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Metacognitions in heterosexual, bisexual, and homosexual men: with or without premature ejaculation and erectile dysfunction

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Abstract

Background: Premature ejaculation (PE) and erectile dysfunction (ED) are prevalent sexual problems, with evidence to suggest variation across sexual orientation. Contributing factors have traditionally been divided into organic and psychological categories. While limited research has found support for the influence of metacognitive beliefs, these studies did not investigate potential differences in sexual orientation.

Aim: The current study aimed to investigate the differences in metacognitive beliefs in men with or without PE and/or ED and whether these varied according to sexual orientation.

Method: A sample of 531 men was recruited (65 met criteria for PE only, 147 for ED, 83 with PE and ED, and 236 healthy controls). Within this sample, 188 men identified as heterosexual, 144 as bisexual, and 199 as homosexual. Participants completed a cross-sectional online survey consisting of psychometric measures.

Results: Participants with PE and ED were significantly higher in cognitive confidence, thoughts concerning uncontrollability and danger, and need to control thoughts than PE only, ED only, and healthy controls. Furthermore, the PE only group was significantly higher than healthy controls for cognitive confidence, with the ED significantly higher for thoughts concerning uncontrollability and danger. There were no significant differences between differing sexual orientations for men with/or without PE and/or ED.

Conclusions: Congruent with previous research, metacognitive beliefs play a role in PE and/or ED, although this is not exclusive to sexual orientation. The findings highlight that assessment and intervention regarding metacognitive beliefs may be beneficial for men of all sexual orientations with PE and/or ED.

Keywords: erectile dysfunction; metacognition; metacognitive beliefs; premature ejaculation; sexual dysfunction; sexual orientation

Introduction

Sexual dysfunctions represent a diverse class of disorders (Frühauf *et al.*, 2013). Premature ejaculation (PE; i.e. ejaculating sooner than desired) and erectile dysfunction (ED; i.e. the inability to obtain and retain an erection for sex) are the two most ubiquitous sexual dysfunctions experienced by men (Nicolosi *et al.*, 2003; Porst *et al.*, 2007; Quek *et al.*, 2008). Prevalence rates for PE and ED vary depending on assessment criteria and methodologies (e.g. varying psychometric measures, multifactorial genesis, pathological standards; McDonagh *et al.*, 2014; Nicolini *et al.*, 2018).

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The analysis by Colson *et al.* (2018b) of epidemiological data found rates of ED varying by 1–9% from 18 to 39 years; 2–30% from 40 to 59 years; 20–40% from 60 to 69 years; and 50–75% over 70 years of age. Evidently, increased age is an independent risk factor for ED (Colson *et al.*, 2018a; Nicolosi *et al.*, 2003). In contrast, rates of PE vary from 3 to 30% (Althof *et al.*, 2014; Komlenac *et al.*, 2018; Porst *et al.*, 2007). Substantial rates of co-morbid PE and ED have also been established (Chen *et al.*, 2018b; McMahon *et al.*, 2012; Quek *et al.*, 2008), with the incidence of ED found in over half of men with PE (Serefoglu *et al.*, 2014). Interestingly, research indicates possible differences in prevalence rates of PE and ED across sexual orientations (McDonagh *et al.*, 2018); i.e. higher rates of ED and lower rates of PE in homosexual men compared with heterosexual men (Bancroft *et al.*, 2005; Peixoto and Nobre, 2015). Yet, potential differences compared with bisexual men remain unclear. Such findings may be explained by sexual concerns specific to gay men (e.g. perceived masculinity; HIV transmission; painful anal sex; performance anxiety) that impact erection quality and the possible distress of premature ejaculation due to expectations of heterosexual men (e.g. negative impact on partner's enjoyment; Bancoft *et al.*, 2005; McDonagh *et al.*, 2018; Peixoto and Nobre, 2015).

PE and ED aetiology

Contributing factors in PE and ED have been conventionally divided into organic and psychological classifications. However, the distinction between the two categories is not definitive as these factors can overlap for individuals (Rajkumar and Kumaran, 2015). Regarding psychological issues, anxiety and depression are implicated in the development and maintenance of sexual dysfunctions, including PE and ED (Chen *et al.*, 2018a; Chen *et al.*, 2018b; Mourikis *et al.*, 2015), alhough research has highlighted that PE and ED may be differentially influenced by anxiety and depression symptomology (Sugimori *et al.*, 2005). For example, whilst depression has been found to play a role in both PE and ED, performance and free-floating anxiety (i.e. worry without an external threat) are recognised as prominent contributors to the development and maintenance of ED (Mourikis *et al.*, 2015). It is worth noting that homosexual, bisexual, and other same-sex attracted people are at a higher risk of mental health issues including depression and anxiety, with research supporting significant positive associations between minority stress and psychological distress (Lea *et al.*, 2014). Similarly, co-morbid PE and ED are associated with higher levels of psychological distress (Chen *et al.*, 2018b). Taken together, factors that are relevant to both emotional dysregulation and sexual dysfunction, such as cognition, have clinical value in treatment planning for PE and ED across sexual orientations.

Metacognitive theory

Recently, emerging research has focused on the contribution of metacognitive factors in emotional distress and sexual dysfunction (Bagcioglu *et al.*, 2012; Giuri *et al.*, 2016; Zarbo *et al.*, 2019). Metacognition refers to knowledge of one's cognitive processes (i.e. thinking about thinking) and, accordingly, is involved in the appraisal, monitoring, or control of cognition (Flavell, 1979; Yılmaz *et al.*, 2011). The metacognitive model of psychological disorder, the Self-Regulatory Executive Function Model (S-REF; Wells and Mathews, 1994; Wells and Mathews, 1996), proposes that psychological distress is caused and maintained perseverative thinking that occurs in the form of cognitive-attentional syndrome (CAS), consisting of worry, rumination, fixated attention, and unhelpful self-regulatory strategies (Wells, 2013). This style of thinking is considered problematic as it allows negative thoughts and emotions to persist, which then prevents the modification of dysfunctional self-beliefs and increases the accessibility of negative information (Caselli and Spada, 2013).

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The CAS is controlled by metacognitive beliefs, which are primarily divided into two domains: positive metacognitive beliefs and negative metacognitive beliefs (Wells, 2009). Positive metacognitive beliefs concern the perceived benefit of engaging in rumination, worry, threat monitoring, thought suppression, and other similar strategies (Wells, 2013). For example, 'if I worry, I will be prepared' or 'focusing on danger will keep me safe' (Wells, 2009; p. 15). Alternatively, negative metacognitive beliefs consist of two broad domains, (1) those that concern the uncontrollability of thoughts and (2) those that concern the danger, importance, and meaning of them (Wells, 2011). For example, 'I have no control over my worrying' and 'psychological distress can make me lose my mind' (Wells, 2009; p. 16). It is through the adoption of these metacognitive patterns and coping strategies that individuals develop and maintain psychological conditions (Wells, 2009).

Relevant research

Substantial research has established that metacognitive beliefs and processes are implicated in a range of psychological problems, including anxiety (Bailey and Wells, 2015; Wells, 2013), addictive behaviours (Allen *et al.*, 2017; Caselli and Spada, 2013; Hamonniere and Varescon, 2018), anger (Ramos-Cejudo *et al.*, 2017; Simpson and Papageorgiou, 2003) and depression (Papageorgiou and Wells, 2001; Papageorgiou and Wells, 2003). Moreover, a recent meta-analysis reported that those with a psychological disorder, including generalised anxiety disorder, eating disorders, major depressive disorder, schizophrenia, or obsessive-compulsive disorder had increased levels of metacognitive beliefs compared to healthy controls (Sun *et al.*, 2017). Thus, it is plausible that metacognitions are related to emotional distress experienced by sexual minorities and individuals who struggled with sexual dysfunction.

Currently, there is limited research exploring the role of metacognitions in PE and ED, with only two published studies to date. First, Bagcioglu and colleagues (2012) investigated metacognitive processes of 40 participants with ED and 40 participants with PE who were diagnosed using a semi-structured interview based on the *DSM-IV-TR* and compared with 40 healthy controls. The short form of the Metacognition Questionnaire (MCQ-30; Wells and Cartwright-Hatton, 2004) was used to evaluate the presence of both positive and negative metacognitive beliefs and maladaptive coping strategies (e.g. excessive focus on thoughts or over-reliance on worry). Bagcioglu and colleagues (2012) found that positive beliefs and negative beliefs subscale scores were significantly higher in participants with PE or ED than healthy controls with no significant difference between the PE or ED groups. There were no significant differences between the groups on the uncontrollability-danger and cognitive confidence subscale scores. However, cognitive self-consciousness was significantly higher in participants with PE than participants with ED and healthy controls, whilst there was no difference between participants with ED and healthy controls. The researchers proposed that this difference may be due to participants with ED being significantly older than participants with PE and the healthy control group. Bagciouglu *et al.* stated that their study highlighted that metacognitions may play a role in PE and ED through the development of maladaptive metacognitive coping strategies associated with higher endorsement of positive and negative metacognitive beliefs.

The second study by Giuri *et al.* (2016) investigated metacognitive beliefs and the processes of the CAS in 11 participants with ED and 10 with PE (*DSM-IV* criteria). A semi-structured interview based on Well's (2000) metacognitive profiling interview was utilised to evaluate the presence of metacognitive beliefs concerning a recent episode of sexual dysfunction. From the results, Giuri *et al.* concluded that positive and negative metacognitive beliefs and the CAS may play a role in the maintenance of sexual dysfunction and in the exacerbation of negative emotional states. For example, participants held negative metacognitive beliefs about the uncontrollability of thoughts (i.e. 'the negative thoughts keep coming back') and the negative

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impact of their CAS thought patterns (i.e. 'worrying doesn't help me get an erection'), which may play a role in promoting negative affect and loss of arousal that in turn may further exacerbate CAS. Furthermore, these findings highlighted that there may be both differences and similarities in the CAS models of men with ED or PE. For example, ED participants reported higher CAS activation in the form of rumination or worry. PE participants reported higher negative appraisal of triggers and the activation of thought control strategies, such as seeking distraction or using suppression, in an attempt to move their attention away from negative thoughts or physical sensations. However, the possibility that individual participants may have been impacted by more than one kind of sexual dysfunction was deemed to be a limitation in this study, because this may have confounded the support for differential metacognitive profiles corresponding to a single diagnosis only.

Both Giuri *et al.* (2016) and Bagcioglu *et al.* (2012) stated that their studies were exploratory and highlighted the need for future research to recruit a larger number of participants. Additionally, they encouraged the adoption of validated psychometric measures for all variables to enable the collection of robust data to compare with their findings. Importantly, neither the Giuri *et al.* nor Bagcioglu *et al.* study investigated the sexual orientation of the participants and there appears to be no published research investigating whether metacognitive processes vary in PE and ED according to sexual orientation. Therefore, given that previous research highlights variances in rates of PE and ED between heterosexual, bisexual and homosexual men, it would be beneficial to investigate this regarding metacognition.

The present study

Building on the research of Bagcioglu *et al.* (2016) and Giuri *et al.* (2012), implementing their suggestions, and addressing the gap in the literature regarding sexual orientation, the current study investigated the differences in metacognitive processes in heterosexual, bisexual, and homosexual men with PE and/or ED compared with healthy controls using validated psychometric measures. Specifically, it was hypothesised that metacognitive beliefs reported by participants with PE and/or ED would be significantly higher than participants without PE and/or ED. A second aim of the study was to explore potential significant differences in metacogntive beliefs reported by heterosexual, homosexual, and bisexual participants with PE and/or ED.

Method

Design and procedure

The study implemented a cross-sectional, online survey design. Following ethical approval from a university board, male participants $\geq$18 years were recruited via social networking and sexual health websites with a survey link. Volunteers who accessed the link were informed of the study's purpose, length (i.e. 20 minutes), risks and safeguards, along with information about consent, anonymous participation, and access to information. The study was described as an investigation of thoughts processes associated with ED and PE. After obtaining consent, participants were invited to complete the demographic questionnaire followed by psychometric measures. All participants were provided with the contact details of suitable support services pre- and post-completion to assist with any distress experienced during participation. Participants were also able to leave the survey at any time without consequence.

Participants

A total of 731 participants undertook the survey, with 531 complete responses included in the MANCOVA. Sixty-five participants satisfied the criteria for PE (12.2%), 147 for ED (27.7%), 83 with PE and ED (15.6%), and 236 with neither (44.4%; referred to as healthy controls). Analysis

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Table 1. Sexual orientation and sexual dysfunction

Sexual dysfunction	Sexual orientation			
	Heterosexual (%)*	Bisexual (%)*	Homosexual (%)*	Total (%)*
HC‡	87 (37%)	69 (29%)	80 (34%)	236 (100%)
ED only	29 (20%)	41 (28%)	77 (52%)	147 (100%)
PE only	34 (52%)	14 (22%)	17 (26%)	65 (100%)
ED and PE	38 (46%)	20 (24%)	25 (30%)	83 (100%)
Total	188 (35%)	144 (27%)	199 (38%)	531 (100%)

*Percentage of total sexual dysfunction; ‡healthy controls.

Table 2. Demographic characteristics as percentages

Characteristics	**Percentage***
Ethnicity	87.6
White/Caucasian	1.9
Asian	3.0
Hispanic/Latino	0.8
Indian	1.1
Black/African-American	1.7
African	3.9
Other (e.g. Middle Eastern)	
Education	
Postgraduate degree	16.7
University/college degree	40.7
Tertiary certificate or diploma	19.4
Completed year 12	17.5
Completed year 10	3.8
Less than year 10	1.9
Current university/college students: part-time/full-time	5.9/15.0

*$n = 474$ (i.e. completed relevant question).

of total responses revealed that complete responders were significantly older (mean = 42.63 years, $SD = 14.34$) than partial responders (mean = 39.98 years, $SD = 15.06$), $t_{729} = -2.196$ (two-tailed), $p = .028$, partial $\eta^2 = .007$. There was no significant difference in sexual orientation between complete (heterosexual = 35.4%, bisexual = 27.1%, homosexual = 37.5%) and partial responders (heterosexual = 34.6%, bisexual = 26.2%, homosexual = 39.3%), χ^2 (–2) = .194, $p = .908$. Details of the participants are provided in Tables 1 and 2.

Measures

Sexual orientation

As a multi-dimensional construct, sexual orientation is often conceptualised as one aspect of human sexuality (Pachankis *et al.*, 2017). For the current study, sexual orientation was gauged using a self-report measure of sexual attraction. Self-reported sexual attraction has been found to differ from sexual identity (Diamond *et al.*, 2017), and may be associated with greater honesty in responses (Smith *et al.*, 2003). Therefore, a sexual attraction question was employed as recommended by the Sexual Minority Assessment Research Team (SMART, 2009): 'People are different in their sexual attraction to other people. Which best describes your feelings? Are you: 1. Only attracted to females; 2. Mostly attracted to females, 3. Equally attracted to females and males; 4. Mostly attracted to males; 5. Only attracted to males?'. For the purpose of the current research, responses were coded as: 1 = heterosexual; 2, 3 and 4 = bisexual; and 5 = homosexual.

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Ejaculation control

The Premature Ejaculation Diagnostic Tool (PEDT 5; Symonds *et al.*, 2007a) is a 5-item measure for assessing premature ejaculation (e.g. 'How difficult is it for you to delay ejaculation?'). Respondents rate items on a 5-point Likert scale from 0 (not at all) to 4 (extremely). Total scores range from 0 to 20, with higher scores indicating poorer control over ejaculation. The PEDT 5 is extensively validated, with good internal consistency ($\alpha = 0.71$) and test–re-test reliability ($\alpha = 0.88$; Symonds *et al.*, 2007b). Cut-offs were scored at 0–8 as indicating without PE, and 9 and above indicating with PE (Breyer *et al.*, 2010; Pakpour *et al.*, 2014).

Erectile function

The Sexual Experiences Questionnaire (SEX-Q) is a validated questionnaire used to measure erectile function, individual satisfaction, and couple's satisfaction (Cappelleri *et al.*, 2009; Mulhall *et al.*, 2008). The erection function subscale of the SEX-Q was used as a measure of erectile function as other questionnaires were primarily developed for heterosexual men with the assumption of penetrative vaginal sex (Coyne *et al.*, 2010) and the SEX-Q erection function subscale had only one question that focused on penetration. Furthermore, not all men who have sex with men practise penetrative anal sex, and they may play the passive or active role only, or both (Vansintejan *et al.*, 2013). The wording for sexual intercourse/penetration was expanded to include 'entering your partner's mouth, vagina, or anus' (Breyer *et al.*, 2010). The erectile function subscale contains six items measured on a 5-point Likert scale, from 1 (never or almost never) to 5 (almost always or always). A sample item is 'How often were you able to maintain an erection for as long as you wanted to?'. Scores are converted to percentages, with lower scores representing higher ED. The erectile domain of the SEX-Q has demonstrated high internal consistency ($\alpha = .88$) and good test–re-test reliability ($\alpha = .76$; Mulhall *et al.*, 2008). Cut-offs were scored at 0–67% indicating with ED and 68% and above without ED (Cappelleri *et al.*, 2009).

Metacognitions

The Metacognition Questionnaire-30 (MCQ-30; Wells and Cartwright-Hatton, 2004) is a well-validated brief 30-item version of the 65-item Metacognition Questionnaire for assessing metacognitions. A sample item is 'When I start to worry, I cannot stop'. Respondents indicate their agreement with each item on a 4-point Likert scale from 1 (do not agree) to 4 (agree very much). The questionnaire has an overall score (30–120) and five subscale scores (6–24) The five subscales are (1) cognitive confidence, which assesses the confidence a person has in their attention and memory; (2) positive beliefs about worry, which measures the extent to which a person believes that perseverative thinking is useful; (3) cognitive self-consciousness, which measures the tendency to monitor one's thoughts and focus attention inward; (4) beliefs about the uncontrollability and danger of thoughts, which assesses the extent to which a person thinks that perseverative thinking is uncontrollable and dangerous; and (5) negative beliefs – the need to control thoughts, which assesses the extent to which a person believes that certain types of thoughts need to be suppressed. Higher scores indicate lower cognitive confidence in attention and memory, greater belief that worry is beneficial, increased tendency towards self-focused attention, greater belief that thoughts are uncontrollable and dangerous, and a greater belief in the need to control thoughts, respectively. The MCQ-30 possesses good internal consistency and convergent validity as well as acceptable test–re-test reliability ($\alpha = .59–.87$; Spada *et al.*, 2010; Wells and Cartwright-Hatton, 2004).

Data analysis

To assess the first and second hypotheses, a single between-participants two-way (sexual orientation: heterosexual, bisexual, and homosexual, by sexual dysfunction: healthy control,

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ED only, PE only, and PE with ED) multivariate analyses of covariance (MANCOVA) was calculated, with the five subscales of the MCQ-30 representing multiple dependent variables. Age was entered as a covariate as it is an independent risk factor for ED (Colson *et al.*, 2018a). After significant MANCOVA effects or interactions, *post hoc* analyses were undertaken to assess differences between cell and marginal means where appropriate. There were no issues with multicollinearity.

Results

Numerous *a priori* G*Power 3.1 calculations, dependent on the type of statistical analysis to be undertaken, indicated a sample size of $n = 120–196$ to achieve a medium population effect size ($f = .25$), power of .80 ($\beta = .20$), and significance criterion $a = .05$. However, these calculations did not take into consideration the high variability of the distribution of the groups (i.e. heterosexual, bisexual, and homosexual males) within the general population. Accordingly, as suggested by Wilson *et al.* (2007), approximately 30 participants per group were required to achieve a medium to large effect size with about 80% power. However, in the current study, not all groups achieved this goal and varied in size. According to Tabachnik and Fidell (2013), when there are unequal sample sizes across the groups, then MANCOVA is considered robust against such challenges.

Data screening

Data were exported from the Survey Monkey platform to the IBM *Statistical Product and Service Solutions* (SPSS) program version 26 for analysis. All data were screened, and incomplete responses were removed. Data had significant Shapiro–Wilks test of normality; however, MANCOVA is robust against violations of the normality assumption when groups exceed 30 (Field, 2013). Multicollinearity was not violated – all correlations were below .90. Box's test of covariance matrices significance was above alpha of .001. An examination of box-plots and *z*-scores revealed a total of 20 univariate outliers. However, the extreme nature of standardised scores depends on the size of the sample and, in larger samples, a few standardised scores in excess of ±3.29 are acceptable. Upon inspection, the univariate outliers were considered a part of the population and were retained for further analysis (Tabachnick and Fidell, 2013).

Differences in metacognitions

Results of the MANCOVA to examine the differences in metacognitions across sexual orientation and of sexual dysfunction groups indicated that there was a significant multivariate main effect for both sexual dysfunction (Wilks' lambda = .895, $F_{15,1419.33} = 3.87$ $p < .001$, partial $\eta^2 = .036$, observed power = 1.00) and for sexual orientation (Wilks' lambda = .945, $F_{10,1028} = 2.97$ $p = 001$, partial $\eta^2 = .028$, observed power = .982). However, the interaction between sexual dysfunction and sexual orientation was non-significant (Wilks' lambda = .951, $F_{30,2058} = .864$ $p = .679$, partial $\eta^2 = .010$, observed power = .696).

Significant univariate main effects of sexual dysfunction on the MCQ-30 subscales were identified for cognitive confidence ($F_{1,518} = 10.119$, $p < .001$, partial $\eta^2 = .055$, observed power = .998); thoughts concerning uncontrollability and danger ($F_{3,518} = 10.734$, $p < .001$, partial $\eta^2 = .059$, observed power = .999); and negative beliefs – need to control thoughts ($F_{3,518} = 4.457$, $p = .004$, partial $\eta^2 = .025$, observed power = .878). Table 3 shows mean and standard deviation (*SD*), sexual orientation, MCQ-30 subscale, and sexual dysfunction scores.

Table 4 shows the mean difference between sexual dysfunction groups and significance level for the MCQ-30 subscale, and 95% confidence interval for the mean difference. Regarding cognitive confidence, results indicated that the PE and ED group score was significantly higher than ED only, PE only, and healthy controls groups, and the PE only group score was significantly

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Table 3. Mean and standard deviation (*SD*), sexual orientation, MCQ-30 subscale and sexual dysfunction

	Sexual orientation							
	Heterosexual		Bisexual		Homosexual		Total	
Sexual dysfunction	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Cognitive confidence								
HC*	10.31	3.86	11.00	4.58	9.70	3.62	10.31	4.02
ED only	10.31	2.80	11.73	4.04	10.74	3.82	10.93	3.72
PE only	11.62	4.19	13.00	3.64	10.71	4.21	11.68	4.10
PE and ED	12.97	4.51	13.30	4.37	13.04	4.49	13.07	4.42
Positive beliefs								
HC*	10.02	3.50	10.26	4.17	9.50	3.89	9.92	3.84
ED only	9.86	4.54	10.49	3.99	10.79	4.34	10.52	4.27
PE only	9.27	3.50	9.43	2.79	11.06	4.83	9.77	3.79
PE and ED	9.95	4.09	10.60	3.98	11.60	4.07	10.60	4.07
Cognitive self-consciousness								
HC*	16.02	4.18	16.78	5.20	16.70	4.44	16.47	4.58
ED only	15.34	5.09	16.54	4.07	16.01	3.37	16.03	3.95
PE only	15.91	3.77	15.07	4.84	16.18	4.52	15.80	4.17
PE and ED	15.68	4.31	16.25	2.84	16.40	3.84	16.04	3.83
Thoughts concerning uncontrollability and danger								
HC*	11.53	4.44	12.70	5.42	11.45	4.91	11.84	4.91
ED only	13.24	5.59	12.98	4.90	13.18	4.91	13.14	5.01
PE only	11.50	4.02	13.93	6.09	14.76	5.02	12.88	4.94
PE and ED	14.44	5.43	14.55	3.61	16.12	4.76	14.98	4.85
Negative beliefs – need to control thoughts								
HC*	11.43	3.78	11.75	4.38	9.94	3.78	11.02	4.03
ED only	12.03	4.60	11.37	5.03	11.12	3.60	11.37	4.23
PE only	11.79	3.37	12.57	5.61	11.71	4.97	11.94	4.31
PE and ED	13.11	4.65	13.15	3.67	11.88	4.33	12.75	4.32

*Healthy controls.

higher than the healthy control group; there were no other significant differences. Regarding thoughts concerning uncontrollability and danger, results indicated that the PE and ED group score was significantly higher than ED only, PE only, and healthy controls groups, and the ED only group score was significantly higher than the healthy control group; there were no other significant differences. Regarding negative beliefs-need to control thoughts, results indicated that the PE and ED group score was significantly higher than the healthy controls group; there were no other significant differences.

Significant univariate main effects of sexual orientation on the MCQ-30 subscales were identified for thoughts concerning uncontrollability and danger only ($F_{2,518} = 4.728$, $p = .009$, partial $\eta^2 = .018$, observed power = .998); whilst positive beliefs ($F_{2,518} = 2.957$, $p = .053$ partial $\eta^2 = .011$, observed power = .575) approached significance. Details of mean of sexual orientation for MCQ-30 subscales and sexual dysfunction are shown in Table 5 and the mean difference between sexual orientation and significance level for the MCQ-30 subscale and 95% confidence interval for the mean difference are shown in Table 6. Regarding thoughts concerning uncontrollability and danger, results indicated that the homosexual men's score was significantly higher than heterosexual men; there were no other significant differences. Regarding positive beliefs, results indicated that the homosexual men's scores was significantly higher than heterosexual men; there were no other significant differences. Also, results indicated that bisexual men reported significantly higher levels of low cognitive confidence than homosexual men.

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Table 4. Mean difference between sexual dysfunction groups and significance level for the MCQ-30 subscale and 95% confidence interval for the mean difference

Groups		Mean difference	*SE*	Sig‡	95% CI for mean difference‡	
					Lower bound	Upper bound
Cognitive confidence						
HC¶	ED only	−.73	.45	.106	−1.62	.16
HC¶	PE only	−1.3*	.60	.027	−2.50	−.15
HC¶	PE + ED	−2.8*	.53	<.001	−3.88	−1.81
ED only	PE only	−.60	.66	.365	−1.89	.70
ED only	PE + ED	−2.11*	.58	<.001	−3.25	−.97
PE only	PE + ED	−1.51*	.71	.033	−2.91	−.12
Positive beliefs						
HC¶	ED only	−.64	.45	.154	−1.52	.24
HC¶	PE only	.16	.59	.788	−1.01	1.33
HC¶	PE + ED	-.89	.52	.091	−1.92	.14
ED only	PE only	.80	.66	.222	−.49	2.09
ED only	PE + ED	−.25	.58	.670	−1.38	.89
PE only	PE + ED	−1.05	.71	.138	−2.43	.34
Cognitive self-consciousness						
HC¶	ED only	.36	.48	.449	−.58	1.30
HC¶	PE only	.92	.64	.148	−.33	2.17
HC¶	PE + ED	.30	.56	.594	−.80	1.40
ED only	PE only	.56	.70	.426	−.82	1.93
ED only	PE + ED	−.06	.62	.917	−1.28	1.15
PE only	PE + ED	−.62	.75	.410	−2.10	.86
Thoughts concerning uncontrollability and danger						
HC¶	ED only	−1.76*	.54	.001	−2.83	−.70
HC¶	PE only	−1.09	.72	.128	−2.50	.32
HC¶	PE + ED	−3.42*	.63	<.001	−4.66	−2.18
ED only	PE only	.67	.79	.397	−.88	2.22
ED only	PE + ED	−1.66*	.70	.017	−3.03	−.29
PE only	PE + ED	−2.33*	.85	.006	−4.00	−.66
Negative beliefs – need to control thoughts						
HC¶	ED only	−.88	.46	.054	−1.78	.02
HC¶	PE only	−.65	.61	.281	−1.85	.54
HC¶	PE + ED	−1.89*	.53	<.001	−2.94	−.84
ED only	PE only	.23	.67	.732	−1.08	1.54
ED only	PE + ED	−1.01	.59	.087	−2.17	.15
PE only	PE + ED	−1.24	.72	.086	−2.65	.18

*The mean difference is significant at the .05 level; ‡adjustment for multiple comparisons: least significant difference (equivalent to no adjustments); ¶healthy controls.

Discussion

The current study aimed to investigate the differences in metacognitive processes in heterosexual, bisexual, and homosexual men with PE and/or ED compared with healthy controls. It was hypothesised that the metacognitive beliefs reported by participants with PE and/or ED would be significantly higher than participants without PE and/or ED. Results from the current study partially supported this hypothesis in that specific types of metacognitive beliefs were significantly higher for participants with PE and/or ED than without PE and/or ED. That is, participants with PE and ED were significantly higher in low cognitive confidence, thoughts concerning uncontrollability and danger, and the need to control thoughts subscales than PE only, ED only, and healthy controls. Furthermore, the PE only group was significantly higher than healthy controls for low cognitive confidence, with the ED significantly higher for thoughts concerning uncontrollability and danger subscales.

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Table 5. Mean of sexual orientation for MCQ-30 subscale and sexual dysfunction

Sexual orientation	Mean	*SE*	95% CI for mean difference	
			Lower bound	Upper bound
Cognitive confidence				
Heterosexual	11.22*	.32	10.59	11.86
Bisexual	12.20*	.40	11.43	13.01
Homosexual	11.12*	.36	10.42	11.82
Positive beliefs				
Heterosexual	9.67*	.32	9.04	10.30
Bisexual	10.14*	.40	9.36	10.93
Homosexual	10.84*	.35	10.15	11.54
Cognitive self-consciousness				
Heterosexual	15.65*	.34	14.97	16.32
Bisexual	16.11*	.43	15.28	16.95
Homosexual	16.42*	.38	15.68	17.16
Negative beliefs – uncontrollability and danger				
Heterosexual	12.39*	.39	11.63	13.15
Bisexual	13.40*	.48	12.45	14.34
Homosexual	14.16*	.43	13.33	15.00
Negative beliefs – need to control thoughts				
Heterosexual	11.86*	.33	11.22	12.50
Bisexual	12.10*	.41	11.30	12.90
Homosexual	11.39*	.36	10.68	12.10

*Covariates appearing in the model are evaluated at the following values: What is current your age in years? = 42.63.

Table 6. Mean difference between sexual orientation and significance level for the MCQ-30 subscale and 95% confidence interval for the mean difference

Sexual orientations		Mean difference	*SE*	Sig‡	95% CI for difference‡	
					Lower bound	Upper bound
Cognitive confidence						
Heterosexual	Bisexual	−.99	.51	.053	−2.00	.01
Heterosexual	Homosexual	.10	.49	.831	−.85	1.06
Bisexual	Homosexual	1.10*	.50	.042	.04	2.16
Positive beliefs						
Heterosexual	Bisexual	−.47	.51	.354	−1.5	.53
Heterosexual	Homosexual	−1.17*	.48	.015	−2.12	−.22
Bisexual	Homosexual	−.70	.54	.193	−1.75	.35
Cognitive self-consciousness						
Heterosexual	Bisexual	−.47	.55	.391	−1.54	.60
Heterosexual	Homosexual	−.77	.52	.134	−1.78	.24
Bisexual	Homosexual	−.31	.57	.594	−1.43	.82
Thoughts concerning uncontrollability and danger						
Heterosexual	Bisexual	−1.00	.62	.103	−2.21	.20
Heterosexual	Homosexual	−1.77*	.58	.002	−2.91	−.63
Bisexual	Homosexual	−.77	.65	.235	−2.04	.50
Negative beliefs – need to control thoughts						
Heterosexual	Bisexual	−.24	.52	.649	−1.26	.79
Heterosexual	Homosexual	.47	.49	.337	−.49	1.44
Bisexual	Homosexual	.71	.55	.194	−.36	1.78

Values are based on estimated marginal means. *The mean difference is significant at the .05 level. ‡Adjustment for multiple comparisons: least significant difference (equivalent to no adjustments).

Therefore, the findings of this study suggest that specific metacognitive beliefs may be involved in PE and ED. Reduced levels of cognitive confidence have been associated with increased anxiety by possibly limiting the choice of effective coping strategies when under stress (Spada *et al.*, 2010). This may reflect low levels of belief in the effectiveness of cognitive abilities and may lead to a cycle of

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perceived failure, which could, in turn, increase sexual dysfunction such as PE or ED (Bagcioglu *et al.*, 2012; Spada *et al.*, 2007). Also, high levels of concern about uncontrollability and danger and the need to control thoughts have been found to lead to the utilisation of unhelpful coping strategies with a focus being centred on controlling thoughts along with the anxious anticipation of failure (Bagcioglu *et al.*, 2012). Paradoxically, attempts to control thoughts or worries have been found to increase their salience and associated distress (Cook *et al.*, 2014). Also, according to Spada *et al.* (2010) the combination of low levels of cognitive confidence and high levels of concern about uncontrollability and danger and the need to control thoughts, as seen in the PE and ED group, has been found to increase levels of state anxiety.

Regarding the differences in the specific types of metacognitive beliefs between the sexual dysfunction groups, Giuri *et al.* (2016) found that strategies to control either PE or ED had a detrimental effect on the other (e.g. 'using distraction to control my PE makes my erection weaker'), which may lead to increased negative metacognitive beliefs and lower confidence in coping strategies as found in the PE and ED group. Furthermore, the differences in the specific metacognitive beliefs found for PE and ED only groups may reflect the focus of the PE only group on their lack of confidence in their strategies to control their PE (e.g. 'Distraction doesn't help me fix things'; Giuri *et al.*, 2016). Whilst the ED only group may be more focused on the uncontrollability of their thoughts and the negative consequences of their impaired erections (e.g. 'I have no control over the worry'; 'It keeps my attention on my flabby penis and I can't get an erection'; Giuri *et al.*, 2016). Both Giuri *et al.* and Bagcioglu *et al.* found differing associations for metacognitive beliefs with PE and ED.

Considering the second aim of the study, there were no significant differences for metacognitive beliefs between differing sexual orientations for men with/or without PE and/or ED. This result may reflect previous findings regarding the complexity of human sexuality and the difficulties in how sexual orientation is categorised (Pachankis *et al.*, 2017). Whilst a sexual attraction measure was used for this research, future research may benefit from exploring different measures. However, results evidenced significant differences relating to sexual orientation and metacognitive beliefs. Homosexual men were found to have higher levels of beliefs concerning the uncontrollability and danger of thoughts, and positive beliefs about the benefits of worry, and were significantly lower than bisexual men in cognitive confidence. This result appears to be consistent with previous research findings of increased levels of psychological disorders, including depression and anxiety, for sexual minority groups including homosexual and bisexual men (e.g. Lea *et al.*, 2014). Currently, there has been minimal research investigating the differences in metacognitive beliefs for differing sexual orientations independent of sexual dysfunction, warranting further research.

The results of this study highlight that metacognitive beliefs may play a role in PE and/or ED. Furthermore, whilst metacognitive beliefs may vary based on sexual orientation, it would appear that sexual orientation does not play a role in metacognitive beliefs related to PE and/or ED. From a therapeutic perspective, these findings suggest that the techniques and principals of metacognitive therapy (Wells, 2000; Wells, 2009) may be beneficial for men with PE and/or ED. However, the current results indicate that the modification of such therapy depending on sexual orientation may not be necessary; however, this requires further investigation.

The findings of the current study should be considered in the context of several limitations. First, the study employed a cross-sectional internet survey design, with a sample that was primarily Caucasian with higher education degrees. Thus, the results may not be generalisable to the broader population, nor could causal inferences be supported. Second, the use of self-report, internet-based, and retrospective measures may result in biased responses due to social desirability, self-report bias, and selective or poor memory. Third, participants' anxiety and depression were not explicitly assessed. However, beliefs regarding worry provide an implicit measure of anxiety. Regardless, future studies may benefit from including validated measures of anxiety and depression and investigating the relationships between anxiety and depression

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with PE and ED, as well as interactions with metacognitive beliefs. Additionally, the current study used the MCQ-30, which is a measure of generalised metacognitive beliefs rather than a validated measure of metacognitive beliefs specific to sexual dysfunction. Future studies would also benefit from larger sample sizes for various sexual orientation groups.

Summary

Given a paucity in research, the present study represents a significant contribution to the literature, providing further support for the implications of metacognitive beliefs in sexual dysfunction such as PE and/or ED. Furthermore, this research provides further support for the S-REF model and metacognitive theory in the understanding of psychopathology, including sexual distress associated with male sexual dysfunction. Our findings, collectively with the previous work of Bagcioglu *et al.* (2012) and Giuri *et al.* (2016), establish that the CAS and metacognitive beliefs are active in male sexual performance difficulties across sexual orientations.

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