



# Attitudes of 10–12-year-old primary school pupils towards food and nutrition: insights from Qualitative FGI Research – Junior-Edu-Żywnienie (JEŻ) Project

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## Abstract

**Introduction and Objective.** Primary school pupils aged 10–12 years constitute an interesting consumer group due to their greater autonomy in the area of nutrition, compared to the younger group of children, among other things, due to their ‘pocket money’ and the greater influence of their peer group. However, this is an age group at high risk of inadequate nutrition, eating disorders, including those related to obesity and underweight. Hence, the aim of the study was to explore the attitudes of pupils aged 10–12 years towards food and nutrition.

**Materials and Method.** A qualitative study was conducted using the Focus Group Interview (FGI) technique among 84 primary school pupils from different localities in Poland.

**Results.** Pupils had moderate knowledge of food and nutrition but did not consistently apply this knowledge in practice. Four pupils’ profiles were identified, categorized as ‘engaged,’ ‘obedient,’ ‘rebels,’ and ‘indifferent,’ based on their level of involvement and awareness of proper nutrition. Lunch was the most regularly consumed meal, sometimes eaten twice a day (at school and at home), while first breakfast was skipped the most frequently, mainly because of lack of time and morning rush. Pupils accurately identified recommended and not recommended food products, but lacked an understanding of their importance for health. Pupils’ emotional state increased the consumption of salty snacks, sweets, and fast food, and to a lesser extent, seeds, vegetables, and fruit. Pupils reported engaging in moderate physical activity, although they also spent a significant amount of time on the internet or watching TV.

**Conclusions.** Primary school pupils aged 10–12 years represented a relatively good level of knowledge about adequate nutrition; nevertheless, they did not follow these recommendations in practice.

## Key words

primary school pupils, attitudes to food and nutrition, eating habits and behaviours, Focus Group Interview (FGI)

## INTRODUCTION

Adolescence is the life stage between childhood and adulthood, and the World Health Organization defines it within a broad age range from 10–24 years, distinguishing between early adolescence (10–15 years), late adolescence (15–18 years), and early adulthood (18–24 years) [1, 2]. During this period, individuals undergo significant physical, mental, and social development while forming behaviours that shape their entry into adulthood, and play a substantial role in determining their health and eating habits in later life [3]. This phase also involves the internalization of values, leading to the establishment of more or less healthy lifestyle. The attitudes of children and adolescents’ toward food, nutrition,

and health are influenced by various factors, such as internal (endogenous), including gender, age, place of residence, parents’ educational and occupational backgrounds, family socioeconomic status [4], as well as external (exogenous) factors, such as the school environment, including peers and teachers [3, 5]. Unhealthy eating behaviours can be attributed to both kinds of determinants [4]. Moreover, the perpetuation of maladaptive eating behaviours across generations creates a vicious cycle, making it challenging to implement sustainable, health-promoting changes in nutrition [6].

The family environment serves as the earliest source of nutrition knowledge and eating behaviour patterns for children and adolescents, and it can act in both positive and negative directions. The family impacts children’s nutritional behaviour directly by providing specific foods and indirectly by conveying attitudes toward food, setting patterns to follow, and shaping food preferences, and sensory experiences. While the parent-child relationship significantly influences the eating decisions and behaviours of younger

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children, during adolescence, the influence of parents and the family tends to diminish, while the influence of peers takes on a more prominent role [1, 5].

Food choices and eating behaviours concerning nutritional value, preparation methods, portion sizes, and number of meals, frequency and timing, have a profound impact on the growth, development, and overall health of individuals, especially children. Adolescence, as previously mentioned, is associated with a decrease in the family's influence on pupils' nutrition due to gaining greater independence, and spending more time with peers whose impact on eating behaviours and self-esteem increases [3, 5]. Social media, the internet and television also play a significant role in shaping eating habits and attitudes during this stage. However, it is essential to be cautious about the reliability of the information available through these channels [3].

Moreover, children and young individuals are not aware of any direct connection between their behaviours and overall health. Consequently, it is crucial to provide them with knowledge and influence attitudes and behaviours that create their lifestyles and, in turn, their future [1, 2]. Body image perceptions also have a significant impact on nutritional behaviour during adolescence. Negative self-perceptions related to being overweight or obese are strong indicators of adopting restrictive diets or unhealthy eating habits [7, 8], even when it is not confirmed by real BMI, which is particularly visible among adolescent girls [9].

Focusing on the health and well-being of adolescents is unquestionably one of the most valuable commitments. Additionally, it is also vital for achieving Sustainable Development Goals and economic benefits. The Lancet Commission has emphasized that investing in adolescents offers a threefold advantage, impacting them during their teenage years, in their adult lives, and even extending to benefit the next generation [1]. In this context, the identification of children and adolescents' nutrition-related knowledge, attitudes, and behaviours, is a fundamental component of promoting a health-conscious lifestyle. This understanding facilitates the development of appropriate educational content, methods and materials for promoting healthy nutrition, both within school and family settings. Research involving children and young people provides insight into their unique behaviours, although it requires carefulness and the usage of suitable research techniques. Teenagers, as research subjects, possess distinct characteristics concerning interpersonal communication and specific perceptual predispositions.

Given this context, the aim of this study was to identify the attitudes of primary school pupils aged 10–12 years towards food and nutrition, encompassing three essential components: knowledge, emotional attitudes, and eating behaviours.

## MATERIALS AND METHOD

**Study Design and participants.** Qualitative research was conducted using the Focus Group Interview (FGI) technique in 10 different locations across Poland. These locations included cities of various sizes: Warsaw, Białystok, Lublin, Kielce, Ostrowiec Świętokrzyski, Nowy Sącz, Brańszczyk, as well as the villages of Rosko, Czachówek, and Poręba. The number of pupils in each focus group ranged from 8–9,

depending on the school's capacity and parental consent for their children's participation in the discussions. In total, 84 pupils aged 10–12 participated in the study. The respondents were characterized by their openness, ease of communication and expression, as well as their ability to listen to others. No conflicts within the groups were reported. The research was conducted on school premises, in an environment familiar to the children.

**Moderation of the FGI.** The FGI interviews adhered to established standards, entailed small group discussions, and facilitated by an experienced moderator [10, 11]. Further details can be found in a previously published paper [12]. The FGI moderation scenario was developed by the authors of the publication, specifically tailored to address the perceptions of pupils within the 10–12 age group. A pilot study was first carried out, and any ambiguities or incomprehensible content were identified and corrected adequately.

Each focus group was led by two moderators who initiated the discussions with 'warming-up' questions related to topics, such as pupils' thoughts on food, meals, 'healthy' eating, and eating habits. The rules operating during the moderation process were also explained, such as confidentiality, respecting each other's opinions, refraining from interrupting one another, and ensuring the anonymity of contributions.

Subsequently, pupils were presented with more specific questions covering various aspects, including their attitudes toward nutrition, the number and timing of meals usually consumed, knowledge about different diets, e.g. vegetarian and vegan, beverage and food choices, recommended and not recommended food groups, as well as their physical activity and leisure behaviours. These questions were related to those included in a quantitative study conducted by the same research team among pupils aged 10–12 years in a nationwide study.

The qualitative research was conducted by the Umbrella Agency Marketing Group, a specialized firm with expertise in this type of research, with the researcher observing each FGI to assure its realization according to a scenario. The duration of moderation with each group averaged approximately 90 minutes.

Prior to the commencement of the interviews, written consent was obtained from each pupils parents/caregivers. The nature and purpose of the interviews were explained to the participants. The inclusion criteria for participation in the focus groups encompassed the following: pupils within the age range of 10–12 years, the child's willingness to partake (consent) in the study, and consent from the children's parents/caregivers for their involvement. Notably, the exclusion criteria for participation in the FGI involved adolescents following specific dietary restrictions such as gluten-free or lactose-free diets.

**Procedures and Data Analysis.** Group discussions were recorded with the explicit permission of the pupils and their parents/caregivers. Transcriptions were generated from the statements made by the pupils. These transcriptions, along with supplementary notes taken by the assistant moderators, were subjected to a coding process. The material derived from the FGI was analyzed using principles of grounded theory, with a specific emphasis on recurrent statements stemming from the interpersonal dynamics inherent in this research technique [10, 11].

The feedback provided in the form of open and original statements by the participants in the group discussions underwent a seven-step analysis, as follows: 1) familiarization and thematic coding of respondents' statements, 2) identification of sub-themes within the main framework, 3) review and refinement of sub-themes, 4) formulation and designation of sub-themes, 5) analysis and interpretation of patterns across the data set, and 6) integration of sub-themes into overarching contextual domains. Initially, two independent researchers conducted the analysis of interview transcriptions. In cases of disagreement, a third party facilitated the resolution of conflicting perspectives to reach a consensus.

**Ethical Approval.** This study received approval from the Bioethics Committee of the Ethics Committee at the Institute of Human Nutrition Sciences, Warsaw University of Life Sciences (Approval No. 18/2022), and was carried out in accordance with the principles outlined in the Declaration of Helsinki. Informed consent was obtained from all participating pupils and their parents/caregivers. Data collected during the interviews were treated with strict confidentiality and were accessible exclusively to the research team.

## RESULTS

**Adolescents' attitudes toward food and nutrition – perception of own diet.** During focus group discussions, the participants expressed a commitment to maintaining a healthy diet, despite occasional indulgence in products such as sweets, sugar-sweetened beverages, salty snacks, and fast food. While they made efforts to incorporate vegetables and fruit into their diets, most of the respondents acknowledged their parents' recommendations to limit the consumption of less healthy foods, but did not consistently adhere to these guidelines. This observation illustrates a certain dissonance

between their nutrition-related knowledge and behaviours. According to pupils' opinions, healthy eating demands certain sacrifices as it entails consuming foods that are deemed healthy, but not necessarily appealing. They believe that the primary components of a healthy diet are fruits and vegetables, although they may not always be aware of the recommended daily intake.

A significant majority of the pupils comprehend the concept of proper nutrition, often citing athletes as role models. Their statements reflect a conviction that there exists a requisite harmony between nutrition and physical activity, both of which demand sacrifices but ultimately lead to success and enjoyment.

Furthermore, pupils were aware that adequate nutrition has a direct impact on their health and well-being, although only a few realized that an inadequate diet can potentially lead to health issues like heart disease, diabetes, obesity, and other conditions. They expressed a desire to change their eating habits, primarily driven by a desire to enhance their appearance, particularly among girls, or to improve their physical fitness, predominantly among boys.

**Typology of pupils participating in FGI.** Analysis of the participants' spontaneous statements revealed the identification of four distinct profiles based on their level of engagement and awareness concerning food and nutrition. These profiles were categorized as 'engaged', 'obedient', 'rebels,' and 'indifferent.' (Tab. 1).

**Adolescents with an 'engaged' profile** constituted the smallest group among participants. They were more likely to be residents of larger cities and villages near major urban areas. This profile was predominantly represented by girls who had developed from an early age a habit of consuming vegetables, fruits, legumes, fish, and whole grain products.

The 'engaged' group often reported engaging in conversations with their parents about the principles of healthy nutrition, and they displayed a genuine interest in

**Table 1.** Profiles of pupils by level of engagement and awareness of healthy eating

Profile of primary school pupils			
'engaged', N=6	'obedient', N=57	'rebels', N=14	'indifferent', N=7
Criterion 1: Pupils' involvement in proper nutrition			
High level	Medium level	Low level	Low level
Criterion 2: Pupils' knowledge of healthy nutrition			
High level	Medium level	Medium level	Low level
Criterion 3: Pupils' approach to nutrition			
<ul style="list-style-type: none"> <li>– eating properly, consuming fruit and vegetables, and an adequate number of meals a day;</li> <li>– avoiding sweets and processed foods because of the additives they contain;</li> <li>– preferring to eat at home;</li> <li>– recognising that food labelled with bio- and eco- certificates, fair trade, etc., is of high quality.</li> </ul>	<ul style="list-style-type: none"> <li>– eating healthily and rationally, succumbing to parental persuasion;</li> <li>– aware that proper nutrition affects health and quality of life;</li> <li>– like their diet, although they would happily reach for their favourite sweets, salty snacks and fast food.</li> </ul>	<ul style="list-style-type: none"> <li>– eating healthily because this is what parents demand;</li> <li>– healthy eating is not a priority for them;</li> <li>– they take pleasure in eating forbidden products, i.e. sweets, salty snacks.</li> </ul>	<ul style="list-style-type: none"> <li>– they do not care what, when, how much, or how they eat;</li> <li>– do not like vegetables and fruit;</li> <li>– they do not avoid fast food, sweets, salty snacks;</li> <li>– they do not always have dinner at home - the family eats convenience and highly processed foods;</li> <li>– are often overweight or obese;</li> <li>– rarely engage in physical activity, spend a lot of time in front of screens.</li> </ul>
Criterion 4: Parents' responsibility to pass on knowledge and teach healthy habits to their children			
High level	High level	High level	Low level
Criterion 5: Children's compliance with restrictive rules imposed by their parents			
High level	High level	High level	Low level

the subject. Consequently, they possessed a higher level of knowledge regarding these matters compared to their peers. In these families, discussions about nutrition were highly valued, treated in a friendly and enjoyable manner, and frequently occurred spontaneously, such as during grocery shopping or while preparing and sharing meals. This approach ensured that there was minimal discord between the views held by parents and their children. It is worth noting that the parents of these pupils were typically individuals with a strong understanding of nutrition.

Example statements by pupils:

'In my opinion, you can replace the bar with fruit, which has healthier sugars' (*Kielce*).

'I balance each meal so there's not too much fat and not too few vitamins. There is everything, but not too much, not too little. I eat blended fruit or beetroot juice for breakfast every day, which I hate. But I drink it. Because it's healthy' (*Białystok*).

On the other hand, the 'obedient' profile was the largest group among the participants, encompassing both boys and girls living in various locations. They were accustomed to maintaining a healthy diet, which was primarily dictated by their parents. These parents had a clear objective of instilling correct eating habits in all family members, with a particular focus on their children.

The 'obedient' individuals were closely supervised in terms of the types and portions of food they consumed. They were typically provided with healthy food at school, although it may not always have been the most delectable option, they firmly believed in its positive impact on their bodies and overall development. These pupils had internalized the dietary restrictions and patterns set by their parents, recognizing their parents' intentions to promote good health, proper physique, and future success in their academic and athletic pursuits. They were simultaneously granted a degree of freedom to eat types of not typically recommended for health reasons. This freedom was most commonly exercised on non-school days when parents allowed them to enjoy treats such as sweets, salty snacks and other unhealthy foods.

Example statements by pupils:

'It is worth eating healthy to be healthy and not to have health problems e.g. obesity or diabetes' (*Czachówek*).

'I prefer to train myself now so that I don't have health problems later' (*Lublin*).

'He who eats properly is not obese, feels better and has more energy' (*Rosko*).

The 'rebel' group consisted of a small number of participants who were more frequently boys living in larger and medium-sized cities. The attitudes of the pupils belonging to this profile displayed some similarities to the 'obedient' group, as they adhered to a healthy diet against their personal preferences in order to fulfill their parents' expectations. However, what set the 'rebels' apart was their occasional defiance of the rules imposed on them. Instead of consuming the healthy second breakfast prepared for school by their parents, they opted to secretly purchase 'forbidden' snacks and sweets whenever the opportunity arose. Regrettably, they often disposed of the vegetables and fruits provided by their parents in their breakfast boxes.

Example statements by pupils:

'There are no healthy things I like. Why does everything that is good have to be unhealthy?' (*Brańszczyk*).

'My mum tells me I need to exercise more and I'm not allowed to eat crisps, only fruit and vegetables, and I eat crisps anyway in secret from my parents' (*Nowy Sącz*).

'My parents hide sweets from me, but I find and eat them secretly' (*Ostrowiec Świętokrzyski*).

**Pupils classified as 'indifferent'** were typically individuals, often boys, residing in various types of communities. The parents of these pupils expressed concerns about maintaining a certain minimum standard of nutrition, such as ensuring their child has a hot meal during the day (preferably at school), a sandwich for the second breakfast, incorporating vegetables and fruit into their diet several times a week, and limiting sweets without establishing clear boundaries. Simultaneously, they infrequently engaged in conversations with their children about the principles of healthy eating and rational food handling, believing that neither they nor the children have time for such discussions. According to their perspective, it is the responsibility of the school to provide nutrition education. The pupils embodying the 'indifferent' profile enjoyed considerable freedom in their selection of food products and meals.

Example statements by pupils:

'When I'm full, it's the best feeling!' (*Poreba*).

'Dinner is the best, that's when there's the biggest portion and I get the most out of it' (*Nowy Sącz*).

'At school, I eat what my classmates eat' (*Warsaw*).

**Adolescents' eating habits.** Adolescents generally believed that it is optimal to have between 3–6 meals a day, with 3 being main meals. However, the number of meals consumed varied, based on home habits, lifestyles of the children and parents, and their attitudes to dietary guidelines. Place of residence had a lesser impact on the quantity and frequency of meals. Many pupils followed a routine of having breakfast, lunch and dinner, occasionally adding a sweet or salty snack.

The majority of pupils acknowledged the importance of breakfast, and indicated that it enhances concentration, provides energy and power for the entire day, and supports proper body development and function, especially of muscles and brain. This perspective was likely influenced by rules learned or reiterated by parents rather than being a result of nutritional awareness among the pupils, who sometimes skipped breakfast due to time constraints or lack of hunger in the morning, perhaps after a late dinner.

Despite this, most pupils had the habit of having breakfast before school, regardless of feeling or not feeling such a need. The most common reasons for skipping breakfast, identified according to pupils' statements, are summarized in Table 2.

Pupils who skipped breakfast at home often had the 'second breakfast' at school after the first or second lesson, and in some instances, school lunch was their first meal of the day. These pupils did not perceive this eating habit as a nutritional mistake, and were not fully aware of the potential health consequences.

Example statements by pupils:

**Table 2.** Reasons for skipping first breakfasts by pupils aged 10–12 years

Reason	Description	Gender	Place of residence
Rush	No or little time before leaving home; no routine, and no need to get up early to eat a morning meal	Boys and girls	More likely to live in larger cities
Lack of appetite	Main cause is a dinner too hearty and/or eaten too late	Boys and girls	Regardless of type of locality of residence
Lack of habit	Absence of the habit of eating breakfast among household members, accompanied by a morning rush and/or by negative emotions	More often boys	Slightly more often children from larger and medium-sized towns
Negative associations	Monotony, repetitiveness and predictability of products/foods	Boys and girls	Regardless of type of locality of residence

‘Breakfast is not appealing. I find myself stuck eating the same thing every day. Each morning before heading to school, I end up having a ham sandwich – it’s a repetitive cycle, the same food every day, the same sandwich, and I’ve grown tired of it’ (*Kielce*).

‘I only eat breakfast at weekends, I don’t have time during the week’ (*Warsaw*).

‘I don’t eat breakfast, food doesn’t taste good to me in the morning’ (*Brańszczyk*).

Most pupils revealed that the second breakfast was prepared and packed in a lunchbox by their parents, and usually consisted of sandwiches, sweet or savory cheese, and fruit. Some individuals purchased selected products in the school shop or from a vending machine.

It is challenging to determine whether children enjoy and consider it important to have a second breakfast, but they undoubtedly felt more secure when they had a packed meal available at any time, but sometimes skipped it all or consumed only a part. A lack of appetite, time constraints, and the desire to socialize with peers were mentioned as the main motives. The contents of the lunch box were of great importance, and the presence of disliked foods increased the likelihood of the second breakfast not being taken out of the backpack.

This group included the children of food-conscious parents and those who tried to pass on good eating habits to their children, although not always successfully. These parents took care to prepare their child’s second breakfast with fruit and vegetables, and checked that it had been eaten.

Example statements by primary school pupils:

‘I don’t eat breakfast when I have to be in school at 8:00, if I start lessons later, I might have a sandwich’ (*Białystok*).

‘I don’t always eat breakfast at home. I always eat breakfast at school, sometimes my dad gives me toast and sometimes my mum packs sandwiches’ (*Nowy Sącz*).

**Lunch** was regarded as the most crucial meal by many pupils aged 10–12, often being a substantial, two-course, nutritious and containing meat, potatoes or groats, and vegetables – the primary source of daily vegetable intake for the majority of participants.

Although most respondents consumed their lunches at school, those meals caused varied emotions among pupils. Regardless of their place of residence, many pupils preferred to have lunch at home for several reasons:

- enhanced palatability of home-cooked meals; a familiar and well-liked method of meal preparation;
- greater serving aesthetics and a more appetizing appearance;
- larger portions with the option to request extras;

- fresh, on-site meal preparation at home rather than by a catering company;
- a more pleasant atmosphere for dining at home, in silence, with loved ones;
- improved eating conditions, without the need to rush or face time constraints.

For these reasons, some studied pupils even asked their parents to excuse them from school lunches. Pupils asserted that lunch was a meal in which they could indulge without limits, to their heart’s content. Parents did not regulate portion sizes or the number of servings; in fact, they were content when their child consumed substantial amounts. Individuals often had two lunches during a day, one at school and second at home with the family.

For the majority of respondents, lunch time was associated with a family atmosphere and quality time spent together. Consequently, lunch was more likely to be enjoyed at weekends, although a significant number of pupils also shared lunch with their families during the week, which mainly depended on the daily routine and the work commitments of parents. In some cases, individuals ate lunch alone in their room or in front of the TV, even when other family members were home. This scenario was more prevalent in larger cities.

Example statements by pupils:

‘With a family it’s just a nicer atmosphere and you can eat in peace. Nobody rushes you. And at the table, not in the corridor. We are not in a big hurry’ (*Brańszczyk*). ‘It’s healthier to eat at home because at school you have to rush. And at home there is as much time for lunch as we want’ (*Białystok*).

‘I eat breakfast sometime around 7:10, when I get up, my mum makes me eat straight away. Then I eat my second breakfast at school. I also eat lunch at school, then I eat second lunch at home. And also dinner/supper. A total of five meals’ (*Białystok*).

**Afternoon snack** was more often described as a snack usually eaten quickly, ‘on the run’, e.g. on the way to an extra-curricular activity. This could be fruit, yoghurt or cheese. Pupils very often skipped this meal because they were simply not yet hungry after lunch.

**Dinner** was a meal omitted by some participants, due to the late lunch at home. On the contrary, others, especially boys, tended to ‘overeat’ during dinner. These individuals often presented unhealthy eating habits, consuming little or no nutritious breakfast, skipping their second breakfast despite having it in their backpack, or forgoing lunch altogether or having a small portion. Such pupils appreciated and associated the end of the day with calm, rest, and more time for consumption. They argued that it was a time conducive

to eating without the need to rush, and the possibility to choose foods they liked, and to enjoy their meal in peace. Additionally, falling asleep with an empty stomach was considered more challenging.

When asked about the recommendations for the time of the last meal, the majority of pupils answered 1–2 hours before bedtime. Some individuals indicated half-an-hour, or even 4 hours. In practice, the correct intervals were not always adhered to, and meal times were often determined by the day's rhythm and extracurricular activities rather than strict adherence to dietary recommendations.

Example statements by pupils:

'I eat dinner sometimes at 7 p.m., sometimes at 8 p.m., sometimes at 10 p.m.' (*Brańszczyk*).

'I don't eat dinner, I eat it from time to time' (*Rosko*).

'I like to eat more for dinner' (*Nowy Sącz*).

### Adolescents' perception of food groups – knowledge of recommended food groups and consumption frequency.

Overall, it can be concluded from the participants' statements during discussions that their diet exhibited considerable diversity. Generally, they ate products from each food group, expressing distinct preferences for specific types of items. Fish, in particular, generated the most polarized opinions. Table 3 presents a description of each discussed product group, indicating the frequency of consumption and the participants' perceptions in terms of healthy eating.

It was difficult for the primary school pupils to spontaneously indicate how many portions of fruit and vegetables they should eat per day, with the most common opinion being that five portions was too much, and that

such recommendations were rather difficult to implement. When asked what the proportion of fruit and vegetables in a meal should be, almost the same number of participants declared a half or a quarter. For some pupils, mostly boys, both quantities seemed too much anyway.

Example statements by pupils:

'It'll be better if it's half, but a quarter can be too' (*Czachówek*).

'There are rather always some vegetables for dinner, or some kind of salad I make, or something like that. And I eat fruit on its own, for example, sliced, such a fruit plate' (*Białystok*).

'Vegetables and fruit are healthy and contain a lot of good ingredients' (*Warsaw*).

Although adolescents were eager to consume a diverse range of healthy foods, they also exhibited a low level of knowledge about them. They were aware of the importance of eating these products but lacked understanding regarding the reasons and health benefits associated with their consumption.

Example statements by pupils:

'Have I heard of fibre? What does this fibre do in our body? Something for sure, I can't remember now' (*Lublin*).

'It was at school, but it's forgotten. Something, as they say, 'rings a bell' somewhere. I just don't remember it' (*Rosko*).

### Knowledge and consumption frequency of non-recommended foods. Pupils expressed a liking and

**Table 3.** Perceptions and frequency consumption of recommended foods by pupils

Products	Perception	Frequency of consumption
Fruit	<ul style="list-style-type: none"> <li>– very popular, especially sweet fruit like banana, grapes and apples;</li> <li>– individuals pointed-out that fruit contains natural sugars and too much cannot be eaten (especially in the evening).</li> </ul>	<ul style="list-style-type: none"> <li>– the majority consumed fruit every day;</li> <li>– a small group ate fruit several times a week;</li> <li>– more often in season, when they are available in family orchards and gardens, e.g. from grandparents.</li> </ul>
Vegetables	<ul style="list-style-type: none"> <li>– it is difficult to say that vegetables are liked;</li> <li>– primary school pupils simply know that they should eat vegetables; they are taught to do so from a young age;</li> <li>– vegetable consumption is not a choice, it is a habit introduced by parents.</li> </ul>	<ul style="list-style-type: none"> <li>– the majority consumed vegetables daily;</li> <li>– a few, several times a week;</li> <li>– individuals, less than once a week; more often in season when available in home gardens.</li> </ul>
Cereal products	<ul style="list-style-type: none"> <li>– in the pupils' perception, this is mainly bread of any kind (wheat, rye, wholemeal);</li> <li>– have little knowledge of fibre and its role in the functioning of the digestive system.</li> </ul>	<ul style="list-style-type: none"> <li>– daily;</li> <li>– groats, rice most consumed about once a week, individuals less often;</li> <li>– a large proportion of respondents ate oatmeal for breakfast every day.</li> </ul>
Milk and milk products	<ul style="list-style-type: none"> <li>– a much-liked product group by most;</li> <li>– indicated protein as the main nutrient for children; some also mentioned calcium - strengthens bones.</li> </ul>	<ul style="list-style-type: none"> <li>– the vast majority consumed these products daily.</li> </ul>
Pumpkin and sunflower seeds, nuts, e.g. walnuts, almonds	<ul style="list-style-type: none"> <li>– for many pupils this is a form of snack;</li> <li>– individual children tolerated them only as an addition to bread, cakes, desserts, etc;</li> <li>– poor knowledge of the effects of these products on the human body;</li> <li>– spontaneously, no one indicated that they improve immunity and memory;</li> <li>– individuals indicated that they affect concentration and complexion.</li> </ul>	<ul style="list-style-type: none"> <li>– many pupils ate them several times a week;</li> <li>– individuals ate once a month or less frequently;</li> <li>– pupils from small towns and villages consumed sunflower seeds only in summer (season for harvesting from own garden).</li> </ul>
Fish and fish products	<ul style="list-style-type: none"> <li>– disliked by pupils because of the unpleasant smell and the bones, troublesome to eat;</li> <li>– in the perception of the majority, fish is healthy because it contains a lot of protein.</li> </ul>	<ul style="list-style-type: none"> <li>– a large part of pupils consumed once a week (on a Friday);</li> <li>– some much less frequently (a few times a year, mainly during holidays).</li> </ul>

willingness to eat products that were not recommended, specifically sweets, sugar-sweetened beverages, salty snacks, and fast food. It is crucial to emphasize that despite this, they were aware of their inappropriate choices, especially considering that most respondents were prohibited from consuming these products on a daily basis. Despite the restrictions, they found it challenging to resist, often reaching for these products away from home, such as between lessons or on the way to and from school. Due to the adolescents' statements four main contexts for reaching for unhealthy foods were identified, namely: family, social, individual, and travel (Tab. 4).

The contexts outlined for the consumption of unhealthy foods can be categorized into controlled situations, occurring in the presence and with the consent of parents, and uncontrolled scenarios, occurring in solitude or among peers, without parental consent or in secret from parents. On the other hand, pupils stated that consuming unhealthy products on a daily basis was unattractive, raising concerns about health, overweight, and overall well-being. Respondents were aware that sweets contribute to a significant sugar intake, leading to obesity and tooth decay, and that they contain colourants, preservatives, and other additives that can contribute to the development of diseases. They also indicated that fast food only provides short-term energy, contain numerous additives and fat, while salty snacks contain salt which stimulates the appetite.

According to adolescents' statements the motivation for reaching for unhealthy products included:

- curiosity, the desire to gain further taste experiences, and learn about new products – mainly in individual, social, and family contexts;
- willingness to break the routine and daily diet imposed by parents – primarily in individual, social and travel contexts;
- the desire to belong to a group and spend time with peers – mainly in a social and travel contexts.

Example statements by pupils:

'I like to eat fast food from time to time. When you don't eat it for a month, there's such satisfaction afterwards that you haven't eaten it for so long, and you appreciate it. If you ate it every day, it would just seem gross to you, or it would be like an ordinary meal' (*Lublin*).

'There is definitely generally a lot of fat in fast food

because they deep-fry it. And they often add various additives to this food' (*Białystok*).

'It's like when you're tired, you eat a bar or drink an energy drink, your sugar jumps, you have strength, and when it drops, it drops with double the strength' (*Kielce*).

Individuals from various residential areas, primarily boys, acknowledged occasionally opting for Chinese-type instant soups, typically a few times a month. The reasons behind this behaviour primarily included a craving for a familiar and specific taste, curiosity, convenience, and affordability. This tendency is exacerbated by the lack of parental supervision and being unable to monitor their children's food choices when they are home alone.

Energy drinks were another category that captivated the interest of adolescents. Respondents felt drawn to consume them due to the enticing benefits highlighted in advertisements, such as a substantial surge of energy, a sudden boost, the novelty of trying a product intended for adults, and the promise of experiencing something interesting. Several boys from different residence locations admitted to having consumed at least one can of an energy drink, although the majority expressed negative opinions about it. Their main deterrents included fear of potential side-effects and uncertainty about the body's reaction. Additionally, some stories circulated among pupils about the health problems their peers faced after consuming energy drinks.

**Knowledge of vegan and vegetarian diets.** All respondents were aware of vegetarian and vegan diets, as well as being able to point-out general differences between the diets. Individuals said that they knew vegetarians or vegans in their surroundings. According to the pupils, these diets mainly consist of eating a lot of vegetables and fruit. Adolescents were not aware of the need to pay special attention to protein, iron or some B vitamins intake in meat-free diets. Only a few knew that legumes are a source of protein in these types of diets and that one can compensate for the deficiency of animal protein in the diet by eating these diets. Some participants expressed the opinion that more plant-based than animal products should be eaten, but at the same time were unaware of the importance of changing this ratio from the environmental reasons.

According to the respondents, the general aim of vegetarians and vegans is to protect animals, which are ethical issues. An additional reason indicated by some pupils

**Table 4.** Context of consumption of non-recommended foods by pupils aged 10–12 years

Context	Type of products	Description	Gender and place of residence
Family	sweets; sweetened beverages; salty snacks; fast food	– during family events, e.g. birthdays; – during an important event, e.g. watching a match, game night, social events.	– boys and girls, regardless of where you live; – in the case of fast food, more often in larger and medium-sized cities - ordered to take away.
Social	sweets; sweetened beverages; salty snacks; fast food	– eaten in company; – while having fun and spending free time together.	– boys and girls, regardless of where you live; – fast food - more often boys from larger and medium-sized towns.
Individual	sweets; sweetened beverages; salty snacks	– out of boredom on the way home from school, they buy in grocery shops; – at school, during breaks, if a purchase can be made from a vending machine or the school shop.	– boys and girls; – regardless of where you live.
Travel	fast food	– on a school trip; – on a trip with the family.	– boys and girls; – regardless of place of residence.

included the high price, or simply avoiding meat because of disliking the taste. They were not convinced that a change in eating habits towards minimising or giving up meat consumption could protect the planet from climate change, or other environmental problems. Many pupils felt that meat was essential for proper human development.

Vegetarian and vegan diets were also unequivocally associated with the need to consult a doctor to see if giving up or limiting the intake of animal products was possible.

Example statements by pupils:

'If you are a vegetarian, you don't eat meat, but the dish is formed like meat and there are peas and carrots inside instead of meat' (*Kielce*).

'A vegetarian diet is for those who love animals and cannot eat them' (*Ostrowiec Świętokrzyski*).

'Actually, if they don't eat meat, the pigs will be slaughtered anyway. If you don't want to eat meat, it's no problem. But in my opinion if you don't eat meat, it doesn't mean you want everyone to be like you' (*Poreba*).

**Consumption of beverages.** Respondents were generally convinced of the need of adequate fluids intake and believed that water was the best for quenching thirst, was healthy and ensured the proper functioning of the organism. The vast majority of pupils reached for water most often, and declared they carried water in bottles, used tap water or a drinking fountain located on school premises. Adolescents declared they drank approximately 1.5–2 liters of water per day, although some pupils tended to drink considerably less than 1 liter.

Black or fruit tea was also liked by pupils, but was more often chosen in winter and consumed with a meal. In the summer, home-made compote served by grandparents during common holidays was also a popular beverage. In winter, water was sometimes added to the home-made fruit juices. Interestingly, store-bought fruit juices were consumed occasionally, rather at home, at family gatherings, holidays and celebrations, as generally parents did not encourage their consumption due to their high sugar content.

Example statements by pupils:

'At home, we generally drink a lot of water. We have a filtered jug, we don't buy water from the shop' (*Warsaw*).

'Sometimes it happens that I drink sugar-sweetened beverages because, for example, when there are parties, parents buy them, but rarely' (*Warsaw*).

'Juices from the shop, for example the apple ones, they have more sugars than you think. Because they have not only sugars from the apples, they are also sweetened' (*Kielce*).

**Food and emotions of pupils.** The study results confirmed a strong connection between the consumption of certain products and the emotional states of pupils. Based on these statements it was observed that they tended to indulge in various emotional states, such as:

- sadness, leading to a desire for consoling themselves through frequent consumption of sweets;
- nervousness and anger, resulting in a similar tendency for sweet consumption, although less frequently than in the case of sadness;
- boredom, motivating relatively frequent consumption of

- foods, such as salty snacks, nuts, sunflower and pumpkin seeds, jelly beans, biscuits and fruit, especially those that are easy to divide, such as grapes and tangerines;
- happiness, created by the expectation of receiving a reward, such as sweets or fast food.

In this context, it can be inferred that adolescents generally compensated for various emotional states by consuming products that bring them satisfaction, linked to the release of endorphins – hormones that induce well-being and self-satisfaction.

**Forms of leisure activity.** Pupils generally expressed a genuine interest in physical activity. They conveyed the belief that they enjoyed engaging in sports, recognizing movement as a means of 'burning calories', maintaining a slim and fit physique. Many pupils perceived sports as enjoyable, giving fun, and a way to enhance their well-being. They also expressed the opinion that physical activity positively impacts mental health, serving as a release and relief for accumulated negative emotions throughout the day. Furthermore, pupils acknowledged that sports contributed to their successes, which provided further satisfaction and motivation to strive harder.

Nearly every adolescent participated in various physical activities beyond regular Physical Education (PE) lessons, including judo, swimming, acrobatics, dance, horse riding, football, basketball or volleyball. Engaging in movement allowed them to suppress negative emotions, stay active, unwind, and socialize with their peers. Only a few pupils, irrespective of their residence location, admitted to disliking sports and limiting their involvement. These were more often individuals with excessive body weight, and those who preferred spending their free time on a computer.

Example statement by a pupil:

'Movement affects our mental health. If you're upset, for example, you can get out of it by playing football' (*Białystok*).

Respondents, irrespective of their gender and place of residence, admitted that online entertainment and education is also a favourite leisure time activity, particularly:

- online games such as Minecraft, or others on the Roblox platform;
- watching funny videos on Tik-Tok, YouTube;
- tracking the activity of online creators and influencers (Instagram, Tik-Tok, YouTube);
- developing hobbies and interests, i.e. painting, motoring, music, competitive cycling;
- platforms and VOD service: films or series on Netflix and HBO;
- communication with peers using WhatsApp and Messenger;
- streaming services for listening to music: Spotify, Tidal.

The study revealed that adolescents do not have specific TV programs or channels they watch regularly, nor did they follow favourite influencers on social media. Their choices were often random, or they received links from friends, typically their peers.

The majority of participants were unlikely to tune into cookery programs or nutrition influencer channels, finding



them boring and unappealing. Only a few individuals mentioned the names of popular Polish cookery programs, emphasizing that these shows focus on cooking rather than promoting healthy eating. Pupils also noted that most influencers tend to endorse unhealthy products, and expressed skepticism about such activities and recognizing them as advertising. A significant number of participants admitted that while the topic of nutrition can be interesting, it is not their primary conversation topic with peers, and they are not keen on delving deeper into this area. Only a few adolescents expressed an interest in learning about how different foods are produced, their origins, and effects on the body.

Pupils indicated they enjoy participating in cooking and can even prepare simple dishes like salad, spaghetti, carbonara pasta, pancakes, or waffles. Some girls mentioned baking cakes or biscuits. However, the level of involvement in cooking activities at home varied greatly depending on the place of residence. In larger cities, pupils appeared to be more independent than in small towns and villages, possibly due to being home alone more frequently, and needing to prepare or reheat meals while waiting for adults to return.

## DISCUSSION

**Attitudes and knowledge toward food and nutrition.** The pupils participating in this study presented insufficient knowledge about food and nutrition, as evidenced, among other things, by the fact that although they showed knowledge of vegetarian and vegan diets, they did not know that not eating meat could have an impact on protecting the planet. In addition, most of them were aware of the limitations of eating unhealthy foods, but did not follow these recommendations. Adolescents' eating behaviour was influenced by both the family [13, 14] and the school environment [15], although peer and social media environments are increasingly influential [5]. Given that taste preferences and eating habits are formed in childhood, nutritional education should start as early as possible, before unfavourable eating habits become entrenched [16]. In the context of the pupils' statements, a dissonance between their knowledge and consumption of healthy foods can be noticed.

Adolescents predominantly maintained a 'healthy' diet as a result of parental expectations (the 'obedient' profile). They reported consuming three or four meals a day, and skipping the first breakfast resulted mainly from the morning rush, lack of appetite, and the negative emotions associated with heading to school in the morning. This is a concerning phenomenon as pupils leave for school on an empty stomach and commencing their school day with low glucose levels that can negatively impact their psychophysical condition and academic performance [17]. Other authors also highlight the issues of skipping breakfast, snacking between meals, and an inappropriate number of meals per day [18, 19]. A meta-analysis of 40 retrospective studies involving 323,244 children of various ages, found that skipping breakfast was associated with an increased risk of overweight and obesity in both children and adolescents [19]. Eating breakfast has been shown to improve cognitive function related to memory and, as part of a healthy lifestyle, can positively influence children's health and well-being [20].

Second breakfast was more often consumed by pupils because they either bring it from home, buy it at school in

vending machines, in the school shop, or in a grocery shop on the way to school, which is also confirmed by other studies [21]. They showed that, of the pupils eating a second breakfast, 87% brought it from home, 10% bought it at school, while 3% bought it on the way to school. It should be emphasized that when buying in school shops, pupils are mainly guided in their choice by taste and appearance, and not by the nutritional value of the products [22]; hence, shop owners take into account the children's preferences, and not the legal regulations in force in Poland in this respect [23]. Similarly unfavourable are the choices in vending machines on school premises which offer mostly sweet and salty snacks and sugar-sweetened carbonated drinks [24]. Hence, parents should either provide second breakfasts for their children or increase parental control of the food offered in school shops, vending machines, or the school breakfast program [18, 20].

The primary meal consistently consumed by all the participating pupils was lunch, whether at school, at home, or a combination of both, which is in alignment with findings from other studies [21]. The current study indicates that 85% of pupils ate lunch every day, and it was also their most favoured meal. Afternoon snacks were often skipped by pupils, primarily those with numerous extracurricular activities, particularly in larger cities. Some pupils who had two lunches (at school and at home), also skipped dinner. The irregularity of meal consumption is also confirmed by other authors [21]. Snacking and skipping meals, as well as long gaps between meals, can lead to impaired concentration, reduced mental and physical abilities, which result in reduced active participation in school and extracurricular activities, and an increase in eating disorders, including obesity [20, 25].

**Recommended and non-recommended foods in the diet of 10–12 year olds.** Pupils correctly identified and indicated the effects on the body of foods recommended and not recommended by experts. They understood that a healthy diet consists, among other things, of consuming water, fruits and vegetables, as well as nuts and seeds, but many of them did not follow the dietary guidelines, especially for vegetables, which they mostly ate as a side-dish with lunch. The results of several international studies [26, 27, 28] have shown that children's average fruit and vegetable intake is limited to 2–3 portions instead of the recommended five which equals 160–240 g/day, well below the 400 g/day set by the WHO [29]. Low fruit and vegetable intake in children can be explained by several barriers, at the intrapersonal level (low preference or negative perceptions of them), interpersonal level (low availability at home, lack of encouragement from adults to eat), community level (low availability in shops and school settings), and the macro level (availability, convenience, cost, advertising and promotion in the media) [2, 28].

Many of pupils participating in this study consumed sweet and salty snacks, often in secret from their parents. Some of them also sporadically consumed energy drinks which were not allowed at this age. As shown in this study, pupils had knowledge of the harmfulness of such products. However, advertisements for energy drinks encourage them to consume them, resulting in the increasing popularity of these drinks among teenagers, as indicated by other authors [21, 30, 31, 32].

The consumption of snacks during the day may improve the daily diet in terms of energy and nutrients, but among adolescents, unfavourable snacking included salty snacks

(providing salt and fat) and sweet snacks (providing free sugars) predominated. Fruit juices and sugar-sweetened beverages also play a significant role in free sugars intake [33, 34, 35, 36]. It is important to note that regular consumption of sugar-sweetened beverages is generally associated with poor diet quality and consequent weight gain [37], and increased risk of type 2 diabetes [38] as well as cardiovascular diseases [37].

During adolescence, socializing with friends often involves an increased consumption of ultra-processed foods, takeaway meals, or ready-to-eat foods. Typically, the social aspect takes precedence over the food consumed [39, 40]. Moreover, children and adolescents who spent more time in front of screens were significantly more likely to consume advertised products, such as sugar-sweetened beverages, juices, sweets, crisps and fast-food [41]. Children's preferences for highly processed products like fast food over wholesome meals or increased consumption of snacks during weekends was also noted by other authors. They emphasize that a lack of alternative activities and succumbing to persuasive advertisements are the main reasons for such behaviours [42].

Frequent consumption of energy-rich and nutrient-poor snacks poses health risks. Among many factors, the EAT 2010 (Eating and Activity in Teens) project identified several important issues. Thus, it was noted that intervention designs aimed at improving diet quality should address individual factors (e.g., eating while watching TV) and characteristics related to the family environment (e.g., limiting the availability of unhealthy foods), peer environment (e.g., guiding peer leader efforts to make healthy choices), and the school environment (e.g., monitoring the assortment available in school shops and vending machines) [43].

**Influence of family environment on children's eating behaviours.** The results of the current study indicated that the attitudes of adolescents towards food and nutrition were significantly influenced by the attitudes of their parents, regardless the profile they represented. The family serves as a crucial social environment in which children develop their eating behaviours, and parents act as health promoters, examples, and educators influencing dietary choices [13, 14, 44]. A systematic review by Yee et al. [13] highlighted that many parental behaviours strongly correlate with children's behaviours related to food consumption.

During adolescence, the family environment is the usual place for the consumption of meals, in which there is no room for autonomy in dietary decisions, as parents control the purchase of food and decide on the meals prepared [45]. In addition, a greater likelihood of healthy eating behaviour occurs when pupils eat meals together with their families [44]. On the contrary, ordering takeaway foods [46] and watching television during shared meals [47] can negate the nutritional benefits of family, home-cooked meals. Pupils' solitary meals at home may be associated with the consumption of highly processed foods [17, 48].

**Emotions and the context of adolescents' food consumption.** This study shows that both negative and positive emotions can influence the consumption of unhealthy foods. The consumption of salty snacks, sweets and fast or comfort food is influenced by emotions such as sadness, nervousness, fear and anger. According to research, people with elevated levels of stress showed a greater preference for energy-rich foods

high in fat and added sugars, and reduced consumption of vegetables and main meals [49, 50]. Psychological stress plays an important role in appetite regulation and food intake preferences. Generally, acute stress results in decreased eating, and chronic stress results in increased eating. Glucocorticoids, as the effector molecules of the stress response has also been shown to result in an increased tendency to consume high-calorie, palatable foods [51]. In addition, the reduced availability of unhealthy, higher calorie snacks, was found to significantly reduce the likelihood of choosing a higher calorie snack relative to an even availability of high and low calorie snacks [52].

**Physical activity and leisure.** Ensuring the healthy physical and mental development of children requires not only an adequate nutrition, but also daily physical activity and active leisure time [53, 54]. Adolescents participating in this study generally expressed positive opinions on physical activity, acknowledging its role in improving physical fitness and reducing the risk of obesity. Sedentary lifestyle was associated with adverse health outcomes in both children and adolescents. Activities connected with sitting in front of screens were linked to lower physical fitness, poorer cardiometabolic fitness, shorter sleep duration, and obesity, often compounded by other unhealthy behaviours, e.g. snacking on energy-rich foods and low levels of physical activity [55]. Sedentary lifestyles may also contribute to poorer mental health and adverse measures of pro-social behaviour [56].

Drawing on a wealth of evidence from the literature, the WHO [56] issued specific recommendations on physical activity for the general population and specific subpopulations. It emphasized that children and adolescents should utilize their recreational time for activities such as walking and other outdoor physical activities, while screen time should be significantly reduced. Developing specific movement skills and habits in children is a shared responsibility of parents, with the support of the school [41].

In summary, the dynamics of daily life in Polish families have undergone significant changes over the past three decades. Traditional home-made meals have given way to dining in establishments providing educational services, such as schools, or on the way to/from school. In contemporary times, the role of the school as a crucial nurturing and caring environment is escalating, exerting a multi-directional impact on pupils. This influence often counterbalances negative aspects stemming from the family or peer environment, particularly in the area of nutrition. This role becomes even more pronounced during adolescence. Despite this shift, pupils remain reliant on their parents for regular purchases, food choices, and meal preparation. The active involvement of parents in nutritional education dedicated to both their children and their own, is of significant importance [57].

The WHO recommends that schools should implement programs fostering a healthy school environment, healthy eating, nutrition knowledge, and physical activity among children and adolescents alike [58], notably, educational programs coupled with practical activities which have demonstrated improvements in the knowledge and eating behaviour of adolescents [28, 57, 59].

## CONCLUSIONS

The findings from the FGIs with pupils aged 10–12 years has reveal a generally quite high level of nutrition-related knowledge and awareness. They acknowledged and could explain the link between the food group consumption and its impact on their health. Unfortunately, this awareness does not consistently translate into practice. This observation echoes the timeless wisdom of Ovid's maxim, 'I see better things and praise them, but I follow worse things' (Latin: *'video meliora proboque, deteriora sequor'*), resonates with the behaviour of school children in their approach to food and nutrition.

Understanding the perceptions of school-age children regarding healthy eating, along with identifying the risks associated with inadequate nutrition, can serve as a foundation for developing educational interventions. These interventions can promote the consumption of highly nutritious foods, making them more appealing and establishing their consumption as the norm within peer groups. Additionally, there is a perceived need to support the efforts of parents through school feeding/nutrition programs, fostering greater coherence in the messages delivered to children by two key educational institutions: the family and the school.

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