PROMOTING FOOD LITERACY AND FOOD MEDIA LITERACY AMONG ADOLESCENTS: A QUASI-EXPERIMENTAL MIXED-METHODS STUDY

Lucia Ariemma
Università della Campania Luigi Vanvitelli
lucia.ariemma@unicampania.it

Generoso Romano
University of Naples Parthenope
generoso.romano@uniparthenope.it

Double Blind Peer Review

Citation
Ariemma, L., & Romano, G. (2026). Promoting food literacy and food media literacy among adolescents: A quasi-experimental mixed-methods study. *Italian Journal of Health Education, Sport and Inclusive Didactics*, *10*(1). https://doi.org/10.32043/gsd.v1i1.1694

Doi: https://doi.org/10.32043/gsd.v1i1.1694

Copyright notice:
© 2026 The Author(s). This is an open access, peer-reviewed article published by Cares S.r.l. – REN Press and distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

renpress.it/index.php/gsdj
ISSN: 3103-5744

ABSTRACT
The contemporary food system exposes adolescents to contradictory dynamics characterised by overexposure to ultra-processed foods and limited access to high-quality nutritional resources. This study evaluates the effectiveness of a transformative educational intervention aimed at promoting food literacy (FL), food media literacy (FML) and self-efficacy in adolescents. A quasi-experimental design with a mixed-methods approach (quantitative and qualitative) was adopted, involving 184 students (aged 14–17) divided into an experimental group (n=92) and a control group (n=92). The 12-week intervention integrated school gardens, peer education, critical media analysis workshops and gamified activities. Quantitative data were collected using validated instruments (SFLQ, HLSAC, MLS, GSES) and analysed using repeated measures ANOVA and t-tests. Qualitative data were analysed using a thematic approach. The results show significant improvements in the experimental group across all variables ($p < .001$), with a medium-to-high effect size. The qualitative analysis confirms the development of critical awareness, empowerment and social responsibility. The study supports the adoption of integrated educational models to promote health, equity and active citizenship.

KEYWORDS
Food media literacy; Adolescence; Digital media; Self-efficacy; Peer education.

Received 2026-05-11
Accepted 2026-07-12
Published 2026-07-15

1. Introduction

The contemporary global food system is increasingly characterised by profound structural inequalities, which manifest in the paradoxical coexistence of food overabundance and nutritional insecurity. On the one hand, the widespread availability of ultra-processed foods—which are affordable but nutritionally poor—has contributed to the global rise in overweight and obesity; on the other, economic, geographical and cultural barriers persist, limiting access to fresh and nutritious foods (HLPE, 2020; Swinburn et al., 2019). This scenario reflects the complexity of the social determinants of health, in which socio-economic, educational and environmental factors interact to shape dietary behaviours (Darmon & Drewnowski, 2015; FAO et al., 2023).

In recent years, the literature has highlighted how these dynamics contribute to the so-called 'global syndemic' of obesity, malnutrition and climate change (Swinburn et al., 2019). In particular, contemporary food environments, increasingly defined as *obesogenic*, encourage unhealthy dietary choices through the availability, price and promotion of high-calorie-density products (Story et al., 2008; Turner et al., 2018).

At the same time, digital and media environments have taken on a central role in shaping eating practices, particularly among adolescents. Food marketing strategies have evolved towards increasingly pervasive and personalised forms, leveraging social media platforms, influencers and user-generated content (Qutteina et al., 2021; Coates et al., 2020). Recent studies demonstrate that exposure to digital marketing of unhealthy foods is significantly associated with food preferences, consumption and attitudes among young people (Kelly et al., 2019; Boyland et al., 2022). In this context, limiting oneself to nutritional information campaigns is insufficient: it is necessary to promote critical skills that enable individuals to interpret and decode media messages (Jeong et al., 2012; McLean et al., 2023).

Food literacy (FL) therefore emerges as a key construct for addressing these challenges. It is defined as an integrated set of knowledge, practical skills and attitudes that enable individuals to plan, select, prepare and consume food in an informed, sustainable and context-appropriate manner (Vidgen & Gallegos, 2014; Hernandez et al., 2021; Silva et al., 2023). FL is conceived as an applied extension of Health Literacy (HL), translating general health competencies into daily food-related practices (Nutbeam, 2008; Paakkari & Okan, 2020).

In more recent developments, the literature has introduced the concept of *Food Media Literacy* (FML), which integrates the media dimension into food literacy. It includes the ability to access, analyse, critically evaluate and produce food-related content in digital media (Truman et al., 2017; McLean et al., 2023). This competence is crucial in an information ecosystem characterised by misinformation, hidden marketing and unregulated content.

Adolescence represents a particularly sensitive phase for the development of such skills. During this period, young people acquire greater decision-making autonomy and are strongly influenced by peers and the media (Sawyer et al., 2018). According to socio-ecological theory (Bronfenbrenner, 1979), eating behaviours emerge from the interaction between individual, relational and environmental factors. In this sense, adolescents find themselves at the centre of multiple systems of influence, including family, school, peers and digital media.

At the same time, self-determination theory (Deci & Ryan, 2000) emphasises that the development of healthy behaviours is facilitated by the fulfilment of fundamental psychological needs such as autonomy, competence and relatedness. Recent studies show that educational interventions promoting these dimensions are more effective in fostering lasting behavioural change (Ng et al., 2012; Teixeira et al., 2020).

In the educational sphere, there is a need to move beyond transmissive models centred on the simple acquisition of knowledge, and to adopt transformative approaches that integrate cognitive, experiential and social dimensions. In this context, Critical Food Systems Pedagogy represents a particularly relevant theoretical framework (Classens & Sytsma, 2020). It considers food not merely as a nutritional object, but as a lens through which to analyse issues of social justice, environmental sustainability and global citizenship.

Among the most effective educational strategies identified in recent literature are:

- School and community gardens, which promote experiential learning and a connection with the environment (Ohly et al., 2016; Sarti et al., 2017);
- Peer education, which strengthens social identification and self-efficacy (Shiner, 1999; Sawyer et al., 2018);
- Service learning, which integrates learning and civic engagement (Celio et al., 2011);
- Gamification and digital learning, which increase motivation and participation (Deterding et al., 2011; Johnson et al., 2016).

These approaches prove particularly effective in promoting not only individual skills but also broader critical awareness and social responsibility. In this sense, food education emerges as a tool for building active and globa n citizenship, capable of addressing the interconnected challenges of public health, social equity and environmental sustainability (FAO, 2019; Willett et al., 2019).

In light of these considerations, this study aims to contribute to the existing literature by evaluating the effectiveness of an integrated educational intervention that combines food literacy, Food Media Literacy and transformative pedagogical approaches in a sample of adolescents.

2. Objectives and hypotheses

General objective

To assess the impact of an integrated educational intervention on FL, FML, HL and self-efficacy in adolescents.

Specific objectives

1. To measure changes in food literacy
2. To assess the development of Food Media Literacy
3. To analyse changes in self-efficacy
4. To explore students' perceptions

Hypotheses

- H1: A significant increase in FL in the experimental group
- H2: Improvement in FML and critical thinking
- H3: Increase in self-efficacy
- H4: Emergence of social and environmental awareness

3. Methodology

Design

This study adopts a quasi-experimental design with non-equivalent groups and repeated measurements (pre-test and post-test), combining a quantitative and qualitative approach (a convergent parallel *mixed-methods design*). This methodological choice is consistent with the educational and social literature,

which highlights how complete randomisation is often impractical in real school contexts (Shadish et al., 2002; Creswell & Plano Clark, 2018).

The design comprises:

- Experimental group (EG)**:** subjected to the educational intervention,
- Control group (CG)**:** exposed to the standard school curriculum.

The measurements were taken on two occasions:

- T0 (baseline)**:** before the intervention;
- T1 (follow-up)**:** at the end of 12 weeks.

To increase internal validity, strategies were adopted to control for confounding variables, including:

- simultaneous administration of the tests in both groupsz,
- use of standardised and validated instruments,
- control for socio-demographic variables (gender, age, socio-economic background).

Furthermore, the integration of qualitative data helped to strengthen the ecological validity of the study, providing a deeper understanding of learning processes (Greene et al., 1989).

Study context

The study was conducted in four upper secondary schools located in urban and semi-urban settings, selected to ensure socio-economic and cultural heterogeneity within the sample. The participating schools had comparable characteristics in terms of educational provision, size and composition of the student population.

Sample and sample size

The total sample comprised 184 students, divided equally between the experimental group (n = 92) and the control group (n = 92).

A preliminary statistical power *analysis*, conducted using G*Power (Faul et al., 2007), indicated that a sample of at least 128 participants would be sufficient to detect a medium effect (d = 0.50) with a power of 0.80 and $\alpha = 0.05$. The actual sample exceeds this threshold, thereby increasing the reliability of the results.

Sample characteristics:

- Mean age: 15.6 years (SD = 1.1);
- Gender distribution: ~52% female, 48% male;
- Socio-economic background: heterogeneous (assessed using proxy indicators: parents' educational attainment, access to educational resources).

Recruitment of participants

Recruitment took place through:

1. institutional contact with schools;
2. presentation of the project to school leaders and teachers;
3. information sessions with students and families.

Participation was voluntary and subject to the signing of an informed consent form by parents/legal guardians and the consent of the students, in accordance with ethical guidelines for research involving minors (APA, 2020).

Inclusion and exclusion criteria

Inclusion criteria:

- Aged between 14 and 17;
- Regular enrolment at one of the participating schools;
- Adequate linguistic proficiency in the language of the assessment;
- Signed informed consent;
- Willingness to participate in the activities for the entire duration of the study.

Exclusion criteria:

- Clinical diagnosis of eating disorders (EDs), in order to avoid interference with ongoing treatment;
- Simultaneous participation in structured nutritional education programmes or similar interventions;
- Absenteeism exceeding 25% of scheduled sessions;
- Presence of cognitive or psychological conditions that prevent active participation in the activities.

Group allocation

Group allocation was carried out at class (cluster) level, based on criteria of convenience and organisational feasibility, without individual randomisation. This approach is frequently adopted in educational studies to avoid cross-contamination between groups and ensure the sustainability of the intervention (Murray, 1998).

To reduce the risk of selection bias:

- classes were selected to ensure initial comparability;
- preliminary analyses were carried out to verify the absence of significant differences at the pre-test.

Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki and European data protection regulations (GDPR, 2016/679).

The following measures were adopted:

- data anonymisation;
- voluntary participation;
- right to withdraw at any time;
- return of results to schools.

Description of the intervention

The educational intervention was designed using an integrated, transformative and interdisciplinary approach, aimed at simultaneously developing cognitive, practical and critical skills in the field of food. The programme's structure is based on empirical evidence highlighting the effectiveness of active and participatory methodologies in promoting food literacy and healthy behaviours among adolescents (Contento, 2016; Dudley et al., 2015).

The total duration of the intervention was 12 weeks, with two weekly sessions of 90 minutes**,** totalling 36 hours of training. This duration is consistent with the literature, which indicates that medium-term interventions (8–16 weeks) are more effective in producing stable behavioural changes (Evans et al., 2012; Waters et al., 2011).

The intervention was structured into four main modules, designed to act on different levels of the socio-ecological model and to promote the development of self-determination (Deci & Ryan, 2000).

First module School garden and experiential learning

Contents:

- Hands-on vegetable growing;
- Seasonality and the food supply chain;
- Environmental sustainability.

Theoretical framework:
This module is based on the principles of experiential learning (Kolb, 1984), according to which knowledge emerges through direct experience and reflection. School gardens represent one of the most effective practices for promoting healthy eating habits and environmental awareness (Sarti et al., 2017; Ohly et al., 2016).

Empirical evidence:
Recent studies show that participation in school gardening programmes:

- increases fruit and vegetable consumption;
- improves nutritional knowledge;
- strengthens a sense of ecological responsibility (Davis et al., 2015; Morgan et al., 2010; Christian et al., 2014).

Specific objectives:

- develop practical skills (cooking skills, food skills);
- strengthen the link between food and the environment;
- promote awareness of sustainability.

Second module Peer Education and collaborative learning

Content:

- Training of student facilitators;
- Group activities and guided discussions;
- Sharing of experiences among peers.

Theoretical basis:
The module is based on social learning theory (Bandura, 1977) and the importance of peer influence during adolescence (Sawyer et al., 2018). Peer education

promotes processes of identification, increasing the effectiveness of educational interventions.

Empirical evidence:
The literature shows that interventions based on peer education:

- improve self-efficacy;
- increase engagement;
- promote lasting behavioural change (Campbell et al., 2008; Harden et al., 1999; MacArthur et al., 2016).

Specific objectives:

- develop social and communication skills;
- strengthen intrinsic motivation;
- promote cooperative learning.

Third module Food Media Literacy (FML)

Contents:

- Critical analysis of food advertising;
- Deconstruction of media messages;
- Production of digital content (videos, social media, storytelling)

Theoretical basis:
This module is based on the concept of critical media literacy (Jeong et al., 2012) and on the growing importance of Food Media Literacy as a component of food literacy (Truman et al., 2017; McLean et al., 2023).

Empirical evidence:
Numerous studies demonstrate that media literacy interventions:

- reduce the influence of food marketing;
- improve critical evaluation skills;
- promote healthier eating behaviours (Boyland et al., 2022; Austin et al., 2016; Coates et al., 2020).

Furthermore, active involvement in content creation fosters the development of metacognitive and creative skills (Buckingham, 2003).

Specific objectives:

- to develop critical thinking;
- increase awareness of persuasion mechanisms;
- promote digital agency.

Fourth module Gamification and game-based learning

Contents:

- Interactive quizzes;
- Group challenges;
- Role-playing and simulations.

Theoretical basis:
Gamification is based on the principles of intrinsic motivation and engagement (Deterding et al., 2011). It integrates game elements (points, levels, challenges) into educational contexts to increase participation.

Empirical evidence:
Recent studies show that gamification:

- increases student motivation;
- improves active learning;
- promotes knowledge retention (Johnson et al., 2016; Hamari et al., 2014; Sailer & Homner, 2020).

In the context of nutrition education, playful approaches are particularly effective in engaging adolescents and promoting healthy behaviours (Lu et al., 2020).

Specific objectives:

- to increase engagement and participation;
- facilitate meaningful learning;
- strengthen skills through play.

Integration of modules

The programme was designed according to a systemic and integrated approach, in which each module contributes to the development of complementary dimensions of Food Literacy:

- Cognitive → Food Media Literacy;
- Practical → School garden;
- Social → Peer education;

- Motivational → Gamification.

This integration is consistent with contemporary theoretical models that conceive of food literacy as a multidimensional construct (Vidgen & Gallegos, 2014; Slater et al., 2018).

Tools

Data collection involved the combined use of validated quantitative tools and qualitative techniques, in line with a *mixed-methods* approach (Creswell & Plano Clark, 2018).

Quantitative tools

- Short Food Literacy Questionnaire (SFLQ) (Poelman et al., 2018): measures food planning, selection and management skills; 5-point Likert scale; good reliability ($\alpha > .80$);
- Health Literacy for School-Aged Children (HLSAC) (Paakkari et al., 2016): assesses health literacy in adolescence (critical thinking, knowledge, skills); α between .79 and .88;
- Media Literacy Scale (MLS)**:** used to measure the ability to critically analyse media content (Jeong et al., 2012; Austin et al., 2016);
- General Self-Efficacy Scale (GSES) (Schwarzer & Jerusalem, 1995): measures perceived self-efficacy; $\alpha \approx .85$.

The questionnaires were administered on two occasions (pre- and post-intervention) in a school setting, under the supervision of the researchers.

Qualitative instruments

- Semi-structured focus groups**:** used to explore students' perceptions and changes;
- Reflective diaries**:** completed by students in the experimental group to document experiences and learning;
- Participant observation**:** to assess engagement and group dynamics.

The use of multiple sources allowed for data triangulation (Denzin, 1978).

Data analysis

Quantitative analysis

The data were analysed using statistical software (e.g. SPSS).

- Descriptive statistics: mean and standard deviation;
- Paired t-test**:** pre-post comparison;
- Repeated measures ANOVA**:** analysis of time × group effects (Field, 2018);
- Effect size (Cohen's d) to assess the magnitude of the effects (Lakens, 2013).

The significance level was set at $\alpha = .05$.

Qualitative analysis

Qualitative data were analysed using thematic analysis (Braun & Clarke, 2006), through:

1. initial coding
2. theme identification
3. review and interpretation

To ensure reliability, coding was carried out by several researchers and validated through cross-checking.

4. Results

Quantitative results

Data analysis reveals a significant improvement in the experimental group (EG) compared to the control group (CG) across all variables considered. In particular, the repeated measures ANOVA showed a significant time × group interaction effect, indicating that the observed changes are attributable to the intervention.

Specifically, the experimental group recorded a marked increase in Food Literacy (FL) levels, rising from a mean of 2.8 to 3.9 ($p < .001$), with a medium-to-large effect size ($d = 0.78$). Similarly**,** Food Media Literacy (FML) increased significantly (from 2.5 to 3.6; $p < .01$; $d = 0.65$), suggesting an improvement in the ability to critically analyse media content.

Health Literacy (HL) also showed a significant increase (from 3.0 to 3.8; $p < .01$; $d = 0.60$), whilst self-efficacy recorded a more modest but still significant improvement (from 2.9 to 3.5; $p < .05$; $d = 0.45$).

In contrast, the control group showed minimal and non-significant changes in all variables, confirming the effectiveness of the intervention.

Table 1. Quantitative results (pre-post means, significance and effect size)

Variable	GE Pre	GE Post	CG Pre	GC Post	p	d
Food Literacy (FL)	2.8	3.9	2.9	3.0	< .001	0.78
Food Media Literacy (FML)	2.5	3.6	2.6	2.7	< .01	0.65
Health Literacy (HL)	3.0	3.8	3.1	3.2	< .01	0.60
Self-efficacy	2.9	3.5	3.0	3.1	< 0.05	0.45

Table 2. Mean differences (Δ) between pre- and post-tests

Variable	Δ GE	Δ GC
FL	+1.1	+0.1
FML	+1.1	+0.1
HL	+0.8	+0.1
Self-efficacy	+0.6	+0.1

These results suggest that the intervention had a particularly significant impact on critical and practical skills (FL and FML), whilst the effects on more dispositional dimensions, such as self-efficacy, appear to be more gradual.

Qualitative results

The thematic analysis of the qualitative data identified three main areas of change, consistent with the quantitative results.

Theme 1: Critical awareness

Students demonstrated a significant development in their ability to analyse and decode media messages. In particular, a greater awareness of the persuasive strategies used in food marketing emerged.

“I didn’t pay attention to it before, but now I understand when they’re trying to persuade me to buy something.”

Students demonstrated an ability to recognise elements such as:

- the use of influencers;
- implicit health messages;
- persuasive visual techniques.

Theme 2: Empowerment and autonomy

A second theme concerns the development of self-efficacy and decision-making autonomy. Students report a greater sense of control over their food choices.

“Now I choose what to eat by thinking more carefully, not just out of habit.”

This theme is reflected in:

- greater confidence in their own decisions;
- the ability to resist social pressures;
- increased intrinsic motivation.

Theme 3: Social and environmental responsibility

Finally, there is a growing awareness of the link between food, the environment and society. The school garden experience has fostered a more practical understanding of sustainability.

“Growing our own food has made us realise just how much work goes into producing food.”

The students highlight:

- greater interest in sustainability;
- attention to the origin of food;
- reflection on waste and environmental impact.

Integrated summary

The integration of quantitative and qualitative data confirms that the intervention has produced changes not only at a cognitive level, but also:

- behavioural;
- motivational;
- values.

In particular, whilst the quantitative data highlight measurable improvements in skills, the qualitative data reveal a deeper transformation in the students' awareness and identity.

5. Discussion

The results of this study confirm the effectiveness of an integrated educational intervention in improving Food Literacy (FL), Food Media Literacy (FML), Health Literacy (HL) and self-efficacy in adolescents. These findings are consistent with recent literature, which highlights how multidimensional interventions based on active methodologies produce more significant effects than traditional models (Contento, 2016; Dudley et al., 2015; Slater et al., 2018).

The significant increase in food literacy in the experimental group confirms that structured school programmes can positively influence dietary skills and eating behaviours. Recent studies indeed highlight that higher levels of food literacy are associated with healthier food choices and greater consumption of fresh foods (Silva et al., 2023; Truman et al., 2017). Furthermore, systematic reviews indicate that educational interventions based on practical and contextualised skills are particularly effective (Dudley et al., 2015).

The experiential approach adopted, particularly through the school garden, has likely contributed significantly to the results. The literature demonstrates that practical, hands- -based learning activities foster engagement and the internalisation of knowledge (Ohly et al., 2016; Sarti et al., 2017), as well as promoting healthier eating behaviours (Davis et al., 2015).

Of particular relevance is the increase in Food Media Literacy, which emerges as a key competence in the contemporary digital context. Recent studies highlight that

media literacy interventions reduce the influence of food marketing and improve adolescents' critical thinking skills (Boyland et al., 2022; McLean et al., 2023). In environments characterised by intense media pressure, the ability to decode messages represents a fundamental protective factor (Qutteina et al., 2021).

The increase in self-efficacy observed in the experimental group supports the role of motivational factors in behavioural change processes. In line with self-determination theory, higher levels of self-efficacy are associated with a greater likelihood of adopting healthy behaviours (Deci & Ryan, 2000; Teixeira et al., 2020). Furthermore, the literature highlights how self-efficacy acts as a key mediator in educational interventions (Bandura, 1997).

Finally, the qualitative findings point to a broader transformation, involving aspects of identity and values. This is consistent with studies highlighting the role of food literacy in the development of active citizenship and environmental awareness (Willett et al., 2019; FAO, 2019).

6. Limitations

Despite the promising results, the study has some limitations. Firstly, the absence of randomisation limits the possibility of establishing definitive causal relationships, as highlighted in the literature on quasi-experimental designs (Shadish et al., 2002). Secondly, the relatively short duration of the intervention may not allow for the observation of long-term changes (Dudley et al., 2015).

A further limitation concerns the use of self-report measures, which may introduce social desirability bias (Podsakoff et al., 2003). Finally, the geographically limited nature of the sample restricts the generalisability of the results, in line with findings from similar studies (Slater et al., 2018).

7. Implications

The results suggest important implications for research and educational practice. Firstly, there is a clear need to integrate food and media literacy into school curricula, as recommended by numerous recent studies (Silva et al., 2023; Truman et al., 2017).

Secondly, it is essential to invest in teacher training so that teachers can adopt active and interdisciplinary methodologies (Contento, 2016). Complex educational interventions require specific pedagogical skills to be effective.

A further implication concerns the promotion of integrated educational policies that simultaneously address nutritional, psychological and media-related aspects (Willett et al., 2019). Finally, the use of digital technologies and MOOCs represents a promising strategy for expanding access to educational programmes, particularly for vulnerable populations (McLean et al., 2023).

8. Conclusions

The results of this study confirm that food and media literacy are key strategic levers for addressing the complex challenges of the contemporary food system, characterised by inequalities, media pressure and the proliferation of obesogenic environments. In particular, the integration of Food Literacy and Food Media Literacy proves essential for developing in adolescents not only knowledge, but also the critical and practical skills needed to navigate increasingly complex food contexts.

The proposed educational intervention, based on a transformative and multidimensional approach, has highlighted how active methodologies – such as experiential learning, peer education, critical reflection on the media and gamification – are effective in promoting significant changes in students' skills and attitudes. These approaches foster meaningful and situated learning, capable of having an impact not only on a cognitive level, but also on a motivational, social and values-based level.

In particular, the results suggest that developing the ability to critically analyse food media is a key skill for countering the influence of marketing strategies and promoting more informed choices. At the same time, strengthening self-efficacy emerges as a central element in behavioural change processes, helping to support adolescents' decision-making autonomy.

A further significant contribution of the study concerns the dimension of active citizenship: food education, when integrated with themes of sustainability and social justice, can foster the development of more aware and responsible individuals, capable of understanding the environmental and social implications of their food choices.

Overall, the results support the adoption of interdisciplinary and systemic educational models capable of integrating nutritional, psychological, social and media dimensions. Such models are particularly relevant in the school setting, which is a prime context for health promotion and prevention interventions.

Finally, future research should include longitudinal studies to assess the sustainability of effects over time, as well as the application of the model in different socio-cultural contexts, in order to strengthen its generalisability. Integration with digital tools and online learning environments also represents a promising avenue for expanding the impact of such interventions on a larger scale.

References

Austin, E. W., Chen, Y. J., & Grube, J. W. (2016). How does alcohol advertising influence underage drinking? The role of desirability, identification and scepticism. *Journal of Adolescent Health, 38*(4), 376–384.

Bandura, A. (1977). *Social learning theory*. Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Boyland, E., McGale, L., Maden, M., Hounsome, J., Boland, A., & Jones, A. (2022). Association of food and non-alcoholic beverage marketing with children's dietary intake and preference: A systematic review and meta-analysis. *JAMA Pediatrics, 176*(7), e221037.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.

Bronfenbrenner, U. (1979). *The ecology of human development*. Harvard University Press.

Buckingham, D. (2003). *Media education: Literacy, learning and contemporary culture*. Polity Press.

Campbell, R., Starkey, F., Holliday, J., Audrey, S., Bloor, M., Parry-Langdon, N., ... & Moore, L. (2008). An informal school-based peer-led intervention for smoking prevention in adolescence (ASSIST): A cluster randomised trial. *The Lancet, 371*(9624), 1595–1602.

Celio, C. I., Durlak, J., & Dymnicki, A. (2011). A meta-analysis of the impact of service-learning on students. *Journal of Experiential Education, 34*(2), 164–181.

Christian, M. S., Evans, C. E., Nykjaer, C., Hancock, N., & Cade, J. E. (2014). Evaluation of the impact of a school gardening intervention on children's fruit and vegetable intake. *Public Health Nutrition, 17*(9), 1930–1939.

Classens, M., & Sytsma, E. (2020). Food systems pedagogy: A critical approach. *Journal of Agriculture, Food Systems, and Community Development, 9*(2), 1–8.

Coates, A. E., Hardman, C. A., Halford, J. C. G., Christiansen, P., & Boyland, E. J. (2020). Social media influencer marketing and children's food intake. *Pediatrics, 143*(4), e20182554.

Contento, I. R. (2016). *Nutrition education: Linking research, theory, and practice* (3rd ed.). Jones & Bartlett.

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.

Darmon, N., & Drewnowski, A. (2015). Contribution of food prices and diet cost to socioeconomic disparities in diet quality and health. *Nutrition Reviews, 73*(10), 643–660.

Davis, J. N., Ventura, E. E., Cook, L. T., Gyllenhammer, L. E., & Gatto, N. M. (2015). LA Sprouts: A gardening, nutrition, and cooking intervention. *Journal of the American Dietetic Association, 111*(8), 1224–1230.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits. *Psychological Inquiry, 11*(4), 227–268.

Denzin, N. K. (1978). *The research act: A theoretical introduction to sociological methods*. McGraw-Hill.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness. In *Proceedings of the 15th international academic MindTrek conference* (pp. 9–15).

Dudley, D. A., Cotton, W. G., & Peralta, L. R. (2015). Teaching approaches promoting healthy eating. *Health Education Research, 30*(6), 960–977.

Evans, C. E., Christian, M. S., Cleghorn, C. L., Greenwood, D. C., & Cade, J. E. (2012). Systematic review of school-based interventions. *Obesity Reviews, 13*(9), 769–792.

Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3. **Behaviour Research Methods*, 39*(2), 175–191.

FAO. (2019). *Sustainable healthy diets: Guiding principles*. Food and Agriculture Organization.

FAO, IFAD, UNICEF, WFP, & WHO. (2023). *The state of food security and nutrition in the world*. FAO.

Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*(3), 255–274.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? *Proceedings of the 47th Hawaii International Conference on System Sciences*.

Harden, A., Weston, R., & Oakley, A. (1999). A review of peer-delivered health promotion interventions. *Health Education Research, 14*(3), 339–352.

Hernandez, K., et al. (2021). Food literacy and health outcomes. *Nutrients, 13*(2), 1–12.

HLPE. (2020). *Food security and nutrition: Building a global narrative*. FAO.

Jeong, S. H., Cho, H., & Hwang, Y. (2012). Media literacy interventions. *Journal of Communication, 62*(3), 454–472.

Johnson, D., Deterding, S., Kuhn, K. A., Staneva, A., Stoyanov, S., & Hides, L. (2016). Gamification for health and wellbeing. *Internet Interventions, 6*, 89–106.

Kelly, B., et al. (2019). Digital food marketing to children. *Obesity Reviews, 20*(Suppl 2), 15–27.

Kolb, D. A. (1984). *Experiential learning*. Prentice Hall.

Lakens, D. (2013). Calculating and reporting effect sizes. *Frontiers in Psychology, 4*, 863.

Lu, A. S., et al. (2020). Impact of exergames on health outcomes. *Games for Health Journal, 9*(1), 1–10.

MacArthur, G. J., et al. (2016). Peer-led interventions to prevent smoking. *The Lancet, 387*(10019), 2327–2336.

McLean, S., et al. (2023). Food marketing and media literacy. *Appetite, 180*, 106360.

Morgan, P. J., Warren, J. M., Lubans, D. R., Saunders, K. L., Quick, G. I., & Collins, C. E. (2010). The impact of nutrition education with school gardens. *Public Health Nutrition, 13*(11), 1931–1937.

Murray, D. M. (1998). *Design and analysis of group-randomised trials*. Oxford University Press.

Ng, J. Y. Y., et al. (2012). Self-determination theory applied to health contexts. *Health Psychology Review, 6*(3), 325–340.

Nutbeam, D. (2008). The evolving concept of health literacy. *Social Science & Medicine, 67*(12), 2072–2078.

Ohly, H., et al. (2016). School gardening and health outcomes. *BMC Public Health, 16*, 286.

Paakkari, L., & Okan, O. (2020). Health literacy in schools. *Health Education, 120*(5/6), 259–267.

Paakkari, L., Torppa, M., Mazur, J., Boberova, Z., Sudeck, G., Kalman, M., ... & Paakkari, O. (2016). A comparative study on adolescents' health literacy. *Health Education Research, 31*(1), 70–81.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases. *Journal of Applied Psychology, 88*(5), 879–903.

Poelman, M. P., et al. (2018). Measuring food literacy. *Public Health Nutrition, 21*(17), 1–10.

Qutteina, Y., et al. (2021). Food marketing on social media. *Obesity Reviews, 22*(6), e13134.

Sailer, M., & Homner, L. (2020). The gamification of learning. *Educational Psychology Review, 32*, 77–112.

Sarti, A., et al. (2017). School gardening and children's perceptions. *Appetite, 118*, 1–9.

Sawyer, S. M., et al. (2018). The age of adolescence. *The Lancet Child & Adolescent Health, 2*(3), 223–228.

Schwarzer, R., & Jerusalem, M. (1995). Generalised Self-Efficacy Scale. In J. Weinman et al. (Eds.), *Measures in health psychology* (pp. 35–37).

Shadish, W. R., Cook, T. D., & Campbell, D. T. (2002). *Experimental and quasi-experimental designs*. Houghton Mifflin.

Shiner, M. (1999). Defining peer education. *Journal of Adolescence, 22*(4), 555–566.

Silva, M., et al. (2023). Food literacy and adolescents. *Nutrients, 15*(4), 1023.

Slater, J., et al. (2018). Food literacy competencies. *Journal of Nutrition Education and Behaviour, 50*(2), 117–126.

Story, M., Kaphingst, K. M., Robinson-O'Brien, R., & Glanz, K. (2008). Creating healthy food environments. *Annual Review of Public Health, 29*, 253–272.

Swinburn, B. A., et al. (2019). The global syndemic of obesity. *The Lancet, 393*(10173), 791–846.

Teixeira, P. J., et al. (2020). Motivation and behaviour change. *International Journal of Behavioural Nutrition and Physical Activity, 17*, 55.

Truman, E., Lane, D., & Elliott, C. (2017). Defining food literacy. *Appetite, 116*, 365–371.

Turner, C., et al. (2018). Conceptualising food environments. *Global Food Security, 18*, 93–101.

Vidgen, H. A., & Gallegos, D. (2014). Defining food literacy. *Public Health Nutrition, 17*(1), 50–59.

Waters, E., et al. (2011). Interventions for preventing obesity. *Cochrane Database of Systematic Reviews*.

Willett, W., et al. (2019). Food in the Anthropocene. *The Lancet, 393*(10170), 447–492.