

BMJ Open Association between smartphone screen time and fast food intake among adolescents: a cross-sectional survey

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ABSTRACT

Objective Despite growing concerns regarding the impact of smartphone use on adolescents' lifestyle, there is a notable lack of studies utilising national data to explore how smartphone use influences eating habits in this age group. We aimed to investigate the association between smartphone screen time and fast food intake using representative data from Korean adolescents.

Design Cross-sectional survey.

Setting This cross-sectional analysis used data from the 2017 Korean Youth Risk Behavior Web-based Survey (KYRBS). We used Poisson regression to directly estimate prevalence ratios (PRs) rather than using logistic regression as odds ratios (ORs) tend to overestimate PRs when the outcome is common. Smartphone screen time was categorised into four groups based on the daily time spent using smartphones: <2 hours/day, 2–3 hours/day, 4–5 hours/day and ≥6 hours/day. Fast food intake was assessed based on the weekly intake frequency of pizza, hamburgers, fried chicken and carbonated beverages (infrequent consumption: ≤2 times/week; frequent consumption: ≥3 times/week).

Participants Data from 39 753 individuals were included.

Primary outcome measures The primary outcome was the frequency of fast food intake, assessed via a self-reported survey that asked: "In the past 7 days, how often did you eat fast food such as pizza, hamburgers, fried chicken, or drink carbonated beverages?". Participants were categorised into two groups based on their median intake: infrequent (≤2 times/week) and frequent (≥3 times/week).

Results Among 39 753 adolescents, 19 273 reported frequent fast food intake (10 162 (51.9%) boys, 9111 (45.1%) girls), while 20 480 reported infrequent intake (9409 (48.1%) boys, 11 071 (54.9%) girls). The probabilities that adolescents who used smartphones for 6 hours daily would have frequent fast food intake were 1.29 times (95% CI: 1.28 to 1.30) among boys, and 1.43 times (95% CI: 1.42 to 1.44) higher among girls, compared with adolescents who used smartphones for 2 hours daily.

Conclusion The association between prolonged smartphone screen time and frequent fast food intake in adolescents suggests the need for targeted interventions addressing digital media use to promote healthier eating behaviors.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ As this study was cross-sectional, causal relationships cannot be confirmed.
- ⇒ This study only assessed the frequency of fast food intake, making it difficult to identify food quantities and specific nutritional components.
- ⇒ Adolescents' eating habits may be influenced by friends and social activities; we were unable to identify potential risk factors.
- ⇒ Considering that the content watched on smartphones by adolescents can significantly influence their health behaviors, this study provides valuable information by stratifying smartphone content, which helps identify factors related to unhealthy food.

INTRODUCTION

Adolescence is a critical transitional stage into adulthood, marked by rapid physical, social and psychological development.¹ During this period, nutrition and living conditions play a crucial role in shaping growth.²

Nonetheless, unbalanced dietary habits are prevalent among adolescents worldwide, posing a significant public health concern.³ Particularly, Korean adolescents are experiencing nutritional imbalance owing to irregular eating habits and increasing fast food intake of food products such as pizza, hamburgers and sugary drinks.⁴ This is because fast food (which is typically rich in fats, salt and additives) is known for its low nutritional value. Over 50% of fast food meals contain levels of sodium that exceed recommended levels, and less than 25% of these meals adhere to guidelines for trans fats.^{5 6} High intake of these food products is potentially harmful to health, increasing the risk of adverse health effects such as obesity, hypertension and cancer.⁷

Considering the negative health effects of fast food intake, it is important to analyse the factors that can influence the formation of adolescent eating habits. There are

many factors that contribute to nutritional imbalance in adolescents, but smartphone overuse has recently been highlighted as one of the causes. According to a survey on smartphone over-reliance conducted by the Ministry of Science and ICT, the proportion of smartphone over-reliance (30 points or more) in Korea in 2023 was 40.1% among adolescents (10–19 years old), the highest percentage compared with infants (25%) and adults (35.2%).⁸

One potential pathway whereby smartphone overuse may be related to adolescent eating habits is the widespread exposure to food marketing through social networking platforms and online media.⁹ Companies target adolescents and use platforms such as SNS, YouTube and TikTok to show advertisements for fast food, processed foods and high-calorie/high-sodium foods.^{10–11} These advertisements have the potential to influence adolescents' food choices, and repeated exposure may contribute to the development of food preferences that are associated with unhealthy eating habits.¹² Specifically, content such as mukbang (eating broadcasts) and autonomous sensory meridian response (ASMR) (videos that emphasise the sound of eating food) not only stimulate immediate appetite but also reinforce positive perceptions of high-calorie foods.¹³ In particular, such content often promotes fatty and hyper-palatable food rather than encouraging healthy eating habits, which may hinder adolescents' balanced nutritional intake.¹⁴

Although previous studies have suggested a general association between adolescent media use and unhealthy eating habits, there is still a dearth of research specifically addressing the association between smartphone screen time and fast food intake. Most of the existing studies have focused solely on screen-based media or television use, overlooking the unique characteristics and pervasiveness of adolescent smartphone use. Furthermore, little is known about how specific types of smartphone content, such as education, social media engagement and gaming, differentially relate to eating behaviors.¹⁵

Therefore, this study aimed to investigate (1) the association between smartphone screen time and fast food intake among adolescents and (2) the association between smartphone screen time and fast food intake stratified by smartphone content. The results of this study extend existing findings by providing evidence that smartphone usage time and content type can affect adolescents' eating habits.

METHODS

Data and participants

This study used data from the 2017 Korea Youth Risk Behavior Web-based Survey (KYRBS). The KYRBS has been conducted annually from 2005 to 2024, and smartphone screen time was surveyed in 2017. The KYRBS, a cross-sectional national survey, is a joint initiative of the Korea Centers for Disease Control and Prevention, Ministry of Health and Welfare and the Ministry of

Education. A multistage cluster sampling technique is employed annually to select representative middle and high school students aged 14 to 19 years.¹⁶ Data are available from the KYRBS official website.¹⁷ The study data encompassed 39 753 participants who completed the online survey (figure 1).

Smartphone screen time

Smartphone screen time was assessed by asking the question: "How many hours a day have you used your smartphone on average in the last 7 days?". Participants provided their usage time on weekdays and weekends separately. The formula for computing the average daily usage time over 7 days was defined as follows: $[(\text{time-weekday}5) + (\text{time-weekend}2)] / 7 = \text{average daily smartphone usage in hours/day}$. We categorised smartphone use time into quartiles (<2 hours/day, 2–3 hours/day, 4–5 hours/day, ≥ 6 hours/day).¹⁸

Fast food intake

Fast food intake was assessed using a self-reported survey item: "In the past 7 days, how often did you consume fast food such as pizza, hamburgers, fried chicken or carbonated beverages?".¹⁹ Participants were asked to report their frequency of fast food intake during the survey week. Based on the median, total fast food intake per week was divided into two categories: infrequent intake (≤ 2 times/week) and frequent intake (≥ 3 times/week).^{20–23}

The median was chosen instead of the mean due to the skewed distribution of fast food intake data, which could have resulted in the mean overestimating or underestimating typical intake patterns.

Covariates

The potential confounding variables considered included sociodemographic factors, health behaviors, and psychological and social factors. Sociodemographic factors included sex (boys, girls), grade (middle school, high school), academic achievement (low, middle, high), household income (low, middle, high), residence type and body mass index. Residence type was divided into living with parents and not living with parents (relatives' house, boarding house, living alone). Health behavior information included perceived stress, participation in school-based nutrition education (no, yes), physical activity (no, yes) and smartphone content (education and information search, email or messenger, games, cartoons, watching movies, music, video, user-generated content, social networking and online shopping). Physical activity was classified as no (no physical activity of 60 min or more once a week or more) and yes (physical activity of 60 min or more once a week or more). Psychological and social factors included smartphone-related conflicts with family, seniors or juniors, and smartphone-related academic difficulties. Participants answered "yes" or "no" to whether they had experienced conflicts with family, seniors, or juniors, or academic difficulties due to smartphone use, in the past 30 days.^{24–25}

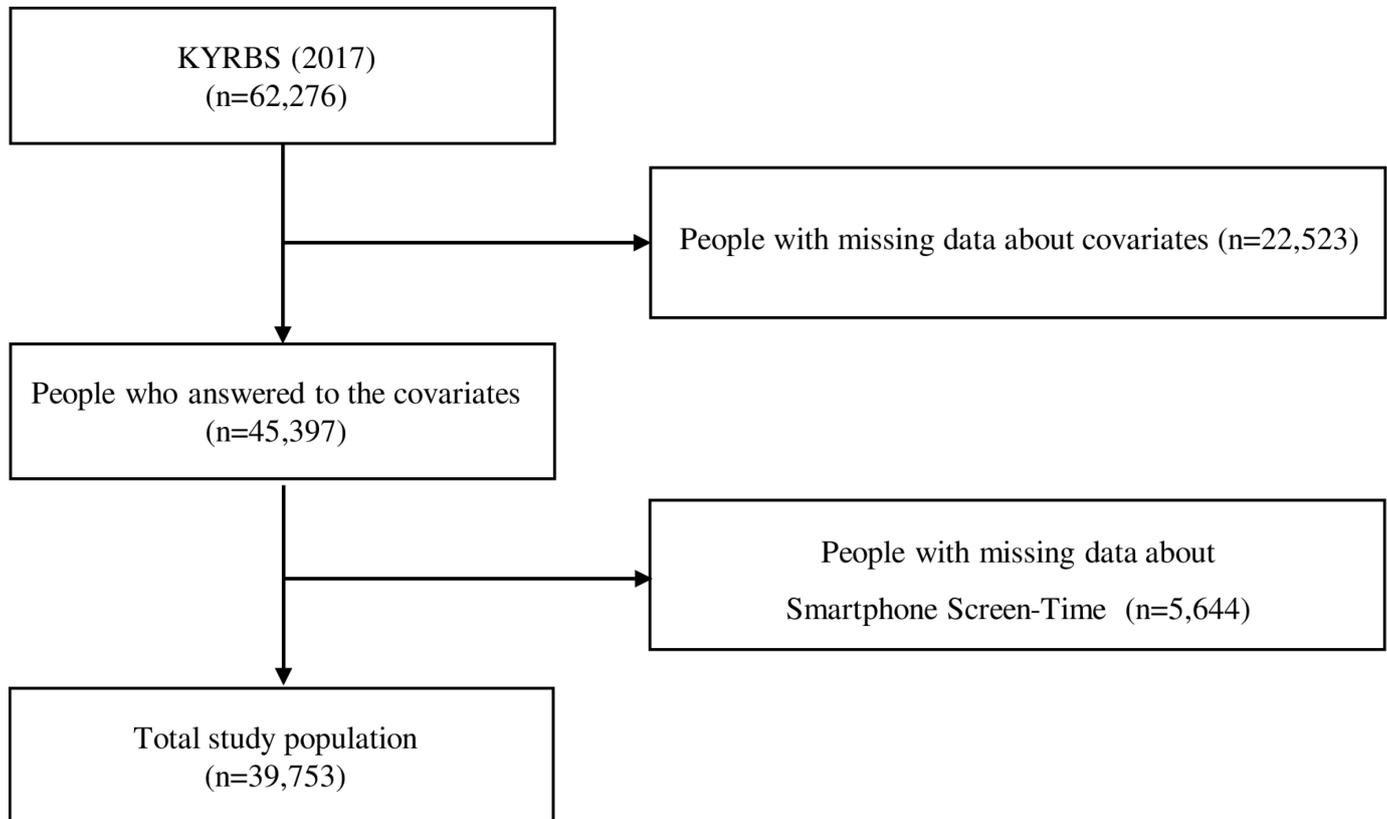


Figure 1 Flow chart of the study population. KYRBS, 2017 Korea Youth Risk Behavior Web-based Survey.

Statistical analysis

We analysed the statistical association between fast food intake and the distribution of each variable using Pearson's chi-square test. We used Poisson regression to estimate prevalence ratios (PRs) adjusted for potential confounders. This approach was chosen rather than using logistic regression as odds ratios (ORs) tend to overestimate PRs. We also performed additional subgroup analysis stratified by smartphone use to confirm the association between smartphone screen time and fast food intake. To evaluate the robustness of the results, a sensitivity analysis was conducted by stratifying smartphone usage time into five categories (<2 hours/day, 2–3 hours/day, 4–5 hours/day, 6–7 hours/day, ≥8 hours/day). All statistical analyses were performed using SAS software (version 9.4; SAS

Institute, Cary, NC, USA) and two-sided p-values < 0.05 were considered statistically significant.

RESULTS

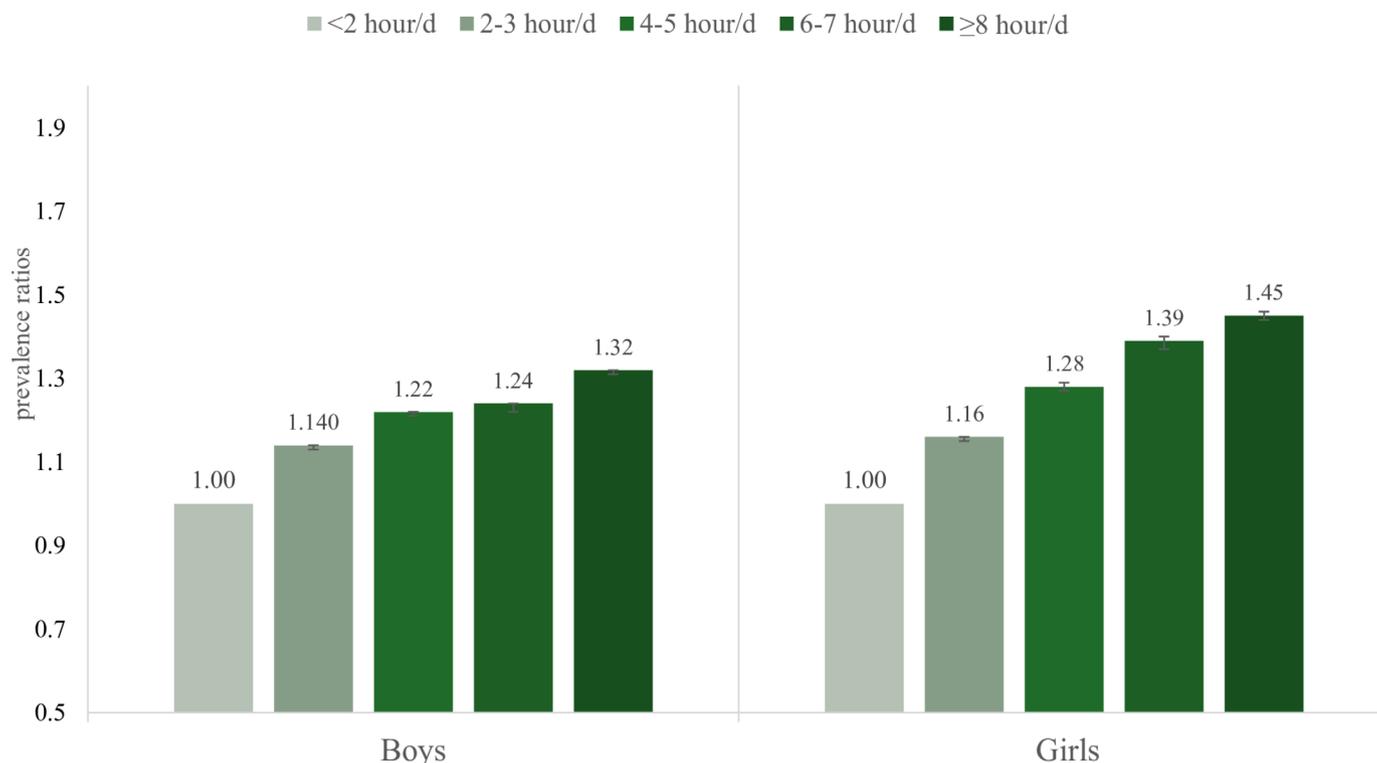
Of the 39 753 participants, 49.2% were boys and 50.8% were girls. online supplemental Table 1 shows the characteristics of the participants according to their fast food intake in 2017; 51.9% of boys (n=10 162) and 45.1% of girls (n=9 111) reported frequent fast food intake.

Table 1 presents the association between smartphone screen time and fast food intake among adolescents. In both groups, adolescents with longer smartphone screen times were more likely to report frequent intake of fast food. Among boys, those who used smartphones

Table 1 Prevalence ratios examining association between smartphone screen time and fast food intake

Smartphone screen time (hours/day)	Fast food intake			
	Boys		Girls	
	PR*	95% CI	PR*	95% CI
<2	1.00		1.00	
2–3	1.14	1.13 to 1.15	1.16	1.15 to 1.17
4–5	1.22	1.21 to 1.23	1.28	1.27 to 1.29
≥6	1.29	1.28 to 1.30	1.43	1.42 to 1.44

*Adjusted for perceived stress, nutrition education in schools, grade, academic achievement, household income, residence type, physical activity, body mass index, smartphone content types, conflict with parents, seniors and juniors, and educational difficulties. CI, confidence interval; PR, prevalence ratio.



Adjusted for perceived stress, nutrition education in schools, grade, academic achievement, household Income, residence type, physical activity, BMI, smartphone content types, conflicts among parents, senior, and junior, Educational Difficulties

Figure 2 Sensitivity analysis stratified by smartphone screen time. BMI, body mass index.

for 2–3 hours per day showed a modest increase in fast food intake compared with those with less than 2 hours of smartphone use. This trend became more pronounced with 4–5 hours of use, and was strongest in those using smartphones for ≥ 6 hours per day (2–3 hours/day: PR=1.14, 95% CI: 1.13 to 1.15; 4–5 hours/day: PR=1.22, 95% CI: 1.21 to 1.23; ≥ 6 hours/day: PR=1.29, 95% CI: 1.28 to 1.29). A similar pattern was observed among girls (2–3 hours/day: PR=1.16, 95% CI: 1.15 to 1.17; 4–5 hours/day: PR=1.28, 95% CI: 1.27 to 1.29; ≥ 6 hours/day: PR=1.43, 95% CI: 1.42 to 1.44).

Figure 2 shows the sensitivity analysis results stratified by smartphone screen time into five categories. Fast food intake showed a proportional increase with longer smartphone screen time, with similar patterns observed in both boys and girls.

Online supplemental table 2 shows the results of subgroup analysis stratified by smartphone content type. Analysis of smartphone content type showed that boys who watched music, video and user-generated content for ≥ 6 hours per day were more likely to eat fast food than those who spent less than 2 hours a day on their smartphones (PR=1.34, 95% CI: 1.32 to 1.35). Among girls, those who spent ≥ 6 hours on social networking were more likely to consume fast food compared with those with screen times of less than 2 hours (PR=1.53, 95% CI: 1.50 to 1.55).

DISCUSSION

This large population-based study investigated the association between smartphone screen time and fast food intake among adolescents in Korea. We found that about 17.8% of Korean adolescents used their smartphones for more than 6 hours per day. We highlight subgroup analysis stratified by smartphone content, with an emphasis on smartphone content types such as music, videos, user-generated content and social networking related to fast food intake. Our findings suggest that appropriate regulation and intervention of smartphone screen time and content may be necessary to prevent negative health outcomes due to fast food intake.

Although the negative effects of smartphone use are well recognised, research examining the association between screen time and fast food intake among adolescents is limited. For example, a previous study of Saudi Arabian adults reported that 30% adopted unhealthier lifestyles (eating more fast food, gaining weight and exercising less) after using a smartphone compared with previously.²⁶ However, this study was limited to college students, making it difficult to generalise the findings to a wider population, and it did not stratify the results by sex. Our findings show that the association between smartphone usage and fast food intake differs by both sex and the type of smartphone content. Among boys, smartphone screen time of ≥ 6 hours per day mainly watching music, videos and user-generated content was significantly associated

with frequent fast food intake. Among girls, smartphone screen time of ≥ 6 hours per day, particularly for social networking, was significantly associated with frequent fast food intake.

Previous studies of adolescents in the United States have linked watching TV and using smartphones, tablets, computers and/or video games with consumption of sugar-sweetened beverages.²⁷ These findings align with our approach, which also examined dietary outcomes in relation to screen time. However, while prior research has often treated screen time as a general exposure, our study adds nuance by focusing specifically on smartphone usage and further stratifying by the type of content watched, such as social networking, video streaming and user-generated content. This distinction is important, as different types of content may exert varying levels of influence on adolescents' dietary behaviors. This highlights an important factor that has been overlooked in previous studies and that may inform the development of tailored strategies to support healthier eating behaviors among adolescents. Given that adolescents exposed to a variety of smartphone content have different fast food consumption patterns, public health strategies might benefit from focusing on media literacy and promoting healthy digital engagement. For example, interventions could be designed to reduce adolescents' exposure to food marketing on social media and video platforms, while also promoting content that supports healthy eating habits.

While the exact mechanism whereby smartphone use contributes to unhealthy eating habits remains unclear, previous studies have indicated that extended smartphone usage impairs cognitive functions related to evaluating the nutritional value of food and accurately recording the amount consumed. This impairment is associated with increased calorie intake, suggesting a potential link between smartphone use and an elevated risk of adopting unhealthy eating behaviors.^{28 29} Additionally, media promotion of non-nutritious foods targeting adolescents may significantly contribute to high-calorie food intake. Media publicity marketers can negatively influence adolescents' food preferences and health by de-emphasising nutritional information and emphasising taste and image.³⁰

This study has some limitations. First, because this study was cross-sectional, causal relationships cannot be confirmed. Consequently, there is a need for experimental or longitudinal studies to elucidate these associations. Second, this study only assessed the frequency of fast food intake, making it difficult to determine the quantity and the specific nutritional content of the food consumed. Moreover, this study was conducted among Korean adolescents, so the findings may not be easily generalised to other countries or indeed to adults, as cultural and social network usage patterns may differ. Third, adolescents' eating habits may be influenced by their friends and social activities, so there may be potential confounding effects related to the frequency of attending private tutoring sessions and meeting friends.

Despite these limitations, the study has its strengths. First, considering that the content watched on smartphones by adolescents can significantly influence their health behaviors, this study provides valuable information by stratifying smartphone content, which helps identify factors related to unhealthy food. Second, the robust response rates and representation of Korean teenagers enhances the external validity of the findings.

In conclusion, this cross-sectional study shows that smartphone screen time in Korean adolescents is associated with fast food intake, and suggests that there is a need for public health interventions targeting digital media use to promote healthier dietary behaviors in this population.

Contributors DBK: conceptualisation, investigation, writing – original draft, formal analysis. SYK, IY: data curation and visualisation. DBK, IY, E-CP: methodology and review. E-CP, S-YJ: supervision and methodology. DBK, SYK, IY, E-CP, S-YJ: writing – review and editing. All authors approved the final version. S-YJ is responsible for the overall content and is the guarantor.

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REFERENCES

- 1 Lenz B. The transition from adolescence to young adulthood: a theoretical perspective. *J Sch Nurs* 2001;17:300–6.
- 2 Özdemir A, Utqualp N, Palloş A. Physical and psychosocial effects of the changes in adolescence period. *Int J Caring Sci* 2016;9:717–23.
- 3 Francis DK, Van den Broeck J, Younger N, *et al*. Fast-food and sweetened beverage consumption: association with overweight and high waist circumference in adolescents. *Public Health Nutr* 2009;12:1106–14.
- 4 Kwon HS, Kang SH, Park YS, *et al*. Association of Household Type and Fast-Food Consumption in Korean Adolescents. *Nutrients* 2022;14:3024.

- 5 Kavle JA, Mehanna S, Saleh G, *et al.* Exploring why junk foods are 'essential' foods and how culturally tailored recommendations improved feeding in Egyptian children. *Matern Child Nutr* 2015;11:346–70.
- 6 O'Donnell SI, Hoerr SL, Mendoza JA, *et al.* Nutrient quality of fast food kids meals. *Am J Clin Nutr* 2008;88:1388–95.
- 7 Chen X, Zhang Z, Yang H, *et al.* Consumption of ultra-processed foods and health outcomes: a systematic review of epidemiological studies. *Nutr J* 2020;19:86.
- 8 Yoo YS. Smartphone Addiction Survey: Ministry of Science and ICT (MSIT). 2023. Available: <https://www.msit.go.kr/bbs/view.do?sCode=user&mId=113&mPid=238&bbsSeqNo=94&nttSeqNo=3184252>
- 9 Chung A, Vieira D, Donley T, *et al.* Adolescent Peer Influence on Eating Behaviors via Social Media: Scoping Review. *J Med Internet Res* 2021;23:e19697.
- 10 Ayyıldız F, Şahin G. Effect of social media addiction on eating behavior, body weight and life satisfaction during pandemic period. *Br Food J* 2022;124:2980–92.
- 11 Xiang K, Kong F. Passive social networking sites use and disordered eating behaviors in adolescents: The roles of upward social comparison and body dissatisfaction and its sex differences. *Appetite* 2024;198.
- 12 Potvin Kent M, Pauzé E, Roy E-A, *et al.* Children and adolescents' exposure to food and beverage marketing in social media apps. *Pediatr Obes* 2019;14:e12508.
- 13 Joo MJ, Kim DB, Ko J, *et al.* Association between watching eating shows and unhealthy food consumption in Korean adolescents. *Nutr J* 2024;23:58.
- 14 Park S, Eom J, Choi S, *et al.* Association between watching eating broadcast "Mukbang and Cookbang" and body mass index status in South Korean adolescents stratified by gender. *Nutr J* 2024;23:43.
- 15 French S, Story M, Neumark-Sztainer D, *et al.* Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *Int J Obes* 2001;25:1823–33.
- 16 Kim Y, Choi S, Chun C, *et al.* Data Resource Profile: The Korea Youth Risk Behavior Web-based Survey (KYRBS). *Int J Epidemiol* 2016;45:1076–1076e.
- 17 KYRBS. Korea youth risk behavior web-based survey 2025. 2025. Available: <https://www.kdca.go.kr/yhs/minihome.jsp>
- 18 Kwon S, Kim R, Lee J-T, *et al.* Association of Smartphone Use With Body Image Distortion and Weight Loss Behaviors in Korean Adolescents. *JAMA Netw Open* 2022;5:e2213237.
- 19 World Health Organization (WHO). Regional Office for the Eastern Mediterranean. Healthy diet. 2019. Available: <https://iris.who.int/handle/10665/325828>
- 20 Larson NI, Neumark-Sztainer DR, Story MT, *et al.* Fast food intake: longitudinal trends during the transition to young adulthood and correlates of intake. *J Adolesc Health* 2008;43:79–86.
- 21 Wang CS, Wang J, Zhang X, *et al.* Is the consumption of fast foods associated with asthma or other allergic diseases? *Respirology* 2018;23:901–13.
- 22 Park S, Lee Y, Lee JH. Association between energy drink intake, sleep, stress, and suicidality in Korean adolescents: energy drink use in isolation or in combination with junk food consumption. *Nutr J* 2016;15:87.
- 23 Hartmann C, Siegrist M, van der Horst K. Snack frequency: associations with healthy and unhealthy food choices. *Public Health Nutr* 2013;16:1487–96.
- 24 Andaya AA, Arredondo EM, Alcaraz JE, *et al.* The association between family meals, TV viewing during meals, and fruit, vegetables, soda, and chips intake among Latino children. *J Nutr Educ Behav* 2011;43:308–15.
- 25 Latif H, Şimşek Kandemir A, Uçkun S, *et al.* The Presence of Smartphones at Dinnertime: A Parental Perspective. *The Family Journal* 2020;28:432–40.
- 26 Alosaimi FD, Alyahya H, Alshahwan H, *et al.* Smartphone addiction among university students in Riyadh, Saudi Arabia. *Saudi Med J* 2016;37:675–83.
- 27 Kenney EL, Gortmaker SL. United States Adolescents' Television, Computer, Videogame, Smartphone, and Tablet Use: Associations with Sugary Drinks, Sleep, Physical Activity, and Obesity. *J Pediatr* 2017;182:144–9.
- 28 La Marra M, Sapuppo W, Caviglia G. Dissociazione e Alessitimia in un campione di pazienti con Disturbo del Comportamento Alimentare. *ResPsy* 2009;12.
- 29 Robinson E, Kersbergen I, Brunstrom JM, *et al.* I'm watching you. Awareness that food consumption is being monitored is a demand characteristic in eating-behavior experiments. *Appetite* 2014;83:19–25.
- 30 Dadras A, Shah Z, Zadeh S. The Impact of Advertising on Children How Does Advertising Influence Children. *International Journal of Management Sciences and Business Research* 2017;103–11.