greater vulnerabilities. These findings reinforce the need for school-based educational interventions and highlight the prominent role of nurses in promoting health literacy in children.

Keywords: health literacy; children; school

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RESUMO

Enquadramento: a literacia em saúde na infância é crucial para consolidar comportamentos promotores de saúde e prevenir riscos ao longo da vida. Áreas como vacinação, exercício físico e alimentação são fundamentais, sendo a escola o contexto privilegiado para esta promoção. **Objetivo:** Avaliar os níveis de literacia em saúde de crianças do 2.º ciclo sobre vacinação, exercício físico e alimentação saudável, num contexto escolar privado. **Metodologia**: estudo quantitativo, observacional, descritivo e transversal, realizado com 106 alunos (5.º e 6.º anos) de um colégio na região de Leiria. Os dados foram recolhidos via questionário em sala de aula e analisados com estatística descritiva e inferencial (testes não paramétricos) no software IBM SPSS**. Resultados:** a maioria das crianças apresentou níveis de literacia "Excelente" ou "Muito Bom/Bom" nos três domínios. Observou-se correlação estatisticamente significativa entre o exercício físico e a alimentação saudável. Não foram encontradas diferenças significativas em função da idade ou sexo**. Conclusão:** as crianças apresentam níveis elevados de literacia em saúde, embora a vacinação revele maiores fragilidades. Os resultados reforçam a necessidade de intervenções educativas escolares e o papel preponderante do enfermeiro na promoção da literacia em saúde infantil.

Palavras-chave: literacia em saúde; crianças; escola

RESUMEN

Marco contextual: la alfabetización en salud en la infancia es crucial para consolidar comportamientos promotores de la salud y prevenir riesgos a lo largo de la vida. Áreas como la vacunación, el ejercicio físico y la alimentación son fundamentales, siendo la escuela el contexto privilegiado para esta promoción. **Objetivo:** evaluar los niveles de alfabetización en salud en niños del segundo ciclo de educación básica, en los dominios de la vacunación, la actividad física y la alimentación saludable, en un contexto escolar privado**. Metodología:** estudio cuantitativo, observacional, descriptivo y transversal, realizado con 106 estudiantes (5.º y 6.º cursos) de un colegio de la región de Leiria. Los datos se recogieron mediante un cuestionario aplicado en el aula y se analizaron utilizando estadística descriptiva e inferencial (pruebas no paramétricas) con el software IBM SPSS. **Resultados:** la mayoría de los niños presentó niveles de alfabetización en salud "Excelente" o "Muy Bueno/Bueno" en los tres dominios. Se observó una correlación estadísticamente significativa entre el ejercicio físico y la alimentación saludable. No se encontraron diferencias significativas en función de la edad o el sexo. **Conclusión:** los niños presentan niveles elevados de alfabetización en salud, aunque la vacunación revela mayores fragilidades. Los resultados refuerzan la necesidad de intervenciones educativas en el ámbito escolar y el papel preponderante del enfermero en la promoción de la alfabetización en salud infantil.

Palabras clave: alfabetización en salud; niños; escuelas

INTRODUCTION

According to the World Health Organization (WHO, 2013), the concept of Health Literacy (HL) is based on cognitive and social skills that empower individuals to promote and maintain good health. It is understood that low levels of health literacy are proportionally associated with increased hospital admissions and visits to emergency services, as well as with a reduction in preventive behaviours. In other words, the acquisition of knowledge and information constitutes an important promoter of health and a key factor in disease prevention (Direção-Geral da Saúde [DGS], 2019). In children, the development of a healthy lifestyle is essential, with particular emphasis on vaccination, physical exercise and a healthy diet, as these are fundamental aspects that promote healthy development.

The National Vaccination Programme (NVP), which has been in force since 1965, aims to prevent the occurrence of diseases that pose a threat to public health (Serviço Nacional de Saúde [SNS], 2025). From the perspective of many children, vaccination is a time of distress and anxiety. In this regard, LS is beneficial, as it helps to dispel these fears and promotes a greater understanding of the benefits of vaccination (Costa, 2023). Just as vaccines contribute to the protection of the population and proper child development, regular physical exercise, adapted to the child's stage of development, is equally essential for all children (Silva et al., 2021). This practice not only reduces the risk of diseases such as diabetes, hypertension, and childhood obesity, but physical activity also plays a crucial role in musculoskeletal development, muscular strength, and cardiorespiratory fitness. (WHO, 2013). However, a sedentary lifestyle is now one of the biggest public health problems, contributing to negative growth and development, both physically and mentally (Carvalho et al., 2021).

A healthy diet is another key factor in child development. Nowadays, as children increasingly consume snacks and fast food, food literacy plays a decisive role in enabling more informed and appropriate dietary choices, thereby preventing the development of diseases associated with unhealthy eating patterns (Brown et al., 2021).

School is a crucial element in children's growth and development, as schools provide a privileged environment for the acquisition of knowledge and the promotion of healthy lifestyles, representing an important context for the development of HL (Nogueira et al., 2022). Therefore, the present study aims to assess the levels of health literacy among children attending the second cycle of basic education, in the domains of vaccination, physical exercise, and healthy eating, within a private school setting in the Leiria region.

BACKGROUND

Nowadays, access to information is becoming increasingly rapid, which can be beneficial but also harmful, particularly when the quality of the information is not guaranteed. In this context, it is important and justifiable to study and assess the LS in children, as it is during this stage that their thinking is shaped and they establish their health patterns. As Duarte et al. (2022, p. 2) note, "the adoption of healthy habits in childhood tends to continue into adulthood (…) and is, from this perspective, considered fundamental, with health benefits and implications that extend far into the future and beyond".

Vaccination

Vaccination is one of the most effective and safest public health interventions for both individual and collective protection. Nevertheless, it remains a sensitive issue from children's perspective, as it is associated with fear related to pain, insecurity, anxiety, and other feelings and emotions. In this context, HL plays a crucial role in dispelling misconceptions and reducing fears, while promoting an understanding of the benefits of vaccines from an early age (Costa, 2023).

In Portugal, NVP, in place since 1965, is founded on key principles such as universality, free access, accessibility, equity, and the maximization of all vaccination opportunities (SNS, 2025). As a result, childhood vaccination coverage rates in Portugal remain stable and high (≥95%). The vaccines included in the Programme are considered first-line interventions, recognised for their safety and effectiveness, and are associated with significant health gains (SNS, 2025).

Authors such as Lorini et al. (2018) emphasize that Health Literacy (HL) is directly associated with the acceptance of preventive measures, particularly vaccination, being one of the most relevant factors influencing adherence. This argument is reinforced by Lamot and Kirbiš (2024), who highlight the importance of communicative literacy, namely the ability to interact with and understand information within social contexts, as an essential dimension in preventing vaccine hesitancy. These contributions demonstrate that HL extends beyond technical knowledge, encompassing relational and contextual competences, which are especially relevant in pediatric settings.

Health organizations should provide vaccination information grounded in scientific evidence, ensuring that both children and their parents understand its importance and potential side effects. Only then can informed and conscious decisions be made (Costa, 2023). The therapeutic relationship established between the nurse and the patient, particularly between the nurse and the child, appears to be a key factor in this decision-making process, making effective, empathetic, and trust-based communication essential. Demonstrating confidence, clearly explaining the importance of vaccines, and using strategies such as distraction techniques during the vaccination procedure may be beneficial for children, helping to reduce anxiety and fear (Costa, 2023).

Healthy eating

Similarly to vaccination, healthy eating constitutes an essential practice with a significant impact on children's well-being in both the short and long term. The early years of life are particularly important, as they represent a critical period for the development of a healthy relationship with food, as well as for the establishment of food preferences, attitudes, and behaviours that are likely to persist into adulthood (DGS, 2024).

Contrary to what most caregivers and/or parents believe, a child's initial reaction of dislike or refusal towards a new food is not necessarily an indicator that the child will dislike that food in the future. Persistence and positive reinforcement are therefore essential. In this regard, caregivers play an extremely important role in the introduction of an appropriate dietary pattern, since this period is characterized by biological and psychomotor growth and development with a significant impact on the child's future health (Alves & Cunha, 2020; Silva et al., 2016).

There are several consequences for both body and mind resulting from unhealthy eating habits,

particularly affecting emotional well-being, concentration capacity, and academic performance. Conversely, healthy eating promotes children's overall well-being, supporting learning as well as physical, mental, cognitive, and psychosocial development (Alves & Cunha, 2020). The prevention of unhealthy dietary habits is recognised as one of the actions with the greatest long-term impact, particularly in preventing diseases such as obesity. The World Health Organization reports that one-third of adolescents are obese (Ronto et al., 2016).

Food literacy is influenced by factors such as educational level, socioeconomic status, ethnicity, and gender. At the same time, lack of time and increased stress are typical characteristics of modern life, causing continuous disruption in the daily routines of families and, consequently, of the children within them. This is reflected in a lifestyle, particularly during adolescence, characterized by the consumption of fast food and snacks, as well as skipping meals throughout the day (Brown et al., 2021). These inadequate eating behaviours have been increasing and are associated with the growing prevalence of preventable diseases. According to Doustmohammadian et al. (2020), these trends may be counteracted through the development of interventions focused on food and nutrition literacy. Such initiatives may positively influence behaviours such as the appropriate selection and preparation of foods, increased consumption of fruit and vegetables, and improvements in overall diet quality.

In line with this perspective and considering that the school environment is a place routinely attended by most children, schools are widely recognised as a privileged context for the promotion of health practices, assuming a strategic role in the development of sustainable lifestyle habits from childhood onwards (Alves & Cunha, 2020). Nogueira et al. (2022) demonstrated that structured food literacy curricula, such as the "Sintra Grows Healthily" programme implemented in primary education, have a positive impact on the adoption of appropriate eating behaviours, reinforcing the educational potential of schools in health promotion and education.

Physical exercise

Maintaining a healthy lifestyle that includes regular physical exercise presents several anatomical, physiological, mental, and cognitive benefits, contributing to improved academic performance (DGS, 2017). Physical activity stimulates musculoskeletal development, muscular strength, and cardiorespiratory health. Furthermore, movement promotes emotional well-being, enhances self-esteem, and supports academic success, helping children to feel more balanced and fulfilled in their daily lives (Carvalho et al., 2021). For children and adolescents, a minimum of 60 minutes of daily physical activity is recommended. However, only boys aged between 10 and 11 years tend to achieve the recommended levels of physical activity, with exercise levels decreasing progressively with age (DGS, 2017).

The acquisition of knowledge regarding healthy lifestyle habits, together with their practical application, is important for the adoption of healthy behaviours. Nevertheless, these factors are influenced by the parental role, as parents and/or caregivers shape not only their own habits but also those of their children (Melby et al., 2023). Regarding physical activity, evidence points to a strong relationship between literacy and behaviour. Melby et al. (2023) reports that higher levels of Health Literacy (HL) are

associated with a greater likelihood of adopting active lifestyles, highlighting the influence of parents and the family context in the development of such behaviours. Therefore, the development of HL from childhood may support informed choices and encourage regular physical exercise.

Despite this, and contrary to current recommendations and ideals, the reality today is that levels of physical activity among children have been decreasing, as a large proportion of this age group demonstrates sedentary habits and behaviours, contributing to poor motor, cognitive, and mental development. This phenomenon has been largely driven by easy access to technological devices such as computers, mobile phones, and televisions, which encourage passive lifestyles. Currently, physical inactivity represents the fourth leading risk factor for global mortality, with the widespread accessibility of computers, mobile phones, and televisions being associated with behaviours that do not promote healthy lifestyles (Carvalho et al., 2021).

Therefore, promoting health knowledge from the earliest years of life emerges as a fundamental intervention. By developing knowledge about the importance of vaccination, healthy eating, and physical exercise, children become more capable of making informed choices and are more likely to maintain healthy practices throughout their life course.

METHODOLOGY

Type of study

A quantitative observational study with a descriptive and correlational design was conducted. Quantitative research methodology was employed, allowing the transformation of the responses obtained into numerical data, which were subsequently analysed and classified (Vilelas, 2020). This methodological approach was selected as it enables the identification and characterisation of health literacy levels among children within the school context, as well as the exploration of possible relationships between these variables and sociodemographic factors. Correlational studies allow the analysis of the relationship and degree of association between variables of interest through the formulation and testing of specific hypotheses (Vilelas, 2020). Accordingly, the study aimed to assess the levels of health literacy among children attending the second cycle of basic education in the domains of vaccination, physical exercise, and healthy eating, using a questionnaire specifically developed for this study.

Research question

The following research questions were formulated: How does health literacy influence children's day-to-day food choices? How does health literacy influence children's adherence to and appreciation of vaccination? How does health literacy influence children's day-to-day physical activity? What is the level of health literacy among children?

Population and sample

The target population consisted of pupils attending Years 5 and 6 at a private school in Leiria, comprising a total of 106 students. The selection of this school was based on its willingness to participate in the present study and, consequently, to assess the health literacy levels of its students. In this study, the sample corresponded to the entire population, with 53 Year 5 pupils and 53 Year 6 pupils participating in the research.

All participants met the predefined inclusion criteria:

being a pupil at the school; being aged between 10 and 12 years inclusive; provision of informed consent by parents or legal guardians; provision of assent by the children; and the ability to read Portuguese. Conversely, the following exclusion criteria were established: inability to understand the questionnaire; absence of parental or guardian consent; and absence of child assent.

Although exclusion criteria had been defined, no student was excluded, as all 106 pupils enrolled in Years 5 and 6 fulfilled the inclusion criteria, obtained the necessary authorizations, and agreed to participate in the study.

Data collection procedure

According to Vilelas (2020), the most effective method of data collection for this type of research is the questionnaire. Data were collected through the administration of an easy-to-understand questionnaire on health literacy, focusing on the domains of vaccination, healthy eating, and physical exercise. The questionnaire was designed to address the research objectives and questions outlined for the study, as the scales available and accredited in Portugal for assessing health literacy levels are intended for adults or adolescents aged over 12. The questionnaires were administered in the classroom in paper format, and it took an average of 10 minutes per class to complete them.

Data collection tool

The questionnaire consisted of 38 items divided into four sections: sociodemographic characteristics, including age, sex, school year, area of residence, household composition, and use of healthcare services; vaccination literacy, which assessed knowledge, attitudes, and perceptions regarding vaccination; healthy eating literacy, including questions related to knowledge and behaviours associated with dietary habits; and physical exercise literacy, which aimed to assess knowledge, attitudes, and practices related to physical activity.

The questions were developed using age-appropriate language and included short answer (open-ended), multiple choice, and 3-point Likert scale formats (1 = Yes; 2 = No; 3 = I Don't Know). The items were derived from national and international references, including the National Vaccination Programme, the Portuguese Directorate-General of Health, the World Health Organization, and relevant literature, ensuring language suitability for children attending the second cycle of basic education.

A cognitive pretest was conducted with five children with similar characteristics to ensure comprehensibility and appropriateness of response time; no modifications were required. It should be noted that the instrument was exploratory and non-validated; therefore, the findings should be interpreted as self-reported knowledge rather than clinically assessed health literacy.

To evaluate literacy levels across the three identified domains, knowledge indices were developed based on specific questionnaire items. For vaccination literacy, five questions were selected: "Vaccination protects health"; "Vaccines prepare the body to fight diseases"; "Vaccines help prevent serious diseases"; "Vaccines are an important way of taking care of health"; and "Feeling protected after receiving vaccines". Children who answered "Yes" to all five questions were classified as having "Excellent" vaccination literacy; four correct answers indicated "Good"; three "Moderate"; one or two "Low"; and zero

"Nonexistent".

A similar procedure was applied to healthy eating literacy using seven questions: "Healthy foods are important to keep the body strong and healthy"; "Fruit and vegetables are important for health"; "Drinking water is an important part of healthy eating"; "Healthy eating helps prevent diseases"; "It is important to avoid fried foods and sweets"; "The quantity and type of food are equally important"; and "Eating slowly and calmly is important for digestion". Participants who answered "Yes" to all seven items were classified as having "Excellent" literacy; six as "Very Good"; five as "Good"; four as "Moderate"; one to three as "Low"; and zero as "Nonexistent".

Finally, for physical exercise literacy, six questions were selected: "Importance of physical exercise for health"; "Physical exercise helps prevent diseases"; "Feeling stronger and more confident when practising physical exercise"; "Physical exercise contributes to maintaining health"; "Physical exercise is important at all ages"; and "Physical education classes are a good opportunity to practice physical exercise". Participants who answered "Yes" to all six questions were classified as having "Excellent" literacy; five as "Very Good"; four as "Good"; three as "Moderate"; one or two as "Low"; and zero as "Nonexistent"

Data analysis procedure

Data processing and analysis were performed using IBM SPSS Statistics (Statistical Package for the Social Sciences), version 29.0.1. Descriptive statistical analyses, including absolute frequencies, relative frequencies, means, and modes, were conducted, followed by inferential statistical analyses for hypothesis testing. The Kolmogorov–Smirnov test was applied to assess the normality of variable distributions. Based on the results obtained, the following statistical tests were used: Spearman's correlation test to analyse associations between ordinal variables; the non-parametric Mann–Whitney U test to compare two independent groups (e.g., differences according to sex); and the non-parametric Kruskal–Wallis test to compare three or more independent groups (e.g., differences according to age).

For the interpretation of the open-ended responses, content analysis with a heuristic function was used to enrich the research process and support the verification of the proposed hypotheses through the children's statements and expressions (Vilelas, 2020).

Ethical and formal procedures

Before the study commenced, and in accordance with the principles of the Declaration of Helsinki, the research project was submitted to the Ethics Committee of the Polytechnic University of Leiria (Opinion No. CE/IPLEIRIA/30/2025) and to the Portuguese Ministry of Education through the School Survey Monitoring Platform (authorization No. 1605200001), receiving approval from both institutions.

Participation in the study was voluntary, and participants were informed that they could withdraw at any time without any consequences. Informed consent was obtained from all parents or legal guardians after they had been informed about the aims of the study. All collected data were anonymous and confidential and were handled by the research team under duties of confidentiality and professional secrecy. The data were digitally stored only for the period strictly necessary to complete the present investigation. Compliance with the General Data

Protection Regulation (GDPR) was ensured throughout the study.

RESULTS

Sample description

The sample consisted of 106 students, of whom 50% (n = 53) attended the 5th grade and the remaining 50% (n = 53) the 6th grade. Regarding sex, 55.7% (n = 59) were male and 44.3% (n = 47) were female. Participants' age ranged from 10 to 12 years, with a mean age of 10.92 years and a mode of 11 years.

Regarding area of residence, 57.5% (n = 61) lived in urban areas, 31.1% (n = 33) lived in rural villages, and the remaining 11.3% (n = 12) lived in small towns. Concerning household composition, 91.5% (n = 97) of the students reported living with their parents or with parents and siblings, while the remaining 8.5% (n = 9) reported other family structures.

Regarding the use of healthcare services, 45.3% (n = 48) of the students reported attending a primary healthcare centre two or three times per year. Additionally, 48.1% (n = 51) reported using private healthcare services when accessing healthcare, 4.7% (n = 5) reported using both public and private healthcare services, and 1.9% (n = 2) stated that they did not use healthcare services regularly.

Health literacy

The results of the health literacy indices across the three domains studied, namely vaccination, physical exercise, and healthy eating, are presented in Table 1. In all domains, a predominance of the "Excellent" level was observed, followed by the "Very Good"/"Good" levels.

Table 1

Health literacy levels by domain

Health Literacy Index Level	Vaccination	Physical exercise	Healthy eating
Excellent	52.8% (n=56)	56.6% (n=60)	52.8% (n=56)
Very Good	----------	31.1% (n=33)	34.9% (n=37)
Good	30.2% (n=32)	10.4% (n=11)	7.5% (n=8)
Moderate	16% (n=17)	0.9% (n=1)	1.9% (n=2)
Low	0.9% (n=1)	0.9% (n=1)	1.9% (n=2)
Non-existent	0% (n=0)	0% (n=0)	0.9% (n=1)

Health literacy: vaccination

In the vaccination domain, 52.8% (n = 56) of the sample presented a vaccination literacy index classified as "Excellent", while 30.2% (n = 32) demonstrated a "Good" level of vaccination literacy. The remaining participants (17.0%) showed literacy levels ranging from "Moderate" to "Low". No statistically significant differences were found between vaccination literacy index levels and students' age (Kruskal–Wallis, p = 0.468), nor between the literacy index and sex (Mann–Whitney, p = 0.367).

Regarding the sources of information most frequently identified by students, 53.8% (n = 57) reported family, school, and the healthcare centre as their main sources of information. Most participants, 97.2% (n = 103), considered vaccination to be an important form of health protection. A statistically significant relationship was identified between the level of the vaccination

literacy index and understanding the importance of vaccination in disease prevention (Spearman, $p < 0.001$).

Responses to the open-ended questions reinforced these findings, as children frequently referred to vaccination to "create antibodies", "protect the body", and "prevent diseases". Some responses also included technical language, such as: "It is a weakened virus that forces the body to create antibodies"; "Vaccination is when we receive the vaccine so the antibodies can train"; "It helps the immune system"; and "It contains a part of the microorganism that helps us fight the disease". Other children described vaccination more simply as "a jab" or "an injection".

Health literacy: physical exercise

In the domain of physical exercise, 56.6% (n = 60) of the students presented a physical exercise literacy index classified as "Excellent", while 41.5% (n = 44) demonstrated literacy levels between "Very Good" and "Good". The remaining participants were classified between "Moderate" and "Low" (1.9%, n = 2). No statistically significant differences were identified between the physical exercise literacy index and students' age (Kruskal–Wallis, $p = 0.065$), nor between the literacy index and sex (Mann–Whitney, $p = 0.078$).

Regarding behavioural adoption, almost all students recognised the importance of physical exercise for health (99.1%). Concerning the perception of the role of physical exercise in disease prevention, 67.0% (n = 71) answered "Yes". A statistically significant relationship was identified between the physical exercise literacy index and students' perception of its role in disease prevention (Spearman, $p < 0.001$).

Additionally, 95.3% (n = 101) of the students reported enjoying practising physical exercise, and 90.6% (n = 96) stated that they felt happy while engaging in physical activity. Regular physical exercise was reported by 98.1% (n = 104) of the sample, and 95.3% (n = 101) considered physical education classes to be a good opportunity for engaging in exercise. Regarding the importance of physical activity across all age groups, 93.4% (n = 99) of the students recognised it as relevant.

A moderate correlation was also identified between the physical exercise literacy index and the healthy eating literacy index ($\rho = 0.406$; $p < 0.001$).

Regarding the open-ended question, "How does physical exercise influence my health?", a large proportion of the children recognised its importance for health, stating expressions such as "becoming healthy", "preventing diseases", "burning fat", "improving the heart", and "heartbeats". Several technically detailed responses were also obtained, demonstrating awareness of physiological benefits, including: "It improves circulation and ventilation"; "It helps the immune system"; "It burns calories and releases waste products"; and "It helps prevent diseases such as bronchitis or heart attacks".

Health literacy: healthy eating

In the domain of healthy eating, 52.8% (n = 56) of the sample presented a healthy eating literacy index classified as "Excellent", 34.9% (n = 37) as "Very Good", 7.5% (n = 8) as "Good", and the remaining participants between "Moderate" and "Non-existent". Once again, no statistically significant differences were identified between the healthy eating literacy index and age (Kruskal–Wallis, $p = 0.834$). Most participants (88.7%) identified the importance of avoiding fried foods, soft drinks, and sweets, while 98.1% (n = 104) highlighted water consumption as essential.

Statistical analysis revealed statistically significant associations between healthy eating literacy indices and several of the factors studied, including children's perception of the equal importance of food quantity and type ($p < 0.001$), school-based educational content related to nutrition ($p = 0.032$), and understanding the importance of healthy eating in maintaining a strong and healthy body ($p = 0.028$).

Responses to the open-ended question regarding healthy eating revealed a diversity of answers, although correct concepts were strongly represented. Most children associated healthy eating with: "Avoiding sweets, fried foods, and soft drinks"; "Eating fruit, vegetables, soup, salad, and drinking water"; "Following the food wheel"; and "Having a varied and balanced diet". In line with responses observed in the other domains, some children also demonstrated more technical knowledge, referring to concepts such as: "Following the food pyramid", "nutritional balance", "proteins, carbohydrates, and fats", and "diet adapted to lifestyle". Associations between healthy eating and disease prevention, good digestion, healthy growth, and improvement of the immune system were also frequently identified.

Correlations between the domains of literacy in health

Correlations were also examined between health literacy indices across the three domains studied. The most significant correlation was found between physical exercise and healthy eating ($\rho = 0.406$; $p < 0.001$). The correlations between the vaccination literacy index and the physical exercise literacy index ($\rho = 0.182$; $p = 0.062$), as well as between the vaccination literacy index and the healthy eating literacy index ($\rho = -0.039$; $p = 0.695$), were not statistically significant.

DISCUSSION

The aim of this study was to analyse the health literacy knowledge of children aged between 10 and 12 in three main areas: vaccination, physical exercise and healthy eating. The results show that many children were classified at the "Excellent" level in all areas, with this proportion being slightly higher for physical exercise compared to vaccination and nutrition. In quantitative terms, 56.6% of children achieved the highest level in physical exercise, whilst for vaccination and healthy eating this percentage was 52.8%. These data suggest, considering the high proportions observed, that health promotion messages are firmly established from early stages of development. However, it is important to bear in mind that the instrument used primarily assesses the recognition of information, which reinforces the need to interpret the data with caution. Thus, the results may reflect frequent exposure to this content rather than its independent application in everyday situations. This distinction between understanding information and being able to translate it into behaviour has been recognised in the literature, particularly in pediatrics settings, where health-related action often depends on factors beyond the child's control (Schulenkorf et al., 2022). In this context, the pattern observed reinforces the importance of school as a key setting for health education.

The results highlight widespread recognition of vaccination as an important tool for disease prevention and health protection. Furthermore, Lorini et al. (2018) demonstrated that health literacy is one of the most significant factors influencing acceptance of vaccination. Complementarily, Lamot and Kirbiš (2024) identified that specific dimensions of literacy, such as

communicative literacy, that is, the ability to interact, understand and use information in social contexts, is associated with lower vaccine hesitancy. This relationship is reinforced by Nukeshtayeva et al. (2024), who found that students recognise the importance, the safety and the effectiveness of vaccines, and that these positive beliefs are significantly associated with higher levels of vaccination literacy.

Although most children do not feel fear, a significant proportion express discomfort or little peace of mind, even after an explanation, prior to the administration of the vaccines. Even when they know what the vaccine is for, fear is present, so it is important to adopt strategies that help children feel safer. Costa (2023) states that providing information prior to vaccination, when done in a clear and child-friendly manner, is a factor that helps reduce fear and anxiety at the time of vaccination. In our study, this was not the case, reinforcing the importance of assessing not only knowledge, but also the feelings of children and how these influence their attitudes. The evidence shows that managing fear associated with vaccination requires the integration of emotional support interventions in addition to information, including strategies such as distraction, physical comfort and cognitive-behavioural approaches, practices described as common and relevant in professional nursing practice (Fernandes et al., 2025). In this context, within the field of school health nursing, it is essential that professionals plan vaccination procedures by simultaneously considering the educational dimension and the child's emotional regulation, in line with the value attributed to non pharmacological interventions in nursing practice (Fernandes et al., 2025). However, Spearman's correlation analysis did not reveal a significant relationship between the two factors. The open-ended responses to the question: "What do you know about vaccination?" demonstrated an understanding of the immunological role of the vaccine, as illustrated by the following statements: " It is a weakened virus which, when taken, forces our body to create antibodies against that virus", "It can be taken orally or by injection and is important for preventing diseases" and "It helps the immune system". However, vaccination was the domain with the highest proportion of ratings below "Good", accounting for around 17% of the sample – approximately one in six children – a figure higher than that observed in the other domains. This result highlights a priority area for strengthening health education. The identification of this group is particularly important, as it highlights the need to support children who may demonstrate lower confidence in understanding the usefulness of vaccines, a factor recognised in the literature as relevant for trust in and adherence to immunisation programmes.

Similarly to the vaccination domain, the level of knowledge regarding healthy eating ranged predominantly between "Good" and "Excellent". Most students reported that the school teaches them how to make healthy food choices. Consistent with this perception, the non parametric Kruskal–Wallis test revealed a statistically significant positive relationship between children's level of knowledge and their perception of what is taught at school regarding healthy eating ($p = 0.032$). As noted by Alves and Cunha (2016), the school environment represents a privileged setting for acquiring knowledge about the importance

of healthy eating.

These findings are aligned with national evidence, namely the "Sintra Cresce Saudável" programme, which demonstrated the effectiveness of structured food literacy curricula in Portuguese primary education, reinforcing the central role of schools in promoting health literacy from early ages (Nogueira et al., 2022). This recognition of the educational context is also consistent with international research, in which schools are frequently associated with the development of health literacy among children and adolescents (Santafé-Madueño et al., 2023).

The prevention of unhealthy dietary habits is considered one of the factors with the greatest influence on health promotion and long-term quality of life improvement Ronto et al. (2016). The findings observed in the present study support this assumption, as most children recognised the importance of avoiding fried foods and sweets, and almost all participants identified water intake as essential for maintaining a healthy diet. These results suggest that basic dietary recommendations are widely understood among children. Consequently, this knowledge can be further developed within the school context to support concrete decision making in everyday life, thereby strengthening and promoting children's autonomy.

In the same context, statistical analysis revealed a significant relationship between healthy eating literacy and children's perception of the equal importance of both the quantity and type of food consumed ($p < 0.001$). These findings are further supported by the content analysis performed, in which the most frequent responses included: "It means having a balanced and varied diet, following the Mediterranean food pyramid, and drinking water regularly"; "They are the foods that provide energy and nutrients necessary for our body"; and "A balanced diet without excessive sweets, salty foods, and other unhealthy foods".

In the field of physical exercise, the results show that this was the area with the highest ratings (56.6% rated it as excellent, 41.5% rated it as very good to good, with only 1.9% rating it as moderate or low). Children consistently recognise the importance of physical activity for their development. According to the content analysis, the most frequent responses included: "Physical exercise makes me active, gives me more energy, and keeps me healthy"; "It helps us become stronger and healthier"; "It influences health so that we can live longer"; and "It keeps us fit and can also help prevent many diseases such as heart attacks and lung diseases like bronchitis, as well as helping release waste products". No statistically significant differences were identified between sex and level of knowledge, indicating that students' level of knowledge was not influenced by being male or female. These findings differ from those published by the DGS (2017), in which boys aged between 10 and 11 years were the group most likely to achieve the recommended levels of physical activity for their age. In the present sample, both girls and boys, across all ages, reported practising physical exercise regularly. For example, among 11-year-old participants, the prevalence of regular physical exercise was 100%.

This reality may be associated with specific characteristics of the school context analysed, namely the institutional value attributed to physical activity, the availability of appropriate facilities, and the active promotion of healthy habits. According to the literature, increased health literacy directly influences the adoption of healthy lifestyle behaviours, meaning

that greater knowledge regarding the importance of physical exercise contributes to the implementation of healthier lifestyles (Melby et al., 2023).

In contrast to the evidence described, the statistical analysis did not reveal a statistically significant association. Although there is a high level of knowledge, this does not significantly influence children's regular physical activity ($p = 0.071$). This result can be understood considering how health literacy in children has been discussed in recent literature. Although many definitions remain focused on individual skills in obtaining and understanding information, it is widely recognised that these aspects correspond primarily to a functional dimension of literacy, and do not, in themselves, guarantee its translation into behaviour. The ability to act often depends on factors beyond the child's control, including parental influence, the role of significant adults, the characteristics of educational contexts, and the stages of development themselves (Schulenkorf et al., 2022). Convergently, Santafé-Madueño et al. (2023) demonstrate that health behaviours emerge in association with networks comprising family, school and professionals, reinforcing the importance of relational factors in the implementation of such practices. Thus, although knowledge is a fundamental element, its translation into action may encounter contextual constraints, which helps to explain the lack of a statistical association found in this study. Nevertheless, an important factor supporting the practice of physical exercise may be the fact that most students reported enjoying physical activity and stated that it made them feel happy.

Some limitations should be considered when interpreting the findings. The use of self-report questionnaires may have influenced children's responses, particularly due to the tendency to provide answers perceived as socially desirable. Furthermore, data collection within a single school context may limit the transferability of the findings to other settings. Nevertheless, the analysis of different domains of health literacy, integrating both quantitative and qualitative data, provides a relevant understanding of the phenomenon within this age group.

The findings have important implications for nursing practice within the school context. Despite the high levels of knowledge identified, the absence of a consistent association with behaviours suggests that the provision of information alone may not be sufficient to sustain effective changes in children's health routines, requiring nursing interventions that support the mobilisation and application of knowledge in everyday life.

Future research may explore more deeply the factors that interfere in the transition from knowledge to action, including the influence of family and the school environment, thereby contributing to the development of more targeted and contextually appropriate interventions.

CONCLUSION

The study made it possible to answer the research questions and achieve the proposed objective, indicating that the level of health literacy in the sample studied is high across the three domains examined: vaccination, healthy eating and physical exercise. The results suggest that children recognise principles associated with behaviours that promote health and healthy development, particularly in valuing vaccination and identifying appropriate dietary choices.

In the area of physical exercise, the high level of literacy on the subject, the sense of happiness and the enjoyment of the activity demonstrated by the pupils may be factors facilitating their participation. However, the absence of statistically significant associations between literacy and behaviour in some variables reinforces the view that knowledge, whilst fundamental, may not be sufficient to guarantee the effective adoption of healthy practices.

The results suggest a need to strengthen health education around vaccination, where higher proportions of lower ratings were observed. This evidence is particularly relevant to school nursing, highlighting the importance of strategies that promote not only the dissemination of information, but also the understanding and management of fears and anxiety associated with vaccination.

Limitations relating to the use of an unvalidated instrument and the collection of data in a specific school context should be considered, as these factors limit the generalisability of the results.

It is recommended that future research should focus on validating the instrument used and deepening our understanding of the factors that influence the translation of knowledge into action, considering the influence of the family and the contexts in which the child develops.

The findings underscore the importance of ongoing health literacy initiatives from childhood onwards, highlighting the role of nursing in creating conditions that facilitate the integration of what children know into their daily lives.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

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