

The Effect of Video Game on Behavior of Adolescents

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Abstract Introduction: Adolescence is a critical phase where lifestyle habits, including video game usage, influence long-term health and behavior. Video games, spanning diverse genres, offer both cognitive benefits and potential risks, such as increased aggression or improved social behavior. This review examines the impact of video gaming on adolescents, focusing on areas like eating habits, anxiety, cognitive functioning, and aggression. It aims to uncover patterns and contradictions in research findings, offering insights to guide parents, educators, and policymakers in managing gaming-related behaviors. **Materials and Methods** A systematic search was conducted across databases like MEDLINE, PUBMED, Scopus, Science Direct, and Google Scholar using search terms such as “Adolescents,” “Video Game,” “Impact,” “Behavior,” and “Randomized Control Trial.” Studies published between 2014-2024, involving adolescents, and available in full-text English were included. Duplicates, non-adolescent studies, and those before 2014 were excluded. **Result** A total of 82 article were reviewed in which only 20 article met the inclusion criteria. The result help in finding inference between the behaviour modification of adolescents **Conclusion** The findings reveal that interactive interventions, such as Move games and serious games, positively influence health behaviors, dietary choices, and psychological outcomes among adolescents. Tailored approaches based on demographic factors like age and sex enhance intervention effectiveness, though some programs show limited impact, indicating the need for refinement. Engagement, adherence, and individual characteristics play crucial roles in outcomes, highlighting the complexity of influencing behavior. While many interventions promote healthier habits, further research is required to optimize strategies and assess the long-term sustainability of these behavioral changes.

Keywords: Adolescents, Video Games, Health Behaviors

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1. Introduction

Adolescence represents a critical phase characterized by a multitude of physical, physiological and psychological transformations [1]. It is important to note that during this period, lifestyle, including healthy and unhealthy habits and behaviors, has a significant impact on the health of adults [1,2]. “Video games” are a popular way for teenagers to engage in recreational activities, fulfilling their “need to play” requirement. [3]. Video games, described as an electronic interactive games, have main objective of the players entertainment by immersing them in virtual environments, two-dimensional or three-dimensional, with specific rules and conditions [4]. These games cover a wide range of genres, from racing/driving, fighting, adventure, action, platforming, puzzle, role-playing, simulation, strategy, sports, shooting, to active video games, to implicit and explicit video games learn video games [5]. The video game industry is important worldwide, with products that work on mobile phones,

computers and video game devices showing positive benefits on basic brain processes such as perception, attention, memory and decision. [6]. Recent estimates have shown that one in three young people under the age of 18 worldwide use the Internet and that 75% of young people play digital video games every day in developed countries. [7,8] Ask any parent what they think of their child's video games and you will almost certainly hear concerns about the hours spent playing in a virtual world and the possibility of negative effects on cognition, mental health and behavior. One element that contributes to these concerns is the growth of video games over the past 20 years. This popularity has raised concern among some scientists who have discovered the possible negative effects of this recreational activity. Studies that have surveyed members of the general public [9,10] as well as scientists [11,12] suggest that opinions about the effects of gambling on youth vary greatly depending on demographics and experiences personal with the game. Some researchers conclude that the game has social [13] and cognitive benefits [14], while others argue that this medium contributes to mass shootings [15,16] and that it

has lasting and strong effects on aggressive behavior, in general [17]. Recently, a series of open letters published by academics warned the public and policy makers about the positive and negative effects of time spent in the game, its addictive potential [18], its cognitive benefits [19,20] and its aggressive effects [21] are overrated. Video games are a double-edged sword, which has its advantages and disadvantages. Video games can act as "teachers" depending on the purpose of the game [22]. Video games have many effects depending on the genre of the game. For example, an animated online game can improve physical fitness [23,24,25,26], while social video games can improve social behavior [27,28,29]. The most interesting results show that play playing video games can modify cognition and the brain [30,31,32,33]. Previous studies have shown that playing video games can benefit cognition. Cross-sectional and longitudinal studies have shown that video game experience is associated with better cognitive functions, especially in terms of viewing pleasure and short-term memory [34], reaction time [35] and memory of work [36]. In addition, several randomized controlled studies show positive effects of video game interventions recognition [35,36]. Recent meta-analytic research has also supported the high-quality effects of video games on cognition [37,38]. This study was conducted to examine the effect of video games on adolescent behavior. The research was done in databases such as PUBMED, Google Scholar, CINAHAL with the search terms VIDEO GAME, Behavior, Effectiveness, Adolescents, Randomized controlled trial, Sexual behavior, Eating behavior, Aggressive behavior.

2. Objectives

The Objectives of this literature review is to critically assess and integrate existing studies on the impact of video games on many areas of teenage behavior, with a particular emphasis on eating habits, stress and anxiety levels, cognitive functioning, aggression, and healthy behaviors. This review seeks to uncover similarities and contradictions in findings, investigate the underlying mechanisms that influence these behaviours, and assess the implications for adolescent development and well-being. The review examines many studies to provide a thorough picture of how video game engagement can impact behavioral outcomes in teenagers, alerting parents, educators, and policymakers about potential hazards and benefits.

This review seeks to uncover similarities and contradictions in findings, investigate the underlying mechanisms that influence these behaviors, and assess the implications for adolescent development and well-being. The review examines many studies to provide a thorough picture of how video game engagement can impact behavioral outcomes in teenagers, alerting parents, educators, and policymakers about potential hazards and benefits.

3. Search Strategy

Electronic Database like MEDLINE, PUBMED, Scopus, Science Direct, Google Scholar Since 20 were

searched using a combination of search term such as "Adolescents" OR "Video Game" OR "Impact" OR "Behavior" OR "Randomized Control Trial". Articles were checked for eligibility based on the inclusion criteria, and the full-text of eligible articles was examined.

4. Inclusion Criteria

All studies which had full text version available
All studies available in English text
Studies available from the year 2014-2024.
Studies done with adolescents.

5. Exclusion Criteria

Same studies that were found on different electronic databases.

Studies done before the year 2014 were excluded
Studies conducted on different age groups.

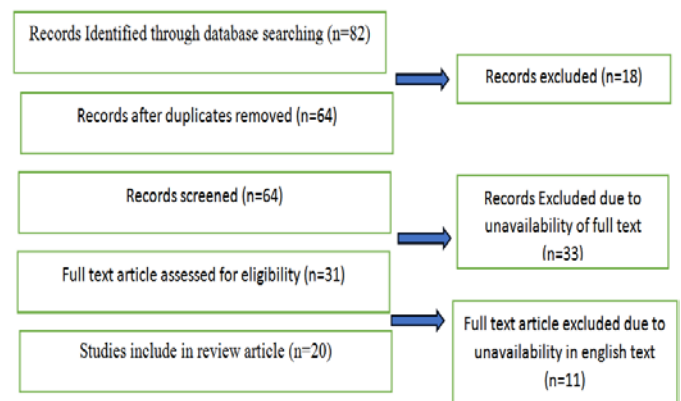


Figure 1. Schematic representation of search strategy for literature review

6. Result

6.1. Effect of Video Game on Eating Behaviour

Video game interventions aimed at improving eating habits show promising, though varied, results. Studies demonstrate that active video games, such as PlayStation Move, contribute to weight management by increasing physical activity among adolescents (Simons et al., 2014). Similarly, Thompson et al. (2015) reported a 50% increase in fruit and vegetable intake in children engaged with the game Squire's Quest II, which incorporates a parental involvement component to reinforce healthy choices. Another study using the Snack Track Tool App showed that high engagement with the app correlated with healthier snack choices and better self-regulation, particularly among boys, while girls showed mixed results (De Cock et al., 2018).

These findings highlight the role of tailored, demographic-sensitive interventions. For instance, family involvement and age-specific approaches appear critical in sustaining healthy changes in adolescents' eating behaviors.

Key Takeaway: Intervention games can encourage healthier eating among adolescents, though demographic factors like age, engagement, and family involvement influence effectiveness.

Table 1. Effect of video game on eating behaviour

Author of research article Year of Publication	Title of the study	Intervention	Finding
Monique Simons, Mai JM Chinapaw, Maaïke van de Bovenkamp, Michiel R de Boer, Jacob C Seidell, Johannes Brug, et al (2014)(39)	Active Video game as a tool to prevent excessive weight gain in adolescents: rationale, design and methods of a randomized controlled trial	Intervention: PlayStation®Move multiple active game systems (such as Nintendo Wii, Dance Dance Revolution, Microsoft Xbox Kinect, PlayStation2®EyeToy)	The study assessed the impact of an intervention on outcome measures, adjusting for demographics and baseline values. Findings indicate measurable effects, with analyses suggesting the intervention influenced targeted behaviors or metrics.
Debbe Thompson, Riddhi Bhatt, Isabel Vazquez, Karen W Cullen, Janice Baranowski, Tom Baranowski, et al (2015)(40)	Creating action plans in a serious video game increases and maintains child fruit vegetable intake: a randomized controlled trial	Squire's Quest II Parent Intervention: Electronic newspaper, Parent Only website	The study showed a significant increase in fruit and vegetable intake in the Action and Coping groups, with the Action group sustaining a 50% increase. High child participation was observed, and most parents rated the program positively.
Nathalie De Cock, Wendy Van Lippevelde, Jolien Vangeel, Melissa Notebaert, Kathleen Beullens, Steven Eggermont et al (2018)(41)	Feasibility and impact study of a reward-based mobile application to improve adolescents' snacking habits	Snack Track Tool App	In a study of 1,463 adolescents, high app users showed better self-efficacy and healthier snack ratios, though no significant snack habit changes were observed overall. Boys in the intervention group increased healthy snack intake with higher self-regulation, while girls showed the opposite trend.
Carolina Martins dos Santos Chagas, Giselle Rhai-Sa Melo, Raquel Braz Assunção Botelho and Natacha Toral (2020)(42)	Effects of the Rango Cards game intervention on food consumption, nutritional knowledge and self-efficacy in the adoption of healthy eating practices of high school students: a cluster randomised controlled trial	Rango Card Games	The study found that the intervention group reduced eating while watching TV or at fast-food restaurants. They also showed improved knowledge of fruit and vegetable intake and intentions to reduce sodium and prepare healthier meals compared to the control group.
Louise Foley, Yannan Jiang, Cliona Ni Mhurchu, Andrew Jull, Harry Prapavessis, Anthony Rodgers, et al (2014)(43)	The effect of active video games by ethnicity, sex and fitness: subgroup analysis from a randomized controlled trial	Electronic Games Via Playstation Eye Toy	The study sample was 17% Māori, 26% Pacific, and 57% New Zealand European/Other, with 73% male. Regression models showed no significant treatment differences or interaction effects among ethnic and gender subgroups.
Sara N. Bleich, Colleen L. Barry, Tiffany L. Gary-Webb, and Bradley J. Herring (2014)(44)	Reducing Sugar-Sweetened Beverage Consumption by Providing Caloric Information How Black Adolescents alter their purchases and Whether the Effects Persist	Computerized picture Selection Game	The study showed that providing caloric information significantly reduced beverage calories purchased and SSB purchases, with average purchases dropping from 149 to 121 calories. Notably, 95% understood the calorie information, and 40% adjusted their choices.
Yi-Chin Kato-Lin, Uttara Bharath Kumar, Bhargav Sri Prakash, Bhairavi Prakash, Vasini Varadan, Sanjeeta Agnihotri, Etal (2020)(45)	Impact of Pediatric Mobile Game Play on Healthy Eating Behavior: Randomized Controlled Trial	Fooya Dietary mobile game	Children in the treatment group chose 1.38 more healthy foods on average than the control group and better identified healthy foods post-intervention. The study emphasizes the role of gameplay and initial food preferences in shaping food choices.
Frans Folkvord, Gosse Hage, Alexandra Theben. (2021)(46)	The effects of a serious health game on children's eating behavior: Cluster-Randomized Controlled Trial	Garfield	The study with 106 children found that a health game had no impact on attitudes or intake of healthy/unhealthy foods. Age influenced attitudes toward some unhealthy foods, but the game itself did not affect food choices or intake frequency.
Brooke M. Bell, Lauren Martinez, Marientina Gotsis, H. Chad Lane, Jaimie N. Davis, Luz Antunez-Castillo, et al (2018)(47)	Virtual Sprouts: A Virtual Gardening Pilot Intervention Increases Self-Efficacy to Cook and Eat Fruits and Vegetables in Minority Youth	Virtual Sprouts	The Virtual Sprouts intervention improved children's self-efficacy in eating and cooking fruits and vegetables, with smaller declines in motivation compared to the control group. However, there were no significant changes in gardening self-efficacy, dietary intake, or BMI-related measures.
Astrid Jander, Rik Crutzen, Liesbeth Mercken, Math Candel, Hein de Vries. (2016)(48)	Effects of a Web-Based Computer-Tailored Game to Reduce Binge Drinking Among Dutch Adolescents: A Cluster Randomized Controlled Trial	Web based tailored video game	The intervention group showed lower binge drinking rates in 15-year-olds, with 16-year-olds also showing reductions, though not significant. Despite improvements in self-efficacy and motivation for healthy eating, there were no significant changes in dietary intake or alcohol consumption, and high attrition rates and low adherence impacted results.
Loana R. Podina, Liviu A. Fodor, Ana Cosmou, Rares Boian. (2017)(49)	An evidence-based gamified mHealth intervention for overweight young adults with maladaptive eating habits: study protocol for a randomized controlled trial	SIGMA mHelath	The SIGMA intervention improved eating behaviors, reduced maladaptive thoughts, and lowered negative self-beliefs about body weight. Participants showed reduced emotional and external eating, lower cravings, decreased binge-eating, and improvements in depression, anxiety, stress, and attentional biases towards healthier food choices.

Table 2. Effect of video game on Anxiety Stress and Depression

Author of research article Year of Publication	Title of the study	Intervention	Finding
Hanneke Scholten, Monique Malmberg, Adam Lobel, Rutger C. M. E. Engels, and Isabela Granic(2016)(50)	A randomized controlled trial to test the effectiveness of an immersive 3D video game for Anxiety prevention among Adolescents	Dojo(Experimental Group) Rayman(Control group)	The study showed no baseline differences between the Dojo and Rayman groups in demographic or anxiety-related variables. Both groups experienced a decrease in anxiety, with the Dojo group showing a steeper decline in personalized anxiety symptoms, but no significant differences in total anxiety symptoms or outcomes based on age or sex.
Lieke A M W Wijnhoven, Daan H M Creemers, Ad A Vermulst, Ramón J L Lindauer, Roy Otten, Rutger C M E Engels etal(2020) (51)	Effects of the video game 'Mindlight' on anxiety of children with an autism spectrum disorder: A randomized controlled trial	Mind light (Experimental group) Triple Town (Control group)	This study screens children for anxiety using the SCAS and SCAS-P, with eligibility based on subclinical anxiety. Primary outcomes measure anxiety, while secondary outcomes assess depression, social functioning, and behavior, with diagnostic tools like the ADIS-P, and effects analyzed using ANOVA and Chi-square tests.

Table 3. Effect of video game on aggressive behaviour

Author of research article Year of Publication	Title of the study	Intervention	Finding
Justin H. Chang, Brad J. Bushman. (2019)(52)	Effect of Exposure to Gun Violence in Video Games on Children's Dangerous Behavior With Real Guns A Randomized Clinical Trial	Intervention: Paired violent video game	The study found that the video game versions tested had no significant impact on children's dangerous behaviors around guns, with no effects observed between active players and passive observers. Exposure to these video games did not alter risky firearm behaviors.
Jack Hollingdale, Tobias Greitmeyer (2014) (53)	The effect of online violent video games on levels of aggression	Violent game: Call of Duty Little Big Planet	The study found that participants who played the violent video game <i>Call of Duty: Modern Warfare 2</i> showed higher perceptions of violence and greater aggression, as measured by chili sauce dispensed, compared to those who played the neutral <i>LittleBigPlanet 2</i> . Aggression was highest in the online context, and the effect remained significant after accounting for game difficulty, enjoyment, and pace ratings.
Justin H. Chang, Brad J. Bushman (2019)(54)	Effect of Exposure to gun violence in video games on children's dangerous behavior with real guns	Minecraft	The study suggests a trend toward increased interactions with handguns among children exposed to violent video games, though the effects are not statistically significant. Trait aggression and media exposure predict aggressive behaviors, while firearm safety courses help mitigate unsafe interactions, highlighting the need to address individual traits and environmental factors to reduce risks.

6.2. Effect of video game on Anxiety Stress and Depression

Therapeutic video games show potential for reducing anxiety and stress among adolescents. For example, the game Dojo, designed for anxiety prevention, was associated with significant reductions in personalized anxiety symptoms compared to a control group playing Rayman, although overall anxiety levels showed similar declines in both groups (Scholten et al., 2016). Similarly, Mindlight, another therapeutic game, showed effectiveness in reducing anxiety in children with Autism Spectrum Disorder, suggesting that games designed for mental health can positively influence stress-related symptoms in adolescents (Wijnhoven et al., 2020).

The impact of these games, however, varies with the game design and the population using them. Therapeutic

games with specific mental health goals may be more effective in managing anxiety than standard video games.

Key Insight: Video games designed for therapeutic purposes can reduce anxiety and stress symptoms, emphasizing the importance of game intent in mental health interventions.

6.3. Effect of Video Game on Aggressive Behaviour

Research on the relationship between violent video games and aggression among adolescents presents complex findings. For instance, Hollingdale and Greitmeyer (2014) reported that violent games like *Call of Duty* increased aggressive responses compared to neutral games. Conversely, studies involving realistic scenarios, such as handling firearms after playing violent video games, showed no significant impact on dangerous

behavior among children (Chang & Bushman, 2019). These mixed findings suggest that while violent video games may heighten aggression in controlled settings, the effects on real-world risky behaviors remain inconclusive.

Individual traits, such as baseline aggression levels, and the context in which games are played may play roles in mediating these effects, indicating that aggression-related outcomes of video games are influenced by personal and environmental factors.

Key Insight: While violent video games may increase aggression in specific contexts, their real-world impact on risky behavior is inconclusive and likely influenced by individual traits and gaming environments.

6.4. Effect of video Game on Healthy Behaviour

Health-focused games demonstrate potential for promoting various positive behaviors in adolescents. The game PlayForward, for example, improved sexual health

knowledge and attitudes among participants, particularly younger boys, although it did not influence behavior change in delaying sexual initiation (Fiellin et al., 2017). Another study found that active video gaming using Xbox Kinect increased physical activity enjoyment levels for young cystic fibrosis patients, despite not consistently reaching target heart rates (Salonini et al., 2015). In virtual gardening interventions, participants reported improved self-efficacy in cooking and eating fruits and vegetables, showcasing the potential for virtual environments to support healthy behaviors (Bell et al., 2018).

These studies suggest that video games promoting health can positively influence adolescents' health knowledge, engagement in physical activity, and dietary self-efficacy. Enjoyable game experiences appear essential for maintaining engagement and promoting behavior change.

Key Insight: Health-oriented video games can effectively encourage positive health behaviors, with high engagement and enjoyment levels being crucial for sustained impact.

Table 4. Effect of video game on healthy behaviour

Author of research article Year of Publication	Title of the study	Intervention	Finding
Lynn E Fiellin, Kimberly D Hieftje, Tyra M Pendegrass, Tassos C Kyriakides, Lindsay R Duncan Et al (2017) (55)	Video Game Intervention for Sexual Risk Reduction in Minority Adolescents: Randomized Controlled Trial	Intervention: Play Forward (Intervention Group) Attention Time control Game (12 commercial video games)	The study involved 333 participants, with no significant differences in sexual initiation between the PlayForward intervention group and the control group. However, the PlayForward group showed improved attitudes and increased sexual health knowledge, especially among younger boys, though intentions to delay sexual initiation remained similar across both groups.
Elena Salonini, Simone Gambazza, Ilaria Meneghelli, Gloria Tridello, Milva Sanguanini, Clizia Cazzarolli, Etal (2015) (56)	Active Video Game Playing in Children and Adolescents With Cystic Fibrosis: Exercise or Just Fun?	Intervention Xbox Kinect (experimental group) Cycle (control group)	The study found that while both Xbox Kinect and traditional cycling achieved similar maximum heart rates in children with cystic fibrosis, more participants in the cycling group reached their target heart rate. However, the Xbox Kinect group reported lower levels of dyspnea and fatigue and higher enjoyment, making it a more enjoyable exercise option despite not meeting heart rate targets as effectively.
Brian Judy, Elisabeth M Whyte, Charles F Geier, Daniel Elbich, Joshua M Smyth.(2018) (57)	Improving sensitivity to eye gaze cues in autism using serious game technology: study protocol for a phase I randomised controlled trial	Intervention: Social Games for Adolescents with Autism Setting: Home Session: 30 Minute 3 weeks for 2 Months	The study assesses the feasibility and effectiveness of an eye gaze intervention for adolescents with autism spectrum disorder (ASD) using a video game. It measures participant engagement, adherence, safety, and primary outcomes such as improvements in eye gaze and social attention, along with secondary measures of autism-like behaviors and social competence through parent-reported questionnaires.
Kim CM Bul, Pamela M Kato, Saskia Van der Oord, Marina Danckaerts, Leonie J Vreeke, Annik Willems, Etal (2016) (58)	Behavioural Outcomes Effects of serious gaming as an Adjunct to Treatment for children with Attention- Deficit Hyperactivity disorder: A randomized controlled trial	Intervention: Plan it Commander Setting:Home Session: For intervention group 20 week treatment with inclusion of Intervention For control group First 10 week treatment only next 10 week treatment with video game	The study found that a serious game improved time management and working memory in participants with ADHD, with both groups showing skill improvements. The intervention was safe, with high satisfaction and mild adverse events.

7. Conclusion

This review demonstrates that video games impact adolescent behavior across multiple domains, with effects influenced by game type, demographic factors, and individual engagement levels. Health-oriented games show promise in promoting positive behaviors, particularly in areas like diet, physical activity, and mental health, especially when they incorporate enjoyable and engaging elements tailored to the target age group. Therapeutic games such as *Mindlight* and *Dojo* are particularly effective in managing anxiety, providing evidence that games designed with specific mental health objectives can serve as useful tools in adolescent intervention.

In contrast, violent games present mixed results on aggression and risky behaviors, with some studies showing increased aggressive tendencies in controlled environments but limited evidence of long-term real-world impact. This complexity suggests that individual differences—such as personality traits and previous exposure to aggression—play a crucial role in shaping outcomes, emphasizing that the broader context and gaming environment are pivotal in determining effects.

Future interventions should prioritize demographic sensitivity, as age, gender, and cultural background influence how adolescents respond to gaming. Additionally, longitudinal studies are needed to assess the sustainability of these behaviors over time, particularly for health-promoting games, to understand if positive changes endure without continuous intervention.

Ultimately, this review underscores the potential of video games as impactful tools for behavior change in adolescents, particularly when combined with family involvement and tailored to individual needs. Policymakers, educators, and mental health professionals should consider these insights when designing or recommending video game-based interventions to maximize positive outcomes and mitigate risks associated with gaming.

Implication of the Study

Altogether in this review significant potential of targeted interventions in promoting healthier behaviors, particularly among children and adolescents. The use of interactive tools, such as video games and apps, demonstrates a notable increase in engagement and positive behavioral outcomes, with high participation rates indicating that incorporating enjoyable elements can enhance adherence and effectiveness. Moreover, the varying levels of parental involvement highlight the importance of including parents in these programs to reinforce healthy behaviors at home. Initial dietary preferences, self-efficacy, and social factors are crucial in shaping intervention success, suggesting that tailoring strategies to account for these characteristics can lead to more effective outcomes. While many studies reported immediate positive changes, concerns about the long-term sustainability of these behaviors emerge, indicating a need for continuous support and periodic assessments. Clear, comprehensible messaging regarding caloric content can influence purchasing behavior, empowering young

audiences to make informed dietary choices. Additionally, interventions addressing emotional eating and maladaptive thoughts related to eating have shown promise, indicating that psychological support integrated with nutritional education can enhance effectiveness. Given the diverse demographics of participants, it is essential for interventions to be culturally sensitive and adaptable to various ethnic backgrounds and societal norms, improving engagement across different population segments. In conclusion, these studies emphasize the importance of employing interactive methods to foster healthy behaviors, highlighting the need for tailored interventions that include parental involvement and psychological support. While immediate improvements in behaviors were noted, further research is warranted to assess the long-term sustainability of these changes, guiding policymakers, educators, and health professionals in designing effective health promotion programs that aim for lasting impacts on public health.

Direction for Future Researches

Future research should focus on several key areas based on these findings. Longitudinal studies are needed to assess the long-term sustainability of behavior changes resulting from interventions, particularly those involving interactive elements like video games. Additionally, exploring the impact of demographic factors on intervention effectiveness can provide insights into cultural and socioeconomic influences. Investigating parental involvement's role in reinforcing healthy habits would also be beneficial. Mixed methods approaches could enrich understanding by combining quantitative and qualitative data on participant experiences. Furthermore, integrating psychological support into nutritional education programs may help address emotional eating. Lastly, more comprehensive studies on the effects of violent video games should consider individual traits such as aggression to clarify their influence on behavior. These directions can enhance strategies for promoting healthier lifestyles among youth.

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