

<https://doi.org/10.48047/AFJBS.8.09.2026.1-11>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

Association of Smartphone Addiction with Functional Dyspepsia and Irritable Bowel Syndrome among Individual aged 12 to 35 years: A Cross-Sectional Study

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Volume 8, Issue 9, September 2026

Received: 10 June 2026

Accepted: 25 August 2026

Published: 12 September 2026

doi:[10.48047/AFJBS.8.9.2026.1-11](https://doi.org/10.48047/AFJBS.8.9.2026.1-11)

Abstract

Background: Smartphone addiction is becoming increasingly prevalent among adolescents and young adults and has been linked to various physical and psychosocial conditions. However, its association with gastrointestinal functional disorders such as functional dyspepsia (FD) and irritable bowel syndrome (IBS) remains understudied, especially in Pakistani populations.

Objective: To determine the association between smartphone addiction and the prevalence of FD and IBS among individuals aged 12–35 years.

Methods: A cross-sectional study was conducted among 350 young adults aged 12–35 years for the period of one year (March 2025 to February 2026). Smartphone addiction was assessed using the Smartphone Addiction Scale-Short Version (SAS-SV). FD and IBS were diagnosed using Rome IV criteria. Data were analyzed using descriptive statistics, Chi-square tests, and Odds Ratios with significance set at $p < 0.05$.

Results: Of 350 participants, 289 (82.6%) met the predefined criteria for smartphone addiction. FD was present in 217 (62.0%) and IBS in 229 (65.4%). Smartphone addiction was significantly associated with FD (Pearson $\chi^2 = 51.91$; $p < 0.001$; OR = 8.86, 95% CI: 4.32-18.17) and IBS (Pearson $\chi^2 = 68.38$; $p < 0.001$; OR = 12.30, 95% CI: 5.98-25.30).

Conclusion: Smartphone addiction was significantly associated with functional dyspepsia and irritable bowel syndrome in this sample. However, the cross-sectional design precludes causal inference. Further prospective studies are warranted to clarify the direction and mechanisms of these associations.

Keywords: Adolescents; Young adults; Smartphone addiction; Functional dyspepsia; Irritable bowel syndrome; SAS-SV; Pakistan

Introduction

Over the last decade, smartphone usage has surged globally. Individuals aged 12–35 years, exhibit the highest usage patterns due to academic, social, and entertainment demands. (Tufail et al., 2025, Wang et al., 2025) Excessive smartphone use is associated with psychological distress, sleep disturbances, and sedentary behavior. (Shokeen et al.,2024, Shoiria et al.,2025) Emerging evidence suggests that these factors may disrupt the gut-brain axis leading to functional gastrointestinal disorders like functional dyspepsia (FD) and irritable bowel syndrome (IBS). (Lee 2020, Kim et al.,2024, Lee. H 2023)

Functional dyspepsia is characterized by chronic upper abdominal discomfort without structural disease and affects quality of life. (Track et al.,2006) **IBS**, a chronic functional bowel disorder, is similarly influenced by psychosocial stress, altered motility, and gut microbiota imbalance. (Sperber et al.,2017) Recent studies from Pakistan have documented high prevalence of smartphone addiction among university students (Aslam 2025) and have linked excessive device usage with anxiety and GI symptoms. (Bibi et al.,2025, Lu et al.,2023, Pera 2020, Torres 2022, Nguyen 2021)

However, research specifically exploring smartphone addiction's role in FD and IBS is sparse in Pakistan and worldwide. This study investigates this association in a young adult population, aiding early clinical recognition and public health intervention.

Materials and Methods

Study Design and Setting

A cross-sectional analytical study was conducted from March 2025 to February 2026 among Individuals aged 12–35 years in community settings in Islamabad. Participants were recruited using convenience sampling, ensuring representation across schools, universities, and community centers.

Sample Size Calculation

The required sample size was estimated using the single-population proportion formula:

$$n = Z^2P(1-P) / d^2$$

where Z represents the standard normal deviate corresponding to a 95% confidence level (1.96), P represents the anticipated prevalence of smartphone addiction, and d represents the desired absolute precision (0.05).

“An anticipated prevalence of approximately 30% was used based on previously published studies reporting a prevalence of approximately 29–30% of smartphone addiction/problematic smartphone use among young populations.” (Clavier. T., et al; 2024) Accordingly:

$$n = (1.96)^2 \times 0.30 \times (1-0.30) / (0.05)^2$$

$n \approx 323$ participants.

To account for an anticipated 10% non-response rate, the minimum required sample size was increased to approximately 355 participants. A total of 350 participants were ultimately included in the analysis after application of the eligibility criteria and completion of data collection.

Inclusion Criteria

- Young adults aged 12–35 years
- Both sexes
- Willing to participate with consent/assent

Exclusion Criteria

Participants were excluded if they had:

1. a previously diagnosed organic gastrointestinal disease that could account for their gastrointestinal symptoms;
2. acute gastroenteritis or another acute gastrointestinal illness at the time of assessment;
3. current use of medications known to substantially affect gastrointestinal motility or bowel function;
4. a diagnosed psychiatric disorder currently under active treatment, where the condition or its treatment could substantially influence smartphone use or gastrointestinal symptoms; or
5. any condition that prevented reliable completion of the study questionnaires.

Because the study used a cross-sectional, symptom-based assessment rather than routine endoscopic or laboratory investigation of every participant, functional gastrointestinal disorders were identified according to Rome IV symptom-based criteria. Participants with a previously diagnosed organic gastrointestinal disorder were excluded to reduce potential misclassification.

Data Collection Instruments

Assessment of Smartphone Addiction

Smartphone addiction was assessed using the Smartphone Addiction Scale–Short Version (SAS-SV), a validated 10-item self-report instrument designed to assess problematic smartphone use. Each item is rated on a six-point Likert scale ranging from 1 (strongly disagree) to 6 (strongly agree), with total scores ranging from 10 to 60. Higher scores indicate greater severity of problematic smartphone use.

For classification of smartphone addiction, the established gender-specific cut-off scores were applied. Participants with a total SAS-SV score of ≥ 31 for males and ≥ 33 for females were classified as having smartphone addiction, whereas participants scoring below these thresholds

The use of the SAS-SV was based on its published validation study, and the scoring and classification criteria were applied consistently across participants. (Kwon et al.,2013)

The study included participants aged 12–35 years to capture both adolescents and young adults, representing age groups with substantial exposure to smartphone use. Because the study population included individuals younger than 18 years, the term “participants aged 12–35 years” is used throughout the Methods and Results sections rather than referring to the entire study population as “young adults.”

Functional Gastrointestinal Disorders: Assessment of Functional Dyspepsia and Irritable Bowel Syndrome

Functional dyspepsia was defined according to the Rome IV criteria by the presence of one or more of the following bothersome symptoms: postprandial fullness, early satiation, epigastric pain, or epigastric burning, with symptom onset at least six months before diagnosis and fulfillment of the required symptom frequency and duration criteria, in the absence of an identified structural disease that could adequately explain the symptoms.

Participants who fulfilled the relevant Rome IV symptom-based criteria were classified as having FD or IBS, respectively. The assessment was performed using the same standardized diagnostic criteria for all participants. (Dorssman et al.,2016, Chang 2017)

Ethical Considerations

Approval was obtained from the Federal Medical College Ethical Review Board. Informed consent was secured from participants ≥ 18 years. For minors (12–17 years), assent and parental/guardian consent were obtained. Confidentiality and voluntary participation were ensured.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 27. Continuous variables were summarized using means and standard deviations, while categorical variables were presented as frequencies and percentages. The distribution of participants according to smartphone addiction status and gastrointestinal outcomes was assessed using contingency tables.

Associations between smartphone addiction and functional dyspepsia, and between smartphone addiction and irritable bowel syndrome, were assessed using the Pearson chi-square test. Odds ratios (ORs) with corresponding 95% confidence intervals (CIs) were calculated to quantify the strength and precision of the associations. A two-sided p-value of <0.05 was considered statistically significant.

Results

Table1: Sociodemographic Characteristics

Variable	Frequency (n)	Percentage (%)
Male	189	54.0
Female	161	46.0
Mean age	22 ± 6.13 yrs	—

Table2: Age Group Distribution

Age Group	Frequency	Percentage (%)
12–18	114	32.6
19–25	129	36.9
26–35	107	30.6

Table3:Prevalence of Smartphone Addiction and GI Disorders

Condition	N	%
Smartphone addicted	289	82.6
Not addicted	61	17.4
Functional Dyspepsia	217	62.0

Condition	N	%
Irritable Bowel Syndrome	229	65.4

Table4:Association with Functional Dyspepsia

	FD Present	FD Absent	Total
Addicted (289)	204	85	289
Non-addicted (61)	13	48	61
Total	217	133	350

Chi-Sq = 51.91; df=1, $p < 0.001$

Odds Ratio = 8.86 (95% CI: 4.32–18.17)

Table5:Association with Irritable Bowel Syndrome

	IBS Present	IBS Absent	Total
Addicted (289)	217	72	289
Non-addicted (61)	12	49	61
Total	229	121	350

Chi-Sq=68.38, df = 1, $p < 0.001$

Odds Ratio = 12.30 (95% CI: 5.98–25.30)

Overlap between Functional Dyspepsia and Irritable Bowel Syndrome: Among the 350 participants, 189 (54.0%) fulfilled the diagnostic criteria for both functional dyspepsia and irritable bowel syndrome. Functional dyspepsia without irritable bowel syndrome was present in 28 participants (8.0%), while irritable bowel syndrome without functional dyspepsia was present in 40 participants (11.4%). A total of 93 participants (26.6%) fulfilled neither the criteria for functional dyspepsia nor irritable bowel syndrome.

Table 6. Distribution of Functional Dyspepsia and Irritable Bowel Syndrome

	IBS (+)	IBS (–)	Total
FD (+)	189 (54.0%)	28 (8.0%)	217 (62.0%)
FD (–)	40 (11.4%)	93 (26.6%)	133 (38.0%)

	IBS (+)	IBS (–)	Total
Total	229 (65.4%)	121 (34.6%)	350 (100%)

Discussion

This study shows a **very high prevalence of smartphone addiction (82.6%)** among young adults, which is consistent with recent Pakistani research reporting high smartphone overuse among university students.^{10–12} Addicted participants had nearly **9 times higher odds** of FD compared to non-addicted peers ($p < 0.001$). This aligns with global findings that excessive smartphone uses by disrupting sleep, increasing stress, and sedentary lifestyles, contributes to GI discomfort and dyspeptic symptoms. (Ryu et al.,2024, Cinquetti et al.,2023, Cinquetti et al.,2021). The association with IBS was even stronger (OR = 12.3). Similar findings are reported worldwide where IBS prevalence is significantly higher in individuals with behavioral addictions and psychological distress. (Lee et al.,2020, Musleh 2024, Khalil et al.,2025, Salzberg et al.,2024) This may be explained by gut-brain axis dysregulation from chronic stress and altered autonomic function due to addictive behaviors. Possible Mechanisms:

- Sleep disruption → altered gut motility (Irwin 2022)
- Stress-induced visceral hypersensitivity (Mayer 2023)
- Sedentary lifestyle → slowed gut transit (Huang 2021)

Comparison with Previous Literature

The findings of the present study are broadly consistent with previous research suggesting an association between problematic smartphone use and functional gastrointestinal symptoms. A previous large-scale study among adolescents reported a significant association between smartphone addiction and functional gastrointestinal disorders, supporting the possibility that excessive smartphone use may be relevant to gastrointestinal health. However, the magnitude of association observed in the present study appears substantially stronger, with smartphone addiction associated with approximately nine-fold higher odds of functional dyspepsia and twelve-fold higher odds of irritable bowel syndrome.

Several factors may explain the difference in effect estimates between studies. These include differences in participant characteristics, age distribution, definitions and cut-off values used to classify smartphone addiction, methods used to ascertain gastrointestinal disorders, and differences in study setting and sampling strategies. In addition, the present study used convenience sampling, which may have resulted in selection of participants with a higher prevalence of smartphone addiction or gastrointestinal symptoms.

The stronger associations observed in the present study should therefore be interpreted cautiously. Because the study was cross-sectional and the reported odds ratios were derived from unadjusted analyses, residual confounding cannot be excluded. Factors such as psychological stress, sleep disturbance, physical activity, dietary habits, and other lifestyle characteristics may contribute to both problematic smartphone use and gastrointestinal symptoms.

The observed findings nevertheless support the need for further investigation of the relationship between problematic smartphone use and disorders of gut–brain interaction, particularly through prospective studies incorporating objective measures of smartphone use and validated assessments of potential psychological and lifestyle confounders.

Conclusion

Smartphone addiction was significantly associated with functional dyspepsia and irritable bowel syndrome among individuals aged 12–35 years. However, these findings should be interpreted cautiously because the cross-sectional design does not establish causality.

Limitations

- Cross-sectional design cannot establish causality
- Self-reported measures may have recall bias
- Convenience sampling limits generalization

Recommendations

- Health education programs on healthy smartphone use
- Early screening for GI symptoms in addicted individuals
- Longitudinal studies to assess causality
- Inclusion of stress, sleep, and dietary assessments

Funding: none

Conflict of Interest: none

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