EJACULATORY FUNCTION

The Comorbidity Between Premature Ejaculation and Erectile Dysfunction—A Cross-Sectional Internet Survey

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ABSTRACT

Introduction: The comorbidity between premature ejaculation (PE) and erectile dysfunction (ED) has not yet been clarified.

Aim: To assess the comorbidity between PE and ED.

Methods: Male members of a shopping club in Taiwan aged 20−60 years with stable sexual relationships were invited to complete an online questionnaire.

Main Outcome Measures: Self-estimated intravaginal ejaculatory latency time (IELT), Premature Ejaculation Diagnostic Tool, Sexual Health Inventory for Men, Self-Esteem and Relationship, and Hospital Anxiety and Depression Scale results were used.

Results: A total of 937 participants with a mean age of 41.1 ± 10.2 years were enrolled. The prevalence rates of ED (Sexual Health Inventory for Men ≤ 21), PE (Premature Ejaculation Diagnostic Tool ≥11), and IELT ≤1 minute were 24.7%, 6.3%, and 6.4%, respectively. Prevalence of acquired PE and IELT ≤1 minute increased marginally with age. Participants with ED had a greater prevalence of PE than those without ED (19.5% vs 2.0%, $P < .001$), and participants with PE had a greater prevalence of ED than those without PE (76.3% vs 19.4%, $P < .001$). Compared with participants without PE, participants with PE had greater adjusted odds of ED (odds ratio [OR] = 12.7, 95% CI = 6.7−24.2). Relative to participants without ED, participants with ED had increased adjusted odds of PE (OR = 7.2, 95% CI = 3.5−14.6 with mild ED and OR = 36.7, 95% CI = 16.2−83.0 with ED severity greater than a mild degree). Poor sexual relationships and self-esteem, depression, and anxiety were reported more frequently in those with PE or ED, especially in those with both problems compared with those without PE and ED.

Conclusions: This study confirmed a high prevalence of PE and ED coexistence, indicating a complicated relationship between the 2 conditions and the importance of screening for their co-occurrence in practice. **Tsai W-K, Chiang P-K, Lu C-C, et al. The Comorbidity Between Premature Ejaculation and Erectile Dysfunction—A Cross-Sectional Internet Survey. Sex Med 2019;7:451−458**

Key Words: Co-occurrence; Premature Ejaculation; Erectile Dysfunction; Psychosocial Impact

INTRODUCTION

Premature ejaculation (PE) has been reported to be the most common sexual problem in men.[1] In addition to differences in methodologies, the reported prevalence of PE varies among studies due to regional variations and different diagnostic criteria.[2] Diagnostic criteria of PE have been modified several

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times. The *Diagnostic and Statistical Manual of Mental Disorders* (DSM) III-R[3] defines PE as "persistent or recurrent ejaculation with minimal sexual stimulation before, upon, or shortly after penetration, and before the person wishes it." The DSM-IV[4] and DSM-IV-TR[5] added marked distress or interpersonal problems as a criterion. The DSM-V[6] added another criterion, namely an ejaculatory latency time (IELT) <1 minute, in 2013. In 2014, the International Society for Sexual Medicine (ISSM) committee recommended using an IELT <1 minute for diagnosing lifelong PE and an IELT <3 minutes for diagnosing acquired PE.[7]

The data of a review demonstrated that PE was the most prevalent type of male sexual dysfunction and occurred in more than 21% of men aged 40−80 years.[8] A survey[9] of Italian men with a mean age of 45.6 years showed a prevalence rate of 18.5% for PE by using the Premature Ejaculation Diagnostic Tool (PEDT).[10] A Chinese population-based study (mean age 34.9 years) following the ISSM definition reported a PE prevalence rate of 11.2%.[11] To clarify which syndrome of PE is being addressed, Waldinger[12] proposed 2 new classes of variable PE (occasional or inconsistent PE) and premature-like ejaculation dysfunction (subjective PE), in addition to the traditional lifelong PE and acquired PE. According to this new classification, population-based studies[13,14] have demonstrated that most men who report having PE have variable or subjective PE and that the total prevalence of lifelong plus acquired PE is 6−8%.

PE is presumably caused by neurobiological, genetic, medical, and psychological factors,[15] but none of these etiologies have been confirmed in large-scale studies.[16] Erectile dysfunction (ED) was reported to be the single greatest risk factor for PE.[17] A study revealed that greater IELT is associated with better erectile function.[18] The co-occurrence of PE and ED is associated with augmented anxiety and distress.[19] Considering the controversy in diagnostic criteria and the limited use of standardized questionnaires, the link between PE and ED has yet to be clarified.[19]

A cross-sectional online survey was conducted on Taiwanese men by using the PEDT to define PE and the Sexual Health Inventory for Men (SHIM)[20] to define ED. The study evaluated the comorbidity between these 2 conditions. Psychosocial problems such as poor sexual relationships and anxiety and depression also were assessed by the Self-Esteem and Relationship (SEAR)[21] test and Hospital Anxiety and Depression Scale (HADS),[22] respectively.

METHODS

Participants

A total of 864,290 members of a Taiwanese shopping club were randomly selected to receive e-mail invitations to complete a questionnaire. The e-mail contained an introduction covering the study purpose and research methods. Only those who fulfilled the inclusion criteria were allowed to complete the questionnaire. The inclusion criteria were as follows: male sex, age of 20−60 years, and having a stable monogamous relationship with a female partner for ≥1 year. The participants' age distribution was set to reflect the age distribution of Taiwanese male residents aged 20−60 years in 2011 (23.5% were 21−30 years, 27.0% were 31−40 years, 26.0% were 41−50 years, and 23.5% were 51−60 years). The website closed access to new participants when the sample size reached 1,000 (a confidence level of 95% and CI of 3.1%). The institutional review board at our institution approved the study protocol. Because this was an anonymous online survey with minimal impact on the interest of participants, the institutional review board waived the requirement for written informed consent.

Outcome Measures

The questionnaire consisted of 65 items pertaining to demographic data, comorbidities such as hypertension (HT) and diabetes mellitus (DM), smoking habits, history of circumcision, mean frequency of sexual activity in the past 3 months, a global assessment question (GAQ) for PE, onset of PE, self-estimated IELT in the last 4 weeks, and PEDT, SHIM, SEAR, and HADS tests.

Self-reported PE was defined as a participant responding "yes" to the GAQ "Do you suffer from PE, which is defined as persistent or recurrent ejaculation with minimal sexual stimulation either before, upon or shortly after penetration in the vagina and before you wish it?"

The 5-item PEDT works well as a screening method for PE in clinical trials and captures the essence of DSM-IV-TR in the PE definition.[10] Participants were categorized as having "PE" (≥11), "probable PE" (9−10), or "no PE" (≤8) according to their PEDT score, which had a range of 0−20. A participant who had PE (a PEDT score ≥11) starting from the initial period of his sexual life was classified as having lifelong PE; if PE developed later, he was classified as having acquired PE.

The 5-item SHIM is a widely used instrument for ED screening and diagnosis in practice and research.[20] The severity of ED was defined by total SHIM score as follows: severe ED (1−7), moderate ED (8−11), mild-to-moderate ED (12−16), mild ED (17−21), and no ED (22−25).[20] Individuals with no sexual activity who recorded a zero score in any item of the SHIM were excluded.[23]

The 14-item SEAR showed good validity and reliability in measuring sexual relationships, confidence, and particularly self-esteem in men with ED.[21] The SEAR consists of 2 domains, namely sexual relationships (8 items, domain score ranging from 8−40) and confidence (6 items, domain score ranging from 6 to 30), with a lower domain score indicating poorer function.[21]

The 14-item HADS performed well in assessing the severity and caseness of anxiety disorders and depression in primary care patients and the general population.[22] The HADS consists of 2 domains, namely anxiety (7 items, domain score ranging from 0−21) and depression (7 items, domain score ranging from 0−21). The caseness for anxiety and depression was defined by a domain score of ≥8 on each.[22]

Statistical Analysis

The χ^2 test was used for comparison of categorical variables. Normality was assessed for continuous variables. The unpaired Student t test or Mann−Whitney U test was used to compare 2 continuous variables depending on the normality of distribution. The Cochran test was applied to assess whether a sexual problem would become more or less severe with age. Multivariate logistic regression was used to estimate the relative odds of having a sexual problem, given exposure to the variable of interest with adjustment of potential confounders as appropriate.[1,24,25] Analysis of variance was used to compare multiple normally distributed continuous variables. Bonferroni's test was used for post-hoc analysis of multiple comparisons.

Data entry was performed using Excel 2003 (Microsoft, Redmond, WA, USA). Statistical analyses were executed using SPSS, Version 17.0 (SPSS Inc., Chicago, IL, USA). The null hypothesis was rejected when a P value was less than .05.

RESULTS

Participant Characteristics

Survey administration began in November 2013 and ended in December 2013 when the number of eligible participants approximated 1,000. After the exclusion of 19 subjects with a score of zero in any item of the SHIM, a total of 937 participants were eligible for analysis. This sample size had a 3.2% margin of error at the 95% confidence level. The mean age of participants was 41.1 ± 10.2 (20−60) years. IELT values of ≤3 minutes and ≤1 minute were reported in 22.3% and 6.4% of the participants, respectively. The prevalence rate of self-reported PE was 28.5%. According to PEDT results, 6.3% (n = 59) of the participants had PE and 5.0% (n = 47) had probable PE. Among the participants with PE (n = 59), 3 had missing IELT data; among the remaining participants (n = 56), IELT values of ≤1 minute, 1−3 minutes, 3−4 minutes, and ≥4 minutes were reported in 18 (32.1%), 23 (41.0%), 7 (12.5%), and 8 (14.3%) participants, respectively. Among the participants with PE, 18 (32.1%) were classified as having lifelong PE, 38 (67.9%) were classified as having acquired PE, and 3 participants had missing data regarding PE onset.

According to SHIM scores, 24.7% of the participants had ED, with 19.3% having mild ED, 4.6% having mild-to-moderate ED, and 0.7% having moderate ED. The prevalence rates of ED (r = 0.197, $P < .001$), acquired PE (r = 0.106, $P < .001$), and IELT ≤1 minute (r = 0.085, $P = .010$) increased significantly with age, but lifelong PE had no association with age (r = −0.010, $P = .754$) (Figure 1). The prevalence of acquired self-reported PE (r = .142, $P < .001$) increased with age, whereas that of lifelong self-reported PE had a negative association with age (r = −0.106, $P = .001$). The characteristics of participants with PE (PEDT ≥11, n = 59) and without PE (PEDT ≤8, n = 831) are compared in Table 1. Participants with PE were older in age, had less frequent sexual activity, and were more likely to have HT than those without PE (all $P < .05$). No significant difference was observed in mean body mass index (BMI), marital status, education level, smoking habits, penile circumcision history, or prevalence of DM. IELT ≤3 minutes was reported in 73.2% of participants with PE and in 18.0% of participants without PE; self-reported PE was found in 89.8% of those with PE and in 20.6% of those without PE.

Comorbidity Between PE and ED

Participants with PE had lower SHIM scores than did those without PE (17.8 ± 4.8 vs 23.3 ± 2.5, $P < .001$). Of participants with PE, 76.3% had ED; 39.0% had mild ED, 25.4% had mild-to-moderate ED, and 11.9% had moderate ED. Of the participants without PE, 19.4% had ED with 16.7% being mild ED and 2.6% being mild-to-moderate ED (Table 1). After we adjusted for potential confounders (age, BMI, marital status, smoking habits, circumcision, HT, and DM), compared with participants without PE, participants with PE had increased odds of ED (odds ratio [OR] = 12.7, 95% CI = 6.7−24.2 in those with PE and OR = 5.2, 95% CI = 2.8−9.8 in those with probable PE, $R^2 = .230$). In addition to PE, age, DM, and HT were also significantly associated with the risk of ED (Table 2).

Participants with ED had a greater prevalence of PE than those without ED (19.5% vs 2.0%, $P < .001$). Compared with participants without ED, participants with ED had increased odds of PE (OR = 7.2, 95% CI = 3.5−14.6 in those with mild ED and OR = 36.7, 95% CI = 16.2−83.0 in those with ED that was more severe than a mild degree) after we adjusted for age, BMI, marital status, smoking habits, circumcision history, HT, and DM ($R^2 = .273$). Except for ED, none of the potential confounders were related to risk of PE (Table 2).

Psychosocial Problems in Participants With PE or ED

Psychosocial problems assessed using the SEAR and the HADS were compared among the following 4 groups: pure PE, pure ED, comorbid PE and ED, and without PE and ED. Groups with either PE or ED reported worse sexual relationships and self-esteem and more depression and anxiety than those without PE and ED, and the group with comorbid PE and ED reported the worst psychosocial problems among the 4 groups (Table 3).

DISCUSSION

This study showed a 28.5% rate of self-reported PE and a 6.3% prevalence rate of PEDT-defined PE. The 28.5% prevalence of self-reported PE in the current study was comparable with the 20−30% rates in studies that also used DSM III-R criteria or similar to define PE.[12,26] PE determined by GAQ overestimates its prevalence because it neglects to consider associated distress. This partly explains why PE seems common but only minority of the complainers sought medical treatment.[27] The PEDT includes

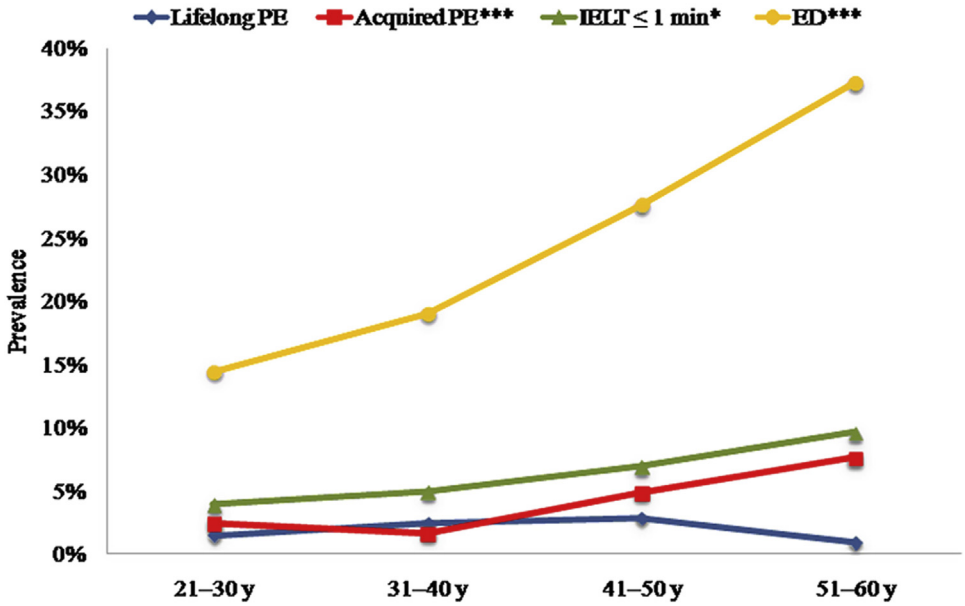

Figure 1. Trends of the prevalence of sexual dysfunction according to age. PE was defined as a Premature Ejaculation Diagnostic Tool score ≥11. IELT was obtained through self-reports. ED was defined as a SHIM score ≤ 21. *P = .010 and *** P < .001, assessed by the Cochran–Armitage test for trends. ED = erectile dysfunction; IELT = intravaginal ejaculatory latency time; PE = premature ejaculation.

PE-associated distress and helps to overcome the difficulty of applying the definition criteria; additionally, it provides clinicians with assurance when assigning patient diagnosis and treatment.[10] The current study was designed in 2012 before the introduction of IELT for defining PE.[6,7] Using the PEDT to diagnose PE without consideration of IELT may lead to overestimation.[15] An investigation in an Italian population reported greater prevalence rates of PEDT-defined PE (18.5% vs 6.3%) and self-reported IELT <1 minute (12.4% vs 6.4%, respectively) compared with those of the current study.[9] The accuracy of self-reported IELT varied widely, being either overestimated or underestimated but were on average being 1.9 minutes more than device-measured outcomes.[28] A multinational survey of stopwatch-measured IELT reported that approximately 3% of the population had an IELT <1 minute.[28] According to epidemiologic data of around 5% of the general population having an IELT <2 minutes, it was estimated that approximately 5% of the population meets the ISSM criteria for PE.[16] However, a study conducted on Chinese men by using the ISSM definition demonstrated an 11.2% rate of PE,[11] which was even greater than the 6.3% indicated in the current study from using the PEDT. This indicates that developing and validating a new tool that captures the essence of the ISSM criteria is needed to facilitate the investigation of PE in large-scale studies.

The current study reveals that PE and ED often coexist. Except for ED, other factors (age, BMI, marital status, smoking habits, circumcision history, HT, and DM) had no significant association with PE. However, ED was associated with risk factors such as PE, age, HT, and DM. PE had the greatest odds for ED. The average OR for PE to have ED was reported to be 3.7,[19] which was far less than the current value of 12.7. The lower OR reported in 1 review[19] was possibly attributed to the inclusion of more mild PE cases, because many studies included in the review adopted criteria similar to those of the DSM III-R. Evidence supports that less-severe ED or PE corresponds to less-frequent coexistence of the 2 conditions.[18,29] A study indicated that 52.4% of patients with severe ED had PE, whereas only 29.5% of mild ED patients had PE.[29] Another study reported that longer IELT was associated with greater IIEF-5 scores.[18] This relationship also was discerned in the present study, wherein subjects with PE had greater odds for ED than those with probable PE, and subjects with serious ED were more likely to have PE than were those with mild ED.

Because ED has a strong association with age[24] and PE is significantly associated with ED,[17,19] PE also is supposed to be associated with age, but most reports have not supported this correlation.[1] However, 2 multinational studies showed a negative trend between the measured IELT and age.[28,30] Two studies reported that PE prevalence increased with age, of which one[9] used PEDT to diagnose PE and the other[13] classified PE into 4 types. The current study observed that the prevalence of acquired PE and IELT ≤1 minute increased with age but that of lifelong PE did not. Insufficient categorization of PE may partially explain the failure to identify a positive correlation between PE and age.[1]

Psychosocial problems such as poor sexual relationships, low self-esteem, anxiety, and depression have been reported to be associated with PE and ED.[31–35] The results of the current study indicate that individuals with PE or ED, particularly those with comorbid PE and ED, were more likely to have these psychosocial problems. The association between sexual dysfunction and psychosocial problems is bidirectional.[34,36] Although the factors linking PE and ED have yet to be confirmed, several possibilities

Table 1. Comparisons of demographic data and sexual function between participants with and without PE

Variables	PE group (N = 59)	Non-PE group (N = 831)	*P* value
Age, y	44.3 ± 9.9 (23–60)	40.9 ± 10.2 (20–60)	.015
Body mass index, kg/m^2	25.25 ± 3.9 (17.9–36.8)	24.56 ± 3.1 (16.8–40.1)	.194
Marital status			.537
Married	76.3%	71.8%	
Divorced, widower	0.0%	1.6%	
Single	23.7%	26.6%	
Education level			.951
High school or less	8.5%	9.5%	
University or college	61.0%	61.4%	
Graduate school	30.5%	29.1%	
Smoking habit			.169
Current smoker	15.3%	14.6%	
Previous smoker	25.4%	16.2%	
Nonsmoker	59.3%	69.2%	
Circumcision	28.8%	18.8%	.06
Hypertension	30.5%	17.1%	.009
Diabetes mellitus	8.5%	4.1%	.112
Mean sexual frequency in the past 3 mo			<.001
>2 times/week	11.9%	25.0%	
1–2 times/week	25.4%	37.7%	
1–4 times/month	35.6%	31.4%	
<1 time/mo	23.7%	5.2%	
No sexual activity	3.4%	0.7%	
IELT			<.001
>3 min	26.8%	82.0%	
1–3 min	41.1%	14.4%	
<1 min	32.1%	3.6%	
Response to global assessment question for having premature ejaculation			<.001
Positive	89.8%	20.6%	
Negative	10.2%	79.4%	
Severity of ED			<.001
No	23.7%	80.6%	
Mild	39.0%	16.7%	
Mild to moderate	25.4%	2.6%	
Moderate	11.9%	0.0%	
Severe	0.0%	0.0%	

Data are presented as mean ± standard deviation (range) or percentage. PE group was defined as having a PEDT score ≥11. The non-PE group was defined as having a PEDT score ≤8. ED was defined according to the SHIM score: severe ED (1–7), moderate ED (8–11), mild-to-moderate ED (12–16), mild ED (17–21), and no ED (22–25). Diabetes, hypertension, and IELT were based on self-report.

The χ^2 test was used for comparison of categorical variables. Unpaired Student *t* test or Mann-Whitney *U* test was used to compare continuous variables depending on the normality of distribution.

ED = erectile dysfunction; IELT = Intravaginal ejaculatory latency time; PE = premature ejaculation; PEDT = Premature Ejaculation Diagnostic Tool; SHIM = Sexual Health Inventory for Men.

have been proposed. Sexual dissatisfaction and personal distress may lead to comorbid PE and ED or further problems such as low orgasmic intensity.[37] Patients with PE might be superimposed with ED due to attempting to reduce sexual excitement.[38] ED may lead to PE because men with ED need intense stimulation to attain and maintain penile erection.[38] In addition, an erectile disorder may be reported by patients with PE due to early detumescence after ejaculation.[39]

Limitations

This study has several limitations. Caution should be exercised in generalizing the results. The response rate was unknown. The sample came from a convenience population and participants may have been highly self-selected because completion of the questionnaire was time-consuming. This cross-sectional study did not include assessments of the onset of PE and ED or of the onset of sexual dysfunction and

Table 2. Odds ratios of ED and PE for potential risk factors in 937 participants

Variables	Odds ratio of ED* (95% CI)	Odds ratio of PE† (95% CI)
PE	12.7 (6.7–24.2)‡	n.a.
Probable PE	5.2 (2.8–9.8)‡	n.a.
Mild ED	n.a.	7.2 (3.5–14.6)‡
ED of worse than mild degrees	n.a.	36.7 (16.2–83.0)‡
Age, y	1.0 (1.0–1.1)‡	1.0 (1.0–1.0)
Body mass index	1.0 (0.9–1.0)	1.0 (0.9–1.1)
Divorced	2.5 (0.8–7.6)	n.a.
Single	1.1 (0.7–1.8)	1.3 (0.6–3.0)
Circumcision	1.5 (1.0–2.2)	1.1 (0.6–2.2)
Hypertension	1.8 (1.2–2.8)§	1.2 (0.6–2.5)
Diabetes mellitus	2.1 (1.0–4.3)‖	1.0 (0.3–3.2)

ED was defined as a Sexual Health Inventory for Men score lower than 22. PE was defined according to the PEDT score as PE (≥11), probable PE (9–10), and no PE (≤8). Diabetes, hypertension, and circumcision were based on self-report.
The Nagelkerke R^2 of multivariate logistic regression: * = .230 and † = .273.
P value: ‡$P < .001$, §$P < .01$, ‖$P < .05$.
ED = erectile dysfunction; n.a. = not available; PE = premature ejaculation.

psychosocial problems. A direct causal effect between PE and ED could not be concluded. The IELT, HT, and DM all relied on self-reports. The questionnaires, namely, the SHIM, PEDT, SEAR, and HADS, have not been validated for Taiwanese men. The potential confounders in the multiple logistic regressions were selected empirically and were restricted to the limited available data. Given that this survey was performed in 2013, the data may not reflect the current situation, especially considering changes that have been made to the definition of PE.

Subjects who had a score of zero in any SHIM item were excluded. This may have led to an underestimation of ED prevalence because of exclusion of the severe ED cases reporting no sexual activity. Another concern was that the SHIM had not been validated to assess ED in men with PE. McMahon[40] reported a 33.3% false-diagnosis rate for ED when using the SHIM to assess ED in men with PE. Because the definition of PE did not include IELT criteria, a false-positive diagnosis of PE may have occurred.[15] A false-positive diagnosis of PE would cause an underestimation of the odds for ED in subjects classified as having PE because of the positive association between the severity and comorbidity of PE and ED.

CONCLUSIONS

PE was not as common as earlier reports. ED prevalence increased with age, and so did acquired PE, but ED exhibited a sharper increase. PE and ED often coexist and are associated with psychosocial distress, which highlights the crucial role of screening for their co-occurrence and the need for combined therapy in clinical practice. Further large-scale studies using the ISSM definition and the new classification of the 4 syndromes are needed to clarify the etiology of PE and the relationship between ED and PE.

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Table 3. Comparison of psychosocial distress among sexual dysfunctions

Variables	Neither ED nor PE (N = 670)	Pure ED (N = 161)	PE (N = 14)	PE + ED (N = 45)	*P* value	Post hoc
Sexual relationship*	33.6 ± 4.8 (12–40)	25.1 ± 4.2 (12–35)	25.9 ± 3.4 (20–33)	20.7 ± 4.1 (13–31)	<.001	4 < 2, 3 < 1
Confidence*	26.2 ± 3.4 (10–30)	20.3 ± 3.4 (10–28)	19.7 ± 3.8 (13–25)	16.4 ± 3.8 (9–26)	<.001	4 < 2, 3 < 1
Anxiety†	19.4%	57.1%	57.1%	64.4%	<.001	
Depression†	20.9%	60.2%	50.0%	68.9%	<.001	

Data are presented as mean ± standard deviation (range) or percentage.
Erectile dysfunction (ED) was defined as a Sexual Health Inventory for Men score lower than 22. Premature ejaculation (PE) was defined as a PEDT score ≥11.
*Defined by the domain scores of the Self-Esteem and Relationship (SEAR) with a lower score indicating poorer sexual relationship and less self-esteem and compared by analysis of variance and post hoc assessed by Bonferroni's test for $P < .05$.
†The caseness for anxiety and depression were defined by a score of ≥8 on the Hospital Anxiety and Depression Scale (HADS) subscales for anxiety domain (HADS-A) and depression domain (HADS-D), respectively, and compared by χ^2 test.

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