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Screen-related Behavioral Patterns and Toilet Postponement are Associated with Lower Urinary Tract Symptoms: A Cross-sectional Survey Study

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What's known on the subject? and What does the study add?

Excessive screen exposure has been linked to sedentary behavior and other adverse health outcomes, while maladaptive toileting behaviors are associated with lower urinary tract symptoms (LUTS). However, the interaction between screen-related behaviors, toilet postponement, and LUTS remains unclear. This study shows that digital behavior and toilet postponement scores are independently associated with LUTS burden, whereas screen exposure duration alone is not. These findings suggest that behavioral patterns accompanying screen use, rather than screen time itself, may be more relevant to urinary health.

Abstract

Objective: To investigate the relationship between screen-related behavioral patterns, toilet postponement behavior, and lower urinary tract symptoms (LUTS) in young adults.

Materials and Methods: This university campus-based cross-sectional survey included participants aged ≥18 years recruited through face-to-face interviews between May 1 and May 30, 2026. The questionnaire assessed demographic characteristics, screen use habits, toilet postponement behavior, and LUTS. Study-specific composite digital behavior score (DBS), toilet postponement score (TPS), and LUTS scores were calculated. Correlation and multivariable linear regression analyses were performed.

Results: A total of 478 participants were included (mean age: 26.05±11.7 years; 62.1% female). DBS was positively correlated with TPS (rho=0.445, p<0.001), LUTS total score (rho=0.268, p<0.001), LUTS storage score (rho=0.140, p=0.002), and LUTS voiding score (rho=0.308, p<0.001). TPS was also associated with LUTS total score (rho=0.344, p<0.001). Participants reporting longer daily screen exposure had significantly higher DBS and TPS values (both p<0.01). In multivariable regression analysis, DBS (β=0.439, p=0.002), TPS (β=0.656, p<0.001), and tea/coffee consumption (β=1.125, p<0.001) remained independently associated with higher LUTS total scores, whereas screen exposure duration was not associated (p=0.771).

Conclusion: Screen-related behavioral patterns and toilet postponement behavior were independently associated with greater LUTS burden, whereas screen exposure duration alone was not associated with greater LUTS burden. Behavioral factors accompanying digital lifestyles may have a greater impact on urinary health than screen time itself.

Keywords: Lower urinary tract symptoms, digital behavior, toilet postponement, screen exposure, voiding behavior

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Introduction

The widespread use of smartphones, tablets, computers, and other digital devices has substantially transformed daily life over the last decade. Screen-based activities have become an integral part of work, education, entertainment, and social interaction, resulting in prolonged sedentary behavior and extended periods of uninterrupted screen exposure. Recent evidence suggests that excessive screen time is associated with various adverse health outcomes, including obesity, musculoskeletal disorders, sleep disturbances, and mental health problems (1-3).

Healthy bladder function depends on regular voiding habits and timely responses to bladder filling sensations. However, individuals engaged in prolonged periods of work, studying, gaming, or social media use may intentionally delay voiding despite urinary urgency. This behavior, commonly referred to as delayed voiding or toilet postponement, has emerged as a potentially modifiable risk factor for lower urinary tract dysfunction (4-6).

Previous studies have demonstrated significant associations between maladaptive toileting behaviors and lower urinary tract symptoms (LUTS), including urinary frequency, urgency, urinary incontinence, and voiding dysfunction (5,7,8). In addition, healthy bladder initiatives have emphasized the importance of appropriate toileting practices to prevent bladder disorders (9).

Despite growing evidence linking excessive screen exposure to adverse health outcomes, and maladaptive toileting behaviors to LUTS, the potential interplay between screen use, toilet-postponement behavior, and LUTS remains largely unexplored. Given the rapid expansion of screen-based lifestyles worldwide, clarifying this relationship may have important implications for bladder health and preventive behavioral interventions. We hypothesized that prolonged screen use and screen-related behavioral patterns are associated with increased toilet postponement and a higher burden of LUTS. Therefore, this study aimed to investigate the relationship between screen-use habits, toilet-postponement behavior, and LUTS in a campus-based, cross-sectional survey conducted at a university.

Materials and Methods

Study Design and Participants

This university campus-based cross-sectional questionnaire survey was conducted between May 1 and May 30, 2026. The study was conducted as part of a social responsibility project organized by university students. Participants were recruited through face-to-face interviews conducted on Zonguldak Bülent Ecevit University campus. Although the majority of participants were university students, members of the general community present on campus during the study period were also invited to participate.

Individuals aged 18 years or older who voluntarily agreed to complete the questionnaire were eligible for inclusion. Participants younger than 18 years of age and those with incomplete questionnaire data were excluded. All responses were collected anonymously, and no personally identifiable information was recorded.

Survey Instrument and Score Definitions

The questionnaire consisted of five sections. The first section collected demographic data, including age, sex, marital status, parental status, occupation, height, weight, daily screen exposure duration, and primary purpose of screen use.

Screen-related behavior was assessed using five Likert-type items evaluating loss of time awareness during screen use, postponement of toileting due to screen use, difficulty reducing screen use, forgetting to drink water during screen use, and family warnings about screen duration. Each item was scored from 1 to 5, with higher scores indicating greater screen-related behavioral involvement. A digital behavior score (DBS) was calculated by summing these five items, resulting in a total score range of 5-25. The DBS is a study-specific composite score developed for this study and has not undergone formal external validation.

Toilet postponement behavior was assessed using two Likert-type items that evaluated intentional delay of voiding and prolonged urine holding. Each item was scored from 1 to 5. The toilet postponement score (TPS) was calculated as the sum of these two items, resulting in a total score range of 2-10, with higher scores indicating greater toilet-postponement behavior. The TPS was also a study-specific composite score and has not undergone formal external validation.

LUTS were assessed using symptom items adapted from the International Consultation on Incontinence Questionnaire female LUTS (ICIQ-FLUTS) and ICIQ male LUTS (ICIQ-MLUTS) questionnaires (10,11). LUTS domain scores were generated to enable analysis across the entire study population. The LUTS storage score was calculated using five items assessing daytime urinary frequency, nocturia, urgency, urgency urinary incontinence, and bladder pain. The LUTS voiding score was calculated using six items assessing hesitancy, straining, intermittency, weak urinary stream, incomplete bladder emptying, and post-micturition dribbling. The LUTS total score was calculated as the sum of the storage score, the voiding score, and four items assessing overall urinary incontinence, stress urinary incontinence, unexplained leakage, and nocturnal enuresis.

Sex-specific ICIQ-FLUTS and ICIQ-MLUTS scores were calculated for female and male participants and used for subgroup analyses.

Outcome Measures

The primary outcome was the association between screen-related behavior and total LUTS burden. Secondary outcomes included associations between screen-related behavior and toilet postponement behavior; between toilet postponement behavior and LUTS domain scores; and between screen exposure duration and LUTS severity. The primary analyses were performed using harmonized LUTS scores to allow combined evaluation of both sexes, whereas sex-specific ICIQ-FLUTS and ICIQ-MLUTS scores were analyzed as secondary outcomes.

Ethical Considerations

The study protocol was approved by the Zonguldak Bülent Ecevit University Non-Interventional Research Ethics Committee (approval number: 2026/06, date: 01.04.2026). All participants provided informed consent. The study was conducted in accordance with the principles of the Declaration of Helsinki and informed consent was obtained from all participants.

Statistical Analysis

Statistical analyses were performed using Jamovi software version 2.3.28 (Jamovi Project, Sydney, Australia). Continuous variables were expressed as mean ± standard deviation or median and interquartile range, depending on data distribution. Categorical variables were presented as frequencies and percentages. The normality of continuous variables was assessed using visual methods and the Shapiro-Wilk test.

Comparisons between groups were performed using the independent samples t-test or Mann-Whitney U test for two-group comparisons and one-way analysis of variance or Kruskal-Wallis test for comparisons among more than two groups, as appropriate. Categorical variables were compared using the chi-square test. Internal consistency was evaluated using Cronbach's alpha (α). Correlations between DBS, TPS, LUTS total score, LUTS storage score, and LUTS voiding score were evaluated using Spearman's rank correlation.

Multivariable linear regression analysis was performed to identify independent predictors of the LUTS total score. Clinically relevant variables, including age, sex, body mass index, daily screen exposure duration, daily fluid intake, tea/coffee consumption category, DBS, and TPS, were considered for inclusion in the model. A two-sided p-value <0.05 was considered statistically significant.

Results

A total of 478 participants were included in the final analysis. The mean age of the study population was 26.05±11.7 years, and 297 participants (62.1%) were female. Most participants reported daily screen exposure exceeding 4 hours (62.1%). Baseline demographic and clinical characteristics are summarized in Table 1.

The mean DBS was 12.64±4.14, while the mean TPS was 4.62±2.39. The mean LUTS storage score, LUTS voiding score, and LUTS total score were 3.36±2.73, 3.35±3.62, and 7.74±7.44, respectively. Internal consistency analysis demonstrated acceptable reliability for DBS (Cronbach's α=0.716) and good reliability for TPS (Cronbach's α=0.846). The LUTS Total Score demonstrated excellent internal consistency (Cronbach's α=0.881) (Table 2).

Table 1. Baseline characteristics of the study population (n=478)

Variable	Value
Age, years	26.05±11.71
BMI, kg/m²	24.04±3.99
Underweight	28 (5.9%)
Normal weight	268 (56.1%)
Overweight	148 (31.0%)
Obese	34 (7.1%)
Gender	
Female	297 (62.1%)
Male	181 (37.9%)
Marital status	
Single	389 (81.4%)
Married	77 (16.1%)
Divorced/widowed	12 (2.5%)
Daily screen time	
<1 hour	5 (1.0%)
1-2 hours	40 (8.4%)
2-4 hours	136 (28.5%)
>4 hours	297 (62.1%)
Most commonly used screen content	
Game	54 (11.3%)
Social media	20 (4.2%)
Work/education	30 (6.3%)
TV series/movie	314 (65.7%)
Other	60 (12.6%)
Daily fluid intake	
<1 L	76 (15.9%)
1-2 L	225 (47.1%)
2-2.5 L	110 (23.0%)
>2.5 L	67 (14.0%)
Tea/coffee consumption	
1 cup/day	135 (28.2%)
2 cups/day	131 (27.4%)
3 cups/day	100 (20.9%)
≥4 cups/day	112 (23.4%)

Data are presented as mean ± standard deviation or n (%)
BMI: Body mass index, TV: Television, L: Liter

Table 2. Distribution and internal consistency of the study scores				
Score	**Possible range**	**Mean ± SD**	**Median (IQR)**	**Cronbach's α**
DBS	5-25	12.64±4.14	12 (10-15)	0.716
TPS	2-10	4.62±2.39	4 (2-6)	0.846
LUTS storage score	0-20	3.36±2.73	3 (2-4.75)	0.666
LUTS voiding Score	0-24	3.35±3.62	2 (1-5)	0.792
LUTS total score	0-60	7.74±7.44	6 (3-10)	0.881
DBS: Digital behavior score, TPS: Toilet postponement score, IQR Interquartile range, SD: Standard deviation, LUTS: Lower urinary tract symptoms				

When participants were stratified according to daily screen exposure duration, significant differences were observed in DBS, TPS, and LUTS voiding scores. Participants with screen exposure exceeding 4 hours per day demonstrated higher DBS and TPS values compared with those reporting shorter screen exposure (p<0.001 and p=0.002). Similarly, LUTS Voiding Scores increased significantly with longer screen exposure duration (p=0.009). In contrast, no significant differences were observed in LUTS storage scores or LUTS total scores among screen-time groups (Table 3).

Correlation analysis demonstrated a moderate positive association between DBS and TPS (rho=0.445, p<0.001). Higher DBS values were also associated with higher LUTS total scores (rho=0.268, p<0.001), LUTS storage scores (rho=0.140, p=0.002), and LUTS voiding scores (rho=0.308, p<0.001). TPS was positively correlated with LUTS total score (rho=0.344, p<0.001) (Table 4).

Multivariable linear regression analysis was performed to identify independent predictors of LUTS burden. After adjustment for age, sex, body mass index, daily screen time, daily fluid intake, and tea and coffee consumption, both DBS [β=0.439, 95% confidence interval (CI): 0.163-0.715, p=0.002] and TPS (β=0.656, 95% CI: 0.334-0.978, p<0.001) remained independently associated with higher LUTS total scores. In addition, higher tea/coffee consumption was independently associated with increased LUTS burden (β=1.125, 95% CI: 0.524-1.727, p<0.001). Daily screen exposure duration was not an independent predictor of LUTS severity after adjustment for behavioral factors (p=0.771) (Table 5). Sex-specific analyses using the validated ICIQ-FLUTS and ICIQ-MLUTS questionnaires, stratified by screen exposure duration, are summarized in Supplementary Tables 1 and 2; these subgroup analyses were broadly consistent with the primary analyses based on harmonized LUTS scores.

Discussion

In the present study, we investigated the relationship between screen use habits, toilet postponement behavior, and LUTS in a relatively young adult population. The principal findings were threefold. First, greater screen-related behavioral involvement was associated with increased LUTS burden. Second, toilet postponement behavior demonstrated a significant positive association with LUTS severity. Third, although prolonged daily screen exposure was associated with higher digital behavior and TPSs, screen duration itself was not an independent predictor of LUTS after adjustment for behavioral factors. These findings suggest that behavioral patterns accompanying screen use may be more relevant to urinary health than screen exposure duration alone.

Excessive screen use has become an important public health concern because of its associations with sedentary behavior, sleep disturbances, obesity, and adverse mental health outcomes (12,13). However, little is known regarding its potential relationship with lower urinary tract function. In our study, higher DBSs were associated with a greater LUTS burden, including storage and voiding symptoms. This finding suggests that the behavioral consequences of intensive screen engagement, rather than screen exposure itself, may be associated with urinary symptom burden. Notably, the items that comprise the DBS—loss of time awareness, difficulty reducing use, and family complaints about screen time—closely parallel the core

Table 3. Comparison of symptom scores according to daily screen exposure duration						
Daily screen time	**n**	**DBS**	**TPS**	**LUTS storage score**	**LUTS voiding score**	**LUTS total score**
<1 hour	5	7 (5-10)	2 (2-4)	5 (3-6)	3 (3-3)	9 (6-10)
1-2 hours	40	10 (8-13)	3 (2-4)	3 (2-4)	1 (0-4)	6 (3-9)
2-4 hours	136	11 (8-14)	4 (2-6)	3 (1-4)	2 (0-4)	5 (3-9)
>4 hours	297	14 (11-16)	4 (3-7)	3 (2-5)	3 (1-5)	6 (4-10)
p-value	–	<0.001	0.002	0.118	0.009	0.076
Data are presented as median (interquartile range). P-values were calculated using the Kruskal-Wallis test DBS: Digital behavior score, TPS: Toilet postponement score, LUTS: Lower urinary tract symptoms						

Table 4. Spearman correlation analysis between digital behavior, toilet postponement, and LUTS scores

Variable 1	Variable 2	Spearman's rho	p-value
DBS	TPS	0.445	<0.001
DBS	LUTS total score	0.268	<0.001
DBS	LUTS storage score	0.140	0.002
DBS	LUTS voiding score	0.308	<0.001
TPS	LUTS total score	0.344	<0.001

DBS: Digital behavior score, TPS: Toilet postponement score, LUTS: Lower urinary tract symptoms

Table 5. Multivariable linear regression analysis predicting LUTS total score

Predictor	β coefficient	95% CI	p-value
Age	0.026	-0.029 to 0.081	0.362
Male gender	-1.234	-2.656 to 0.187	0.089
BMI	0.134	-0.023 to 0.290	0.094
Daily screen time category	0.140	-0.804 to 1.083	0.771
Daily fluid intake category	0.524	-0.360 to 1.409	0.245
Tea/coffee consumption category	1.125	0.524 to 1.727	<0.001
DBS	0.439	0.163 to 0.715	0.002
TPS	0.656	0.334 to 0.978	<0.001

DBS: Digital behavior score, TPS: Toilet postponement score, LUTS: Lower urinary tract symptoms, CI: Confidence interval, BMI: Body mass index

dimensions of problematic smartphone use (PSU), a behavioral construct typically characterized by salience, loss of control, and negative life consequences (14). This conceptual overlap is further supported by evidence that PSU itself is associated with greater screen exposure, reduced physical activity, and adverse physical health outcomes such as fatigue and obesity, lending construct validity to a behavior-based score rather than relying on screen duration alone (15). Individuals who become highly immersed in screen-based activities may be prone to ignoring physiological signals, postponing basic bodily needs, and reporting unhealthy voiding habits. To our knowledge, this is among the first studies to demonstrate a significant relationship between screen-related behavioral patterns and LUTS.

A particularly important finding was the strong association between toilet postponement behavior and LUTS severity. This observation is consistent with previous studies demonstrating that maladaptive toileting behaviors are associated with urinary urgency, urinary incontinence, overactive bladder symptoms, and voiding dysfunction (4,7,8,16). Notably, this association is not confined to women or children; comparable patterns have been reported in mixed occupational settings where task demands enforce postponement irrespective of sex, such as among nurses, in whom delayed voiding was the most frequently reported unhealthy toileting behavior and was linked to a high prevalence of urge and stress incontinence (17). This parallel suggests that screen-driven postponement may represent a discretionary, non-occupational analogue of the same underlying behavioral mechanism. Healthy bladder function depends on regular voiding habits and timely responses to bladder filling sensations (6,7,9). Habitual postponement of micturition has been proposed to be associated with altered bladder sensation, increased bladder storage pressures, dysfunctional voiding patterns, and worsening urinary symptoms (4). Our findings further support the growing body of evidence suggesting that toilet postponement represents a potentially modifiable behavioral factor associated with LUTS.

Interestingly, daily screen exposure duration was not independently associated with LUTS severity after adjustment for digital behavior and TPSs. This finding may explain why studies evaluating screen time alone have often produced inconsistent health-related outcomes (1,2). The observed association between digital lifestyles and LUTS may therefore be better explained by accompanying behavioral patterns rather than exposure duration itself. Spending several hours in front of a screen may not be associated with greater symptom burden if healthy hydration and voiding behaviors are maintained. Conversely, individuals with maladaptive screen-related behaviors may experience greater urinary symptom burden regardless of total screen exposure time.

Another notable finding was an independent association between higher consumption of tea and coffee and greater LUTS burden. Caffeine has long been recognized as a potential contributor to urinary urgency, frequency, and overactive bladder symptoms via both diuretic and bladder-stimulatory effects (18,19). Our findings are consistent with previous reports and support current recommendations encouraging moderation of caffeine intake in individuals experiencing bothersome urinary symptoms.

The clinical implications of our findings deserve consideration. Modern lifestyles increasingly involve prolonged engagement with smartphones, computers, and other digital devices. Educational interventions targeting healthy voiding behaviors, adequate hydration, and awareness of toilet postponement may therefore represent simple and cost-effective approaches for addressing LUTS burden in young adults. Because toilet-postponement behavior appears modifiable, behavioral counseling may be particularly valuable for individuals reporting intensive screen-related activities (9,20).

Study Limitations

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes any conclusions regarding causality. Second, all information was self-reported

and may therefore be subject to recall bias. Third, the study population predominantly comprised young adults recruited from a university, which may limit generalizability to older populations. Fourth, the smallest screen-time category (<1 hour/day) included relatively few participants, and comparisons involving this subgroup should therefore be interpreted with caution. Fifth, although several questionnaire items were adapted from validated ICIQ instruments, the DBS and TPS were study-specific composite measures and have not undergone formal psychometric validation. Although both demonstrated acceptable internal consistency, further validation in independent populations is warranted.

Despite these limitations, this study provides novel evidence regarding the relationship among digital behavior, toilet postponement, and LUTS. To our knowledge, this is one of the first studies to investigate these factors simultaneously within a single analytical framework. Prospective studies are needed to clarify temporal relationships and determine whether behavioral interventions targeting screen-related habits are associated with changes in LUTS burden.

Conclusion

Screen-related behavioral patterns and toilet postponement behavior were independently associated with greater LUTS burden, whereas daily screen exposure duration alone was not associated. These findings suggest that behavioral adaptations accompanying digital lifestyles may be more closely related to urinary health than to screen time itself. Promoting healthy voiding habits and reducing toilet postponement may represent practical strategies for addressing LUTS among individuals with intensive screen use.

Ethics

Ethics Committee Approval: The study protocol was approved by the Zonguldak Bülent Ecevit University Non-Interventional Research Ethics Committee (approval number: 2026/06, date: 01.04.2026).

Informed Consent: Informed consent was obtained from all participants.

Footnotes

Authorship Contributions

Concept: E.D.D., Design: E.D.D., Data Collection or Processing: O.B.Ç., A.A., B.E., E.Ç., A.K., N.K., İ.C., C.D., B.O., F.S.Ş., T.Y., J.B.Ç., C.N.A., Analysis or Interpretation: E.D.D., Literature Search: E.D.D., O.B.Ç., A.A., B.E., E.Ç., A.K., N.K., İ.C., C.D., B.O., F.S.Ş., T.Y., J.B.Ç., C.N.A., Writing: E.D.D.

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