



Shoham, D. A., Wang, Z., Lindberg, S., Chu, H., Brubaker, L., Brady, S. S., Coyne-Beasley, T., Fitzgerald, C. M., Gahagan, S., Harlow, B. L., Joinson, C., Low, L. K., Markland, A. D., Newman, D. K., Smith, A. L., Stapleton, A., Sutcliffe, S., & Berry, A. (2020). School Toileting Environment, Bullying, and Lower Urinary Tract Symptoms in a Population of Adolescent and Young Adult Girls: Preventing Lower Urinary Tract Symptoms Consortium Analysis of Avon Longitudinal Study of Parents and Children. *Urology*.  
<https://doi.org/10.1016/j.urology.2020.06.060>

Peer reviewed version

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[10.1016/j.urology.2020.06.060](https://doi.org/10.1016/j.urology.2020.06.060)

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**School toileting environment, bullying, and lower urinary tract symptoms (LUTS) in a population of adolescent and young adult girls: Preventing Lower Urinary Tract Symptoms Consortium (PLUS) analysis of Avon Longitudinal Study of Parents and Children (ALSPAC)**

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Keywords: lower urinary tract symptoms; toilet; built environment; bladder health; girls; women; prevention; life course; theory; epidemiology; transdisciplinary; interdisciplinary

#### Acknowledgements

The Prevention of Lower Urinary Tract Symptoms (PLUS) Research Consortium is supported by the National Institutes of Health (NIH) through cooperative agreements (grants U01DK106786, U01DK106853, U01DK106858, U01DK106898, U01DK106893, U01DK106827, U01DK106908, U01DK106892). Additional support is provided by the National Institute on Aging, NIH Office of Research on Women's Health, and NIH Office of Behavioral and Social Sciences Research. The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of NIH. Funding for the ALSPAC study was provided by the UK Medical Research Council and Wellcome (Grant ref: 217065/Z/19/Z) and the University of Bristol provide core support for ALSPAC. A comprehensive list of grants funding is available on the ALSPAC website (<http://www.bristol.ac.uk/alspac/external/documents/grant-acknowledgements.pdf>). This publication is the work of the authors and will serve as guarantors for the contents of this paper.

We are extremely grateful to all the families who took part in the ASLPAC study, the midwives for their help in recruiting them, and the whole ALSPAC team, which includes interviewers, computer and laboratory technicians, clerical workers, research scientists, volunteers, managers, receptionists and nurses.

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## ABSTRACT

(a) Objectives: To examine whether the school toilet environment at age 13, including bullying at toilets, is associated with female LUTS at ages 13 and 19, as little is known about the association among school toilet environment, voiding behaviors, and lower urinary tract symptoms (LUTS) in adolescent girls.

(b) Methods: The sample comprised 3962 female participants from the Avon Longitudinal Study of Parents and Children (ALSPAC). At age 13, participants reported on 7 school toilet environment characteristics and a range of LUTS items. At age 19, participants completed the Bristol Female Lower Urinary Tract Symptoms (ICIQ-BFLUTS) questionnaire.

(c) Results: All toilet environmental factors were associated with at least one LUTS outcome at age 13. Holding behavior was associated with all school toilet environmental factors, with odds ratios (ORs) ranging from 1.36 (95% CI: 1.05, 1.76) for dirty toilets to 2.38 (95% CI: 1.60, 3.52) for feeling bullied at toilets. Bullying was associated with all daytime LUTS symptoms and nocturia; ORs ranged from 1.60 (95% CI: 1.04, 2.07) for nocturia to 2.90 (95% CI: 1.77, 4.75) for urgency. Associations between age 13 school toilets and age 19 LUTS were in the same direction as age 13 LUTS.

(d) Conclusions: This is the first examination of associations between school toilets and LUTS. Toileting environments were cross-sectionally associated with LUTS in adolescent girls. While further work is needed to determine whether these associations are causal, school toilet environments are modifiable and thus a promising target for LUTS prevention.



## Introduction

Lower urinary tract symptoms (LUTS) are common in childhood and may include urinary incontinence (UI), urinary urgency, frequent urination, and urinary tract infection (UTI).<sup>1</sup> Nocturnal enuresis is the most common form of UI in children and may be associated with other LUTS concurrently, later in life, or as an isolated entity.<sup>2</sup> In a large British cohort, parents of 7 year old children reported that 7.8% had daytime UI and 15.5% had nocturnal enuresis.<sup>3</sup> Daytime UI and LUTS are more common in girls than boys,<sup>4,5</sup> and 4.2 % of adolescent girls in the British cohort reported daytime UI.<sup>6</sup> Furthermore, childhood UI was recalled by women suffering from overactive bladder and UI, highlighting the importance of female bladder health.<sup>2</sup>

The psychosocial consequences of LUTS impact children of all ages, but adolescents are particularly vulnerable. During adolescence, individuals develop self-direction and a sense of identity. Incontinence that presents or persists into adolescence negatively impacts self-esteem and peer relationships.<sup>7</sup>

Adolescents spend a significant portion of their day in school, where the toilet environment may be a key determinant of sufficient toileting to prevent<sup>8</sup> or manage LUTS.<sup>9</sup> Students report many problems with their school toilets, which may pose barriers to toileting at school, including embarrassment and fear being bullied in the bathroom.<sup>10</sup> Similar barriers to using toilets have been observed in focus groups of adolescents conducted in Sweden,<sup>11</sup> the United States,<sup>12</sup> Brazil,<sup>13</sup> and South Africa.<sup>14</sup> Students have also described toilet stalls with missing doors or doors that would not

close,<sup>13,14</sup> as well as incidents of security guards<sup>14</sup> or other students<sup>11</sup> trying to push or kick doors open while adolescents were using the toilet. As adolescents mature, concerns become more prominent; in a Swedish survey of schoolchildren, 35% of adolescents 13-16 years old reported avoiding the school toilet and 25% reported never urinating in school.<sup>15</sup> Barriers also are felt acutely by adolescents with continence problems.<sup>9</sup> A poor school toilet environment may lead adolescents to engage in unhealthy compensatory behaviors such as avoiding fluids during school hours and use of physical maneuvers to actively withhold voiding.<sup>11</sup>

The fear of using the bathroom due to lack of privacy or safety may reduce adolescents' likelihood of using school bathrooms.<sup>11</sup> The experience of bullying is one such safety concern of adolescents globally, and with health implications.<sup>16</sup> In the United States, nearly 25% of school-aged children are regularly bullied, and bullying was found to be significantly greater in children with LUTS compared to those without.<sup>17</sup>

The purpose of the present secondary data analysis is to examine whether the school toilet environment at age 13, including bullying at the school toilet, is associated with holding urine, frequency, and incontinence in girls and women at the critical ages of 13 (the beginning of adolescence) and 19 (the start of young adulthood).

## **Methods**

### **Participants**

This analysis used data from participants in the Avon Longitudinal Study of Parents and Children (ALSPAC). Pregnant women residing in Avon, UK, with expected dates of delivery between April 1991 and December 1992 were invited to take part in the study. Additional recruitment brought the total sample size for analyses using any data collected after the age of seven to 15,454 pregnancies, resulting in 15,589 fetuses. Of these, 14,901 were alive at one year of age.

Detailed information about the cohort has been collected since early pregnancy, including regular self-completion questionnaires from mothers and children. Information about ALSPAC is available at [www.bristol.ac.uk/alspac/](http://www.bristol.ac.uk/alspac/), including a searchable data dictionary (<https://www.bris.ac.uk/alspac/researchers/data-access/data-dictionary/>). Further details on the cohort profile, representativeness, and phases of recruitment are described in two cohort profile papers<sup>18,19</sup> as well as an update.<sup>20</sup> As of 2019, over 75% of study participants continue to live at a Bristol address (<http://www.bristol.ac.uk/alspac/news/2019/co90s-grant-award.html>)”.

Because our focus is on adolescent girls and young adult women, our analyses examined the data from female offspring alive at 1 year (n=7,148) using an imputed dataset, as described in statistical methods section.

### **Ethical approval**

Ethical approval for the study was obtained from the ALSPAC ethics and law committee and the local research ethics committees. Informed consent for the use of data collected

via questionnaires was obtained from participants following the recommendations of the ALSPAC ethics and law committee at the time. As these analyses use pre-existing de-identified data, they do not constitute human subjects research.

## **Measures**

Toileting Environment - Questions regarding the children's school toileting environment were developed by ALSPAC investigators and asked at age 13. This consisted of 7 checkbox questions (toilets are dirty or in a bad condition, don't have any privacy, don't have toilet paper, don't have soap, don't have hand dryers or towels, child is likely to be bullied at toilets, there is always a queue at toilets). A toileting environment score was created by summing responses across these 7 variables for a range of 0-7. Adolescent school toileting environment was measured only at the age 13 time point; young adult women at age 19 were no longer attending these schools.

LUTS Measures- A self-report postal questionnaire was sent to study children when they were 13 years, 10 months (hereafter referred to as 13 years). The questionnaire asked about the presence and frequency of a range of lower urinary tract symptoms, including daytime urinary incontinence, urgency, frequent urination, low voiding volume, nocturia, bedwetting, and holding behavior.<sup>6</sup> Questions from the Bristol Female Lower Urinary Tract Symptoms (ICIQ-BFLUTS) questionnaire,<sup>21</sup> including subscales (filling, voiding, incontinence) were administered at age 19. Although the standard clinical definition of frequent urination is 8 or more times per day,<sup>1</sup> these data required using a cut-point of 7+ times per day. We further note that age 13 LUTS items do not perfectly

overlap with age 19 ICIQ items; some items were assessed only at age 19 (e.g., stress incontinence; see Appendix, Table 1).

Confounders- Potential confounders were initially selected based on previous literature<sup>22,23</sup> and included BMI (associated with LUTS in adult women in the BACH) at 12.5 years; LUTS items reported at age 10 (times child usually goes to toilet to pass water during the day, times child usually gets up to go to toilet at night, times child wets self during the day, times child wets the bed at night); highest education reported among parents; and parental social class, determined during pregnancy and dichotomized into manual or non-manual occupations.

### **Statistical Methods:**

The pattern of missing data was analyzed. A total of 3,962 participants had data on at least one age 13 holding behavior variable (holding urine when the urge is felt to urinate) and associated behaviors (e.g., fidgeting) or one age 19 LUTS variable response. Complete risk factor and outcome data was available for 970 of the participants (13.6% of the overall female study sample, 24.5% of females who completed at least one outcome measure). Multivariate imputation by chained equations was used to handle missing data.<sup>24</sup> The imputation model included age 13 outcome variables, age 19 outcome variables, age 13 risk factor variables, many potential confounding variables, and other auxiliary variables that were not included in the regression analysis but may be associated with missing values. The MI procedure generated 50 imputed datasets. Both exposure and outcome variables had missing

values, but importantly for the validity of the imputation model, we had complete data on 970 observations. Sensitivity analyses were carried out by comparing imputed results with the complete-case analysis (see Appendix).

The association between risk factors and LUTS was estimated using multivariate logistic regression methods. Covariates were added to the model to examine their effects on the association. Age 13 analyses were cross-sectional; longitudinal analysis of incident LUTS at age 19 restricted analyses to those without prevalent LUTS at age 13.

Toileting environment was assessed both as a continuous composite score and as separate variables using logistic regression models. LUTS variables were dichotomized.<sup>6</sup> Baseline characteristics were compared between complete case and imputation sample populations and were found to be similar. All analyses were completed in SAS 9.4 mainly by procedures MI, GLIMMIX, and MIANALYZE.<sup>25</sup>

## **Results**

Overall, 3,962 girls were included in the imputed analyses, 3,745 in the complete case cross-sectional analysis of LUTS at age 13, and 1,942 in the complete case prospective analysis of LUTS at age 19 (see Appendix for complete case sensitivity analyses).

These samples were similar with respect to the school toilet environment, LUTS, and potential confounders (Table 1). At age 13, girls rated school toilets as having 2.3

problems on average. The most common of these were dirtiness (56.4%) and lack of soap (49.6%), toilet paper (44.8%), and privacy (35.4%), and the least common were perceived bullying at the school toilet (7.6%) and a lack of hand dryers or towels (14.7%). The intraclass correlation coefficient (a measure of clustering at the school level) was consistently elevated for school toilet environment characteristics, ranging from 0.087 for perceived bullying at school toilets to 0.324 for overall school toilet problems.

At age 13, the proportion prevalence of LUTS and bladder or LUT behaviors ranged from 2.4% for bedwetting to 15.5% for postponing voiding due to focusing on other activities. At age 19, the most commonly reported LUTS were starting and stopping urination (36%), pain in the bladder (25.3%), leaking with physical activity (23.7%), and urination of 7 or more times per day (23.6%).

*Regression model results – unadjusted and adjusted measures* - All toilet environment factors were associated with at least one LUTS outcome at age 13 (Table 2). In unadjusted cross-sectional analyses, voiding postponement at age 13, and all toilet environment factors except for missing toilet paper were positively associated with at least one additional LUTS (see Appendix, Table 2). Bullying at the toilets was associated with all LUTS investigated, except nocturnal enuresis, and was the environment factor most strongly associated with LUTS. Adjusted odds ratios for bullying at the toilet ranged from 1.60 (95% confidence interval [CI]: 1.04-2.47) for nocturia to 2.90 (95% CI: 1.77-4.75) for urgency. All associations between the toilet

environment and LUTS persisted after adjustment for BMI, parental education and social class, and restriction to participants who did not report LUTS at age 10 (Table 2).

In unadjusted prospective analyses, fewer associations were observed between the school toilet environment at age 13 and incident LUTS at age 19. Dirty toilets and toilets lacking privacy and soap (a proxy for cleanliness) were each associated with incident ICIQ filling symptoms. Combining all LUTS, toilets lacking soap were positively associated with total ICIQ symptoms (see Appendix, Table 6). These associations persisted after adjustment for BMI and parental social class (Table 3). All analyses were repeated using complete data, i.e., without imputation (see Appendix, Tables 4, 5, 7 and 8); results were consistent with multiple imputation analyses.

## **Discussion**

Effective prevention of LUTS requires identification of modifiable risk factors. Our findings suggest that there is a cohort of adolescent girls who are impacted by negative features of the school toilet environment and subsequently develop LUTS as they become young adults. This analysis highlights the opportunity to impact the prevalence of LUTS through improved standards of toileting environments, including the social context in which toileting occurs in schools. It is clear that adolescents may avoid toileting environments that they perceive as unacceptable. Facility attributes such as ease of access, privacy, safety, and cleanliness are important to adolescents, just as they are to adults. Adolescents may restrict fluids during school to reduce the risk of having to use the bathroom during school hours.<sup>11</sup>



From a biological standpoint, adolescents may defer urination during the school day, leading to increased fluid intake and frequent voiding after hours, potentially inciting or exacerbating nocturia. Unlike children in whom evening fluid provocation triggers nocturnal enuresis, adolescents are more likely to arouse to bladder stimulus and experience nocturia,<sup>26</sup> which may explain the lack of association with nocturnal enuresis.

This analysis also highlighted an association between bullying at the school toilet and LUTS at age 13. Bullying at the toilet was associated with all daytime LUTS symptoms at age 13; while not significant, the direction of the association was consistent with all three ICIQ subscales at age 19. Lack of statistical significance may have arisen due to removal of affected girls with prevalent LUTS at age 13. Although the prevalence of adolescents who fear bullying at the toilet may seem low (7.6%), the number of adolescents affected is high from a population perspective. Since the time of the original ALSPAC study, mechanisms of bullying have moved beyond in-person only events to include cyber bullying on social media. In response, parents, school personnel, and clinicians have heightened efforts to identify and effectively intervene to reduce or eliminate bullying. The temporal association between bullying, LUTS, and related outcomes (e.g., anxiety) is not yet known and the direction of causality, if it exists, is not yet defined. It is possible that bullying leads to LUTS since children may escape their school environment and frequent the toilet to avoid being bullied. Alternatively, bullying occurring in school bathrooms may victimize students,<sup>9</sup> who then avoid using the toilet and hold their urine despite an urge to void until leaving school or returning

home. Conversely, children with urinary incontinence or urinary frequency may get bullied due to smelling like urine or constantly leaving class to use the toilet.

Consistent with bullying being identified as commonplace in high schools in the US,<sup>27</sup> a range of bullying experiences in school toilets has been noted for adolescent girls.

While some studies have identified the bathroom as an opportune space for bullying to occur,<sup>28</sup> others have noted toilets may be safe spaces, free from bullying across gender identities.<sup>29</sup> This range of experiences documented in small studies raises the need for further exploration of the current experience of adolescents in the toileting environment.

While the ALSPAC study design limits causal inferences, this intriguing association gives rise to several hypotheses. It is not known whether adolescents who are bullied are more likely to avoid school toileting environments where bullying episodes may occur. Alternatively, the toileting behavior of adolescents with LUTS may stimulate bullying from peers who focus on deviations from normality as an opportunity for bullying. Adolescents may have emotional and/or psychological conditions (such as depression and anxiety) that act as mediators or confounders of toileting behaviors or LUTS.<sup>30</sup> In order to move forward, we need better temporal and mechanistic understanding of the relationship between bullying, social stress and anxiety, and LUTS since they appear to be closely related.

A missing component of this analysis is the process adolescents must use to access the environment. The role of gatekeepers, individuals who have power over access to the

toilets, is a potential contributor to the overall experience adolescents have in the school setting related to bathroom access. Camenga and colleagues documented the role of teachers as gatekeepers that students had to ask permission from to use the toilets during school hours.<sup>12</sup> Work by Allen and colleagues described a range of classroom policies that created stigma about adolescent females needing to use the toilet, including making students carry a large item as a pass to use the restroom or penalizing students for asking for a bathroom pass.<sup>29</sup> Most of the policies are in place to reduce assumed risk for behavior issues outside the classroom, but for the adolescent with LUTS, these policies present unique challenges and potentially may call unwanted attention to them. This contextual aspect of seeking to use the bathroom is not part of this analysis, yet may contribute to the feeling of stigma and potentially increase risk for bullying. Future studies should include evaluation of the contextual factors surrounding navigation of the toileting environment.

Everyone prefers toileting environments that feature basic amenities with appropriate access. The health consequences of unmet needs have not been studied appropriately, perhaps contributing to a range of school toilet environments with respect to adequacy. Given the evidence of heightened LUTS risk, the modifiable factor of the school toileting environment should be addressed. Similarly, everyone agrees that bullying is not to be tolerated, within or beyond the school toileting environment. Expanding efforts to implement school policies that support access to a quality toileting environment is required to assure safe access, ideally in a space that provides adequate privacy.

This study has notable strengths. The ALSPAC dataset is unique in collecting life course data from gestation into young adulthood, allowing analysis of both cross sectional and longitudinal associations with LUTS. Furthermore, we know of no other datasets that tie comprehensive LUTS conditions to school toilet environments. LUTS were assessed at age 19 using the ICIQ, a validated instrument. The larger ALSPAC study was robust, with sufficient size and longitudinal data and careful characterization of LUTS. In addition, the details of the toileting environment remain relevant for contemporary research. While this analysis shares the limitations of all observational data sets, findings allow hypothesis generation for future investigation. Associations such as that between bullying and LUTS are not amenable to randomized trial designs; however, heightened awareness of the phenomenon of school toileting behavior in adolescent girls may inform future research design.

Several weaknesses warrant discussion. Our analyses are restricted to girls and young adult women, meaning results are not generalizable to males. Analyses are further restricted to a UK cohort, which may have important social and cultural differences with United States populations. As with any longitudinal study, loss to follow-up diminished the sample size; however, multiple imputation allowed us to minimize bias due to selective loss to follow-up. The cross-sectional associations at age 13 preclude assessing temporality. The LUTS conditions assessed at age 13 did not employ a validated instrument, using instead a set of items indicative of LUTS. Given that age 19 analyses were restricted to incident LUTS and thus removed girls with prevalent LUTS

conditions at age 13, we had limited power to observe any associations that may in fact be present.

## **Conclusion**

Toileting environments and concern for bullying at the toilet are associated with LUTS in girls, particularly at age 13. These factors are modifiable, highlighting a need to remedy poor and unsafe toileting environments in schools. Students have rights to access toilets, and feel safe and comfortable when using them. Although further work needs to be done to determine if these associations are indeed causal, these results suggest that planners, parents, and educators should improve the school toileting environment in an effort to improve school safety and reduce LUTS.

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Table 1. Participant responses to school toilet environment and LUTS, and parental reported potential confounders: Unimputed (complete cases) vs. imputed dataset population.

	<b>Complete Case</b>	<b>Imputation Sample</b>
<b>Number</b>	<b>970</b>	<b>3962</b>
<b><i>School Toileting Environment Questionnaire Responses (age13)</i></b>		
Toilets are dirty or in a bad condition	558 (57.5%)	2236 (56.4%)
Toilets don't have any privacy	342 (35.3%)	1404 (35.4%)
toilets don't have toilet paper	432 (44.5%)	1776 (44.8%)
Toilets don't have soap	477 (49.2%)	1966 (49.6%)
toilets don't have hand dryers or towels	146 (15.1%)	584 (14.7%)
Child is likely to be bullied at toilets	73 (7.5%)	299 (7.6%)
There is always a queue at toilets	196 (20.2%)	754 (19.0%)
Child reported toilet environment sum score	2.3 ± 1.7	2.3 ± 1.7
<b><i>Urinary Symptoms Questionnaire Responses (Age 13)</i></b>		
Had a sudden feeling you need a wee and had to dash to the toilet? (Urgency)	57 (5.9%)	248 (6.3%)
Had to go to the toilet for a wee more than 7 times a day? (Frequent urination)	33 (3.4%)	152 (3.8%)

Frequency child passed only a small amount when they went for a wee in the last 2 weeks (Low voided volume)	46 (4.8%)	227 (5.7%)
Frequency child had to hold on until they felt like bursting before they had a wee	79 (8.1%)	402 (10.2%)
Frequency child avoided going for a wee until the last moment because they were concentrating on other activities (Voiding Postponement)	121 (12.5%)	614 (15.5%)
Frequency child had hard stools that were difficult to pass in the last 2 weeks	28 (2.9%)	135 (3.4%)
Woken up to go for a wee? (Nocturia)	82 (8.5%)	415 (10.5%)
Frequency child woke up needing a wee but turned over and went back to sleep	41 (4.2%)	240 (6.1%)
Frequency child wets themselves during day (Daytime wetting)	43 (4.5%)	187 (4.7%)
Frequency Child wets the bed at night (Bedwetting)	22 (2.3%)	96 (2.4%)
How often do you pass urine during the day?	236 (24.3%)	934 (23.6%)
During the night, how many times do you have to get up to urinate, on average?	45 (4.6%)	266 (6.7%)
Does urine leak when you are physically active, exert yourself, cough or sneeze?	257 (26.5%)	937 (23.7%)
Do you have a sudden need to rush to the toilet to urinate?	128 (13.2%)	547 (13.8%)
Does urine leak before you can get to the toilet?	201 (20.7%)	729 (18.4%)
Do you ever leak urine for no obvious reason and without feeling that you want to go?	66 (6.8%)	322 (8.1%)
Is there a delay before you can start to urinate?	73 (7.5%)	353 (8.9%)

Do you have to strain to urinate?	23 (2.4%)	182 (4.6%)
Do you stop and start more than once while you urinate?	370 (38.2%)	1426 (36.0%)
How often do you leak urine?	216 (22.3%)	795 (20.1%)
Do you leak urine when you are asleep?	39 (4.0%)	248 (6.3%)
How often do you feel that your bladder has not emptied properly after you have urinated?	104 (10.7%)	488 (12.3%)
Have you had a wetting accident yourself in the past year, either during the night or day?	59 (6.1%)	285 (7.2%)
Do you have pain in your bladder?	254 (26.5%)	1002 (25.3%)
In the past month, how often have you had a urinary/bladder infection?	149 (15.4%)	604 (15.2%)
ICIQ Filling Score *	1.7 ± 1.8	1.8 ± 2.4
ICIQ Voiding Score *	1.1 ± 1.3	1.2 ± 1.8
ICIQ Incontinence Score *	1.0 ± 1.8	1.1 ± 2.6
ICIQ Total Score*	3.9 ± 3.7	4.2 ± 6.0
<b>Covariates</b>		
BMI (12.5y)	19.9 ± 3.4	20.2 ± 3.7
BMI (17y)	22.8 ± 4.4	23.1 ± 4.6
Parental Manual Social class (vs Non -Manual)	108 (12.0%)	535 (13.5%)
Parental Education		

Low (%)	90 (9.7%)	580 (14.6%)
Medium (%)	214 (23.1%)	982 (24.8%)
High (%)	623 (67.2%)	2399 (60.6%)
<b><i>LUTS (age 10)</i></b>		
Times child usually goes to toilet to pass water during the day	5 (0.8%)	108 (1.6%)
Times child usually gets up to go to toilet at night	12 (1.4%)	16846 (2.2%)
Times child wets self during the day	58 (6.6%)	58 (5.9%)
Times child wets the bed at night	44 (5.0%)	44 (6.1%)

\* ICIQ scores range from 0 to 48 points, where a higher score indicates greater symptom severity.

0-16 filling symptoms subscale

0-12 voiding symptoms subscale

0-20

Table 2. Regression results (LUTS items by toilet environment at age 13). **Bold** font indicates p<0.05.

\* Adjusted for BMI at age 13, parental education, and parental social class.

	Daytime						Nighttime	
<i>(number with condition in parentheses)</i>	<b>Urgency</b> (n=248)	<b>Hold until feeling like bursting</b> (n=402)	<b>Voiding postponement</b> (n=614)	<b>Frequent urination</b> (n=152)	<b>Low volume</b> (n=227)	<b>Daytime wetting</b> (n=187)	<b>Nocturia</b> (n=266)	<b>Nighttime wetting</b> (n=96)
Toilets are dirty or in a bad condition (n=2236)	<b>1.71 (1.20 - 2.44)</b>	<b>1.36 (1.05 - 1.76)</b>	1.22 (0.99 - 1.50)	1.32 (0.86 - 2.04)	1.06 (0.77 - 1.47)	1.11 (0.75 - 1.65)	<b>1.31 (1.02 - 1.69)</b>	0.78 (0.41 - 1.48)
Toilets don't have any privacy (1404)	<b>1.74 (1.23 - 2.46)</b>	<b>1.90 (1.48 - 2.46)</b>	<b>1.46 (1.18 - 1.80)</b>	<b>1.88 (1.22 - 2.91)</b>	<b>1.61 (1.15 - 2.26)</b>	1.21 (0.79 - 1.83)	<b>1.42 (1.10 - 1.83)</b>	0.79 (0.38 - 1.66)
Toilets don't have toilet paper (1776)	1.07 (0.74 - 1.55)	<b>1.38 (1.06 - 1.80)</b>	1.22 (0.99 - 1.50)	1.10 (0.67 - 1.79)	1.14 (0.81 - 1.61)	1.44 (0.98 - 2.13)	1.25 (0.96 - 1.63)	1.42 (0.73 - 2.76)
Toilets don't have soap (1966)	<b>1.87 (1.30 - 2.69)</b>	<b>1.37 (1.06 - 1.77)</b>	<b>1.49 (1.22 - 1.83)</b>	<b>1.77 (1.12 - 2.80)</b>	<b>1.64 (1.16 - 2.31)</b>	1.21 (0.81 - 1.80)	<b>1.40 (1.08 - 1.81)</b>	0.89 (0.47 - 1.69)
Toilets don't have hand dryers or towels (584)	1.34 (0.85 - 2.11)	<b>1.50 (1.08 - 2.10)</b>	<b>1.43 (1.09 - 1.88)</b>	1.31 (0.71 - 2.39)	1.24 (0.78 - 1.96)	1.55 (0.93 - 2.56)	1.29 (0.91 - 1.82)	1.19 (0.47 - 2.98)
Child is likely to be bullied at toilets (299)	<b>2.90 (1.77 - 4.75)</b>	<b>2.38 (1.60 - 3.52)</b>	<b>1.98 (1.41 - 2.79)</b>	<b>2.60 (1.37 - 4.95)</b>	<b>2.44 (1.49 - 3.99)</b>	<b>2.08 (1.12 - 3.86)</b>	<b>1.60 (1.04 - 2.47)</b>	1.32 (0.38 - 4.54)

There is always a queue at toilets (754)	<b>1.56 (1.04 - 2.32)</b>	<b>1.59 (1.18 - 2.15)</b>	1.11 (0.85 - 1.44)	1.32 (0.78 - 2.23)	<b>1.56 (1.07 - 2.28)</b>	1.04 (0.63 - 1.71)	1.22 (0.88 - 1.70)	1.97 (0.97 - 4.02)
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Table 3. Toilet environmental variables at age 13 and Age 19 ICIQ Subscales. Restricted to those without LUTS at age 13. Adjusted for BMI, social class, education; analyses are restricted to girls without prevalent LUTS at age 13. **Bold** font indicates  $p < 0.05$ .

<i>Risk Factors (yes vs. no)</i>	<b>Filling symptoms</b>	<b>Volume symptoms</b>	<b>Incontinence symptoms</b>	<b>Total ICIQ Symptoms</b>
Toilets are dirty or in a bad condition (n=2236)	<b>0.16 (0.01 - 0.31)</b>	0.02 (-0.10 - 0.14)	0.03 (-0.12 - 0.17)	0.21 (-0.12 - 0.54)
Toilets don't have any privacy (1404)	<b>0.16 (0.01 - 0.31)</b>	-0.01 (-0.14 - 0.12)	-0.03 (-0.19 - 0.12)	0.11 (-0.22 - 0.45)
Toilets don't have toilet paper (1776)	0.04 (-0.11 - 0.18)	-0.02 (-0.14 - 0.10)	0.06 (-0.08 - 0.20)	0.08 (-0.25 - 0.40)
Toilets don't have soap (1966)	<b>0.19 (0.04 - 0.34)</b>	0.09 (-0.02 - 0.21)	0.09 (-0.06 - 0.25)	<b>0.38 (0.04 - 0.71)</b>
Toilets don't have hand dryers or towels (584)	0.02 (-0.19 - 0.24)	0.02 (-0.15 - 0.19)	-0.06 (-0.27 - 0.15)	-0.01 (-0.47 - 0.44)
Child is likely to be bullied at toilets (299)	0.16 (-0.14 - 0.47)	0.12 (-0.13 - 0.37)	0.02 (-0.30 - 0.33)	0.30 (-0.38 - 0.97)
There is always a queue at toilets (754)	0.02 (-0.18 - 0.22)	-0.04 (-0.19 - 0.12)	0.06 (-0.14 - 0.26)	0.04 (-0.41 - 0.50)