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Prevalence, Awareness, and Understanding of Pelvic Floor Disorders in Adolescent and Young Women

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Abstract

Objectives—The objective of this study was to characterize symptom prevalence, awareness of pelvic floor disorders in family/friends, and understanding of factors contributing to the development of pelvic floor disorders (PFDs) in women ages 19–30.

Methods—A cross-sectional study via online questionnaire survey of female students ages 19–30 enrolled at the University of Alabama at Birmingham. Results of "adolescent women" ages 19–24 were compared to "young women" age 25–30.

Results—1092 questionnaires were completed with the mean age being 23.5 ± 3.1 years old. The overall rate of urinary incontinence (UI) was 10.3% without a difference between adolescent and young women (p=0.61). There were no differences in rates of urgency urinary incontinence (UUI) (p=0.061), stress urinary incontinence (SUI) (p=0.29), or pelvic organ prolapse (POP) symptoms (p=0.56) between groups. There was no difference between groups in awareness of family members with UI, fecal incontinence (FI) or POP symptoms (p≥0.24). However, logistic regression showed that the young women were more likely to have received education regarding UI (aOR 2.6, 95% CI 1.8–3.6), FI (aOR 3.3, 95% CI 2.2–4.8), POP (aOR 2.9, 95% CI 2.1–4.2)

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and have greater understanding regarding causes of UI (aOR 2.9, 95% CI 1.7–4.8), FI (aOR 1.6, 95% CI 1.1–2.3 and POP (aOR 1.9, 95% CI 1.3–2.9).

Conclusions—Women ages 25–30 had more awareness and understanding of pelvic floor disorders compared to adolescent females. These data may have implications for primary prevention strategies of pelvic floor disorders.

Keywords

adolescent; pelvic floor disorders; prevention

Introduction

Urinary incontinence (UI), fecal incontinence (FI), and pelvic organ prolapse (POP) are common conditions in women with a lifetime risk of 20% of undergoing a single operation for these pelvic floor conditions.[1] In one recent cross-sectional national health survey, symptoms of UI, FI and POP had a prevalence rate of 23.7% in women aged 20 and older, and 49.7% in women aged 80 and older.[2] There will be an increasing need for treatment of pelvic floor disorders (PFD) in the United States as it has been estimated that the proportion of women seeking care for these conditions will increase from 28.1 million to 43.8 million by the year 2050, paralleling the aging demographic.[3] There is also an enormous healthcare cost associated with the treatment of these disorders as well as a significant impact on the quality of life of women who are affected, therefore prevention strategies should be a public health initative.[4,5,6]

In order to plan, initiate and implement primary prevention strategies for the development of pelvic floor disorders it is important for pelvic floor researchers to understand the younger female's awareness of these conditions, the prevalence of symptoms in younger females and whether they understand factors associated with their development. The objective of this cross-sectional study was to characterize lower urinary tract and pelvic floor symptom prevalence, awareness of these symptoms in women in general and in their family members as well as to gain insight regarding their understanding of potential causes of female pelvic floor disorders among women ages 19–30.

Materials and Methods

This is a cross-sectional study of women aged 19–30 years enrolled at the University of Alabama at Birmingham for the 2014–2015 academic year. Inclusion criteria were any female enrolled in college classes, post graduate and graduate courses ages 19 to 30 and willing to answer an online questionnaire. University of Alabama at Birmingham Institutional Review Board approval was obtained. The strengthening the reporting of observational studies in epidemiology (STROBE) guidelines were followed.[7]

Participants were asked to complete a brief online questionnaire (see Supplement), using a secure access link to a questionnaire sent by the University of Alabama's Department of Institutional Effectiveness and Analysis, Web Based Services. The email sent to participants stated that by completing the questionnaire they implied informed consent. The

questionnaire contained imbedded questions from validated questionnaires, including the Incontinence Severity Index - 2 (ISI-2), the Incontinence Symptom Index - Pediatric (ISI-P), the Fecal Incontinence Severity Index (FISI), and one question from the Pelvic Organ Prolapse Inventory 6 (POPDI-6) part of the Pelvic Floor Distress Inventory Short Form 20. [8–11] The ISI-P has 5 severity domains of stress urinary incontinence (SUI), urgency urinary incontinence (UUI), insensate incontinence, night time incontinence, and pad use with the domain scores more important than total score (Range, 0–44). Although the ISI-P is validated in children ages 11–17, given our original target age population and the wording of the questions, we thought that the ISI-P would allow an understanding of the content regardless of education level. The questionnaire also included study-specific questions to acquire non-identifiable demographic information, and information about participants' awareness and understanding of pelvic floor disorders (Supplement).

For analysis purposes, to quantify the presence or absence of a condition/symptom the answers from the ISI-2, ISI-P, and POPDI-6 questions were reported dichotomously as yes or no. Answers of "Sometimes", "About ½ the time", and "Most of the time" were consisted YES and answers of "Never" or "Rarely" were considered NO for the ISI-P questions. Answers of "Moderately" or "Quite a bit" were considered YES and answers of "Not at all" or "Somewhat" were considered NO for the POPDI-6 question. Answers of "Moderately" or "Quite a bit" were considered YES and answers of "Never" or "Less than once a month" were considered NO for the ISI-2 questions.

Currently, there is no formal definition of adolescents and the age range utilized varies by organization or agency. However, we utilized the definition of the Association of Maternal and Child Health Programs and the National Network of State Adolescent Health Coordinators who groups adolescents into three stages, "early adolescent" age 10–14 years old, "middle adolescent" age 15–17 year old, and "late adolescent/young adults" ages 18–24 year old.[12] Results of adolescent women ages 19–24 were compared to young women ages 25–30. Since educational background could have an impact on the results, an exploratory subgroup analysis comparing outcomes of science versus non-science majors was also performed.

Characteristics regarding demographic variables (e.g., age, education), PFD symptoms and other measured items were compared between the adolescent and young women age groups using a t-test for continuous measures and chi-square for categorical measures. A p value of $\leq .05$ was considered significant and used for all statistical testing. A logistic regression analysis was used to estimate adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for the association between receiving education and understanding of causes of PFDs (Dichotomized as "any" or "none") with age group and type of collegiate major (i.e., science/non-science) separately. Logistic models were adjusted for region of residence, education, and number of pregnancies. Analysis was performed with the SAS statistical software, version 9.2 (SAS Institute, Cary, NC).

Results

Population

Out of a total of 7,125 e-mail invitations sent, 1,092 responded with data included in this analysis. The average age of all respondents was 23.5 ± 3.1; most women were undergraduates, and nulliparous (Table 1). Sixty nine percent were Caucasian, the majority of respondents had sex education in 6th or 7th grade and most reported their overall level of health as “Good”. Other variables are noted in Table 1.

The average age in the adolescent group was 21.5±1.7 (N = 682) versus 27.0±1.7 (N = 410) in the young women group. A comparison of demographics and medical history between adolescent aged females and “young” women was performed (Table 1). Both groups reported average age at menses to be 11–12 years old and the majority had sex education in the 6th–7th or 8th–9th grade. The young women were more likely to have been pregnant (25.9% vs 5.0%, p=<.0001) and given birth (18.7% vs 2.9%, p=<.0001). Only 2.8% had given birth to 2 or more babies and most (71%), had delivered vaginally. Nulliparous women had lower rates of UI (8.8% vs. 28.7%, p<0.0001) and SUI (10.6% vs. 27.7%, p<0.0001). There were no differences in UUI (p=0.07) or FI (p=0.88) symptoms between groups. The majority of participants in both the adolescent and young women groups rated their overall level of health to be either “Good” (58.4% vs 62.2%, p=0.13) or “Excellent” (30.6% vs 30.0%, p=0.13) (Table 1).

Pelvic Floor Symptom Prevalence

Overall, the prevalence of any UI symptoms was 10.3% (Table 2). Of those with UI, 11.2 % (129/1092) described having SUI and 9.4% (103/1092) stated they had UUI. Two percent (22/1092) reported enuresis, 1.2 % (13/1092) FI symptoms and overall 0.3% (3/1092) related having POP symptoms. The mean ± SD total ISI-P score was 2.9±3.6.

There were no differences between adolescent vs young women groups in prevalence rates of UI, SUI, UUI, insensate urine loss, enuresis, or POP symptoms (Table 2). Severity of any urine leakage was similar between the adolescent and “young” women groups with 31.45% and 34.4%, respectively reporting only drops (p=0.16). There was also no difference in type of protection or amount used with the majority reporting no usage (90.2% adolescent vs 88.1% young women, p=0.52). Both adolescent women and young women reported that UI did not bother them (95.9% vs 94.2%, p=.32) and did not consider it a problem (84.0% vs 92.9%, p=0.23). Interestingly, the adolescent group had a nearly 7.5-fold increase in the likelihood of FI symptoms compared to the young women group (1.8% vs 0.2%, OR 7.32, 95% CI 1.44–133.64).

Pelvic Floor Disorders Awareness and Understanding

Young women were more likely to have heard about problems related to UI and FI (85.7% vs 75.9%, p=0.0004), as well as POP (67.2% vs 43.7%, p=<0.0001). There was no difference in awareness of UI, FI or POP symptoms in female family members reported between groups (Table 2). More young women had discussed with family or friends issues related to UI (35.2% vs 24.5%, p=0.001) and POP (15.6% vs 10.2%, p=0.03) than the

adolescent group. The majority of subjects in both the adolescent and young women groups had not discussed issues related to FI with family or friends (91.9% vs 92.3%, p=0.84). The young women group reported much higher rates of exposure to UI, FI, and POP education in school (p<.0001).

This was consistent with the significantly higher rates of knowledge or understanding of causes of UI (79.0% vs 60.0%, p=<.0001), FI (52.2% vs 41.1%, p=0.006), Flatal Incontinence (38.5% vs 28.6%, p=0.0007), and POP (56.9% vs 40.6%, p=<.0001) in the young women group versus adolescent group, respectively. The adolescent group also answered “I don’t know” more often and had more variable responses regarding potential specific causes of UI, FI and POP (Table 2). Even with low rates of symptoms and bother in both groups, the adolescent women and young women groups had similar interest in learning more about PFD (33.9% vs 31.4%, p=0.45). Those who wanted to know more about PFDs in the adolescent group were more likely to be white (72.5% vs. 59.9%, p=0.0004), and to have personally experienced UI (p =0.01), SUI (p=0.001), UUI (p=0.0001). Those who wanted to know more in the young women group were more likely to be white (80.2 % vs. 52.1%, p<0.0001)) and to have personally experienced UUI (p=0.002).

As an exploratory aim, demographics, awareness of the condition in family or friends and understanding of potential causes pelvic floor conditions in women studying in scientific disciplines compared to those in other disciplines were compared (Table 3). There was no difference in mean age of women studying science versus those in non-science majors (p=0.65). The science group had more women in medical professional school such as Medical School or Dental School (18.2%vs 1.4%, p=<.0001). The majority of both groups had not discussed issues related to PFD with family or friends (Table 3). The science group had significantly higher rates of receiving education on UI (31.5% vs 8.4%, p=<.0001), FI (24% vs 5.4%, p=<.0001), and POP (27.6% vs 8.2%, p=<.0001). There was no difference regarding interest to learn more about these conditions between groups (p=0.37).

Results of logistic regression comparing awareness and understanding of causes of PFDs in young women vs. adolescent group and science vs. non-science majors, controlling for region of residence, education, and number of pregnancies are presented in Table 4. Overall, young women were approximately 3 times more likely to have received education regarding UI, FI, and POP. The young women were more likely to have understanding of causes of UI, FI, and POP but not flatal incontinence. Similar, yet stronger, associations were observed for the science majors where they were over 4 times more likely to have received education on UI, FI, and POP. They were also more likely to have a greater understanding of causes of UI, FI, POP and flatal incontinence.

Discussion

In this large cross sectional study of college aged women, symptom prevalence of UI, FI and POP were low. Overall prevalence rates of UI symptoms were 10.3%, SUI 11.2%, UUI 9.4%, enuresis 2.0%, and POP symptoms 0.3% which did not vary by age group. Further, overall UI symptoms were not bothersome to these participants. In this study, although the

rate and actual number of individuals reporting FI in both groups is low, the adolescent group had a higher rate of FI.

The rate of UI that we report is slightly less than previously reported rates in this age range.[13–16] Specifically, in one small Canadian study of 332 college age women, rates of urgency urinary incontinence and stress urinary incontinence were reported to be 17% and 15%, respectively using non-validated surveys (which were not provided in the report).[16] Schwartz et al, described UI symptoms in 40 obese and 20 non-obese adolescent girls where 12.5% of obese girls and 0% of non-obese reported any UI symptoms.[17] Our slightly lower reported rates may be due to the use of validated means compared to other studies.

In this cross-sectional study the young women group had greater awareness of these conditions in women in general and in family members as well and a greater understanding of the potential causes of PFDs. Science majors reported an increase in exposure and knowledge of PFDs compared to non-science majors. After controlling for baseline differences the young women and science majors still had great awareness of PFDs and understanding of PFDs. PFDs, like other conditions that tend to occur at older ages, (myocardial infarction, diabetes, hypertension), may not be of concern in younger generations tend to not concern themselves with issues that seem remote. Despite the relatively low number of women affected by PFDs, 33% were interested in learning more about them.

Young women with pelvic floor symptoms may be at risk for increased severity of these conditions later in life. Recent evidence suggests that greater strenuous activity during the teen years modestly increased the odds of stress UI in middle-aged women.[18] However, the majority of women in this study had not discussed the existence of these conditions with family or friends and by inference may be reticent to discuss the condition with a healthcare provider. Shaw et al, reported that only 15% of women who reported SUI had sought help for the condition and older women were more likely to seek help.[13] This highlights the fact that often women may suffer for years in silence due to shame that may be rooted in lack of education about the existence of pelvic floor disorders and available treatment. Therefore, a proactive approach education and prevention may be beneficial on many levels.

In an effort to empower a younger generation of women to become more pelvic floor muscle aware, Howard-Thornton and colleagues conducted a qualitative analysis with survey focus groups and educational sessions in teenage females with a mean age of 17 years. The study, though limited by a small sample size, revealed that many women within this demographic, often do not learn or even become aware of conditions of the pelvic floor until after they experience childbirth.[19] This survey of teenagers found that only 35% would consider seeking help for UI problems and most would avoid activities that caused SUI. They also found that teenage girls look for general health advice from their mother, magazines, and best friends but search for a specific issue via the internet. This knowledge could help to guide relevant, informative, and interactive education to adolescent and young women. A community based study of 431 women ages 19–98 reported that 71.2% and 48.1% lacked knowledge regarding the development of UI and POP respectively.[20]

A recent pilot study by Herbert-Beirne, et al looked at baseline knowledge of pelvic anatomy and function before and after pelvic health curriculum.[21] There were 168 female students with a mean age of 14.1 years and baseline knowledge of anatomy was low with only 18% knowing where urine exits the body and 37% knowing that there are three openings in a women's pelvic region. The adolescent girls in the education group had significant improvement in knowledge and understanding, therefore demonstrating that health educational initiatives are effective.

The literature is replete with data demonstrating a strong association between pregnancy, obesity, and the development of pelvic floor disorders.[22] These are known modifiable risk factors associated with the development of these conditions.[23–25] We also know that the development of PFD's is multifactorial and not solely isolated to the obese or the multiparous woman as data in nulliparous women reflect prevalence rates ranging from 8% to 32%.[26] Robust educational initiatives regarding the existence of PFD's and modifiable risk factors may help lead to women seeking care earlier and, ultimately, being less impacted by PFD's.

Strengths of this study include the large sample size assessing pelvic floor symptoms, awareness, and understanding regarding their development in younger women, especially of those females aged 19–24, as well as the use of validated measures to assess pelvic floor symptoms. Also, the racial and demographic make-up of respondents is similar to the racial and demographic make-up of all students enrolled at this university.[27] Limitations include of a large number of non-responders and inherent non-responder bias as well as the study being performed in one academic institution therefore decreasing external generalizability. Participants by definition had received some higher education and may not reflect the general population. We also did not collect anthropomorphic or clinical patient information (i.e. height, weight, past medical or surgical history), therefore we cannot evaluate the impact this information might have had on the results. We also did not control for multiple comparisons.

In summary, 33 % of adolescents and women age 25–30 would like more information regarding pelvic floor disorders. Information about these disorders at a time when young girls receive information about menarche and sexually transmitted illnesses in school or from their physician may be an opportune time to introduce the topic of PFDs and discuss risk factors associated with their development. Education at the time of pregnancy may not be early enough. Research initiatives in the implementation of prevention practices and health education curriculum for adolescent and younger women should be considered especially if they result in reduction in the burden and impact of PFD's on long-term quality of life.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Demographics and Basic Health Information

Characteristics, N=1092	All N=1092	Adolescent (Age 19–24) N=682	Young Women (Ages 25–30) N=410	p-value[a]
Age, mean +/− SD (Range 19–30)	23.5±3.1	21.5±1.7	27.0±1.7	<.0001
State, n (%)				<.0001
Alabama	780 (71.4)	522 (76.5)	258 (62.9)	
Other	312 (28.6)	160 (23.5)	152 (37.1)	
Level of education, n (%)				<.0001
Undergraduate	681 (62.7)	494 (72.9)	187 (45.7)	
Master	202 (18.6)	67 (9.9)	135 (33.0)	
Professional School (MD, DDS, etc)	127 (11.7)	83 (12.2)	44 (10.8)	
Health Professional (NP, PT, PA, etc)	43 (4.0)	22 (3.2)	21 (5.1)	
Doctorate	34 (3.1)	12 (1.8)	22 (5.4)	
Race, n (%)				0.82
White	743 (68.9)	456 (67.7)	287 (70.9)	
Black/African American	200 (18.5)	127 (18.8)	73 (18.0)	
Asian	76 (7.0)	49 (7.3)	27 (6.7)	
Hispanic/Latina	37 (3.4)	27 (4.0)	10 (2.5)	
American Indian/Alaska Native	5 (0.4)	3 (0.4)	23 (0.5)	
Pacific Islander/Native Hawaiian	2 (0.2)	1 (0.1)	1 (0.2)	
Defer Response	16 (1.5)	11 (1.6)	5 (1.2)	
Sex Education, n (%)				0.08
4^{th}–5^{th} Grade	204 (19.0)	121 (18.0)	83 (20.5)	
6^{th}–7^{th} Grade	313 (29.1)	203 (30.2)	110 (27.2)	
8^{th}–9^{th} Grade	243 (22.6)	137 (20.4)	106 (26.2)	
10^{th}–11^{th} Grade	161 (15.0)	110 (16.4)	51 (12.6)	
None	154 (14.3)	100 (14.9)	54 (13.4)	
Age at Menses, n (%)				0.49
Less than 10	58 (5.4)	39 (5.8)	19 (4.7)	
11–12	525 (49.0)	318 (47.5)	207 (51.5)	
13–14	413 (38.5)	270 (40.3)	143 (35.6)	
15–16	65 (6.0)	36 (5.4)	29 (7.2)	
17 or older	9 (0.8)	6 (0.9)	3 (0.8)	
No period	2 (0.2)	1 (0.1)	1 (0.2)	
Pregnancies, n (%)				<.0001
0	934 (87.2)	636 (95.1)	298 (74.1)	
1	94 (8.8)	26 (3.9)	68 (16.9)	
2	27 (2.5)	5 (0.8)	22 (5.5)	
3 or more	16 (1.5)	2 (0.3)	14 (3.5)	

Characteristics, N=1092	All N=1092	Adolescent (Age 19–24) N=682	Young Women (Ages 25–30) N=410	p-value[a]
Births, n (%)				<.0001
0	975 (91.2)	648 (97.2)	327 (81.3)	
1	64 (6.0)	17 (2.6)	47 (11.7)	
2 or more	30 (2.8)	2 (0.3)	26 (7.0)	
Mode of Delivery, n (%)				<.0001
Vaginal	66 (71.0)	13 (68.4)	53 (71.6)	
C-Section	26 (28.0)	6 (31.6)	20 (27.0)	
Both	1 (1.0)	0	1 (1.4)	
Level of Health, n (%)				0.13
Excellent	324 (30.4)	204 (30.6)	120 (30.0)	
Good	638 (59.9)	389 (58.4)	249 (62.2)	
Fair	99 (9.3)	71 (10.7)	28 (7.0)	
Poor	5 (0.5)	2 (0.3)	3 (0.8)	

[a] p-value comparing characteristics of Adolescent vs Young Adult, p-values estimated from t-test and chi-square for continuous and categorical variables, respectively

Table 2

Pelvic Floor Symptoms and Knowledge in Adolescents (≤24 years-old) Compared to Young Women (25–30 years-old)

	All N=1092	Adolescent (Ages 19–24) N=682	Young Women (Ages 25–30) N=410	p-value[a]
How often do you experience urine leakage, n (%)				0.61
Yes	113 (10.3)	68 (10.0)	45 (11.0)	
No	979 (89.7)	614 (90.0)	365 (89.0)	
Urine leakage with physical activity, n (%)				0.29
Yes	129 (11.2)	75 (11.0)	54 (13.2)	
No	963 (88.2)	607 (89.0)	356 (86.8)	
Type of sport[b], n (%)				1.0
Impact	55 (80.9)	34 (80.9)	21 (80.8)	
Non-Impact	13 (19.1)	8 (19.1)	5 (19.2)	
How often has a sudden urge to pass urine caused you to leak, n (%)				0.49
Yes	103 (9.4)	71 (10.8)	35 (8.9)	
No	989 (90.6)	588 (89.2)	361 (91.1)	
Insensate urine loss, n (%)				0.67
Yes	42 (4.0)	28 (4.4)	14 (3.6)	
No	1011 (96.0)	629 (95.6)	382 (96.4)	
Enuresis, n (%)				0.66
Yes	22 (2.0)	15 (2.2)	7 (1.7)	
No	1070 (98.0)	667 (97.8)	403 (98.3)	
Sensation of a bulge, n (%)				0.56
Yes	3 (0.3)	1 (0.2)	2 (0.5)	
No	1089 (99.7)	681 (99.8)	408 (99.5)	
Experience accidental bowel leakage, n (%)				0.0390
Yes	13 (1.2)	12 (1.8)	1 (0.2)	
No	1079 (98.8)	670 (98.2)	409 (99.8)	
ISI-P total score, mean (+/− SD)	2.9±3.6	2.9±3.6	2.9±3.6	0.95
Type of Protection, n (%)				0.52
Nothing	938 (89.4)	590 (90.2)	348 (88.1)	
Thin pad or tissue	104 (9.9)	60 (9.2)	44 (11.1)	
Medium/regular pad	5 (0.5)	3 (0.5)	2 (0.5)	
Large/maxi pad	1 (0.1)	0	1 (.2)	
Pull-up or diaper	1 (0.1)	1 (0.2)	0	
Amount of Protection Used, n (%)				0.31
None	936 (89.4)	592 (90.7)	344 (87.3)	
1 per day/less for safety	99 (9.5)	54 (8.3)	45 (11.4)	

	All N=1092	Adolescent (Ages 19–24) N=682	Young Women (Ages 25–30) N=410	p-value[a]
1 per day, usually wet	4 (0.4)	2 (0.3)	2 (0.5)	
2–3 per day	8 (0.8)	5 (0.8)	3 (0.8)	
Bother of UI, n (%)				0.32
Never	996 (95.2)	625 (95.9)	371 (94.2)	
Rarely	41 (3.9)	21 (3.2)	20 (5.1)	
Sometimes	9 (0.9)	6 (0.9)	3 (0.8)	
Is UI a Problem, n (%)				0.23
No problem	983 (94.1)	168 (84.0)	365 (92.9)	
Very small problem	40 (3.8)	20 (10.0)	20 (5.1)	
Small problem	20 (1.9)	12 (6.0)	8 (2.0)	
Awareness of Women having UI or FI, n (%)				0.0004
Yes	846 (79.6)	504 (75.9)	342 (85.7)	
No	217 (20.4)	160 (24.1)	57 (14.3)	
Awareness of Women having POP, n (%)				<.0001
Yes	558 (52.5)	290 (43.7)	268 (67.2)	
No	504 (47.5)	373 (56.3)	131 (32.8)	
Awareness of female family members with: n (%)				
UI				0.24
Yes	395 (38.0)	232 (35.9)	163 (41.5)	
No	266 (25.6)	176 (27.2)	90 (22.9)	
I don’t know	379 (36.4)	239 (36.9)	140 (35.6)	
FI				0.92
Yes	84 (8.1)	54 (8.4)	30 (7.6)	
No	538 (51.8)	334 (51.7)	204 (51.9)	
I don’t know	417 (40.1)	258 (39.9)	159 (40.5)	
POP				0.36
Yes	65 (6.3)	36 (5.6)	29 (7.4)	
No	580 (55.8)	357 (55.3)	223 (56.7)	
I don’t know	394 (37.9)	253 (39.2)	141 (35.9)	
Received education on PFD: n (%)				
UI				<.0001
Yes	183 (17.7)	110 (17.1)	136 (34.9)	
No	849 (23.8)	534 (82.9)	254 (65.1)	
FI				<.0001
Yes	246 (23.8)	70 (10.9)	113 (29.1)	
No	788 (76.2)	573 (89.1)	276 (71.0)	
POP				<.0001
Yes	219 (21.2)	91 (14.2)	128 (32.9)	
No	812 (78.8)	552 (85.8)	261 (67.1)	

	All N=1092	Adolescent (Ages 19–24) N=682	Young Women (Ages 25–30) N=410	p-value[a]
Discussed with Friends/Family, n(%)				
UI				0.001
Yes	296 (28.5)	158 (24.5)	138 (35.2)	
No	741 (71.5)	487 (75.5)	254 (6.8)	
FI				0.84
Yes	82 (7.9)	52 (8.1)	30 (7.7)	
No	953 (92.1)	592 (91.9)	361 (92.3)	
POP				0.03
Yes	127 (12.3)	66 (10.2)	61 (15.6)	
No	907 (87.7)	578 (89.8)	329 (84.4)	
Understanding of Causes of PFD, n (%)				
UI				<.0001
Having a baby	332 (67.8)	174 (60.0)	158 (79.0)	
Menopause	14 (2.9)	7 (2.4)	7 (3.5)	
Breastfeeding	0 (0.0)	0 (0.0)	0 (0.0)	
Pap smear	3 (0.6)	3 (1.0)	0 (0.0)	
I don’t know	141 (28.8)	106 (36.6)	35 (17.5)	
FI				0.006
Having a baby	336 (45.5)	185 (41.1)	151 (52.2)	
Menopause	24 (3.2)	19 (4.2)	5 (1.7)	
Breastfeeding	0 (0.0)	0 (0.0)	0 (0.0)	
Pap smear	2 (0.3)	2 (0.4)	0 (0.0)	
I don’t know	377 (51.0)	244 (54.2)	133 (46.0)	
Flatal				0.0007
Having a baby	213 (32.5)	114 (28.6)	99 (38.5)	
Menopause	20 (3.0)	19 (4.8)	1 (0.4)	
Breastfeeding	4 (0.6)	3 (0.8)	1 (0.4)	
Pap smear	3 (0.5)	2 (0.5)	1 (0.4)	
I don’t know	416 (63.4)	261 (65.4)	155 (60.3)	
POP				<.0001
Having a baby	255 (47.1)	131 (40.6)	124 (56.9)	
Menopause	13 (2.4)	6 (1.9)	7 (3.2)	
Breastfeeding	2 (0.4)	1 (0.3)	1 (0.5)	
Tubes tied	12 (2.2)	12 (3.7)	0 (0.0)	
I don’t know	259 (47.9)	173 (53.6)	86 (39.4)	
Wanted to know more about PFD, n (%)				0.45
Yes	337 (33.0)	216 (33.9)	121 (31.4)	
No	685 (67.0)	421 (66.1)	264 (68.6)	

[a] p-value comparing characteristics of Adolescent vs Young Adult; p-values estimated from chi-square test

[b]IMPACT – Running (Track and Field), Soccer, Tennis, Softball, Volleyball, Football, Gymnastics, Basketball, Dance, Jumping (rope), Cheerleading, Ultimate Frisbee, Badminton, Aerobics, Kickboxing

UI =Urinary Incontinence FI = Fecal Incontinence POP = Pelvic Organ Prolapse

PFD = Pelvic Floor Disorders

ISI-P = Incontinence Symptom Index – Pediatric

Table 3

Science vs Non-Science Majors

	Science[a] N=666	Non-Science N=426	p-value[b]
Age, mean (+/− SD)	23.6±3.1	23.5±3.2	0.65
State, n (%)			0.002
Alabama	453 (68.0)	327 (76.8)	
Other	213 (32.0)	99 (23.2)	
Level of education, n (%)			<.0001
Undergraduate	389 (58.4)	292 (69.4)	
Master	112 (16.8)	90 (21.4)	
Professional School (MD, DDS, etc)	121 (18.2)	6 (1.4)	
Health Professional (NP, PT, PA, etc)	23 (3.4)	20 (4.8)	
Doctorate	21 (3.2)	13 (3.1)	
Births, n (%)			0.22
0	604 (91.5)	371 (90.7)	
1	34 (5.2)	30 (7.3)	
2 or more	22 (3.3)	8 (2.0)	
Have discussed PFD with family/friend, n (%)			
UI			0.18
Yes	194 (30.1)	102 (26.0)	
No	451 (69.9)	290 (74.0)	
FI			0.54
Yes	55 (8.5)	27 (6.9)	
No	589 (91.5)	364 (93.1)	
POP			0.14
Yes	84 (13.0)	43 (11.0)	
No	560 (87.0)	347 (90.0)	
Received Education on PFD, n (%)			
UI			<.0001
Yes	210 (31.5)	36 (8.4)	
No	456 (68.5)	390 (91.6)	
FI			<.0001
Yes	160 (24.0)	23 (5.4)	
No	506 (76.0)	403 (94.6)	
POP			<.0001
Yes	184 (27.6)	35 (8.2)	
No	482 (72.4)	391 (91.8)	
Understanding of Causes of PFDs, n (%)			
UI			<.0001

	Science[a] N=666	Non-Science N=426	p-value[b]
Having a baby	233 (74.7)	99 (55.6)	
Menopause	9 (2.9)	5 (2.8)	
Breastfeeding	0	0	
Pap smear	1 (0.3)	2 (1.1)	
I don't know	69 (22.1)	72 (40.4)	
FI			.0004
Having a baby	238 (50.6)	98 (36.4)	
Menopause	14 (3.0)	10 (3.7)	
Breastfeeding	0	0	
Pap smear	0	2 (0.7)	
I don't know	218 (46.4)	159 (59.1)	
Flatal			.005
Having a baby	150 (37.3)	63 (24.8)	
Menopause	13 (3.2)	7 (2.8)	
Breastfeeding	3 (0.8)	1 (0.4)	
Pap smear	1 (0.2)	2 (0.8)	
I don't know	235 (58.5)	181 (71.3)	
POP			<.0001
Having a baby	188 (56.1)	67 (32.5)	
Menopause	8 (2.4)	5 (2.4)	
Breastfeeding	1 (0.3)	1 (0.5)	
Tubes tied	7 (2.1)	5 (2.4)	
I don't know	131 (39.1)	128 (62.1)	
Interested to learn more, n (%)			0.37
Yes	217 (34.1)	120 (31.2)	
No	420 (65.9)	265 (68.8)	

UI =Urinary Incontinence FI = Fecal Incontinence POP = Pelvic Organ Prolapse

PFD = Pelvic Floor Disorders

[a]Nursing, Medicine, Biology, Psychology, Public Health, Biomedical Sciences, Chemistry, Dentistry, Neuroscience, Physical Therapy, Kinesiology, Physician Assistant, Optometry, Biomedical Engineering, Nutrition Sciences, Epidemiology, Health-Related Programs, Health Education/Promotion, Rehabilitation Science, Occupation Therapy, Immunology, Genetics and Genomic Sciences, Periodontics, Neurobiology, Orthodontics, Cell/Molecular/Developmental Biology, Biochem and Molecular Genetics, Microbiology, Cancer Biology, Clinical Laboratory Science

[b]p-values estimated from t-test and chi-square for continuous and categorical variables, respectively

Table 4

Multivariable Analysis Regarding Education and Understanding of Pelvic Floor Disorders

	Young Women[a]		Science Majors[b]	
	aOR (95% CI)[†]	p-value[*†]	aOR (95% CI)[†]	p-value[*†]
Received education regarding:				
Urinary incontinence	2.59 (1.84–3.65)	<0.0001	4.54 (3.01–6.84)	<0.0001
Fecal incontinence	3.29 (2.25–4.80)	<0.0001	5.93 (3.65–9.62)	<0.0001
Pelvic organ prolapse	2.92 (2.05–4.16)	<0.0001	4.01 (2.66–6.03)	<0.0001
Discussed with friends/family regarding:				
Urinary incontinence	1.40 (1.02–1.93)	0.04	1.21 (0.89–1.63)	0.23
Fecal incontinence	0.82 (0.49–1.39)	0.46	1.17 (0.71–1.93)	0.54
Pelvic organ prolapse	1.41 (0.91–2.17)	0.12	1.13 (0.74–1.71)	0.58
Understanding regarding causes of PFD:				
Urinary incontinence	2.88 (1.72–4.81)	<0.0001	2.26 (1.48–3.47)	0.0002
Fecal incontinence	1.62 (1.14–2.28)	0.007	1.45 (1.06–1.99)	0.02
Flatal incontinence	1.35 (0.93–1.96)	0.11	1.68 (1.18–2.38)	0.004
Pelvic organ prolapse	1.91 (1.28–2.87)	0.002	2.25 (1.55–3.28)	<0.0001
Wanted to know more about PFD	0.85 (0.62–1.16)	0.30	1.16 (0.88–1.54)	0.30

PFD = Pelvic Floor Disorders

[a] Compared to Adolescent Group

[b] Compared to Non-Science Majors

[*] Estimated from logistic regression

[†] adjusted odds ratio, 95% confidence interval; adjusted for region of residence, education, and number of pregnancies