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# Sex differences in the association between (sexual) abuse and lower urinary tract symptoms

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## Abstract

**Objectives:** To study the possible association between (sexual) abuse and lower urinary tract symptoms (LUTS) in men and women. To study the differences in this association between men and women, and between the timing of the abuse.

**Subjects and Methods:** A Dutch observational population-based cross-sectional study was used, based on self-administered questionnaires. Respondents were included if they had answered all questions about abuse and LUTS. Logistic regression was used to analyse the data.

**Results:** Included were 558 men and 790 women, of whom 29% and 37%, respectively, reported a history of one of more types of abuse. Abuse was significantly associated with LUTS in both men (odds ratio [OR] 1.7; 1.2–2.5) and women (OR 1.4; 1.1–2.1). This association, testing by two-way interaction, was significantly stronger in men. No association was found between childhood abuse or adulthood abuse and LUTS, in men or women. The association of sexual abuse with LUTS was significant in both men (2.7; 1.4–5.2) and in women (1.5; 1.1–2.2), and this association (testing by two-way interaction) was significantly much stronger in men.

**Conclusion:** In men more than in women, a history of any type of abuse is associated with LUTS, regardless of whether the abuse occurred during childhood or adulthood. In both sexes, a history of sexual abuse is also associated with experiencing LUTS, with a much stronger association in men than in women. Patients, in particular male patients, presenting with LUTS should therefore be asked about sexual abuse in the past.

## KEYWORDS

abuse, adulthood, childhood, general population, LUTS, sex differences

## 1 | INTRODUCTION

Lower urinary tract symptoms (LUTS) are common in the aging general population, with a prevalence ranging between 18% and 70%.<sup>1–4</sup> LUTS negatively affect physical and mental well-being and quality of life and interfere with daily activities.<sup>4–6</sup> The etiology of LUTS is multifactorial, and factors that may influence the development of LUTS are traumatic incidents, with animal models demonstrating that trauma can sensitize micturition pathways and lead to overactive bladder and incontinence.<sup>7</sup> This influence of trauma on micturition pathways is reflected in multiple studies in humans showing a relation between sexual abuse and LUTS.<sup>5–13</sup>

The majority of these studies focus on women, on sexual abuse specifically, and on childhood abuse. Men are rarely included in studies about (sexual) abuse. Recent studies, including men concluded that childhood sexual abuse was related to the development of overactive bladder and bladder pain in both men and women.<sup>6,7</sup> Sexual abuse is only one expression of abuse. In a wider sense, it also includes emotional neglect, psychological abuse, and physical abuse. Apart from a 2007 survey, we found no recent study focusing on types of abuse other than sexual abuse.<sup>9</sup> Studies in a general population on relations between (sexual) abuse and LUTS, also including men and adulthood abuse, are scarce.

We aimed to study the possible association between (sexual) abuse and LUTS in men and women. We also aimed to study the differences in this association between men and women and between the timing of the abuse. Our research questions are:

(1) Is there an association between a history of any type of abuse (emotional, psychological, physical, and/or sexual) and LUTS? (2) Is there an association between only sexual abuse and LUTS? (3) Are there differences between childhood and adulthood abuse and the association with LUTS? (4) Are there differences in these relations associations between men and women?

## 2 | SUBJECT AND METHODS

### 2.1 | Study design

We performed post hoc analyses using data from a cross-sectional survey in the general population based on validated and self-administered questionnaires.<sup>14</sup>

### 2.2 | Population

Residents of the Dutch town of Coevorden, aged 16 years or older, were invited by their general practitioner (GP)

to take part in the study in May 2019.<sup>14</sup> In The Netherlands, all residents have a GP, so all potential participants are registered with a GP. All nine GPs of Coevorden participated in the recruitment process.

Excluded were people who met any of the following criteria: those under 16 years of age, all residents of nursing homes, those with cognitive impairment or a current psychological condition precluding informed consent; or those not suitable or too ill to participate based on the GP's opinion. Therefore, GPs were asked to select those ineligible for the study based on specific registration codes for diseases (ICPC classification of disease). Those with a specific diagnosis for cognitive impairment, a current psychological condition or residents of nursing homes were not sent an invitation for this study. Furthermore, when GPs knew that it was not suitable to ask a specific person (e.g., due to personal circumstances), also those were not invited. This process was done by the GP practices, and the researchers only received the final number of potential participants. Once this "list" was created, those people were invited by mail (receiving the information letter and informed consent form at their home address).

We considered nonresponders those who had not returned a signed consent form after one postal reminder. See also the published article "Exploring concomitant pelvic floor symptoms in community-dwelling females and males."<sup>14</sup>

All participants signed informed consent. Participants who returned the signed consent form received a paper version of the questionnaire or an email with the link. The study was approved by the local medical ethical committee.

### 2.3 | Measurements

Data collection took place between May 2019 and January 2020 and included subject characteristics such as age, country of birth, having a partner (yes/no), height, weight, and smoking status (yes/no). Overall health perception was assessed by a 5-point Likert Scale, ranging from bad to excellent. Educational level was divided into three categories: lower education, medium education, and higher education, according to the Dutch Central Bureau of Statistics (CBS). LUTS were assessed by the Dutch translation of the International Consultation on Incontinence Modular Questionnaire (ICIQ), ICIQ-MLUTS for men, and ICIQ-FLUTS for women.<sup>15</sup> Higher scores indicate a greater impact of symptoms. As there is no established cut-off value in the literature, we used the upper quartiles of the ICIQ-male and ICIQ-female to define participants experiencing LUTS in this study in line with earlier analyses on this cohort.<sup>14</sup> In men, LUTS was defined

as ICIQ-MLUTS score  $\geq 9.0$ , and in women, LUTS was defined as ICIQ-FLUTS score  $\geq 11.0$ .<sup>14</sup>

Trauma was measured in two life stages (before the age of 16, when 16 years and older) using the four questions about emotionally, psychologically, physically, and sexually abuse in the NEMESIS-1 trauma questionnaire.<sup>16</sup> A short definition of the different types of abuse was given, and participants scored each type of abuse on a 5-point scale (never, once, sometimes, regularly, and no answer) for both life stages.

Abuse was categorized into “yes” and “no” (see definitions in Box 1), and items with “no answer” were excluded for analysis.

Participants were included in this study if they had answered all questions concerning abuse as well LUTS.

## 2.4 | Statistical analysis

Participant characteristics were described as mean and standard deviation or median and interquartile range for continuous characteristics, depending on the data distribution. Categorical outcomes were presented as numbers and percentages.

Logistic regression analysis was used to test the association between (a) any type of abuse with LUTS, (b) childhood abuse with LUTS, (c) adulthood abuse with LUTS, and (d) and sexual abuse with LUTS. These

models were corrected for age, and all were performed for men and women separately.

To test if the association between abuse and LUTS differed between men and women, we applied two-way interaction testing. This was also done for the possible impact of the time of abuse with LUTS in men and in women.

The intended analyses for the association between only childhood and adulthood sexual abuse with LUTS were not performed as the numbers were too small. Differences were expressed as odds ratio (OR) using the “no abuse” group as a reference group. Statistical significance was set at  $p < 0.05$  (two-tailed tests). Analyses were performed using IBM SPSS version 27 (IBM Corp.).

## 3 | RESULTS

### 3.1 | Participants

Of the 11 724 people invited, 694 men (12.1%) and 997 women (16.7%) returned the informed consent form, and 558 men (80.4%) and 790 women (79.2%) of these completed all questions about LUTS as well as abuse. In total nine GPs participated, and the percentage of men and women who participated (number of participants divided by number of invited) was equal amongst the different GPs (between 9% and 15%).

Characteristics of the study population are shown in Table 1. Men were older (62.1 years (SD 13.5), with 84.8% having a partner, than women (mean age 56.3 years SD 15.9), with 79.3% having a partner. No differences were found in adiposity and smoking between men and women. Overall health was reported as “very good” or “excellent” by 31.2% of men and 23.0% of women. No differences were found in educational level. The mean total ICIQ-LUTS score in men was 6.6 (SD 5.2) compared with 7.8 (SD 5.3) in women.

A history of one or more of any of the four types of abuse in both life stages was reported in 28.5% of men and in 37.1% of women. Thirty-four percent of men and 22% of women experienced such abuse only in childhood, 14% of men and 16% of women only in adulthood, and 52% of men and 61% of women in both childhood and adulthood. Sexual abuse, whether or not combined with one or more other types of abuse, was reported in 6.9% of men and 21.5% of women.

### 3.2 | All types of abuse

Abused men reported significantly more LUTS (38.4%) than non-abused men (26.6%), with an OR of 1.7 (95%

#### BOX 1. Definitions

	Definition
Abuse in general	Having experienced abuse at least once in life (emotional neglect, psychological abuse, physical abuse, and/or sexual abuse)
No abuse	Never having experienced any abuse in life (emotional neglect, psychological abuse, physical abuse, or sexual abuse)
Childhood abuse	<u>Only</u> having experienced abuse <u>under</u> the age of 16 (and NO abuse trauma from the age of 16)
Adulthood abuse	Only having experienced abuse <u>from</u> the age of 16 (and NO abuse trauma under the age of 16)
Sexual abuse	Having experienced <u>sexual abuse at least once in life</u> (with or without other types of abuse)

TABLE 1 Characteristics in men and women.

	Men ( <i>n</i> = 558)	Women ( <i>n</i> = 790)
Age (years)	62.1 (SD 13.5)	56.3 (SD 15.9)
Age category %		
16–35	3.9	12.2
36–55	20.3	28.2
56–75	59.5	47.7
>75	16.3	11.9
Partner %		
Yes	84.8	79.3
No	15.2	20.7
BMI (kg/m <sup>2</sup> ) <sup>a</sup> %		
<30	81.0	77.6
≥30	18.1	21.4
missing	0.9	1.0
Smoking <sup>b</sup> %		
Yes	11.6	11.6
No	88.4	88.4
Overall health %		
Excellent	6.8	4.6
Very good	24.4	18.4
Good	51.8	60.6
Moderate	15.4	14.7
Bad	1.6	1.7
Educational level %		
Lower	35.7	37.8
Medium	35.7	39.2
Higher	28.1	22.4
Unknown	0.5	0.6
LUTS %		
Yes	29.9	24.2
No	70.1	75.8
ICIQ score (mean)		
ICIQ-MLUTS in men	6.6 (SD 5.2)	
ICIQ-FLUTS in women		7.8 (SD 5.1)
Abuse (any) %		
Yes	28.5	37.1
No	71.5	62.9

TABLE 1 (Continued)

	Men	Women
Sexual abuse (with or without another type) %		
Yes	6.9	21.5
No	93.1	78.5

Abbreviations: BMI, body mass index; ICIQ-MLUTS, International Consultation on Incontinence Modular Questionnaire; LUTS, lower urinary tract symptoms; SD, standard deviation.

<sup>a</sup>30 or ≥ adiposity.

<sup>b</sup>Smoking is defined as “yes” when currently smoking.

confidence interval [CI] 1.2–2.5) (Table 2). Abused women also reported significantly more LUTS (28.0%) than nonabused women (21.9%), (OR = 1.4, 95% CI 1.1–2.1).

### 3.3 | Sex differences in the association between all types of abuse and LUTS

The association between all types of abuse and LUTS was significantly stronger in men than in women (two-way interaction,  $p = 0.04$ ).

### 3.4 | Sex differences between the association childhood abuse with LUTS and the association adulthood abuse with LUTS

No significant differences in the prevalence of LUTS were found between those with childhood abuse compared with non-abused respondents and those with adulthood abuse compared with non-abused (Table 2) Furthermore, the association of childhood abuse with LUTS did not differ from the association adulthood of abuse with LUTS in both men ( $p = 0.82$ ) and women ( $p = 0.96$ ).

### 3.5 | Sex differences in the association between sexual abuse and LUTS

If we look at sexual abuse only, sexually abused men reported LUTS in 51.3% of cases compared to 26.6% in nonabused men, OR 2.7 (95% CI 1.4–5.2). Sexually abused women reported LUTS in 29.8% of cases

**TABLE 2** Participants with LUTS<sup>#</sup> in men and women with a history of any type of abuse and a history of any type of childhood abuse and adulthood abuse compared with nonabused men and women.

	LUTS	OR <sup>a</sup>	95% CI	p-Value*
<b>Men</b>				
Any type of abuse ( <i>n</i> = 159)	61 (38.4%)	1.7	1.2–2.5	0.01
No abuse ( <i>n</i> = 399)	106 (26.6%)			
<b>Women<sup>b</sup></b>				
Any type of abuse ( <i>n</i> = 293)	82 (28.0%)	1.4	1.1–2.1	0.02
No abuse ( <i>n</i> = 497)	109 (21.9%)			
	LUTS	OR	95% CI	p-Value
<b>Men</b>				
Any type of childhood abuse ( <i>n</i> = 54)	16 (29.6%)	1.2	0.6–2.2	0.63
Any type of adulthood abuse ( <i>n</i> = 23)	5 (21.7%)	0.8	0.3–2.1	0.61
No abuse ( <i>n</i> = 399)	106 (26.6%)			
<b>Women<sup>c</sup></b>				
Any type of childhood abuse ( <i>n</i> = 65)	15 (23.1%)	1.1	0.6–2.0	0.83
Any type of adulthood abuse ( <i>n</i> = 48)	10 (20.8%)	0.9	0.5–1.9	0.86
No abuse ( <i>n</i> = 497)	109 (21.9%)			

Abbreviations: CI, confidence interval; LUTS, lower urinary tract symptoms; OR, odds ratio.

\*p-Value logistic regression corrected for age.

<sup>a</sup>OR compared with the control group (no abuse).

<sup>b</sup>Difference between the association abuse with LUTS in men compared to the association abuse with LUTS in women  $p = 0.04$  (two-way interaction).

<sup>c</sup>Difference in the association childhood abuse with LUTS compared to the association adulthood abuse with LUTS in men  $p = 0.82$  and difference in the association childhood abuse with LUTS compared with the association adulthood abuse with LUTS in women  $p = 0.96$  (two-way interaction).

**TABLE 3** Participants with LUTS<sup>#</sup> in men and women with a history of sexual abuse and adulthood abuse compared to nonabused men and women.

	LUTS	OR <sup>a</sup>	95% CI	p-Value*
<b>Men</b>				
Sexual abuse ( <i>n</i> = 39)	20 (51.3%)	2.7	1.4–5.2	0.00
No abuse ( <i>n</i> = 399)	106 (26.6%)			
<b>Women<sup>b</sup></b>				
Sexual abuse ( <i>n</i> = 171)	51 (29.8%)	1.5	1.1–2.2	0.03
No abuse ( <i>n</i> = 497)	109 (21.9%)			

Abbreviations: CI, confidence interval; LUTS, lower urinary tract symptoms; OR, odds ratio.

\*p-Value logistic regression corrected for age.

<sup>a</sup>OR compared with the control group (no abuse).

<sup>b</sup>Difference between the association of sexual abuse with LUTS in men compared with the association sexual abuse with LUTS in women  $p = 0.01$  (two-way interaction).

compared with 21.9% in nonabused women, OR 1.5 (95% CI 1.1–2.1) (Table 3). Both associations were statistically significant and significantly stronger in men than in women ( $p = 0.01$ ).

## 4 | DISCUSSION

### 4.1 | Summary

The most important finding of this study is that LUTS is very common, and patient with LUTS have often a history of (sexual) abuse, especially male patients. Men who report a history of emotional, psychological, physical, and/or sexual abuse have significantly more LUTS than women. A history of specific sexual abuse is a factor associated with LUTS in both sexes, also significantly stronger in men than in women. In both sexes, childhood abuse or adulthood abuse makes no difference in reporting LUTS.

### 4.2 | Comparison with existing literature

We did not find previous studies about the association of abuse with a validated and well-defined LUTS-score. A study by Link et al.<sup>9</sup> found an association between abuse and frequency, urgency, and nocturia, in men and women. In contrast with our results, that study showed an association between childhood abuse with LUTS compared with no-



abused and adulthood abuse with LUTS compared with non-abused, in both sexes. Physical abuse in men, occurring in childhood or in adulthood, was associated with frequency, urgency, and nocturia. In women, physical abuse occurring in childhood was associated with urgency, and abuse occurring in adulthood was associated with urgency and nocturia. In men and in women, emotional abuse in childhood as well as in adulthood was associated with urgency and frequency. In that study, the associations were also stronger in men than in women. A striking finding was, unlike our study, that sexual abuse was associated with frequency and urgency only in women and not in men.

It can be suggested that having a history of emotional, psychological, or physical abuse is more strongly associated with LUTS in men than in women. One could conclude that the impact of all types of abuse except sexual abuse on having micturition problems is greater in men than in women. But our results show that sexual abuse also contributes to LUTS to a greater extent in men than in women. To our knowledge, there is no previous study about this finding.<sup>11</sup>

One explanation for the possible association between sexual abuse and LUTS is that physical and psychological damage could cause increased tension of the pelvic floor muscles, which may lead to LUTS.<sup>17,18</sup> Consequently, LUTS, in its turn, can then lead to more anxiety and/or mental distress, increasing overactivity of the pelvic floor. A recent systematic review about the relationship between sexual abuse and LUTS among women showed that most of the included studies found an association between sexual abuse and LUTS, such as urinary incontinence, frequency, and nocturia. It is difficult, however, to draw any overall conclusion from this review because the included studies involved different cohorts, and showed heterogeneity in definitions and study designs. Moreover, most studies were of moderate quality.<sup>11</sup>

The stronger association between sexual abuse and LUTS in men than in women may be caused by other contributors to LUTS in women. The definition of LUTS is very broad, with many symptoms and various pathophysiological pathways being associated with its development.<sup>4,17,19–21</sup> In our study, stress urinary incontinence was reported by around 65% of women with LUTS, compared to around 10% of men. The greatest risk factor for stress incontinence in women is pregnancy and vaginal deliveries causing damage to the pelvic floor, resulting in underactivity of the pelvic floor. Because incontinence and underactivity of the pelvic floor cause so many of the LUTS symptoms in women, abuse will have less influence on the development of LUTS in women. Another possible contributor to the difference between men and women is that men are less likely to seek help after sexual abuse. Barriers to help-seeking include fear of disclosure and challenges to masculinity.<sup>22</sup>

Because of a culture of silence around sexual abuse and its poor recognition in men, care for male victims of sexual abuse is not optimal. As a consequence, symptoms might remain untreated more frequently in men than in women, causing a higher prevalence of long-term physical consequences such as LUTS.

Lastly, the outcome that we did not find any differences between the group that experienced abuse under the age of 16 and those over this age was unexpected. Lai and colleagues showed that patients with overactive bladder had experienced more childhood sexual trauma compared to age-matched controls, while no differences in overactive bladder prevalence were found in the group that experienced more recent traumatic events compared to controls.<sup>6</sup> Other previous literature on this subject is scarce. A possible contributor to our finding is the size of the samples. Particularly the childhood abuse group was small, as respondents who had experienced trauma both in childhood and adulthood were excluded from the analysis. The fact that more than half of the victims experienced abuse both in childhood and in adulthood is consistent with the phenomenon of revictimization: childhood abuse increases the risk of revictimization in adulthood.<sup>23</sup>

### 4.3 | Strengths and limitations

A major strength is that the data used are based on the inhabitants of a town representative of the Dutch population in all respects, except for the proportion of migrants, which was lower than in the entire Dutch population.<sup>14</sup> Another strength is the large number of included respondents. This gave us the possibility to assess secondary research questions on age and type of abuse. Moreover, internationally validated questionnaires were used, adapted to gender.

A possible limitation is the definition of abuse. Respondents were included in the abused group if they had experienced one or more of the types of abuse at least once. As a result, we were unable to determine the effect of increasing exposure to abuse. Another limitation is that LUTS was defined as “yes” if a respondent had scored above the highest quartile in the questionnaire, causing a loss of data. Self-report bias and recall bias are also limitations, as there were questions about childhood experiences, and questions about abuse may have been disturbing to the respondents. A further limitation might be the size of our male samples assessing type and only childhood or adulthood abuse. The smaller sizes make the analyses less powerful. However, the model is converging, there are no extreme estimates of the OR, and the 95% CIs are not extremely broad, which implies a valid estimation.

#### 4.4 | Implications for practice

We strongly recommend physicians in their history-taking to pay attention to physical, psychological, emotional, and sexual abuse in men and women presenting with LUTS, particularly to sexual abuse in men with LUTS. Patients with a history of sexual abuse may be reluctant to undergo sensitive procedures such as pelvic exams and cystoscopy. It is important to keep this in mind.

#### 4.5 | Implications for research

We recommend further research on improving therapy approaches and the prevention of LUTS associated with abuse. Furthermore, we recommend in-depth research on different types of LUTS to be able to specify the most common symptoms patients present after abuse. Lastly, we recommend further research on the association between childhood and adulthood abuse and LUTS, aiming to find an explanation for the contrary results between our study and previous studies.

### 5 | CONCLUSION

In men more than in women, a history of any type of abuse is associated with LUTS, regardless of whether the abuse occurred during childhood or adulthood. In both sexes, a history of sexual abuse is also associated with experiencing LUTS, with a much stronger association in men than in women. Patients, in particular male patients, presenting with LUTS should therefore be asked about sexual abuse in the past.

#### ETHICS STATEMENT

The study was approved by the local medical ethical committee (University Medical Center Groningen: METc2018/601), and all participants provided written informed consent before the start of any data collection.

#### AUTHOR CONTRIBUTIONS

TAM Teunissen, ALM Lagro-Janssen, and GE Knol-de Vries developed the study design. TAM Teunissen, ALM Lagro-Janssen, RP Akkermans, MH Blanker, and GE Knol-de Vries participated in conducting the study. TAM Teunissen drafted the first version of the manuscript. All authors read and approved the final manuscript.

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#### CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

#### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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