

1 **Urogenital symptoms: prevalence, bother, associations and impact in 22 year-old**
2 **women of the Raine Study.**

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46

47 **Abstract**

48 **Introduction**

49 Urogenital symptoms are prevalent in older women but there is little data available on the
50 prevalence, bother, impact and associations with low back pain (LBP), obesity, parity, mental
51 health (MH), and quality of life (QOL) in young women.

52 **Objectives**

53 To determine the prevalence, bother and impact of urogenital symptoms, and to explore
54 associations with LBP, obesity, parity, MH and QOL in 22 year-old women.

55 **Methods**

56 A cross sectional evaluation using data collected from 588 women in the Raine Study, a
57 pregnancy cohort in which participants have been regularly followed up from birth until 22
58 years. Data was analysed using descriptive statistics, univariate comparisons and linear
59 regression models.

60 **Results**

61 Prevalence of urogenital symptoms were: stress urinary incontinence (SUI) 6.3%; mixed
62 urinary incontinence (MUI) 11.5%; leakage of drops 5.8%; urge urinary incontinence (UUI)
63 5.3%; bothersome urinary frequency 41.5%; difficulty emptying 11.8% and urogenital pain
64 22.9%. Urinary frequency, MUI, difficulty emptying and urogenital pain were most
65 bothersome, whilst difficulty emptying and urogenital pain were associated with greatest
66 impact. Urinary frequency, SUI, leakage of drops, difficulty emptying and urogenital pain
67 were associated with current LBP and LBP ever. Difficulty emptying and urogenital pain
68 were associated with chronic LBP. Urogenital symptoms were not associated with obesity or
69 parity. Women with urogenital symptoms had significantly poorer scores on Mental
70 Component Score of the SF-12 and all aspects of the Depression Anxiety Stress Score.

71 **Conclusions**

72 Urogenital symptoms are prevalent in young women, and bothersome for some. They are
73 associated with LBP, poorer MH and QOL.

74

75 **Keywords**

76 lower urinary tract symptoms; mental health; prevalence; quality of life; urinary incontinence;
77 urogenital pain.

78 **Brief Summary**

79 Urogenital symptoms are prevalent in young women. They are associated with low back
80 pain, poorer mental health and quality of life, and negative functional impact.

81 **Introduction**

82

83 Urogenital symptoms such as urinary incontinence (UI), lower urinary tract symptoms
84 (LUTS) and urogenital pain have been associated with significant bother and impact,
85 obesity, parity, low back pain (LBP), poorer mental wellbeing and poorer quality of life (QOL)
86 in middle aged and older women, however there is less data available pertaining specifically
87 to young women [1, 2, 4-6]. In addition, prevalence studies tend to cluster women from age
88 18 to the 30's, and suggest that at some point between late adolescence and early
89 adulthood, the prevalence of UI and LUTS begins to increase, but little data is available on
90 the age at which this occurs, or on the factors associated with these changes, therefore
91 more specific estimates during early adulthood may be beneficial [3, 8, 9]. Practically,
92 understanding this transition period may allow for improved prevention and management
93 strategies and inform when to target such measures.

94 Recent research suggests that urogenital symptoms do not occur in isolation but are
95 associated with other pain problems and mental health related factors [2]. However there is
96 little data available for young women, and therefore detailed comorbidity patterns are not
97 established for younger women. Understanding comorbidities could assist in the design of
98 holistic management programs.

99 **Aims**

100 The first aim was to estimate the prevalence, bother and impact of urogenital symptoms
101 specifically for young women using standardised terminology and validated questionnaires.

102 The second aim was to explore associations between urogenital symptoms and LBP,
103 obesity, parity, MH and QOL in these women.

104 **Materials and method**

105 Cross-sectional evaluation was conducted using data from participants in the Western
106 Australian Pregnancy Cohort (Raine) Study at the 22 year-old follow-up [17]. The Raine
107 Study started as a pregnancy cohort, and included 2868 babies at birth. Participants have
108 been followed up at regular intervals, with each follow-up including many measures of

109 health, disease and demographics. The cohort has retained good representativeness to the
110 general population [17].

111 At the 22 year-old follow-up, 1414 participants completed questionnaires investigating a
112 number of health elements including: urogenital symptoms; current and past history of LBP;
113 parity; MH and QOL; and a physical examination where height and weight were measured.

114 Of the 1414 participants, 607 were women and were therefore included in this study.

115 This project was approved by the Raine Study Executive Committee. Ethical approval was
116 obtained through Curtin University (RDHS-122-15).

117 Measures

118 The seven urogenital symptoms assessed were: UI; SUI; UUI; MUI; bothersome urinary
119 frequency; difficulty emptying the bladder and urogenital pain. A combined estimate of
120 prevalence and bother were measured using the Urogenital Distress Inventory-Short Form
121 (UDI-6) which has established reliability and validity [18]. The participants were asked the
122 following questions: 'Do you experience, and, if so, how much are you bothered by: 1.
123 Frequent urination? (bothersome urinary frequency) 2. Urine leakage related to feeling of
124 urgency? (Urinary urge incontinence) 3. Urine leakage related to physical activity, coughing
125 or sneezing? 4. Small amounts of urine leakage (drops)? 5. Difficulty emptying your
126 bladder? 6. Pain or discomfort in the lower abdomen/genital area?' (urogenital pain). A
127 urogenital symptom was considered to be present and bothersome when a response of
128 slightly, moderately or greatly was given to any one of the questions.

129 SUI was defined when a response of either slightly, moderately or greatly was given to
130 leaking urine related to physical activity, coughing or sneezing. Although small amounts of
131 urine leakage (drops) is considered as a stress symptom in terms of the UDI-6, potentially it
132 could be any form of UI and therefore in this study it was analyzed separately. MUI was
133 considered when a response of either slightly, moderately or greatly was given to question 2
134 (UUI) and question 3 (SUI) or question 4 (leakage of drops).

135 The pelvic floor impact questionnaire- short-form 7 (PFIQ-7) has established validity and
136 reliability for assessing the impact of urogenital symptoms on QOL in women [19]. Seven

137 questions ask if urinary problems/pain or discomfort have affected ability to do household
138 chores, physical activities, entertainment activities, travel, participate in social activities,
139 emotional health and frustration [20]. For this study the responses were scored as follows:
140 not at all=0; slightly=1; greatly and moderately were scored together due to low numbers=2.
141 Scores were added, with a minimum score of 0 indicating no impact and 14 indicating
142 maximal impact.

143 LBP prevalence was measured using questions from the modified Nordic Questionnaire
144 which is both valid and reliable [21]. LBP was classified as: chronic (positive response to
145 'Has your low back pain ever lasted for more than three months continuously?' and/or
146 positive response to 'Has your low back pain ever lasted for more than three months off and
147 on?'); current (positive response to 'Has your low back been painful at any time in the last
148 month?') and ever (positive response to 'Have you ever had low back pain?'). BMI, was
149 calculated as weight (kilograms) divided by height (meters) squared, both being reliable and
150 valid [22]. Women were classified as underweight (BMI < 18.5); normal weight (BMI 18.5-
151 <25), overweight (BMI ≥25-<30) or obese (BMI ≥30) [23]. Parity was ascertained by 'Do you
152 have any biological children?' (no=nulliparous, yes=parous). MH was assessed using the
153 short-form Depression Anxiety Stress Scale (DASS-21), a valid and reliable measure of
154 depression, anxiety and stress [24]. QOL was measured using the Short Form 12 Health
155 Survey (SF-12), which consists of twelve questions assessing physical and mental
156 wellbeing. It is valid and reliable for assessing QOL in women [25]. Separate physical and
157 mental component scores were calculated, standardised to a mean of 50 (SD = 10), with
158 higher scores indicating better QOL [25].

159 Statistical analysis

160 Aim 1: For each urogenital symptom, prevalence for the presence of a bothersome
161 symptom was estimated. Proportions of women with slight and moderate/great bother, and
162 with slight (PFIQ-7=1-7) or moderate/great impact (PFIQ-7 >7-14), were calculated. In
163 addition, a binary variable was derived denoting the prevalence of having at least one or
164 more symptoms assessed.

165 Aim 2: To examine the associations between each urogenital symptom and LBP, obesity,
166 parity, mental health and QOL, a series of logistic regressions were estimated. Each
167 urogenital symptom was considered as the dependent variable, with the reference group
168 being those without any urogenital symptoms.

169 Mental health measures (DASS depression, anxiety and stress subscales) displayed skewed
170 distributions and were parametrised in logistic regression models as ordinal (categories none
171 (z score >0.5), mild (z-score 0.5-1.0), moderate (z score 1.0 -2.0) severe (z score 2.0-3.0),
172 extremely severe (z score >3.0) [26] where numbers permitted, or as a binary variable
173 categories (none or mild versus, moderate or more) to avoid empty or sparse cells for
174 urogenital symptoms with low prevalence. Estimates for mental health (DASS-21) and QOL
175 (SF12) were adjusted for the presence of current LBP in instances where the urogenital
176 symptom was associated with this potential confounder. Odds ratios with associated 95%
177 confidence intervals and p-values are presented.

178 Data were analysed using IBM SPSS version 24.0 (Armonk, NY). P-values <0.05 were
179 considered statistically significant.

180 **Results**

181 Of the 607 women completing the 22 year follow-up questionnaire, 581/607 (95.6%)
182 provided valid responses for all six questions assessing the presence of the seven urogenital
183 symptoms, whilst 588 (96.7%) provided a valid response to one or more of the six questions.

184 Sample characteristics are shown in Table 1.

185 Participants reporting at least one current bothersome urogenital symptom were 334/581
186 (57.5%). The most prevalent type of UI was MUI (11.5%), followed by SUI (6.3%), small
187 drops of leakage (5.8%), and UUI (5.3%). Prevalence of bothersome urinary frequency was
188 41.5%, however the majority of these women (62.7%) reported only slight bother (Table 2).
189 Prevalence of bothersome urinary frequency at moderate/great levels was 15.5%. The
190 urogenital symptoms that were most bothersome (moderate to great bother) were urogenital

191 pain 47/134 (64.9%), frequency 91/244 (37.3%), MUI 22/67 (32.8%), and difficulty emptying
192 the bladder with 17/69 (24.6%). In terms of UI, MUI was more bothersome than SUI or UUI
193 (Table2).

194 Urogenital symptoms associated with the greatest impact on QOL of young women were
195 difficulty emptying the bladder 7/67 (10.4%) and urogenital pain 10/131 (7.6%) (Table 2).

196 Although the majority of women with each symptom did not report any level of impact (i.e.
197 PRIQ-7=0), slight impact was reported by at least a third of all the young women
198 experiencing each symptom (Table 2).

199 Table 3 presents odds ratios for the presence of urogenital symptoms according to LBP,
200 obesity, parity, and mental/physical health status. The presence of at least one urogenital
201 symptom was strongly associated with LBP ever (Table 3). LBP ever and current LBP were
202 also significantly associated with urinary frequency, SUI, leakage of drops, difficulty
203 emptying and urogenital pain. Chronic LBP was associated with difficulty emptying the
204 bladder and urogenital pain (Table 3).

205 There were no associations between obesity or parity and any urogenital symptoms (Table
206 3).

207 Higher levels of depression, anxiety and stress were significantly associated with the
208 presence of at least one urogenital symptom and also with frequency, MUI, difficulty
209 emptying and pain (Table 3).

210 Lower levels of mental component score were associated with the presence of at least one
211 urogenital symptom and with frequency, MUI, difficulty emptying and pain. Lower levels of
212 physical component score were not significantly associated with urogenital symptoms (Table
213 3).

214 **Discussion**

215 **Prevalence**

216 This study found that the prevalence of any UI in young, predominantly nulliparous women to
217 be between 5.3% and 11.5%. This is higher than the reported prevalence of 0.3% for UI in
218 15-17 year olds [4], but is lower than the prevalence range of 9.3%-20.4% currently reported

219 for women aged younger than 30 [3, 8, 9]. Prevalence data has previously been reported for
220 mixed aged groups of women: 15-25 years [8], 16-30 [3] and 18-29 [9], whilst the women in
221 this study were all aged 22 years. This may account for the lower prevalence. It is possible
222 that at age 22, the downward trend of UI seen in children and adolescents has begun to turn
223 upwards. The prevalence of the main subtypes of UI in this study were SUI 6.3%, UUI 5.3%
224 and MUI 11.5%. The prevalence of SUI and UUI are consistent with the prevalence ranges
225 currently reported in the literature for women aged younger than 30, SUI 5.9%-7.7% and UUI
226 3.4%-9% [3, 8, 9].

227 However, the prevalence of MUI is much higher in this study than the current prevalence
228 range of MUI 1.9%-5.4% in women aged younger than 30 [3, 8, 9]. This may be due to the
229 way MUI was defined in the questionnaires used in each of the studies. In the present study,
230 the UDI-6 was used to measure prevalence of UI subtypes, and leakage of drops of urine
231 was included in MUI which may have contributed to the higher prevalence. 'Leakage of
232 drops' was analysed separately to SUI as the researchers were not sure that all women
233 reporting leakage of small drops of urine had SUI. However, the results show that leakage of
234 drops and SUI behave in a similar way and therefore it is likely that young women are
235 reporting SUI as leakage of drops. Current literature suggests that the severity of UI
236 increases with increasing age [4] and given that between 5.3% and 11.5% of the young adult
237 women in our study are already experiencing a form of UI, screening younger women for UI
238 would give an opportunity for early intervention.

239 LUTS such as bothersome urinary frequency, difficulty emptying the bladder and urogenital
240 pain were prevalent in young women, with 41.5% reporting urinary frequency, 11.8%
241 reporting difficulty emptying the bladder and 22.9% reporting urogenital pain. These
242 prevalence ranges are higher than those reported in literature for women aged younger than
243 39, frequency 7.9% - 9.5%, difficulty emptying the bladder 0.6%-6.0% and bladder pain 3.9%
244 [11, 12]. However, comparing these results is difficult as different questionnaires and
245 definitions were used. Definitions used for daytime urinary frequency may be based on the
246 responder's perception of whether they void too often per day (as recommended by the

247 International Continence Society) or alternatively on a threshold number of voids per day
248 (Irwin et al 2008). One study [11] used a responder's perception based definition "the
249 complaint that micturition occurs more frequently than previously deemed normal by the
250 woman" [10], whilst the other defined urinary frequency as more than 8 voids per day [12].
251 The UDI-6 used for the present study includes a responder's perception type question where
252 the young women were asked if they experienced urinary frequency and if so, how much
253 were they bothered by it. No data were collected on the number of voids per day or fluid
254 intake. Irwin et al (2008) compared prevalence of ICS defined frequency (responder
255 perception) with a numerical threshold of more than 8 voids per day in a population-based
256 sample. They found the prevalence of urinary frequency was higher using the perception
257 definition than using the numerical threshold definition (25% versus 19% of women with
258 overactive bladder) [28] . This may, in part, explain the higher prevalence of frequency in our
259 sample. Nonetheless, further research into the number of day voids and fluid intake in
260 young Australian women is recommended to obtain a better understanding of urinary
261 frequency in this group and whether it is related to higher fluid intake or other lifestyle
262 factors.

263 For difficulty emptying the bladder, the young women in the present study were asked
264 whether they experienced and if so were they bothered by difficulty emptying the bladder. In
265 other studies the International Continence Foundation definitions are used, in which difficulty
266 emptying the bladder is described more specifically such as straining, hesitancy,
267 intermittency or slow stream, which may explain the higher numbers in this study [10-12].
268 The pain definition used in the present study was quite broad, 'pain or discomfort in the
269 lower abdomen/genital area', whereas in other studies women were asked about bladder
270 pain, hence the likely reason for the higher prevalence in this study. In addition, a recent
271 study reported the prevalence of severe menstrual pain in this same cohort of young women
272 aged at 20 and 22 years to be 17% [27]. Further investigation of urogenital pain and
273 menstrual pain in the cohort may be useful, given there could be potential shared underlying
274 pain mechanisms.

275 **Bother and Impact**

276 Urogenital pain, urinary frequency and difficulty emptying the bladder were found to be most
277 bothersome by the young women in this study, and MUI was found to be more bothersome
278 than SUI and UUI. Urogenital symptoms associated with the greatest impact on the QOL of
279 young women were difficulty emptying the bladder and urogenital pain, which is similar to
280 current literature including older women [1, 5, 6]. In terms of impact, at least a third of all the
281 young women who reported having each urogenital symptom reported slight impact on their
282 ability to perform simple daily activities. Whilst this proportion is fairly small, it is important to
283 remember the young age of these women, and that the tasks being affected are normal
284 activities of daily living such as shopping, entertaining and household chores. Previous
285 studies have found that UI in young women is also associated with adverse impact on daily
286 life such as limiting fluid intake, wearing pads due to fear of odour, as well as poorer overall
287 well-being [3, 8].

288 **Correlates of urogenital symptoms**

289 **Lower back pain**

290 Strong associations were identified between the presence of at least one urogenital
291 symptom and both LBP ever and current LBP, with SUI and leakage of drops being
292 associated with current LBP and a history of LBP ever. This appears consistent with the
293 finding that pre-existing and/or new onset UI or LBP can be associated with a higher risk of
294 developing LBP or UI respectively. [13]. The associations between LBP and UI are likely to
295 be complex and are not yet fully understood. It has been suggested that sensorimotor
296 changes linked to altered motor control of muscles including the abdominal, back and PFM,
297 known to be associated with a history of LBP and UI, may underpin this relationship [13].
298 In addition, there were strong associations between difficulty emptying the bladder and
299 urogenital pain with current, chronic and LBP ever. This comorbidity of urogenital pain and
300 musculoskeletal LBP may relate to shared musculature, or shared underlying pain
301 mechanisms [14]. In this study, urogenital pain was considered as any pain in the lower

302 abdominal or genital area, and as such it is possible that this included some LBP, thus
303 confounding the data.

304 **Obesity**

305 Obesity was more strongly associated with SUI and leakage of small drops of urine
306 (although not significant) than with any of the other urogenital symptoms. This may be due to
307 a lack of power as only 17% of the sample were classified as obese. A sensitivity analysis
308 did not identify significant associations either. These results are consistent with another
309 study which reported no association between UI and BMI in young nulligravid women [3].
310 However, there is existing strong evidence to suggest that obesity increases intra-abdominal
311 pressure which then predisposes SUI [4], and that women who become obese at a younger
312 age are at a higher risk of developing UI in middle age [4, 29]. In light of this, it is
313 recommended that young women are given advice and education on the risks associated
314 with being obese, strategies to help reduce their BMI and referred on for early diagnosis and
315 treatment of SUI. There is good evidence that both reducing BMI and simple, safe
316 treatments like pelvic floor muscle training can effectively treat and reduce the symptoms of
317 SUI [4]. The prospective nature of the Raine study means that additional data on the
318 association between obesity and urogenital symptoms can be gathered as these women
319 age.

320 **Parity**

321 There was no association between parity and UI, which may be due to the very low number
322 of parous women in our study (6.1%) thereby reducing the power, or because most of the
323 parous women had only one baby. However, parity is an established risk factor for UI, with
324 increasing parity being associated with increased risk of UI, and this association is strongest
325 for women aged in their thirties and forties [4]. The underlying mechanisms of exactly how
326 pregnancy and childbirth predispose UI are still not fully understood [4]. Current research
327 suggests pelvic floor dysfunction may occur as a result of trauma to the muscles, connective
328 tissue, nerves or blood supply during vaginal birth, which can then predispose women to UI
329 [4]. It is possible that parity and obesity were not found to be associated with urogenital

330 symptoms in this study due to the relatively young, same aged (all 22 years old) mostly
331 nulliparous sample. Previous studies finding associations have been in older or mixed age
332 samples, and it may be that the influence of BMI becomes greater with age and parity.

333 **Mental health and quality of life**

334 The results suggest significantly poorer DASS and SF-12 scores in young women with
335 urogenital symptoms as opposed to those without urogenital symptoms, even after
336 adjustment for comorbid LBP. However, the mean SF-12 scores for the young women with
337 urogenital symptoms were within one standard deviation of the population mean (PCS=52.6;
338 MCS=43.7), and the difference in these scores between those with and without urogenital
339 symptoms was, although statistically significant, only 1.6 and 2.7 points respectively.

340 Therefore, the clinical relevance of the association between urogenital symptoms,
341 particularly urogenital pain, and poorer MH in young women, is difficult to ascertain. Previous
342 studies that have reported an association between urogenital symptoms and poorer MH and
343 QOL in middle aged and older women [4-6], and therefore it would be recommended that
344 any young women presenting with urogenital symptoms are screened for MH and QOL. The
345 prospective nature of the Raine study may provide insight into these associations in future
346 follow-up studies.

347 Our results also showed an association between MUI and higher depression, anxiety and
348 stress scores, which is in accordance with previous studies which included middle and older
349 ages women [5, 30]. An association between UI and depression, and MUI and anxiety have
350 been reported in the literature, however the underlying mechanisms for the observed
351 associations are complex and not yet fully understood [4, 5].

352 **Significance and implications**

353 The results indicate that urogenital symptoms are prevalent and bothersome in young
354 women, and are associated with significant impact including poorer MH and QOL. Research
355 has shown that many women who experience urogenital symptoms do not seek help [7],
356 and that younger women have little insight into their urogenital health [8]. It is therefore
357 recommended that primary prevention programs are developed such as community-based

358 education sessions, and that health professionals screen young women for urogenital
359 symptoms and impact during routine episodes of care. Whilst there is Level 1 evidence that
360 simple, safe, cost-effective treatments such as pelvic floor muscle training are effective for
361 treating and reducing urogenital symptoms [31], optimal management of urogenital
362 symptoms requires a multidimensional view which considers physical health, LBP history,
363 MH and QOL to minimise impact on young women. The Raine Study is a prospective study
364 and as such there is great potential for further follow up of these women to obtain more
365 detailed information and data on trajectories of urogenital symptoms and associated factors.
366 This study involved a community sample of women of the same age, thus minimising
367 selection bias.

368 **Limitations of study and Recommendations**

369 The urogenital symptoms were based on self-report by the participants, and therefore there
370 is potential for misclassification, especially for those who reported leakage of small drops of
371 urine. Not all young women were able to attend the physical examination, and therefore
372 numbers available for estimation of the association BMI with urogenital symptoms were
373 smaller.

374 As this is a cross-sectional evaluation, the findings are associations and no causality can be
375 drawn. Further research is recommended to establish: the prevalence of other types of UI in
376 young women, (such as post micturition dribble and passive incontinence which are not
377 included in the UDI-6); to study specific pain syndromes such as bladder pain syndrome,
378 chronic pelvic pain and urethral pain syndrome; and to determine the direction and
379 underlying mechanisms of the associations between urogenital symptoms and QOL and MH
380 in young women. A limitation of the study is that the association of sexual activity with
381 urogenital symptoms was not assessed, as sexually active women may be at a higher risk of
382 having lower urinary tract symptoms.

383 **Conclusion**

384 Urogenital symptoms are both prevalent and bothersome in some young women. They are
385 associated with LBP, poorer MH and QOL, and functional impacts.

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399

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Table 1: Response rates and sample characteristics

Correlates	Number providing data N (%)	Number affected N (%)
Low back pain		
LBP ever	585 (99.5)	406 (69.4)
LBP current	583 (99.1)	308 (52.8)
LBP chronic	583 (99.1)	225 (38.6)
BMI ^a	478 (81.3)	
Underweight		22 (4.6)
Normal		284 (59.4)
Overweight		89 (18.6)
Obese		83 (17.4)
Parity	588 (100)	
Nulliparous		230 (93.1)
DASS-21		
Depression	583 (99.1)	
None		380 (65.2)
Mild		73(12.5)
Moderate		65 (11.2)
Severe		32 (5.5)
Extremely severe		33 (5.7)
Anxiety	582 (98.9)	
None		412 (70.8)
Mild		41(7.0)
Moderate		75 (12.9)
Severe		27 (4.6)
Extremely severe		27 (4.6)
Stress	581 (98.8)	
None		432 (74.4)
Mild		45 (7.8)
Moderate		53 (9.1)
Severe		37 (6.4)
Extremely severe		14 (2.4)
SF-12 ^b	573 (97.4)	
Physical component score		53.3 (7.2)
Mental component score		44.8 (10.7)

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487 ^a BMI was not measured for 110 women (18.7%) as they did not attend the physical examination.
488 Women were classified as either obese (BMI ≥30) or non-obese (BMI<30) in regression models.

489 ^b The physical and mental component scores are reported as mean (SD)

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Table 2: Prevalence, bother and level of impact associated with urogenital symptoms.

Urogenital symptom	Presence of symptom N (% of total sample)	Severity of Bother ^a N (% of those with the symptom)			Level of impact ^b N (% of those with the symptom)	
		Yes n (%)	Slight n (%)	Moderate/ Great n (%)	Slight (1-7) N %	Moderate (>7) N %
Frequency	244 of 588 (41.5)	153 of 244 (62.7)	91 of 244 (37.3)	86 of 237 (36.3)	8 of 237 (3.4)	
UUI	31 of 583 (5.3)	26 of 31 (83.9)	5 of 31 (16.1)	11 of 30 (36.7)	0 of 30 (0.0)	
SUI	37 of 583 (6.3)	34 of 37 (91.9)	3 of 37 (8.1)	14 of 37 (37.8)	1 of 37 (2.7)	
MUI	67 of 583 (11.5)	45 of 67 (67.2)	22 of 67 (32.8)	26 of 66 (39.4)	5 of 66 (7.6)	
Leakage of small drops	34 of 583 (5.8)	30 of 34 (88.2)	4 of 34 (11.8)	13 of 33 (39.4)	0 of 33 (0.0)	
Difficulty emptying bladder	69 of 584 (11.8)	52 of 69 (75.4)	17 of 69 (24.6)	31 of 67 (46.3)	7 of 67 (10.4)	
Pain	134 of 584 (22.9)	87 of 134 (64.9)	47 of 134 (35.1)	62 of 131 (47.3)	10 of 131 (7.6)	

497 *UUI urinary urge incontinence, SUI stress urinary incontinence, MUI mixed urinary incontinence, leakage of small drops*
498 *small drops of urinary leakage*

499 Of the 607 women who completed the 22 year follow-up questionnaire, 581/607 (95.6%) provided valid responses for all 6
500 questions of the UDI-6), whilst 588 (96.7%) provided a valid response to one or more of the 6 questions.

501 ^a The level of bother was calculated from responses to the UDI-6 and is therefore only given for women who had the particular
502 urogenital symptom. Percentage of subjects with presence of stated urogenital symptom

503 ^b The level of impact was calculated from responses to the PFIQ-7 and therefore is only given for the women who had the
504 particular urogenital symptom. Percentage of subjects with presence of stated urogenital symptom.
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506 **Table 3:** Comparisons of LBP, obesity, parity, mental and physical health in those 588 participants who provided a valid response to the UDI-6
 507 .

	No Symptoms n= 247 ^a	At least one UG symptom n=334 ^a		Frequency n=244 ^a		UUI n=31 ^a		SUI n=37 ^a	
		OR 95% CI p-value	OR 95% CI p-value	OR 95% CI p-value	OR 95% CI p-value	OR 95% CI p-value	OR 95% CI p-value		
LBP ever	151 (61.6%)	248 (74.5%)	1.82* 1.27- 2.59* .001*	181 (74.5%)	1.82* 1.23- 2.68* .002*	18 (58.1%)	0.86 0.40- 1.84 .701	31 (83.8%)	3.22* 1.29- 8.00* .012*
LBP current	108 (44.3%)	194 (58.4%)	1.77* 1.27- 2.47* .001*	137 (56.6%)	1.64* 1.15- 2.35* .007*	14 (45.2%)	1.04 0.49- 2.20 .924	24 (64.9%)	2.32* 1.13- 4.78* .022*
LBP chronic	83 (34.2%)	136 (40.8%)	1.33 0.94- 1.88 .103	104 (42.8%)	1.44 1.00-2.08 .051	7 (22.6%)	0.56 0.23- 1.36 .201	16 (43.2%)	1.47 0.73- 2.96 .283
Obese (BMI>30)	32 (16.5%)	51 (18.4%)	1.14 0.70- 1.86 .591	33 (16.3%)	0.99 0.58-1.68 .966	4 (16.7%)	1.01 0.32- 3.16 .983	9 (27.3%)	1.90 0.81- 4.46 .142
Nulliparous	230 (93.1%)	315 (94.3%)	1.23 0.63- 2.42 .556	230 (94.3%)	1.21 0.58-2.52 .602	28 (90.3%)	0.69 0.19- 2.50 .572	33 (89.2%)	0.61 0.19- 1.92 .399
DASS depression (moderate or more)	46 (18.8%)	83 (25.1%)	1.19* ^{b,c} 1.03- 1.38* .018*	66 (27.3%)	1.21* ^{b,c} 1.03- 1.41* .019*	6 (20.0%)	1.08 ^e 0.42- 2.80 .872	12 (32.4%)	1.92 ^{c,e} 0.89- 4.15 .099
DASS anxiety	37	90	1.26* ^{b,c}	68	1.28* ^{b,c}	6	1.34 ^e	8	1.32 ^{c,e}

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(moderate or more)	(15.2%)	(27.2%)	1.07-1.47* .004*	(28.2%)	1.08-2.13* .004*	(20.0%)	0.52-3.50 .546	(21.6%)	0.55-3.19 .531
DASS stress (moderate or more)	31 (12.8%)	71 (21.5%)	1.28* ^{b,c} 1.07-1.52* .006*	54 (22.3%)	1.30* ^{b,c} 1.08-1.56* .005*	6 (20.0%)	1.64 ^e 0.62-4.32 .315	5 (13.9%)	1.08 ^{c,e} 0.39-3.03 .878
SF12 PCS (mean, SD)	54.2 (6.6)	52.6 (7.5)	0.98 ^{c,d} 0.95-1.00 .069	52.5 (7.9)	0.98 ^{c,d} 0.95-1.00 .067	53.0 (6.1)	0.98 ^d 0.93-1.03 .383	54.0 (6.9)	1.01 ^{c,d} 0.96-1.06 .796
SF12 MCS (mean, SD)	46.5 (10.7)	43.6 (10.6)	0.98* ^{c,d} 0.96-0.99* .005*	43.5 (10.8)	0.98* ^{c,d} 0.96-0.99* .008*	43.9 (10.8)	0.98 ^d 0.95-1.01 .214	42.0 (12.4)	0.97 ^{c,d} 0.94-1.00 .066

	No Symptoms n= 247 ^a	MUI n=67 ^a	OR 95% CI p-value	Small drops n=34 ^a	OR 95% CI p-value	Difficulty Emptying n=69 ^a	OR 95% CI p-value	Pain n=134 ^a	OR 95% CI p-value
LBP ever	151 (61.6%)	46 (68.7%)	1.36 0.77-2.43 .292	31 (91.2%)	6.43* 1.91-21.63* .003*	54 (78.3%)	2.24* 1.20-4.20* .012*	107 (79.9%)	2.47* 1.50-4.04* <.001*
LBP current	108 (44.3%)	35 (52.2%)	1.38 0.80-2.37 .247	26 (76.5%)	1.09* 1.78-9.40* .001*	43 (62.3%)	2.08* 1.20-3.60* .009*	87 (64.9%)	2.33* 1.51-3.60* <.001*
LBP chronic	83 (34.2%)	30 (44.8)	1.56 0.90-2.71 .111	16 (47.1%)	1.71 0.83-3.53 .145	34 (49.3%)	1.87* 1.08-3.22* .023*	67 (50.0%)	1.93* 1.25-2.96* .003*
Obese	32	13	1.50	8	2.13	10	1.05	19	1.01

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(BMI>30)	(16.5%)	(22.8%)	0.72-3.09 .277	(29.6%)	0.86-5.29 .103	(17.2%)	0.48-2.30 .894	(16.7%)	0.54-1.89 .969
Nulliparous	230 (93.1%)	60 (89.6%)	0.63 0.25-1.60 .333	33 (97.1%)	2.44 0.31-18.94 .394	64 (92.8%)	0.95 0.34-2.66 .916	126 (94.0%)	1.16 0.49-2.77 .731
DASS depression	46 (18.8%)	21 (31.8%)	1.34 ^{*b} 1.08-1.66 [*] .007 [*]	6 (17.7%)	0.84 ^{c,e} 0.32-2.19 .720	24 (34.8%)	1.37 ^{*b,c} 1.11-1.69 [*] .003 [*]	44 (33.1%)	1.39 ^{*b,c} 1.17-1.66 [*] <.001 [*]
DASS anxiety	37 (15.2%)	23 (34.9%)	1.41 ^{*b} 1.13-1.75 [*] .002 [*]	9 (26.5%)	1.60 ^{c,e} 0.67-3.82 .284	29 (42.0%)	1.51 ^{*b,c} 1.21-1.86 [*] <.001 [*]	45 (34.1%)	1.41 ^{*b,c} 1.18-1.68 [*] <.001 [*]
DASS stress	31 (12.8%)	21 (31.3%)	1.47 ^{*b} 1.15-1.88 [*] .002 [*]	8 (25.5%)	2.01 0.81-4.99 .130	21 (30.4%)	1.52 [*] 1.21-1.91 [*] <.001 [*]	45 (34.1%)	1.62 ^{*b,c} 1.32-1.98 [*] <.001 [*]
SF12 PCS (mean, SD)	54.2 (6.6)	52.1 (8.4)	0.97 0.93-1.00 .063	52.3 (7.4)	0.98 0.94-1.03 .467	51.5 (9.3)	0.97 0.93-1.00 .056	51.7 (8.7)	0.97 0.94-1.00 .051
SF12 MCS (mean, SD)	46.5 (10.7)	42.7 (11.4)	0.97 [*] 0.95-0.99 [*] .013 [*]	44.0 (9.9)	0.99 0.96-1.02 .529	41.5 (11.5)	0.97 [*] 0.94-0.99 [*] .005 [*]	41.0 (10.5)	0.96 [*] 0.94-0.98 [*] <.001 [*]

508 UG urogenital, UUI urinary urge incontinence, SUI stress urinary incontinence, MUI mixed urinary incontinence, leakage of small drops small drops of urinary leakage, difficulty emptying difficulty emptying the bladder, pain urogenital pain, LBP

509 low back pain, DASS Depression Anxiety Stress Scale short version, SF-12 Short Form 12 Health Survey, PCS physical component score, MCS mental component score

510 *statistically significant odds ratios

511 ^apercentages for independent variables are column percentages with number available for analysis with/without UG symptom as the denominator

512 ^bOdds Ratio represents proportional increase in odds for UG symptom for 1 increment of the 5 categories (none, mild, moderate, severe, extremely severe)
513 of DASS-21 score. (descriptives collapsed by moderate or more presented for brevity)

514 ^cadjusted for current LBP

515 ^dOdds Ratio represents proportional decrease in odds for UG symptom for each increment of 1 in SF score.

516 ^eCategories collapsed due to sparse cells. Odds Ratio presents proportional increase in odds for UG symptom for category (moderate, severe, extremely
517 severe) compared to category (none, mild) of DASS-21 score.

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