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Relationship between depression, anxiety, and attendance at pelvic-floor muscle training sessions

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Abstract

Objectives Psychological comorbidities are associated with non-attendance for pelvic-floor muscle training (PFMT) appointments and non-engagement with ongoing treatment. However, little direct work has examined the precise relationship between these variables.
Design A prospective observational study of consecutively referred women patients with Pelvic-floor Dysfunction. Patients were assessed at intake for age, BMI, pelvic symptoms (measured by the Queensland Pelvic Symptom Scale), and anxiety and depression (measured by the Hospital Anxiety and Depression Scales).
Setting A women's health physiotherapy outpatient unit of a metropolitan hospital.
Participants 433 consecutively-referred women with pelvic-floor dysfunction (PFD).
Interventions Six sessions of PFMT, lasting over a period of 6 months.
Main outcome measures Attendance at PFMT sessions was the outcome, and was related to intake patient age, BMI, pelvic symptoms, as well as anxiety and depression.
Results Psychological symptoms of depression and anxiety predicted attendance at PFMT sessions, over and above physical symptoms. Depression was the key predictor of non-attendance, with anxiety having a more complex relationship with attendance. There were few differences between these psychological variables and the different types of PFD, or between type of PFD and PFMT attendance.
Conclusions The findings add to the literature suggesting that consideration of patients' psychological state is important when designing treatment-regimes.
Contribution of the paper

- In this report, we looked at the impact of depression and anxiety of patients with pelvic-floor dysfunction on their attendance at pelvic-floor muscle training sessions.
- We found depression negatively impacted patients' ability to engage with treatment.
- We suggest offering psychological support to patients to help them engage more fully with their treatment, and potentially prevent future surgery.

Keywords: Anxiety; Depression; Pelvic-floor symptoms; Session attendance; Pelvic-floor dysfunction

Introduction

Pelvic-floor dysfunction (PFD) includes a range of different and often overlapping symptoms: stress and urge urinary incontinence, bowel incontinence, prolapse, and sexual dysfunction [1]. Estimates suggest that 25% of adult females are affected [2]. This number increases to 50% for women who have experienced pregnancy and childbirth [3,4], who are over 60 years [5], and who are obese [6]. There is an estimated yearly incidence rate of 1–2% of the population [2]. These problems carry significant health and economic burdens, with the cost to the UK health service

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being £1.8bn/year [7], although the true cost is certainly higher, as many do not seek help [8].

Pelvic-floor Muscle Training (PFMT) is a recommended first-line treatment for PFD [7], and has strong outcome-effectiveness and cost-effectiveness evidence [9]. However, clinical outcomes are negatively affected by poor patient take-up [10,11] non-attendance at PFMT appointments averages 25% in the UK, and can be as high as 50% [12]. Patients can also fail to practice their pelvic-floor exercises, reducing the effectiveness of PFMT [8,13].

Women with PFD have a high prevalence of psychological comorbidities [14], especially depression and anxiety [15,16]. Rates of clinically-diagnosable depression are estimated at 20% for this clinical population (i.e. those with PFD), and rates of clinically-diagnosable anxiety are estimated at 30% for this clinical population [17]. These psychological comorbidities are suggested to be associated with higher rates of non-attendance for PFMT appointments [10,18], and non-engagement with ongoing treatment [10,12,13]. The consequence is that women do not seek and adhere to treatment for PFD, making the condition worse, and making necessary later expensive and less-safe surgery, potentially increasing the costs to the health system [10,12].

The current study explored two unresolved issues. Firstly, PFD is a diverse set of conditions, and it is unclear whether common psychological comorbidities (depression and anxiety) occur at similar rates for different aspects of PFD; for example, urinary versus bowel incontinence. The latter dysfunction has been suggested to be particularly distressing for patients [19]. Secondly, although psychological distress (depression and anxiety together) negatively impacts PFMT attendance [15], it is unclear what contribution depression and anxiety, separately, make to this effect. It might be expected that depression would have a straightforward negative effect on attendance, as it does for other conditions [20]. However, the role of anxiety may be more complicated, with both lower and higher levels of anxiety being associated with poorer motivation and performance, which may be reflected in attendance. According to the Yerkes-Dodson Law [21,22], performance (attendance in this case) will increase as anxiety moves from no anxiety to moderate levels (as this may motivate patients to attend), and then decrease at some point when anxiety levels become debilitating. Given this, a range of patient characteristics were recorded at the start of a PFMT programme for consecutively-referred patients, including depression and anxiety, and their attendance for the programme was recorded. The intake characteristics were related to this attendance outcome.

Method

Participants

479 adult females with PFD, consecutively referred to an outpatient PFMT programme, 90% (433/479) gave their informed consent, and participated in the study. G-Power analysis suggested that, to obtain 90% power, using a rejection criterion of $p < 0.05$, with a small effect size ($f^2 = 0.03$), assessing the relationship between two predictors (anxiety and depression) and an outcome (attendance), while controlling three other variables (age, BMI, and pelvic floor symptoms), would require a sample size of 425.

The participants had a mean age of 52 (SD = 13, range 17–91) years, and a mean BMI of 30 (6, range 17–67). The patients were referred to PFMT for a variety of pelvic-floor conditions: 21% (89/433) with stress urinary incontinence but no prolapse; 6% (28/433) with urge urinary incontinence but no prolapse; 30% (129/433) with mixed urinary incontinence but no prolapse; 6% (28/433) with faecal incontinence but no prolapse; 13% (57/433) with prolapse; and 24% (102/433) with prolapse and mixed incontinence.

The study was organised jointly by the NHS hospital and a research group at the university. Ethical approval was granted to this study by the NRES Committee Region – East Midlands, UK (13/EM/0314). The trial was registered on clinicaltrials.gov (NCT02549157). The data from the participants recruited for this study have not previously been reported.

Measures

Queensland Pelvic Floor Questionnaire [23] is a self-administered female pelvic-floor questionnaire. Sections relate to bladder dysfunction, bowel dysfunction, prolapse, and sexual dysfunction, each producing a score from 0 to 10, the sum gives overall pelvic-floor dysfunction (0–40). Greater scores represent worse function. The internal reliability of the scales (Cronbach α) range between 0.72 and 0.95 [23].

Hospital Anxiety and Depression Scales (HADS [24]) is a widely-used measure of anxiety and depression, with strong test-retest reliability and validity. [24] It focuses on psychological symptoms, and excludes somatic symptoms to avoid overlap with physical symptoms. The HADS consists of 14 questions: 7 for anxiety, and 7 for depression, with each question scored from 0 to 3. There are four symptom categories: normal (0–7), mild (8–10), moderate (11–14), and severe (15–21). The internal reliability of the scales (Cronbach α) range between 0.87 and 0.92.

Intervention

The PFMT programme was delivered over six 60-min sessions to groups of patients (5–6 patients per group), with two individual appointments, spaced over the course of six months. The programme provided training in pelvic-floor exercises, identifying and isolating the correct muscle group, and education regarding pelvic-floor anatomy and function. Sessions were led by a clinical physiotherapy specialist in women's health, a senior physiotherapist in women's health, or a surgical nurse specialist attached to the women's health unit. Each of these professionals delivered the same content during the sessions.

Every session provided training in pelvic-floor exercises, and advice about behavioural management of continence (fluid intake, bladder drill, 'the knack', double voiding, and helpful activities). Patients were asked to practice pelvic-floor exercises on a daily basis. The correctness and appropriateness of the exercises were checked during the individual sessions with the physiotherapist. At the start, patients were advised to perform five rapid pelvic-floor muscle squeezes, holding each squeeze between 1 and 3 s before releasing. Patients were encouraged to progressively increase the number and duration of squeezes over the course of the programme, with a goal to accomplish 10 long squeezes, for 10 s, followed by 10 short squeezes, at least two to three times a day. PFMT sessions also provided information regarding: (1) the anatomy and function of the pelvic-floor muscles; (2) back and spinal care, as well as posture; (3) medical and surgical management of pelvic-floor conditions; (4) psychosexual issues; (5) anatomy of the intestines and bowel, and colorectal problems; and (6) physiotherapy management of PFD, and available aids. Individual appointments were taken by a clinical physiotherapy specialist, and were held usually at the start and end of the group sessions. These individual appointments established the needs of the patient, and could involve vaginal examination to assess vaginal muscles and tissues, and determine pelvic-floor strength, in order to assess the quality of technique of the pelvic-floor exercises that the patient was performing.

Procedure

The patients with PFD were referred to an outpatient physiotherapy, at a metropolitan hospital, by a range of health practitioners: GPs, consultants/registrars, and continence nurses, who had made the clinical diagnoses. The study was conducted from May, 2017, to July, 2019. The referred patients were placed on a waiting list for the hospital outpatient PFMT service, and were invited to attend the first group session of an available set of PFMT classes. At the start of this intervention, at the clinic prior to their first session, participants completed the questionnaires to assess their subjective view of their problems (Queensland), and their levels of anxiety and depression (HADS). Patients completed the questionnaires in the presence of a researcher, and they could ask for help if they needed this (which reduced the amount of missing data to minimal amounts). Data relating to other demographic characteristics (e.g., age, BMI) were collected from the participants. Patients then progressed through the treatment-regime, as described above, and their attendance at PFMT group sessions was monitored.

Date analysis

Missing data was addressed by mean substitution based on the participant's own scores for that questionnaire or sub-scale of the questionnaire. Given the method of data collection, there were no more than 2 missing items, in total, for any of the questionnaires. The data were examined for normality by calculating the skewness values (a value of < -1 or > 1 indicates high levels of these indices). All variables had values within the -1 to $+1$ range, except for Prolapse symptoms (skewness = 1.5), and BMI (skewness = 1.20), so were deemed suitable for parametric analyses. The total scores for the variables: Pelvic-floor symptoms (Queensland), as well as anxiety and depression (HADS) were calculated.

Differences between the six groups of PFD patients (stress urinary incontinence, urge urinary incontinence, mixed urinary incontinence, faecal incontinence, prolapse, and mixed incontinence and prolapse) in terms of demographics, pelvic-floor symptoms, and psychological variable (anxiety and depression), were assessed by analysis of variance. The relationship between the psychological variables (HADS) and the pelvic floor symptoms (Queensland), as well as demographic variables (age, BMI), were initially examined through Pearson correlations. To determine whether the psychological variable impacted attendance over and above the impact of other variables, a stepwise multiple regression was conducted, with patient age, BMI, and total Queensland symptoms entered in step 1, and anxiety and depression entered in step 2 to determine if the addition of the psychological variables significantly increased the predictive accuracy of attendance over the other variables. Finally, the individual relationship between anxiety, and depression, and attendance was explored for their linear and quadratic relationships.

Results

Impact of PFD on variables

Table 1 shows the mean (standard deviation) age, BMI, reported pelvic-floor symptoms (Queensland), and number of PFMT sessions attended, for patients diagnosed with different forms of PFD. There were no statistically significant differences between the PFD groups for age, BMI, PFMT sessions attended, or sexual-function symptoms. The differences between the six groups for the different symptoms are as expected (i.e. higher prolapse symptoms in prolapse-related groups, etc.), and this was confirmed by statistical analyses reported in Appendix 1.

The mean anxiety rating (HADS_A) for the sample was 12.1 (5.8, range 0–21), with 25% (112/433) patients in the normal range; 18% (80/433) in the mild range; 15% (65/433) in the moderate range; and 40% (174/433) in the severe range. The mean depression rating (HADS_D) was 10.3 (6.1, range 0–21); 40% (178/433) of patients were in the normal range; 10% (43/433) in the mild range; 14% (59/433) in the moderate range; and 35% (153/433) in the severe range.

Fig. 1 shows the mean scores for anxiety and depression for the six groups of patients. Inspection of these data

Table 1
Mean (standard deviation) age, BMI, pelvic-floor symptoms (Queensland), and number of PFMT sessions attended, for patients diagnosed with different forms of PFD.

	Diagnosis						
	Stress	Urge	Mixed	Faecal	Prolapse	Prolapse & Mixed	*F* (5427)
n	89	28	129	28	57	102	
Age	49 (14)	52 (11)	52 (11)	56 (14)	51 (14)	53 (14)	1.92
BMI	28.9 (8.1)	29.9 (8.5)	30.6 (6.8)	31.2 (4.4)	30.6 (4.9)	30.5 (8.4)	1.21
Attend	3.6 (1.7)	4.0 (1.6)	3.2 (1.8)	4.0 (1.4)	3.9 (1.8)	3.3 (1.7)	2.77
Queensland							
Bladder (max = 10)	4.3 (2.4)	3.8 (2.9)	3.7 (2.1)	3.4 (2.4)	2.8 (2.0)	3.9 (2.4)	3.00**
Bowel (max = 10)	2.5 (1.6)	3.0 (1.9)	2.8 (1.8)	4.0 (1.9)	3.1 (2.0)	4.3 (2.2)	11.09***
Prolapse (max = 10)	1.9 (3.1)	1.9 (2.0)	1.3 (2.1)	2.0 (2.4)	5.5 (2.8)	4.4 (3.4)	28.78***
Sexual (max = 10)	3.4 (3.7)	3.4 (3.3)	3.2 (3.6)	2.6 (3.0)	4.5 (4.1)	4.4 (4.5)	2.28
Total (max = 40)	12.0 (8.0)	12.0 (7.0)	11.0 (6.6)	12.0 (9.4)	16.0 (8.3)	17.0 (9.6)	8.72***

**p < 0.01; ***p < 0.001

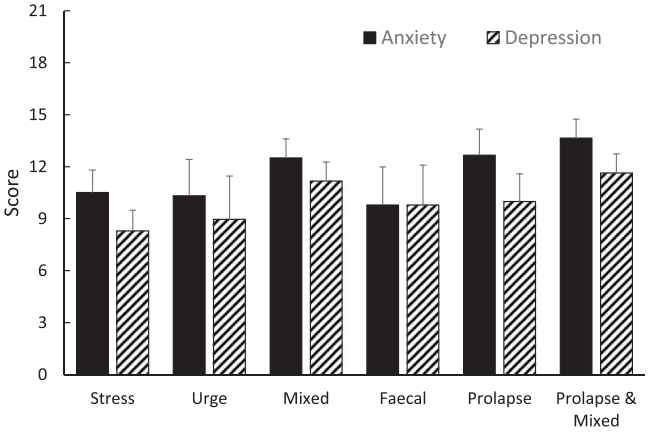

Fig. 1. Mean scores for anxiety and depression for the six PFD subgroups of patients. Both scales have a range of 0 – 21. Error bars = 95% confidence limits.

reveals that there are differences in the scores for anxiety and depression across the groups. In particular, there was greater anxiety in both the prolapse and mixed groups than for both the stress incontinence and faecal groups. There was greater depression for both the prolapse and mixed groups compared to the stress incontinence group. The results of the statistical analysis that support these conclusions are shown in Appendix 2.

Associations between anxiety and depression and other variables

Table 2 shows correlations between anxiety and depression and the other patient variables. Due to the number of correlations, focus is directed at those corrrelations with r values > 0.30, and with p values smaller than $p < 0.001$ (Bonferroni correction for significance; $p = 0.05/17 = 0.002$). There were significant positive relationships between anxiety and depression. Both psychological variables had a significant negative relationship with PFMT session attendance, with depression having a stronger negative relationship with attendance than anxiety, $z = 7.843$, $p < 0.001$.

Impact of psychological variables on attendance

To further analyse the relationships between these variables and PFMT attendance, a stepwise multiple regression was conducted. Patient age, BMI, and total Queensland symptoms were entered in step 1, and anxiety and depression in step 2. Step 2 was significant, $R^2 = 0.449$, $F(5427) = 69.46$, $p < 0.001$, and the psychological variables added significantly more predictive accuracy regarding PFMT session attendance, compared to patient age, BMI, and physical symptoms (Step 1), change $R^2 = 0.388$, $F(2427) = 150.09$, $p < 0.001$. Total pelvic-floor symptoms significantly predicted attendance, with patients who reported more symptoms being less likely to attend ($\beta = -0.025$, $p < 0.001$), as did age, with older patients being more likely to attend ($\beta = 0.010$, $p = 0.032$). BMI did not predict attendance ($\beta = -0.012$, $p = 0.278$). Of the psychological variables, higher levels of depression predicted worse attendance ($\beta = -0.189$, $p < 0.001$), but anxiety did not predict attendance ($\beta = 0.0170$, $p = 0.267$).

Relationships between anxiety and depression on attendance

To explore further the relationship between both anxiety and depression and PFMT session attendance, the relationships

Table 2
Pearson's correlations for the sample between anxiety and depression on the other variables.

	Dep.	Age	BMI	Total	Bladder	Bowel	Prolapse	Sexual	Attend
Anx.	0.703***	0.043	0.102*	0.178***	0.148**	0.147**	0.065	0.164**	-0.437***
Dep.		0.015	0.118*	0.149**	0.170***	0.163***	0.001	0.132**	-0.651***

* $p < 0.05$; * * $p < 0.01$; * ** $p < 0.001$

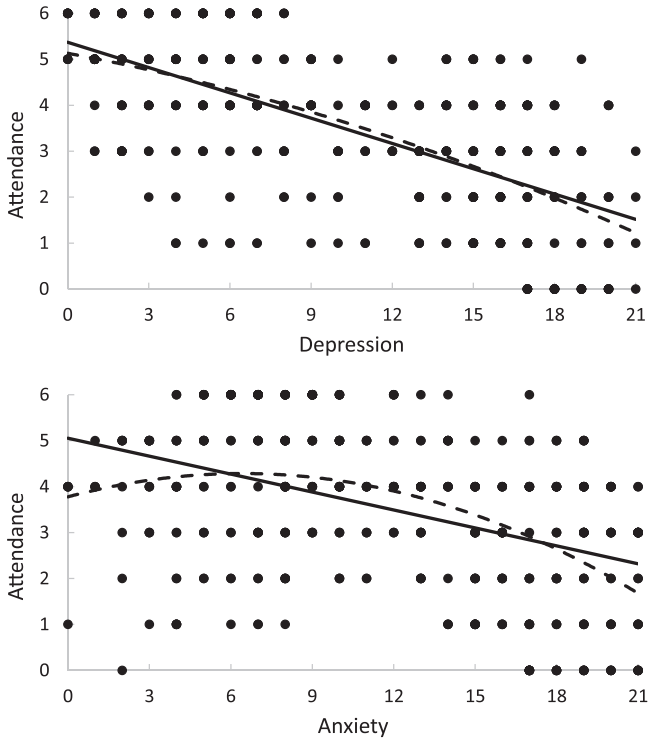

Fig. 2. Scatterplots for relationships between depression (top panel), and anxiety (bottom panel), and PFMT session attendance. The linear (solid line), and quadratic (dotted line), relationships between these variables are also shown.

between these two variables and sessions attended were analysed separately. Fig. 2 shows the scatterplots for the relationships between anxiety (top panel) and depression (bottom panel) and PFMT session attendance. The linear (solid line) and quadratic (dotted line) relationships between these variables are also shown. For anxiety, the linear relationship, $R^2 = 0.191$, $F(1431) = 101.45$, $p < 0.001$, and quadratic, $R^2 = 0.237$, $F(2430) = 66.65$, $p < 0.001$, were significant. For depression, the linear, $R^2 = 0.424$, $F(1431) = 317.85$, $p < 0.001$, and quadratic, $R^2 = 0.428$, $F(2430) = 161.18$, $p < 0.001$, relationships were significant. Thus, both linear and quadratic relationships for both psychological variables and PFMT session attendance were significant, but these were stronger for depression than for anxiety. However, the quadratic relationship was stronger than the linear relationship for anxiety, which was not so for depression.

Discussion

These findings suggest that psychological symptoms of depression and anxiety are predictors of attendance at PFMT sessions, over and above physical symptoms, which corroborates previous work [15]. Of the two, depression was the key predictor of non-attendance, with anxiety having a more complex relationship with engagement with treatment. It was also noted that there were few differences between these psychological variables and the different types of PFD, or between the type of PFD and PFMT attendance. The findings add to the literature suggesting that consideration of patients' psychological state is important, when designing treatment-regimes for patients with PFD, irrespective of the exact nature of the PFD.

The finding that depression was a strong predictor of non-attendance for treatment is consistent with previous research [15], and is predictable from the nature of depression. A key aspect of depression is its negative impact on motivation and ability to experience reward. [25] Both of these deleterious effects will undermine patients' motivation-to-change behaviours [20]. It is known, in the context of PFMT, that poor patient motivation-to-change will negatively impact session attendance [18], and also negatively impact outcomes, even when the symptom severity is matched [12]. Given these findings, it may be worth considering giving psychological support and counselling to patients with depression prior to, or during, their PFMT, in order to increase their chances of engagement with treatment [10,26]. In previous studies, psychotherapeutic counselling, including both person centred therapy for depression, and CBT, has been employed, along with motivational interviewing for health values [10,26]. These have been provided by psychologists/counsellors associated with the women's health outpatient clinic, but it may be that some low intensity interventions, like motivational interviewing, could be provided by many health care professionals. Should this depression prove resistant to treatment or support, within this context, which can occur [27], then it may be worth considering referral to psychological services, depending on the most pressing patient needs or wishes. Addressing any mental health issues may enable better treatment adherence, later.

The findings with respect to anxiety were less straightforward. Levels of anxiety were higher in the current cohort than levels of depression – which corroborates previous work [17], and anxiety was associated with more bothersome pelvic-floor symptoms. However, its negative impact on PFMT attendance was less pronounced than that of depression. Moreover, at both low and high levels of anxiety, attendance was somewhat worse than at mild or moderate levels. This finding is in line with suggestions that both lower and higher levels of anxiety are associated with poor motivation [21,22] The implications of this for treatment are unclear, but they suggest that support for highly-anxious patients may be needed during their treatment.

Both of the psychological factors (depression and anxiety) occurred at high rates in the present sample, which adds to the importance of this suggestion. However, it should be noted that the levels of depression and anxiety in the current sample were higher than have been estimated in previous studies. It is unclear why this was the case, but is probably due to the nature of this particular sample. It may be that collection of the depression and anxiety data in the clinic may have contributed to the heightened rates. The HADS is a measure of psychological distress in the last two

weeks, so it should not be impacted only by immediate experiences, however, these certainly may be given more weight by the patients than any longstanding problems.

The above considerations regarding the impacts of depression and anxiety on PFMT attendance were independent of patient-reported pelvic-floor symptoms, as measured by the Queensland scale, which corroborates previous research [15]. The pelvic-floor symptoms, themselves, did have a negative impact on the likelihood of attending PFMT. In terms of the potential impact of the various types of PFD, the clinical diagnosis given to a patient was reflected in the self-reported pelvic symptoms, as measured by the Queensland scale. However, beyond this finding, there was little to suggest any strong differences in the impact of the types of PFD on psychological functioning or on PFMT attendance. Of the other patient variables, it was noted that age was a predictor of attendance, with older patients more likely to engage; again, this replicates previous findings [13]. However, the current study only collected a limited range of demographic and socioeconomic factors, and future studies may consider recording a greater range of these factors, and studying some of these like age in more detail, as these may also predict attendance [13].

As with any study there are limitations that need to be considered. Although adequately powered to detect statistical difference for the overall analyses, the sub-samples for the different groups of PFD patients were quite small. Future studies could focus on particular groups to explore these issues for more precisely controlled symptomotologies. Additionally, the current study did not record other aspects of the patients' personal history, such as their obstetric history, medication use, or the presence of other comorbidities. Again, future studies may consider taking such information, and by increasing the sample size, assessing the degree to which these factors impact the relationship between depression and change in PFD symptoms. The sample also was undergoing one form of PFMT intervention, and these data may not be applicable to other forms of treatment. It may be interesting to explore whether patients undergoing other treatments would show different impacts of anxiety and depression. The current sample had sought treatment for PFD, and had attended PFMT. Given this, these results may not apply to all patients referred, some of whom will not attend or complete treatment.

In summary, improving patient psychological functioning may reduce attrition rates for PFMT. The current report suggests that anxious patients, and depressed patients in particular, may require psychological support in order to engage fully with PFMT. This may have cost-lowering implications, as facilitating improvements in quality of life may help patients be more successful with this treatment and reduce their need for subsequent surgery.

Ethical approval: Ethical approval was granted to this study by the NRES Committee Region - East Midlands, UK. The trial was registered on clinicaltrials.gov (NCT02549157).

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Conflict of Interest

Authors state that there are none.

Appendix 1

There were differences between the groups for the total number of self-reported pelvic-floor symptoms, as well as for bladder, bowel, and prolapse symptoms (shown in Table 1). There was a medium-sized ($\eta_p^2 = 0.093$) significant effect for total pelvic-floor symptoms, and Tukey's Honestly Significant Difference (HSD) tests revealed that the prolapse group reported more symptoms than both the stress group, and the mixed group; the prolapse and mixed group reported more symptoms than each of the stress, urge, mixed, and faecal groups, all $ps < 0.05$. There was a small-sized ($\eta_p^2 = 0.006$) significant difference for bladder symptoms, with Tukey's HSD tests revealing that the stress group, and the prolapse and mixed group, both reported more bladder symptoms than the prolapse group, all $ps < 0.05$. There was a large-sized ($\eta_p^2 = 0.115$) difference for bowel symptoms, with Tukey's HSD tests revealing that the faecal group reported more bowel symptoms than both the stress group, and the mixed group; the prolapse and mixed group reported more symptoms than the stress, urge, mixed, and prolapse groups, all $ps < 0.05$. Finally, there was a large-sized ($\eta_p^2 = 0.252$) significant difference for prolapse symptoms, with Tukey's HSD tests revealing the prolapse group reported more prolapse symptoms than the stress, urge, mixed, and bowel groups; and the prolapse and mixed group reporting more prolapse symptoms than the stress, urge, mixed, and bowl groups, all $ps < 0.05$.

Appendix 2

A multivariate analysis of variance (MANOVA) conducted on these data revealed a significant difference between the PFD groups, *Wilks' Lambda* = 0.927, $F(10,852) = 3.28$, $p < 0.001$, $\eta_p^2 = 0.037$. Univariate analysis of variance (ANOVA) revealed a significant difference between the groups for anxiety, $F(5427) = 4.64$, $p < 0.001$, η_p^2

= 0.052, with Tukey's HSD tests revealing greater anxiety for the prolapse and mixed group than for both the stress and the faecal groups, all ps < 0.05. There was also a significant difference between the groups for depression, $F(5427) = 3.87$, $p < 0.001$, $\eta_p^2 = 0.043$. Tukey's HSD tests revealed greater depression for the prolapse and mixed group than for the stress group, and greater depression for the mixed group than for the stress group, all ps < 0.05.

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