2.º CICLO

NUTRIÇÃO PEDIÁTRICA

Perceções de adolescentes, professores e assistentes operacionais sobre comportamentos alimentares inadequados na adolescência: fatores associados e sugestões de melhoria

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Perceções de adolescentes, professores e assistentes operacionais sobre comportamentos alimentares inadequados na adolescência: fatores associados e sugestões de melhoria

Perceptions of adolescents, teachers and support staff regarding inadequate eating habits in adolescence: associated factors and suggestions for improvement

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Resumo

Apesar da crescente atenção aos hábitos alimentares pouco saudáveis na adolescência, permanece limitada a evidência sobre as barreiras, a diferentes níveis, à adoção de uma alimentação saudável, bem como sobre as estratégias de melhoria propostas pelos próprios adolescentes e pelos *stakeholders* escolares, cujo papel é fundamental na construção de um ambiente escolar favorável a escolhas alimentares saudáveis. O objetivo deste estudo qualitativo foi explorar as perceções de adolescentes, professores e assistentes operacionais portugueses relativamente às barreiras à alimentação saudável na adolescência e às estratégias para a sua melhoria. Desenvolvido no âmbito do Projeto "Programa de Alimentação Saudável em Contexto Escolar" (PASCE) em três escolas do Porto, o estudo envolveu 202 alunos (dos 11 aos 14 anos de idade) que participaram em atividades estruturadas em sala de aula, juntamente com 16 profissionais escolares (incluindo membros da direção, professores e assistentes operacionais) que participaram em entrevistas semiestruturadas. Os dados foram analisados utilizando uma abordagem temática qualitativa indutiva por dois investigadores independentes e mapeados segundo o modelo socioecológico de *Bronfenbrenner*. Os resultados revelaram um elevado consumo de alimentos ultraprocessados e bebidas energéticas, a par de um consumo inadequado de frutas, legumes e pescado, impulsionado por uma acentuada discrepância entre conhecimento e comportamento e pela impulsividade inerente ao desenvolvimento. Ao nível familiar, a escassez de tempo dos pais, os baixos níveis de literacia e as restrições económicas levaram a uma dependência de refeições pré-preparadas. Nas escolas, diretrizes rígidas criaram um paradoxo de «excesso de saúde», em que a baixa palatabilidade e a variedade limitada resultaram na rejeição das refeições da

cantina. Além disso, a nível comunitário e ambiental, o marketing digital generalizado, a influência dos pares e o elevado número de estabelecimentos de fast-food nas imediações da escola incentivaram fortemente escolhas alimentares pouco saudáveis. Os participantes defenderam a transição de campanhas informativas isoladas para uma educação nutricional integrada no currículo escolar e um maior apelo das refeições escolares e iniciativas lideradas por pares. Estas conclusões demonstram que as escolhas alimentares dos adolescentes são sistematicamente impulsionadas por ambientes físicos, digitais e sociais pouco favoráveis, em vez de uma simples falta de motivação individual. Para superar estas barreiras, são necessárias intervenções multidimensionais que abranjam toda a escola, combinadas com regulamentações ambientais mais rigorosas e com a participação ativa dos alunos, de modo a colmatar a lacuna entre o conhecimento nutricional e a mudança sustentável de comportamentos.

Palavras-Chave

Adolescentes; ambiente alimentar; comportamentos alimentares; escola; investigação qualitativa; modelo socioecológico

Abstract

Despite growing attention to unhealthy eating behaviours during adolescence, evidence remains limited on the multi-level barriers to healthy eating, as well as on strategies for improvement proposed by adolescents themselves and by school stakeholders, whose role is critical in shaping a school environment that supports healthy food choices. The aim of this qualitative study was to explore the perceptions of Portuguese adolescents, teachers and school support staff regarding barriers to healthy eating during adolescence and strategies for improvement. Developed within the "Healthy Eating Promotion in Schools Project" (*Programa de Alimentação Saudável em Contexto Escolar* – PASCE) across three schools in Porto, the study involved 202 students (11–14 years old) engaged in structured classroom activities, alongside 16 school professionals (including board members, teachers, and support staff) participating in semi-structured interviews. Data were analysed using an inductive qualitative thematic approach by two independent researchers and mapped onto Bronfenbrenner's socio-ecological model. Results revealed a high intake of ultra-processed foods and energy drinks alongside inadequate consumption of fruits, vegetables, and fish, driven by a pronounced knowledge–behaviour gap and developmental impulsivity. At the family level, parental time scarcity, low literacy, and economic constraints led to a reliance on convenience meals. Within schools, rigid guidelines created a "*too healthy*" paradox, where low palatability and limited variety resulted in canteen meal rejection. Also, at community and environmental levels, pervasive digital marketing, peer conformity dynamics, and a high density of fast-food outlets surrounding school heavily encouraged unhealthy food choices. Participants advocated for shifting from isolated informational campaigns to

curriculum-integrated nutrition education, enhanced school meal appeal and peer-led "youth health promoter" initiatives. These findings demonstrate that adolescent food choices are systematically driven by unsupportive physical, digital, and social environments rather than a simple lack of individual motivation. Addressing these barriers requires multi-component, whole-school interventions combined with stricter environmental regulations and active student participation to bridge the gap between nutritional knowledge and sustainable behaviour change.

Keywords

Adolescents; dietary behaviour; food environment; qualitative research; school; socio-ecological model

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Lista de Abreviaturas

Manuscrito:

- A: Adolescents
- COREQ: Consolidated Criteria for Reporting Qualitative Research
- DGS: Portuguese Directorate-General of Health
- PASCE: Healthy Eating Promotion in Schools Project (*Programa de Alimentação Saudável em Contexto Escolar*)
- SB: School board
- SS: Support staff
- T: Teachers
- WHO: World Health Organization

Tese:

- AF: atividade física
- OMS: Organização Mundial da Saúde
- IAN-AF: Inquérito Alimentar Nacional e de Atividade Física
- COSI: Childhood Obesity Surveillance Initiative

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Enquadramento

A alimentação constitui um determinante fundamental da saúde com implicações a curto e longo prazo, sendo a idade pediátrica uma janela de oportunidade crítica[1-4]. A adolescência, enquanto fase marcada por mudanças fisiológicas e comportamentais aceleradas e por um aumento da autonomia comportamental[1, 2], representa um período crítico para a consolidação de padrões alimentares duradouros[5-7], que tendem a perdurar ao longo da vida. A relevância do estudo dos comportamentos alimentares na adolescência adquire uma maior dimensão tendo em conta o atual contexto epidemiológico assinalado pelo aumento global da prevalência de excesso de peso e pelo surgimento precoce de doenças crónicas não transmissíveis[8-10]. Segundo a Organização Mundial da Saúde (OMS) (2025), uma em cada cinco crianças e adolescentes (20%), com idades compreendidas entre os 5 e 19 anos, vive com excesso de peso[11].

Em Portugal, os dados do relatório *Childhood Obesity Surveillance Initiative* (COSI) 2022 revelam que 31,9% das crianças entre os 6 e os 8 anos de idade apresentam excesso de peso, das quais 13,5% vivem com obesidade[12], valores alarmantes numa faixa etária que antecede a adolescência e que constituem um forte preditor de obesidade e risco cardiometabólico futuro[13]. Para além do impacto físico, a obesidade na adolescência acarreta graves consequências psicossociais, tais como discriminação, estigmatização, baixa autoestima e isolamento social, afetando negativamente a qualidade de vida e o rendimento escolar dos adolescentes[9, 14, 15].

Deste modo, sendo a ingestão alimentar um fator de risco modificável, o estudo dos comportamentos alimentares emergiu como um eixo central da

investigação em saúde pública. O comportamento alimentar é um processo biopsicossocial de elevada complexidade, cujo entendimento exige uma perspetiva sistémica. O modelo socioecológico de Bronfenbrenner (1977) descreve a estrutura conceptual ideal para mapear esta complexidade, organizando as influências em níveis interconectados: o *microssistema* (família, grupo de pares e ambiente escolar); o *exossistema* (estruturas comunitárias, políticas públicas, indústria alimentar e media); e o *macrossistema* (valores socioculturais e normas/crenças dominantes)[16]. Compreender a hierarquia destes determinantes torna-se essencial para fundamentar intervenções eficazes e sustentáveis, principalmente durante períodos críticos do desenvolvimento, como a infância e a adolescência, nos quais se estabelecem os alicerces para a promoção e a adoção precoce de padrões alimentares futuros[17-19].

Caracterização dos Comportamentos Alimentares Saudáveis na Adolescência

A realidade dos padrões alimentares dos adolescentes revela-se preocupante à luz da evidência científica[8, 20, 21]. Em Portugal, segundo o relatório do Inquérito Alimentar Nacional e de Atividade Física (IAN-AF), os adolescentes, dos 10 aos 17 anos de idade, apresentam um consumo insuficiente de hortícolas, frutas e leguminosas e um consumo excessivo de produtos de origem animal, nomeadamente produtos lácteos, carnes e derivados[22]. Sendo ainda destacado o consumo excessivo de alimentos ultraprocessados, estes representam cerca de 34,8% da ingestão energética total dos adolescentes portugueses (490g/dia)[23]. Além disso, cerca de 48,7% dos adolescentes excede a quantidade recomendada de açúcares livres contribuindo com 10,5% para o Valor Energético Total[22].

Este cenário foi exacerbado pela pandemia de COVID-19, tal como documentado pelo relatório COSI 2022, que não só sublinha a persistência dos padrões alimentares de risco identificados anteriormente no IAN-AF, como quantifica um aumento estatisticamente significativo do excesso de peso entre os 6 e os 8 anos de idade[24].

Os principais grupos de alimentos ultraprocessados consumidos são as bebidas açucaradas e refrigerantes, carnes e laticínios processados[20, 21], produtos de panificação industrial [21], cereais de pequeno-almoço, pizzas e hambúrgueres[25] e snacks embalados, doces e salgados[22, 24]. Relativamente às principais fontes de açúcares livres, a contribuição primária reside no açúcar de adição e nos doces e guloseimas[22]. Contudo, com a transição para a adolescência surge um contributo crescente do contributo dos refrigerantes e néctares[20, 26].

De acordo com duas revisões sistemáticas, o consumo alimentar dos adolescentes caracteriza-se por uma baixa adesão a padrões alimentares saudáveis e sustentáveis, destacando-se a baixa adesão à Dieta Mediterrânica em idade pediátrica[6, 27]. De facto, como já reportado neste enquadramento, a evidência disponível aponta para padrões alimentares dos adolescentes portugueses caracterizados por um elevado consumo de alimentos pouco saudáveis e ambientalmente insustentáveis, nomeadamente alimentos ultraprocessados e de origem animal, concomitantemente com um baixo consumo de alimentos simultaneamente promotores da saúde e ambientalmente mais sustentáveis, como frutas, hortícolas e leguminosas.

A evidência científica aponta para uma associação consistente entre padrões alimentares de risco e o desenvolvimento de comorbilidades ao longo da

vida[4, 28]. Entre os fatores mais relevantes destes padrões de risco destacam-se o elevado consumo de açúcares livres[22, 29] e de alimentos ultraprocessados[23]. Nos adolescentes portugueses, o consumo excessivo de açúcares livres associa-se a uma pior qualidade da dieta e a uma maior predisposição para o ganho de peso, contribuindo para um perfil de risco cardiometabólico menos favorável[29]. Paralelamente, o consumo elevado de alimentos ultraprocessados durante a infância mostrou-se associado a piores trajetórias de crescimento e adiposidade até à adolescência[23].

Em contrapartida, a adoção de um padrão alimentar protetor em fases precoces do desenvolvimento exerce um papel fundamental na prevenção de doenças. Um estudo longitudinal demonstrou que uma maior adesão a um padrão alimentar saudável e sustentável aos 7 anos, de acordo com as recomendações alimentares da Comissão de EAT-Lancet, se associou a uma menor prevalência de obesidade no início da adolescência, aos 10 e 13 anos, e de síndrome metabólica aos 13 anos de idade[30]. Estes resultados enfatizam a importância dos padrões alimentares precoces, saudáveis e sustentáveis, na promoção da saúde futura dos adolescentes.

Determinantes dos Comportamentos Alimentares Saudáveis na Adolescência

Sociodemográficos e económicos

Os fatores sociodemográficos e económicos constituem a base para a modulação dos comportamentos alimentares dos adolescentes, sendo o seu impacto complexo e, por vezes, aparentemente contraditório, variando conforme o contexto geográfico, cultural e a metodologia dos estudos[9, 31].

No que concerne aos determinantes individuais, o avançar da idade na adolescência surge como um preditor consistente do declínio na qualidade da dieta[21, 26, 32]. Tendência esta ilustrada por um estudo longitudinal em crianças e adolescentes portugueses, dos 4 para os 13 anos, medida pela ferramenta "*Healthy Eating Index*", salientando uma quebra mais significativa da qualidade da dieta entre os 7 e os 10 anos de idade[3]. Quanto ao sexo, a evidência sobre o seu impacto é inconclusiva, alguns estudos associam o sexo masculino a padrões menos saudáveis[3, 33], outros demonstram o oposto[8, 31]. De acordo com os dados da coorte Geração XXI, apesar do sexo masculino apresentar uma melhor qualidade de dieta aos 4 anos de idade, ao longo do tempo essa qualidade deteriora rapidamente ao longo do tempo em comparação com o sexo feminino[3]. Outro fator relevante é a composição do agregado familiar, em que agregados familiares com mais do que duas crianças estão associados a um consumo mais elevado de ultraprocessados[34].

Relativamente aos determinantes socioeconómicos, o nível socioeconómico e o nível de educação parental são os fatores mais estudados e com um impacto mais consistente nos hábitos alimentares na infância e adolescência. Um maior nível socioecómico do agregado familiar bem como um maior nível de educação dos pais associam-se a padrões alimentares mais saudáveis em adolescentes[3, 31, 34, 35]. Essa associação positiva manifesta-se de várias formas: maior consumo diário e maior disponibilidade de alimentos saudáveis em casa, como fruta e hortícolas[3, 35], menor consumo de alimentos de elevada densidade energética e bebidas açucaradas[34, 36] e uma melhor qualidade da dieta[34]. Em particular o

baixo estatuto socioeconómico está frequentemente associado à baixa adesão à Dieta Mediterrânica[37].

De destacar que, fatores maternos, nomeadamente a idade e o nível de educação da mãe, bem como a qualidade da sua dieta tendem a ser os fatores chave. Uma idade e educação materna mais elevada foram associados a uma maior adesão às recomendações alimentares do EAT-Lancet, através do índice *World Index for Sustainability and Health* aos 7 anos de idade e uma melhor qualidade da dieta materna aos 4 anos de idade foi também associada a pontuações WISH mais elevadas aos 7 anos de idade[38].

Estilos de vida

Os estilos de vida adotados na adolescência constituem um conjunto de determinantes profundamente interligados que refletem o impacto cumulativo do contexto sociodemográfico e social envolvente. Estes determinantes, profundamente interligados entre si, desempenham um papel crucial no comportamento alimentar dos adolescentes[31]. A prática de atividade física (AF) apresenta uma relação bidirecional positiva com a qualidade da dieta[3, 6, 39], sendo que, em crianças portuguesas, a prática regular de atividade física estruturada fora do contexto escolar foi associada a pontuações a uma maior qualidade da dieta aos 4 anos de idade[3]. Contudo, verifica-se um preocupante declínio da adesão à prática de atividade física ao longo da infância e adolescência[3, 22].

Para além disto, as rotinas revelam-se determinantes influentes para a adoção de uma alimentação saudável. Relativamente à rotina de sono, um horário de deitar mais tardio é preditor significativo não apenas de uma menor duração do sono,

mas também de escolhas alimentares menos saudáveis[40, 41]. Dentro das rotinas alimentares, o hábito de tomar o pequeno-almoço é consistentemente identificado como estando diretamente associado a uma maior adesão a padrões alimentares saudáveis. Em contrapartida, a omissão desta refeição está fortemente ligada a padrões alimentares pouco saudáveis[31], salientando que adolescentes com elevado nível socioeconómico têm maior probabilidade de tomar o pequeno-almoço regularmente[42].

Por fim, os hábitos tabágicos e o consumo de álcool devem também ser considerados determinantes dos comportamentos alimentares dos adolescentes, dada a sua associação com padrões de estilo de vida menos saudáveis[8, 43]. O consumo de tabaco tem sido associado a uma maior probabilidade de hábitos alimentares inadequados, incluindo maior consumo de alimentos ultraprocessados e menor consumo de hortícolas, frutas e lacticínios[44]. De forma semelhante, o consumo de álcool e a adoção de hábitos alimentares desequilibrados parecem partilhar determinantes socioecológicos, nomeadamente fatores emocionais e de procura de prazer, influência dos pares e exposição a estratégias de marketing[45]. Estes comportamentos tendem ainda a coexistir com outros comportamentos de risco, reforçando a importância de uma abordagem integrada dos determinantes individuais, sociais e ambientais da alimentação saudável na adolescência[46, 47].

Ambiente social (Influência da Família, Pares e Escola)

A família apresenta um papel central na modulação dos comportamentos alimentares na infância. Contudo esta influência tende a diminuir durante a adolescência[33, 48, 49] devido à crescente autonomia dos adolescentes e ao

desenvolvimento de preferências alimentares fora do ambiente familiar, surgindo outros determinantes que ganham mais relevância como a influência dos seus pares[3, 20].

Não obstante esta evolução, as atitudes, os conhecimentos e as práticas parentais continuam a atuar como facilitadores cruciais[38, 50]. Práticas parentais fundamentadas na monitorização, na modelagem comportamental positiva e no fornecimento de uma boa disponibilidade alimentar em casa influenciam indiretamente a ingestão dos adolescentes e favorecem o desenvolvimento de competências de autorregulação alimentar[51, 52]. Em contrapartida, o recurso a estratégias coercivas e de controlo rígido tais como a restrição e a utilização de comida como recompensa e/ou como controlo emocional foram associadas ao desenvolvimento de comportamentos alimentares inadequados[53]. No entanto, a capacidade de implementação destas pelos pais, é fortemente condicionada por barreiras contextuais, como a escassez de tempo e a disponibilidade de alimentos[54]. Paradoxalmente, apesar dos adolescentes procurarem autonomia, os mesmos reconhecem a dependência logística da família, que controla o ambiente alimentar familiar[25].

À medida que o papel da família se reconfigura, o grupo de pares assume um relevo acrescido no quotidiano dos adolescentes[55]. A procura de aceitação social, o sentimento de pertença e a conformidade com o grupo traduzem-se frequentemente numa influência negativa sobre as escolhas alimentares, caracterizada pelo aumento do consumo de alimentos densos em energia e com baixo valor nutricional[25, 56]. Contudo, pode ser um fator protetor significativo

quando há aprovação e encorajamento dos pares para comer alimentos saudáveis[55].

Por fim, o ambiente escolar posiciona-se como um espaço privilegiado e indispensável para a promoção de saúde. Sendo o local onde os adolescentes passam a maior parte do tempo e realizam uma ou mais refeições, a escola oferece um contexto único para intervenções que tenham como objetivo promover comportamentos alimentares mais saudáveis e sustentáveis. Para além de garantir um ambiente alimentar equilibrado, a escola tem um papel crucial no desenvolvimento da literacia alimentar, capacitando os adolescentes com os conhecimentos e competências necessários para fazerem escolhas informadas e conscientes, independentemente do contexto familiar[57-59].

O ambiente alimentar obesogénico, no qual adolescentes e famílias estão inseridos, é reconfigurado por forças macrosistémicas que moldam atitudes, preferências e comportamentos, frequentemente em direção contrária às recomendações de saúde pública[20, 25]. Este ambiente reflete transformações socioculturais profundas como a dessocialização das refeições, o sedentarismo, perda progressiva de competências culinárias, e a constante presença do marketing alimentar[24, 56, 60], que criam condições estruturais e favoráveis para a escolha e consumo de produtos pobres nutricionalmente[20].

A Literacia Alimentar e Nutricional como essencial na Promoção Alimentar

Perante este cenário, impõe-se a necessidade de dotar os adolescentes de ferramentas que promovam escolhas alimentares conscientes e,

consequentemente, comportamentos alimentares saudáveis e sustentáveis. Neste contexto, a literacia alimentar e nutricional consolida-se não como um mero determinante, mas como uma competência de mediação fundamental[37]. Contudo, importa reforçar que o conhecimento, por si só, é insuficiente para alterar comportamentos. A maioria dos adolescentes portugueses demonstra reconhecer a importância de uma alimentação saudável, embora a sua compreensão de conceitos como sustentabilidade alimentar é limitada[25]. Neste mesmo estudo, os adolescentes portugueses referiram que o conhecimento/literacia alimentar e nutricional por si só, não é suficiente para impulsionar a mudança comportamental, existindo uma necessidade de alterar os ambientes alimentares[25]. Este défice sublinha a urgência de intervenções que fortaleçam a literacia alimentar e nutricional de forma abrangente, posicionando-a como eixo central para a capacitação dos adolescentes.

Neste enquadramento, a escola surge consensualmente como um agente central na promoção de estilos de vida saudáveis e sustentáveis. Contudo, a existência de políticas e diretrizes não garante a sua implementação efetiva, estando esta condicionada por fatores contextuais, recursos disponíveis e pelo envolvimento da comunidade escolar[61, 62]. Persiste, assim, uma lacuna na compreensão integrada dos comportamentos alimentares dos adolescentes e das perspetivas dos diferentes agentes escolares sobre as barreiras, facilitadores e estratégias para promover uma alimentação saudável e sustentável. Considerando a eficácia das intervenções multicomponentes[57], torna-se fundamental gerar evidência que permita compreender o adolescente e o contexto escolar de forma integrada, informando estratégias de mudança mais adequadas e sustentáveis.

Objetivo

O objetivo deste estudo consiste em explorar o comportamento alimentar dos adolescentes e as perceções da comunidade escolar (estudantes, professores, assistentes operacionais e elementos da direção) relativamente às barreiras, facilitadores e oportunidades para a promoção de uma alimentação saudável e sustentável em contexto escolar, visando fundamentar futuras intervenções co-criadas.

Metodologia

Este estudo adotou uma abordagem qualitativa, baseada primordialmente na realização de entrevistas em contexto escolar, tendo sido aprovado pela Comissão de Ética do Instituto de Saúde Pública da Universidade do Porto (CE25298) e pela Direção-Geral da Educação (N.º de inquérito: 0455200004). A opção por uma abordagem qualitativa fundamenta-se na sua capacidade única para explorar a complexidade dos fenómenos sociais e comportamentais em saúde, permitindo aceder às vivências, significados e dinâmicas contextuais que os métodos quantitativos não conseguem capturar[63]. No âmbito da promoção da saúde em contexto escolar, a investigação qualitativa revela-se indispensável para compreender não apenas de o "quê", mas do "como" e do "porquê" das escolhas alimentares dos adolescentes, auscultando diretamente a voz dos diferentes intervenientes no seu ecossistema educativo. Neste enquadramento, a realização de entrevistas com profissionais escolares, constitui uma metodologia privilegiada para mapear em profundidade as barreiras e as expectativas da comunidade escolar[64].

O recurso a esta metodologia indutiva e participativa permitiu promover a reflexão crítica e a co-criação de propostas de intervenção adaptadas à realidade concreta do ambiente escolar. A recolha e análise dos dados, caraterização detalhada dos participantes, foi realizada com recurso à Análise Temática Indutiva[65] e ao mapeamento conceptual no modelo socioecológico de Bronfenbrenner[16], bem como as considerações éticas e os procedimentos metodológicos específicos adotados nesta investigação.

Mais detalhes sobre a metodologia deste trabalho encontram-se descritos em pormenor no manuscrito abaixo.

Resultados, Discussão e Conclusão

Manuscrito

Perceptions of Adolescents, Teachers, and Support Staff Regarding Inadequate Eating Habits in Adolescence: Associated Factors and Strategies for Improvement

*Proposta de artigo desenvolvido por **Margarida Rito** no âmbito do Projeto PASCE – Promoção da Alimentação Saudável em Contexto Escolar, financiado pela Câmara Municipal do Porto através do PAOITI/PRR e implementado pelo Instituto de Saúde Pública da Universidade do Porto.*

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Introduction

Dietary intake is a key determinant of lifelong health, and adolescence is a critical period for the consolidation of long-lasting dietary patterns[1, 2]. During this stage, adequate nutrition is essential for physiological growth and maturation[3, 4], playing a key role in the prevention of non-communicable diseases, which often originate early in life [5, 6]. However, adolescence is frequently characterized by an unfavourable nutritional transition[7, 8], marked by the skipping of main meals[9], particularly breakfast[10] and a high consumption of foods rich in free sugars and saturated fats [10-15]. These dietary behaviours reflect suboptimal dietary quality and are further influenced by the increasing autonomy that accompanies adolescence, leading to greater independence in food-related decision-making and increased exposure to food environments that often do not promote healthy dietary choices[16-18].

Adolescent eating behaviour is shaped by a complex interplay of social, environmental and individual factors, including family[19, 20], peers[21], and socioeconomic conditions[22]. Within this framework, the school represents a particularly important setting for health promotion[7, 23], as it provides a structured environment where dietary behaviours can be influenced daily. However, the effectiveness of school health promotion may be limited by several perceived barriers, including low acceptability of school meals and unfavourable contextual factors such as noise, overcrowding, long waiting times and limited comfort, which may reduce students' willingness to use the school canteen[9, 24, 25]. As a result, adolescents may be more likely to obtain food outside the school environment, where greater autonomy and social influences shape choices that

are often more energy-dense and less aligned with nutritional recommendations[11, 22, 26]. This systematic exposure to obesogenic environments outside school grounds, coupled with suboptimal dietary habits, has been directly linked to a rising global prevalence of metabolic complications and excessive weight gain during youth[2, 27].

In Portugal, the consequences of these dietary behaviours and environmental vulnerabilities are particularly concerning, given the high prevalence of overweight and obesity among children and adolescents. Recent data from the Childhood Obesity Surveillance Initiative (COSI 2022) indicate that 31.9% of children and adolescents are overweight[23]. This condition represents a major public health concern, not only due to its persistence into adulthood[28], but also because it is already associated with early cardiometabolic risk markers [29]. National evidence further highlights unfavourable dietary patterns among adolescents, including high consumption of ultra-processed foods, such as snacks and sugar-sweetened beverages[14], reinforcing the need for effective school-based strategies to promote healthier eating behaviours.

Although international literature has highlighted the role of peers and environmental influences, research has predominantly focused on students' perspectives[21], with limited attention to the views of those who are involved in the daily functioning of schools. In the Portuguese context, studies exploring adolescent dietary behaviours from the perspective of school support staff remain scarce. Importantly, teachers and support staff may provide valuable complementary insights[7, 9], given their continuous presence in the school environment and their ability to observe eating behaviours, contextual influences,

and practical barriers that are not always captured through student self-report. From a public health implementation perspective, incorporating the perspectives of multiple school stakeholders, alongside adolescents themselves, may enhance the co-creation of interventions and increase their acceptability, feasibility, and sustainability [8, 30, 31].

Therefore, this study aims to explore adolescent dietary behaviours through the perceptions of adolescents, teachers, and school support staff, focusing on perceived barriers and facilitators to healthy eating during adolescence, as well as suggestions for improvement, to inform future co-created school-based interventions.

Materials and Methods

Setting and Participants

This study was conducted within the scope of the "Healthy Eating Promotion in Schools Project" (*Programa de Alimentação Saudável em Contexto Escolar* – PASCE), a school-based initiative funded by the Municipality of Porto, Portugal. The project aimed to support the improvement of adolescents' eating behaviours in the school setting. This project was implemented between September and December 2025 and covered three schools, with students from the 6th to the 9th grade (approximately 10 to 15 years of age).

A convenience sample of professionals from the school community was recruited across the three participating schools. Following the presentation of the project, each school was contacted via email and asked to identify key staff

members to be interviewed about perceived barriers to healthy eating among students and potential strategies for improvement. Based on staff identified by the schools, a total of 16 participants were invited to take part in the study: 3 board members, 7 teachers (including 4 responsible for the Health Education Programme) and 6 support staff (including 3 responsible for supervising the school canteen and"school snack bar). In addition, a group of 202 students aged 11-14 years old participated in the study through a classroom-based activity conducted as part of the PASCE intervention.

This study was approved by the Ethics Committee of the Institute of Public Health of the University of Porto (CE25298) and by the Directorate-General for Education (Survey No.: 0455200004), following the Consolidated Criteria for Reporting Qualitative Research (COREQ)[32]. For the interviews, participants consented to audio and video recording (for online interviews), with recordings being immediately deleted after transcription.

Data Collection

Data were collected through two complementary approaches: a structured classroom activity with students and semi-structured interviews with school professionals.

Within the classroom context, a group of 202 students participated in a structured activity designed to explore their perceptions of barriers to the adoption of healthy eating habits during adolescence. As part of this activity, students were asked to provide written responses to an open-ended question regarding the main barriers influencing their food choices. This approach aimed

to capture students' perspectives directly, complementing the insights obtained from school stakeholders. Nonpersonal information was collected.

Semi-structured interviews were conducted to explore school stakeholders' perceptions of barriers to the adoption of healthy eating behaviours in adolescence within the school context, as well as to identify potential strategies and solutions for improvement. The interviews had an average duration of 30 to 45 minutes and were conducted in Portuguese by three members of the research team. To ensure methodological rigour and depth of data collection, each interview was conducted by two researchers: one acting as a facilitator responsible for guiding the interview and the second dedicated to taking detailed field notes and recording non-verbal observations.

The semi-structured interview guide, originally developed in Portuguese (Appendix A), was structured into thematic blocks covering: i) characterization of current adolescents' eating behaviours; ii) perceived barriers to the adoption of healthy eating behaviours; iii) perception of the school food environment and the influence of the surrounding context; and iv) proposed strategies for improvement proposals and capacity-building opportunities.

Due to participant availability, thirteen interviews were conducted in person and three were carried out via the Microsoft Teams platform. A neutral and comfortable environment was ensured in all settings and care was taken to use clear and accessible language throughout the interviews[33]. In addition to the predefined sample size, particular attention was given to data saturation, which

was monitored throughout the data collection process and considered achieved within the constraints of the school settings and participant availability.

Information regarding participants' professional role and sex was also collected.

Data Analysis

Interviews were audio-recorded (and video-recorded when online) and transcribed verbatim. In addition, written responses from students collected through the classroom-based activity were compiled and prepared for analysis. All qualitative data were analysed using an inductive thematic approach following Braun and Clarke's (2006)[34]. This process was operationalized in two complementary stages.

First, exploratory extraction and coding were performed using Microsoft Word and Excel. To ensure rigour and reliability, initial coding was conducted independently by two researchers. Preliminary codes were subsequently compared and adjusted until consensus was reached, with the process documented in an iterative codebook. The broader research team was also involved in the discussion and refinement of the coding framework, contributing to the interpretation and validation of emerging categories.

In the second stage, a latent interpretative analysis grounded in social constructionist principles[35, 36] was conducted, leading to the construction of a dynamic thematic map based on the Bronfenbrenner's socio-ecological model[37]. This framework allowed for the visualization of complex interconnections between

data and the organization of emerging categories into five levels of influence: Individual, Family , School, Community and Environment.

To ensure transparency and credibility, reflexive discussions were held among researchers to validate data interpretation. Illustrative quotes (verbatims) were selected to support the analysis while preserving participant anonymity. Some of the excerpts were translated into English for inclusion in the manuscript, ensuring that the original meaning and intent of participants' statements were maintained.

Results

The findings were structured according to Bronfenbrenner's socio-ecological model and presented across five levels of influence: individual, family, school, community and environmental factors. A synthesis of these data is systematized in Figure 1 and Table 1, while the illustrative transcripts are detailed in Supplementary table 1.

At the **individual level**, the analysis of perceptions highlights several interrelated barriers to healthy eating among adolescents. A strong consensus was observed across all groups (school board (SB), teachers (T), support staff (SS), and adolescents (A)) regarding the high consumption of ultra-processed foods and energy drinks during adolescence.

> *"They avoid bread and fruit, they prefer sweets and fizzy drinks, and that's what they consume during breaks and not just then; I think their consumption is excessive"* (Interview-I, SS)

In contrast, adolescents specifically report an inadequate consumption of fruit, vegetables and fish, while the behaviour of skipping breakfast was mainly highlighted by adults. Our findings further suggest that the high intake of energy-dense foods is driven by neurobiological and behavioural factors characteristic of adolescence, including strong hedonic responses to palatable foods, limited dietary self-regulation and emotional eating. Participants described a persistent "*urge to eat sweets*", a preference for highly palatable, nutrient-dense foods and severe difficulties resisting food-related temptations, particularly during periods of stress, boredom or negative emotions. For some adolescents, these patterns are further complicated by body image-related concerns, including an explicit desire for thinness.

Overall, these findings are framed by a widely shared perception of a knowledge–behaviour gap, as all groups acknowledge that although adolescents are aware of the importance of healthy eating and that they are sufficiently knowledgeable about diet and nutrition, this awareness does not consistently translate into healthier dietary behaviours:

> *"They are aware of the importance of healthy eating and the harmful effects of consuming unhealthy food, yet they continue to have inadequate habits."* (I, SB); *"They have this mindset that nothing will ever happen to them... that they will be eternally healthy."* (I, T)

Despite acknowledging that theoretical awareness alone is insufficient to modulate behaviour, school board and teachers still predominantly advocated the need to integrate nutrition education into the school curriculum in a continuous

and sustainable manner over time. Their proposals focused on developing practical skills and critical autonomy, aiming to bridge the knowledge-behaviour gap by preparing students for real-world choices. As a participant emphasized, the objective is:

> "t*o equip students with value judgements so that they can make informed decisions regarding advertising (...) and know how to read a nutritional label"* (I, SB).

The **family context** was described as a key determinant, particularly by adults, who highlighted low parental food literacy and time constraints due to demanding daily routines as major influences on adolescents' food choices and consumption:

> *"There is a complete lack of food education within families."* (I, SB), *"The adolescents are on their own, and what do they eat? Whatever is at hand, whatever is easiest to open and eat on the spot."* (I, T)

Adolescents validate the impact of the home food environment, reporting a lack of decision-making power over main meals and a reliance on frozen and processed options due to parents' lack of time. Additionally, teachers and the adolescents themselves converge on the identification of economic barriers, recognizing that foods considered healthier carry a higher financial cost.

Additionally, school support staff also highlighted parental permissiveness towards adolescents' food preferences, together with the provision of financial

resources that enable eating outside school, both of which may favour nutritionally poor food choices:

> *"Most parents prefer giving them money to go eat outside schools such as hamburgers and hot dogs, rather than having the trouble of preparing a healthy meal."* (I, SS)

Finally, school stakeholders generally reported a discrepancy between home and school food environments, highlighting the family context as a key factor contributing to students' rejection of, or dissatisfaction with school meals:

> *"They are not used to consuming those same foods (the school canteen provision) at home."* (I, SB).

To address this challenge, participants propose increasing parental involvement in nutritional education and strengthening collaboration between school and families.

Within the **school context**, three main institutional barriers were identified across all groups of participants. The most prominent was widespread dissatisfaction with school food provision, particularly canteen meals. This includes low acceptability of meals and perceived poor organoleptic quality, which contributes to frequent rejection of school-provided food. As a corrective strategy, participants suggest optimizing the organoleptic quality and visual appeal of school meals.

> *"Most of them turn down the offer because they don't like it, and look for alternatives outside school…"* (I, SS)

The second barrier relates to the limited variety of food items available for sale at the school snack bar. Participants reported a restricted range of options, which reduces student choice and encourages the search for alternative foods outside the school environment. As a participant noted, even when official guidelines are met, the options remain unvaried:

> *"We can only sell certain foods, they (authorities) automatically remove the others, and this gives students the impression that the school is restrictive."* (I, SS);

> *"Although they adhere to the school meal guidelines, the variety of food options available is limited"* (I, SB)

Lastly, the absence of a structured, curriculum-based nutrition education programme, together with insufficient teacher training in food and nutrition literacy, was identified as an institutional barrier. This gap is perceived as limiting the systematic promotion of healthy eating behaviours within the school setting:

> *"Occasional initiatives are not enough… we need projects with a clear beginning, middle and end, which integrate school health and sport in a holistic way (…) Teachers need to be equipped with tools… training initiatives that enable them to address these issues across the curriculum."* (I, T).

At the **community level**, two main contextual influences were consistently identified across participants: the external commercial food environment nearby school and the peer influence during school breaks.

A highly prevalent factor concerns the attractiveness of the out-of-school food environment surrounding schools, particularly commercial food outlets. Participants reported that the proximity, autonomy and variety offered by these local establishments make them more appealing than the school food environment, leading students to systematically leave school grounds during break periods. This displacement is driven by the immediate appeal of ultra-processed options, as illustrated by the participants:

> *"Students do not use [the school canteen] and choose foods outside school, such as commercial establishments and/or local shops due to proximity..." (I, T); "...they go outside to buy foods like pizzas, fries, biscuits, soft drinks they always prefer what is bad for them."* (I, SB)

Another key factor relates to peer influence, which was reported as a transversal determinant of food-related behaviours across all participants. Eating behaviours are frequently shaped by collective decision-making dynamics among peers.

> *"Behaviour during recess is influenced by the group, which tends to imitate each other."* (I, SB); *"If one eats X, the others feel the pressure to do the same to belong to the group. The purchase decision ends up being collective."* (I, T)

Adolescents further confirm that peer influence can negatively condition their individual food choices, reinforcing peer conformity over personal preference or nutritional awareness. In contrast, participants also highlight a potential positive use of peer dynamics, suggesting the implementation of peer-led approaches, whereby students act as *"youth health promoters"* (I, T), making

use of peer social influence to encourage healthier eating behaviours within peer networks.

Regarding the **environment level,** all groups identify the influence of marketing on food choices. School boards and teachers highlight the impact of geographic convenience marketing, characterized by constant visual exposure and the strategic placement of sweet shops and small food outlets just outside school gates:

> *"Brands have great economic power (...) visual exposure is constant (...) they have the sweet shop right at the door with lines and lines. It is convenience marketing."* (I, SB)

Adolescents expand this barrier to the digital sphere, reporting the massive impact of social media content in stimulating the desire to consume ultra-processed foods. Faced with the vulnerability of the surroundings, school board members and teachers advocate for a response based on the regulation and control of public spaces, suggesting the implementation of policy measures that strictly limit access to and the sale of energy-dense, nutritionally poor foods in the immediate surroundings of the school.

"The commercial infrastructures nearby school end up attracting them... [it would be necessary] to restrict the easy access and visual appeal of those products. There should be a limitation(...)" (I, T) *"...[there is a] need for regulation of what is sold at the school gates... so there isn't such facilitated access."* (I, T)

Discussion

The present study identified barriers to healthy eating among adolescents across five socioecological levels. At the individual level, some knowledge–behaviour gap was consistently reported, suggesting that interventions must move beyond informational approaches. At the family level, low parental food literacy, time constraints and economic barriers emerged as key structural determinants, reinforcing the need for school–family collaboration. Within the school context, poor canteen meal quality, limited food variety and the absence of curriculum-integrated nutrition education were the main institutional barriers identified, highlighting the value of sustained whole-school approaches. At the community level, the proximity of commercial food outlets and peer dynamics were identified as powerful drivers of unhealthy choices, alongside the potential of peer-led health promotion strategies. Finally, at the environmental level, invasive food marketing (both physical and digital) underscores the need for regulatory measures restricting adolescents' exposure to energy-dense food environments.

The findings of the present study reveal that all participants consistently identify high consumption of ultra-processed foods and energy drinks among adolescents, complemented by low consumption of vegetables, fruits and fish. These results are corroborated by national data, specifically *The UPPER Project* highlighted that more than one-third of adolescents' daily energy intake derives from ultra-processed products, with 51.1% falling into an unhealthy dietary pattern, characterised by a higher consumption of sugar-sweetened beverages, industrial breads and sausage[28]. Also, the National Food and Physical Activity Survey report reinforces this scenario, indicating that approximately 78% of

Portuguese adolescents fail to meet the World Health Organization (WHO) recommendations for fruit and vegetable consumption[14]. Alongside poor diet quality, breakfast omission emerged as a major disruption in adolescents' dietary routines. Scientific evidence confirms that breakfast is the most frequently skipped meal during adolescence[38], often leading to subsequent compensatory food choices characterized by high energy density and low nutritional quality[17].

In this study, adolescents mentioned that these choices are driven by a preference for palatable flavours and difficulties in self-regulation, aspects that are already widely highlighted in the literature[39]. This vulnerability is partly explained by developmental neurobiology, where the still-maturing prefrontal cortex is overridden by the immediate gratification-seeking nature of the limbic system[18, 40]. This biological sensitivity justifies their preference for highly palatable options and increased impulsivity, traits that are actively exploited by digital marketing strategies.

At the family level, time scarcity and parents' overburdened work schedules emerged as critical determinants in this study. This lack of time translates into a systematic reliance on processed and frozen meals due to their convenience and practicality. This pattern is often compounded by limited food and nutrition literacy, which hinders families' ability to make informed choices within increasingly complex food environments[41]. Parental time constraints and their own inadequate dietary habits are extensively documented as factors that compromise adolescent diet quality and reduce the frequency of structured family meals, which are essential for appetite regulation and serve as protective factors against obesity and eating disorders[42]. Additionally, financial barriers outlined by

our participants play a central role, as the higher cost of fresh foods leads ultra-processed products and fast food to be perceived as more affordable alternatives[16].

The disconnection between health recommendations and family realities extends to the school context, where the dissatisfaction with school food provision reported in this study aligns with the literature[8, 31]. Regarding school snack bar options, participants complained about a lack of variety, a limitation that literature attributes to strict compliance with current school health guidelines[30]. Conversely, the rejection of canteen meals in this study was attributed to low palatability and poor visual appeal, which represent the strongest predictors of food acceptance or waste among youth[9]. These constraints are significantly exacerbated by other barriers such as excessive noise, overcrowding and limited time to eat. Allied with physical barriers, these issues undermine the health-promoting potential of the school environment. According to Rito et al. (2023), the persistence of these barriers compromises the pedagogical effectiveness of schools as privileged settings for health promotion[23]. Additionally, evidence suggests that schools face structural barriers to sourcing foods that meet nutritional standards while also allowing them to provide varied and appealing menus for adolescents[9, 43].

In this study, the results revealed an interpretative contrast: while adolescents focused their criticisms on the technical and logistical quality of the service, school support staff tended to attribute meal rejection to cultural factors and deeply ingrained family habits. This tendency to attribute responsibility primarily to the home environment, rather than recognising the interplay between school

and family influences, has also been described in previous studies[9]. Instead of assigning responsibility to one setting, evidence suggests that schools and families should be viewed as complementary environments for shaping adolescents' eating behaviours[44]. As key settings for health promotion, schools have an important role in fostering healthy eating, but their efforts are more effective when reinforced by consistent messages and practices at home[30]. When these environments are not aligned, adolescents receive conflicting messages about food choices. While schools promote healthy choices through nutritional guidelines, these are frequently perceived by youth as overly restrictive or misaligned with their organoleptic preferences[9]. Families, on the other hand, often face financial, time and logistical constraints that limit the implementation of these recommendations, reducing the effectiveness of school-based interventions[13, 45] and potentially reinforcing diet quality inequities rooted in socioeconomic status [8, 24].

This lack of coherence across adolescents' main social environments may also increase the influence of other social determinants of food choice. In this study, participants consistently reported that adolescents' food choices were heavily influenced by their peers. This finding is consistent with previous evidence identifying peer influence as an important determinant of ultra-processed food consumption, particularly during adolescence, when food choices function as markers of identity, belonging and conformity to social norms[21]. Regarding the surrounding environment, participants highlighted the persuasive impact of marketing, with adolescents describing continuous exposure across both physical and digital settings. In the physical environment, this concern is supported by

evidence showing that a high density of fast-food outlets surrounding schools undermines the positive impact of healthier food options available within the school environment[26]. Likewise, adolescents' perceptions of digital marketing are consistent with previous studies demonstrating the effectiveness of social media advertising and influencer marketing in shaping young people's food preferences and purchasing behaviours[11, 46].

In response to this pervasive exposure, participants consistently advocated for stricter regulation of food marketing directed at adolescents. This perspective aligns with the Portuguese Directorate-General of Health (DGS) pilot study using the WHO CLICK tool, which evaluated the implementation of Portuguese Law No. 30/2019. While this legislation restricts the advertising of foods high in sugar, salt, and saturated fat to children under 16 years of age, the study revealed that 81% of digital advertisements seen by Portuguese youth still promote products that fail to meet these nutritional criteria[47]. However, the WHO report also highlighted that although restrictions have reduced exposure in traditional media and certain physical settings, digital platforms remain insufficiently regulated, allowing food companies to reach adolescents through sophisticated techniques like influencer marketing[11].

Importantly, participants also suggested that regulating the external food environment alone is insufficient[30]. Evidence from longitudinal studies suggests that a high density of external food outlets can significantly attenuate the positive impact of healthy food availability within schools, highlighting the need for place-based policies that restrict the proximity of fast-food retail to educational settings[26]. Although Portuguese school food policies establish nutritional

standards for foods available within schools, adolescents frequently described the available options as lacking variety and appeal[44]. This misalignment often leads to the "*too healthy*" paradox, where students reject canteen meals not due to a lack of nutritional value, but because of low palatability and poor visual appeal, which remain the strongest predictors of food acceptance in this age group. These findings suggest that effective interventions require a comprehensive approach that combines stronger regulation of food marketing, particularly in digital environments, with improvements in the attractiveness, variety and acceptability of healthy foods offered in schools. Otherwise, adolescents may continue to seek alternative food sources despite the existence of school food policies and nutritional standards[41].

The findings of this study highlight a substantial knowledge–behaviour gap, indicating that the primary barrier to healthy eating in adolescence is not a lack of nutritional knowledge, but the difficulty of translating this knowledge into healthier dietary behaviours. These results demonstrate that although adolescents can identify the guidelines of a balanced diet, this cognitive knowledge remains ineffective against environmental incentives. In fact, isolated knowledge does not provide the self-regulation skills needed to override automatic or non-conscious impulses triggered by hyperpalatable food cues[39]. To address this gap, participants advocated integrating nutrition education across the school curriculum. Evidence suggests that combining nutrition education with improvements to the school food environment, such as nudging strategies and healthier canteen offerings, is more effective in promoting healthy eating behaviours than classroom-based education alone. As a complementary strategy

to increase adolescent engagement, participants suggest implementing peer-led approaches, turning adolescents into active *'health promoters'*. Our empirical proposal highlights the potential of peer-led approaches, which aligns with previous literature demonstrating that peer-led initiatives are highly effective in enhancing intervention acceptability and outcomes[7, 21]. Furthermore, actively involving students in intervention design aligns initiatives with their actual social dynamics, ensuring greater efficacy, acceptance and sustainability in promoting healthy eating behaviours[31].

In this context, our findings also underscore the need to expand the traditional socio-ecological model beyond physical spaces such as the home, school, and immediate community. The digital environment particularly social media platforms and the targeted marketing of ultra-processed foods and energy drinks emerged in adolescents' discourses as a pervasive, cross-cutting ecosystem. This digital landscape acts as a powerful amplifier of unhealthy dietary habits, where peer pressure and social norms are no longer confined to the school grounds, but are continuously reinforced online. Consequently, school-based food literacy initiatives must evolve to incorporate digital media literacy, empowering adolescents to critically navigate and deconstruct commercial food cues and digital marketing strategies.

While this study provides valuable qualitative insights, inherent methodological limitations must be considered. First, there is a potential for reporting bias, specifically social desirability among adult stakeholders. Second, different data collection methods were used across participant groups due to practical and logistical constraints within the school environment. While adult

stakeholders participated in semi-structured interviews, adolescents provided written responses to open-ended questions during a classroom activity. Although both approaches were appropriate for the respective contexts, the interviews yielded richer and more detailed accounts than the adolescents' written responses. The main strength of this study lies in the triangulation of perspectives from key stakeholders within the school community. By capturing the views of school board members, teachers, support staff and adolescents, it was possible to identify convergences and perceptual asymmetries that would not have emerged from a single stakeholder group. Methodological rigour and transparency were further strengthened through adherence to the COREQ guidelines[32], ensuring reflexivity throughout the research process and independent consensus during data analysis. Beyond these methodological considerations, the findings offer a significant conceptual contribution to the application of Bronfenbrenner's socio-ecological model[37]. Specifically, they suggest that digital food environments transcend traditional geographical boundaries, allowing marketing and social media content to influence adolescents immediate microsystem regardless of physical proximity.

From a research and practice perspective, these findings should be used to transition from generic school nutrition programs toward highly tailored interventions that directly target the specific structural and environmental barriers reported by the school community. Future initiatives should leverage these institutional insights to design multi-level strategies focused on improving school canteen meal acceptability, regulating the immediate out-of-school food

environment and implementing peer-led literacy interventions that effectively counter obesogenic pressures.

Conclusion

This study identifies the critical factors that shape adolescents' eating behaviours across the socio-ecological spectrum, highlighting that a high level of nutritional awareness does not translate into healthy choices due to powerful environmental barriers. The main individual and family barriers to healthy eating include strong sensory preferences for ultra-processed foods, parents' time constraints, low food literacy within the family context and financial constraints. Within the school environment, barriers to healthy eating include dissatisfaction with the organoleptic quality of canteen meals, a limited range of options in the school café and the lack of structured nutrition education integrated into the school curriculum. These factors encourage adolescents to bring food from home or purchase food outside the school environment, thereby reducing the effectiveness of school food policies. At the community and environmental level, healthy food choices are further undermined by intense peer pressure, ubiquitous marketing and the widespread availability of unhealthy food outlets surrounding schools. To overcome these challenges, the school community largely advocates for interconnected and sustainable strategies. These include the systematic integration of food and nutrition literacy into the school curriculum and increased parental involvement. Furthermore, participants emphasise the need to improve the sensory and visual appeal of school meals, implement peer-led intervention programmes and apply policy and regulatory measures to control the sale and marketing of energy-dense foods in the immediate vicinity of schools.

Figure 1. Barriers to healthy eating among adolescents based on the Socio-ecological Model

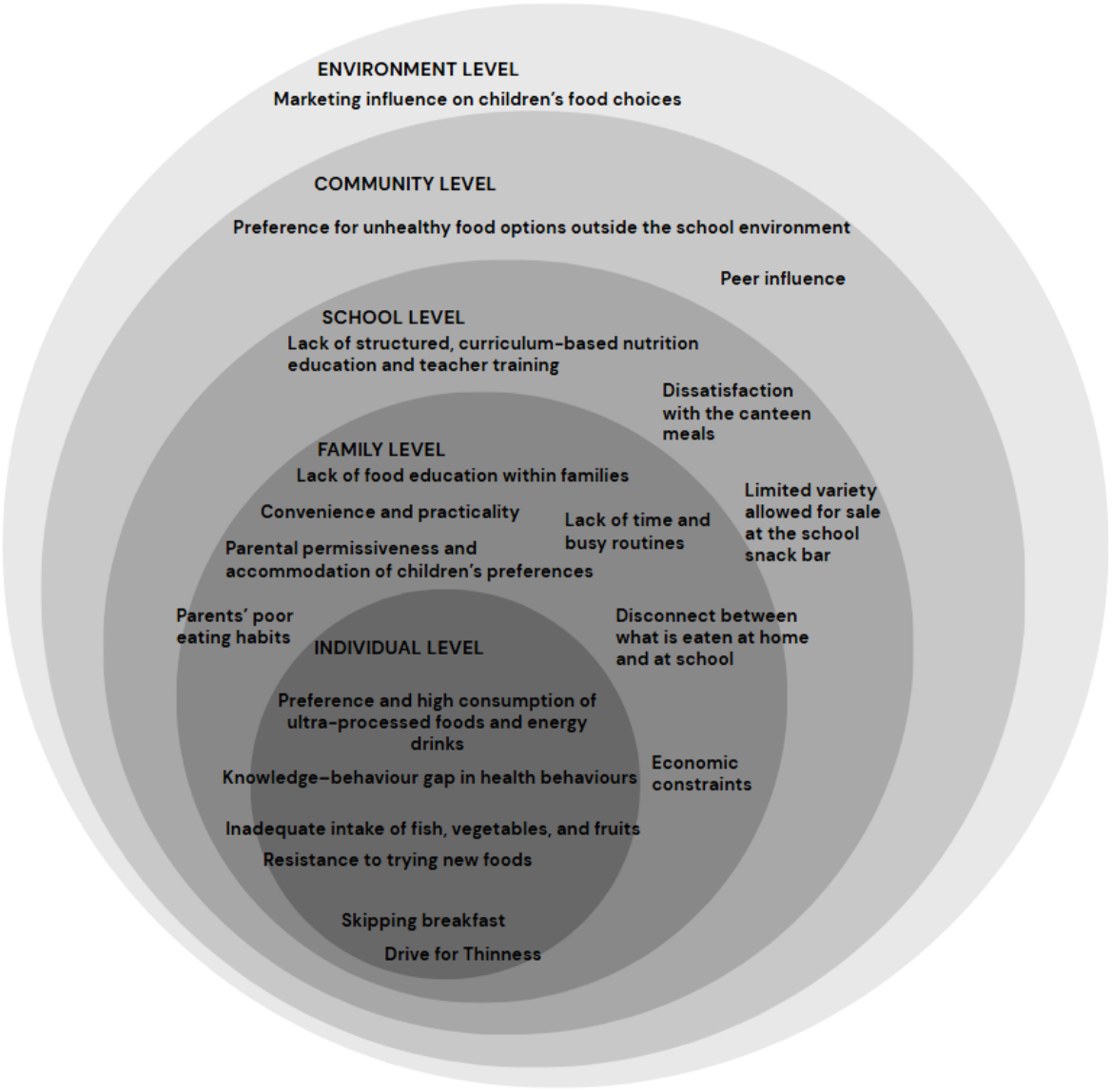


Table 1. Summary of reported barriers to healthy eating in adolescence and suggested solutions by school board members, teachers, and support staff

	Barriers				Suggested solutions			
	Adolescents (n=202)	Board (n=3)	Teachers (n=7)	Support staff (n=6)		Board (n=3)	Teachers (n= 7)	Support staff (n=6)
Individual level								
Preferences and high consumption of ultra-processed foods and energy drinks	✓	✓	✓	✓	Food and nutrition literacy	✓	✓	—
Skipping breakfast	—	✓	✓	✓				
Knowledge–behaviour gap in health behaviours	✓	✓	✓	✓				
Inadequate intake of fish, vegetables, and fruits	✓	—	—	—	—	—	—	—
Resistance to trying new foods	✓	—	—	—	—	—	—	—
Drive for Thinness	✓	—	—	—	—	—	—	—
Family level								
Lack of food education within families	—	✓	✓	—	Food and nutrition literacy	✓	✓	—
Convenience and practicality	✓		✓	✓				
Parents' poor eating habits	✓	—	—	—	—	—	—	—
Lack of time and busy routines	✓	✓	✓	✓	—	—	—	—
Economic constraints	✓	—	✓	—	—	—	—	—
Disconnect between what is eaten at home and at school	—	✓	✓	✓	Involve the parents	—	✓	✓
Parental permissiveness and accommodation of children's preferences	—	✓	—	✓				

School level								
Dissatisfaction with the canteen meals	✓	—	✓	✓	Appeal and attractiveness of healthy	✓	✓	✓
Limited variety allowed for sale at the school snack bar	✓	✓	—	✓	—	—	—	—
Lack of structured, curriculum-based nutrition education and teacher training	—	✓	✓	—	Integration of Diet and Nutrition into the school curriculum and sustainability of actions	✓	✓	—
Community level								
Preference for unhealthy food options outside the school environment	✓	✓	✓	✓	Limiting access to unhealthy food at school gates	✓	✓	—
Peer influence	✓	✓	✓	✓	Young people as agents of change	✓	✓	—
Environment level								
Marketing influence on children's food choices	✓	✓	—	—	—	—	—	—

Legend: Markings (✓) identify the topic mentioned by the specific group.

Supplementary Table 1. Example of transcriptions *on perceived barriers and suggested solutions to healthy eating among adolescents*).

Barriers	
Individual level	
1.1. High consumption of ultra-processed foods and energy drinks	"They avoid bread and fruit, they prefer sweets and fizzy drinks, and that's what they consume during breaks and not just then; I think their consumption is excessive" (I, SS) "They frequently resort to this type of food: hamburgers, fries" (I, SB); "biscuits, soft drinks, [...] packaged cheese, those packaged potato chips with cheese, etc." (I, SS); "first thing in the morning." (I, SS); "The reasons that keep me from having a healthier diet are my cravings for sweets and the fact that I love highly seasoned food." (Q, A); "I prefer foods that are not good for my health, and whenever I am nervous or bored, I can't stop eating." (Q, A) "Most of the time, it's just the temptation to eat or do what I know I shouldn´t" (Q, A); "because when I'm hungry, I eat anything" (Q, A); "sometimes I can't resist, and every now and then, I eat what I shouldn't." (Q, A)
1.2. Skipping breakfast	"The majority of students do not eat breakfast at home." (I, T); "They come to school without having breakfast. The first meal they have is based on fast food." (I, SB)
1.3. Knowledge–behaviour gap in health behaviours	"They are aware, but they have this mindset that nothing will ever happen to them [...] that they will be eternally healthy." (I, T) "They are aware of the importance of healthy eating and the harmful effects of consuming unhealthy food, yet they continue to have inadequate habits." (I, SB); "There isn't one specific reason, I just don't like many of the foods that I know are healthy and better for me" (Q, A) "I think the adolescents are genuinely interested in it, but whether they will actually put it into practice, well, that's a whole different story." (I, SB) "Because I don't know how to prepare food and I don't know any healthy meals that I actually like" (Q, A); "(…) not knowing how to cook." (Q, A)
1.4. Inadequate intake of fish, vegetables, and fruits	"I don't like any kind of fish and I don't eat vegetables [...] I rarely ever eat fruit and vegetables." (Q, A)
1.5. Resistance to trying new foods	"I dislike certain foods either because of their flavour or texture, and I rarely try anything new." (Q, A)
1.6. Drive for thinness	"I can't eat without feeling nauseous, and I keep comparing myself to thinner people." (Q, A)

Family level	
2.1. Lack of food education within families	“There is a complete lack of food education within families.” (I, SB) “The school addresses these topics (e.g., 'Fruit Heroes') [...], but the family environment ends up overriding it." (I, T) “Without a doubt, a lot of it comes down to how they are raised at home [...] the school does its part, but at the family level…” (I, T)
2.2. Convenience and practicality	“Often, the example does not come from home [...] parents give them whatever is most practical. And what is practical? It's a packet of biscuits, it's sugary chocolate drinks, or those tiny bags of potato chips that are easy to throw into a backpack.” (I, T); “Most parents prefer giving them money to go eat outside school such as hamburgers and hot dogs, rather than having the trouble of preparing a healthy meal.” (I, SS) “Many parents work late, the adolescents are on their own, and what do they eat? Whatever is at hand, whatever is easiest to open and eat on the spot.” (I, T)
2.3. Parents’ poor eating habits	“The rest of my family eat things that aren’t so healthy” (Q, A)
2.4. Lack of time and busy routines	"Parents get home late, exhausted, so what do they do? Whatever is fastest. Sometimes it’s fast food or pre-packaged meals [...] because it's convenient, isn't it?!” (I, T); “My mother has been very busy with work, so she resorts to frozen meals, but when she has time, she cooks healthy meals.” (Q, A)
2.5. Parental permissiveness and accommodation of children’s preferences	“The parents are aware of it, yet [...] they still give them money to go out and buy those things."(I, SS); “The response that parents give is that the food at school is terrible and the child needs to eat. And if he likes hot dogs, they have to give the hot dog to the boy."(I, SB)
2.6. Economic constraints	“[...] and then there is the financial aspect. It is simply cheaper to buy a packet of biscuits or an industrial pastry than to prepare a healthy snack” (I, T) "Normally, foods considered healthier are more expensive.” (Q, A)
2.7. Disconnect between what is eaten at home and at school	“It comes from home, from the family environment [...] they simply state that they are not used to consuming those same foods (the school canteen provision) at home.” (I, SB); “They say the food is bad, but that is because they aren't used to eating this type of more natural food at home.” (I, T)
School level	
3.1. Dissatisfaction with the canteen meals	“Most of them turn down the offer because they don’t like it, and look for alternatives outside school.” (I, SS);

	“The food has no salt, they serve small quantities, particularly of soup and salad.” (Q, A)
3.2. Limited variety allowed for sale at the school snack bar	“We can only sell certain foods; they automatically remove the others, and for students this gives the impression that the school is restrictive, that the school imposes things."(I, SS); “Although they adhere to the school meal guidelines, the variety of food options available is limited” (I, SB)
3.3. Lack of structured, curriculum-based nutrition education and teacher training	“We have occasional initiatives; however, we need projects with a clear beginning, middle, and end, which we have never had.” (I, T); “There is neither the time nor the training for this to happen consistently.” (I, T); “The school ends up being somewhat passive in that regard [...] there is no consistent framework for food literacy, just isolated actions.” (I, SS); “The capacity for value judgement is missing... the student has the information, but the school has not empowered them to know how to decide when faced with advertising and the available offer.” (I, SB)
Community level	
4.1. Preference for unhealthy food options outside the school environment	“Students do not use (the school canteen) and opt for food outside of school, such as commercial establishments and/or local shops due to proximity...” (I, T); “they go outside to buy foods like pizzas, fries, biscuits, soft drinks, they always prefer what is bad for them.” (I, SB)
4.2. Peer influence	“Behaviour during recess is influenced by the group, which tends to imitate each other.” (I, SB); “If one eats X, the others feel the pressure to do the same to belong to the group. The purchase decision ends up being collective.” (I, T); “They always hang around in packs [...] and whatever one of them has in their hand, the others immediately run to the local food outlets in the school neighbourhood to buy the exact same thing.” (I, SS); “My peers lead me down the wrong path.” (Q, A)
Environment level	
5.1. Marketing influence on children’s food choices	“Brands have great economic power and succeed through advertising [...] which is always very suggestive and attractive. Visual exposure is constant [...] they have the sweet shop right at the door with lines and lines. It is convenience marketing, suggestive and attractive advertising that causes curiosity.” (I, SB) “The influence of social media, when those ultra-processed foods appear and trigger the urge to eat that.” (Q, A)
Suggested solutions	
1. Food and nutrition literacy	“We need to equip them with value-judgement skills so that they can make decisions when confronted with advertising, such as knowing how to read a nutrition label (...)” (I, SB)

	"They know what is right [...] they know the food wheel, but adolescence is a tough stage and it's as if they are driven to eat everything they shouldn't." (I, T); "We have to work on literacy not only in terms of knowledge but also in practice: bringing students into the kitchen, showing them how things are prepared" (I, SB) "Anything that involves dynamic, hands-on activities is far more appealing to them." (I, T) "These adolescents lack a lot, especially food literacy; it would be something interesting, just as they already have financial literacy. Because the adolescents do not have a real understanding of value/cost." (I, SB)
2. Involve the parents	"It is essential to bring parents into the school, share with them what their children eat, and try to align eating habits at home." (I, SS) "Bringing parents into the school environment is considered a relevant aspect" (I, T)
3. Appeal and attractiveness of healthy school food	"Change the face of food [...] it's not just about being healthy, it has to be visually appealing, have colour, and be something they actually want to eat." (I, SS); "*We have to adjust the menus, so they aren't 'punitive'* [...] *if it's fish, they don't accept it; we need to find ways to make the healthy option competitive with the outside [in terms of taste/appearance]."* (I, T) "The school canteen complies with every single regulation [...], but it completely lacks the 'appeal' that the outside world offers." (I, T)
4. Integration of Diet and Nutrition into the school curriculum and sustainability of actions	"Occasional initiatives are not enough, we need projects with a beginning, middle, and end, involving School Health and Sport in an integrated way [...] It is necessary to provide teachers with tools… training initiatives that allow them to address these themes transversally." (I, T)
5. Limiting access to unhealthy food at school gates	"The infrastructures outside the school end up enticing them (it would be necessary) to halt the easy access and visual appeal of those products. There should be a limitation" (I, T) "regulation of what is sold at the school gates [...] so there isn't such facilitated access." (I, T)
6. Young people as agents of change (*peer education*)	"They function very much as a group; they are influenced and act together" (I, T); "We would like to have a group of young people "health promoters", so to speak." (I, T)

Legend: Identification in parentheses indicates the participant's code (I: Interview; Q: Questionnaire) and group role: School Board (SB), Teachers (T), Support Staff (SS), or Adolescents (A). (e.g., I, SB or Q, A)

**The use of square brackets [...] indicates omissions of text to facilitate reading, without altering the original meaning of the recording.*

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Anexo 1

Guião de Entrevista semiestruturado

Começar por agradecer a presença e a disponibilidade para esta entrevista que se estima ter cerca de 60 minutos.

Apresentação e Enquadramento

O projeto PASCE, coordenado pelo Instituto de Saúde Pública da Universidade do Porto, com o apoio da Câmara Municipal do Porto, tem como principal objetivo promover práticas alimentares mais equilibradas e sustentáveis entre adolescentes e aumentar os seus conhecimentos sobre alimentação saudável e literacia alimentar, através de intervenções educativas desenvolvidas em contexto escolar.

Esta entrevista insere-se na fase inicial do projeto e tem como objetivo compreender melhor a realidade de cada escola, com base na experiência e perceção de diferentes representantes (Direção, responsável da Educação para a Saúde…), de forma a adequar as estratégias às necessidades específicas dos alunos.

O projeto iniciará o seu trabalho de campo em setembro, e a intervenção será implementada em outubro/novembro, com a respetiva avaliação da mesma em dezembro. A intervenção será desenvolvida em estreita articulação com os professores e restante comunidade escolar.

Agradecemos desde já a sua disponibilidade e colaboração.

Papel, tarefas e responsabilidades

1. Pode descrever sucintamente a sua função atual e as suas principais responsabilidades na sua organização? Que tarefas específicas desempenha no seu trabalho que estejam relacionadas com a alimentação?

Perceção geral sobre hábitos alimentares dos alunos

2. Quais considera serem as principais problemáticas relacionadas com os hábitos alimentares dos alunos da vossa escola?

3. Considera que estas questões são transversais a toda a população escolar ou afetam mais alguns grupos específicos *(por exemplo, por faixa etária ou sexo)*? *Existem diferenças visíveis entre ciclos ou anos de escolaridade, relativamente a estas questões?*

Causas e fatores associados

4. Na sua opinião, quais são as principais causas ou fatores que contribuem para hábitos alimentares menos saudáveis entre os adolescentes? *Identificam-se desafios estruturais (ex. tempo para refeições, acesso a alimentos saudáveis, contexto socioeconómico, etc.)?*

5. Considera que os alunos estão motivados para terem progressivamente uma alimentação mais saudável e sustentável?

a) Quais os fatores para essa motivação ou ausência dela?

6. São dadas oportunidades/condições de incentivo para que os alunos tenham uma alimentação saudável e sustentável na escola? (ex. oferta da cantina, bar, horários destas unidades adequados às atividades letivas)

7. Existem incentivos dentro ou nas imediações da escola para que os alunos tenham uma alimentação menos saudável? (Máquinas de vending, estabelecimentos nas imediações da escola)

Estratégias e Iniciativas Passadas

8. A escola já implementou anteriormente iniciativas relacionadas com a promoção da alimentação saudável ou sustentável? Se sim, quais:

a) Essas iniciativas foram desenvolvidas pela escola ou sugeridas por alguma outra entidade? Ex.: materiais da DGS, equipa de saúde pública, etc...
b) Pode descrever em detalhe os conteúdos e meios usados nessa(s) intervenção/intervenções? O alvo era toda a comunidade escolar ou algum target específico?
c) Qual a sua avaliação da adequação dessas iniciativas, ao nível do design da intervenção, conteúdos, pertinência, implementação.
d) Qual foi, no seu entender, a recetividade dos alunos e restante comunidade escolar?
e) As iniciativas foram formalmente avaliadas em termos de impacto objetivo na mudança de comportamento?

9. Tendo em consideração o seu conhecimento das intervenções do passado (ou ausência delas), bem como as características específicas dos estudantes deste agrupamento de escolas que cuidados devem atender as estratégias de promoção da alimentação saudável e sustentável no sentido de potenciar a sua eficácia neste contexto?

10. Há ideias ou iniciativas que gostariam de implementar, mas que ainda não foram possíveis por falta de recursos, tempo ou outros motivos?

Conhecimentos e literacia alimentar

11. Considera que os alunos têm conhecimentos adequados sobre alimentação saudável e sustentável?

- *Identificam-se mitos, lacunas ou desinformação frequente? Se sim, pode detalhar?*

12. Existe algum trabalho já articulado com os professores ou outros profissionais (ex.: nutricionistas, técnicos de saúde) neste domínio?

Integração com o projeto

13. Que tipo de atividades/intervenções considera que seriam importantes neste projeto, tendo em conta a realidade e contexto específico da escola?

14. Há algum aspeto contextual que considera importante que seja tido em conta na preparação e implementação das atividades para estes alunos?

Obrigada desde já pelo tempo e atenção dispensado.

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