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General Erectile Functioning among Young, Heterosexual Men Who Do and Do Not Report Condom-Associated Erection Problems (CAEP)

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Abstract

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Introduction.—Condom-associated erection problems (CAEP) are an underestimated factor related to inconsistent or incomplete male condom use. The underlying mechanisms of CAEP are not understood, and whether men who report these difficulties are also likely to experience erectile problems in situations when condoms are not used has not been studied.

Aim.—The aim of the study was to investigate, in a sample of condom-using young, heterosexual men (aged 18–24 years), whether men who report CAEP are more likely to (i) have erection problems when not using condoms and (ii) meet criteria for erectile dysfunction.

Methods.—A total of 479 men recruited online completed the International Index of Erectile Function (IIEF-5) and answered questions about erection problems experienced when using and not using condoms during the last 90 days. Demographic, sexual experience, and health status variables were investigated as correlates.

Main Outcome Measures.—Self-reported frequency of erection loss during condom application or during penile–vaginal intercourse (PVI) in the past 90 days and IIEF-5 scores.

Results.—Of the men, 38.4% were classified in the no CAEP group, 13.8% as having CAEP during condom application, 15.7% as having CAEP during PVI, and 32.2% as having CAEP during both condom application and PVI. Men reporting any form of CAEP were significantly more likely than men reporting no CAEP to also report erection difficulties during sexual activity when not using condoms. Men who reported CAEP during PVI only or during both application and PVI scored significantly lower on the IIEF-5 than men without CAEP.

Conclusion.—The findings suggest that men who report CAEP are also more likely to experience more generalized erection difficulties. Clinicians should assess whether men using condoms experience CAEP and where appropriate, refer for psychosexual therapy or provide condom skills education.

Keywords

Condom-Associated Erection Problems; Condoms for Penile–Vaginal Intercourse; Sexual Arousal; Condoms

Introduction

The estimated prevalence of erectile dysfunction (ED) varies across studies, depending in part on the definition and criteria used [1–3]. One of the most consistent predictors for erectile problems is age. Although the prevalence of ED is considerably higher among older men [4], erectile problems are reported by young men as well. One epidemiologic study estimated that approximately 2% of men younger than age 40–50 years complained of frequent erection problems (EPs) [2]. A more recent survey across five European countries reported that 5% of men aged between 18 and 29 years of age had experienced ED in the past 6 months [5]. The proportion of young men who experience occasional erectile difficulties, however, is much higher, ranging from 16% in a sample of U.S. men under 40 years [6] to 30% in a Swiss sample of men aged 18–25 years [7].

The more common experience of occasional erectile problems suggests that situational factors may play an important etiologic role. Use of male condoms may be one example of a

situation that predisposes some men to experience erection difficulties. In a study of Brazilian medical students (mean age: 21.2 years), 13.3% were diagnosed as having ED, using the simplified International Index of Erectile Function (IIEF-5) [8]. Young men in this study who used condoms were twice as likely to report erectile problems. In a sample of young male sexually transmitted infection (STI) clinic attendees [9], 37.1% of the men reported condom-associated erection problems (CAEP) on at least one occasion. Several studies, involving both homosexual and heterosexual men, have now documented that CAEP may be common [10]. Although the mechanisms underlying CAEP are still not well understood, in a recent psychophysiologic study of sexual arousal patterns, men with CAEP needed more time and/or more intense stimulation to become aroused than men without CAEP [11]. It is noteworthy, however, that the erectile responses were lower in the CAEP group only in the first minute of exposure to sexual stimuli, with no significant differences thereafter.

Condom-associated erectile difficulties may be an underestimated factor related to imperfect use, in that men who report CAEP are more likely to report a range of other condom use errors and problems, including condom slippage [12], incomplete condom use (late application and early removal) [9,13], and inconsistent condom use [14,15]. In one recent prospective study involving 1,875 men, perceptions of erection “quality” (including ratings of rigidity, penile length, and circumference, as well as difficulty maintaining erections) were associated with greater likelihood of incomplete condom use [13]. Men may be more likely to experience CAEP if they lack confidence to use condoms correctly, if they experience problems with the way condoms fit or feel, and if they have sex with multiple partners [9].

Aims

One question that has, as yet, not been investigated is whether men who report CAEP are more likely to experience erectile difficulties in sexual situations where condoms are not used. Accordingly, the aim of this study was to investigate, in a sample of condom-using young, heterosexual men (aged 18–24), whether those who report CAEP (either during condom application, during penile– vaginal intercourse [PVI], or in both situations) are more likely to: (i) have EPs when not using condoms; and (ii) score differently on the IIEF. Our aim was not to estimate prevalence of erectile difficulties but to identify correlates of CAEP in a nonclinical sample of young, condom-using men.

Methods

Participants

Participants were young, heterosexual men recruited through university listservs (e.g., university student groups and department listings) and electronic flyers disseminated on Facebook. Permission was obtained from listserv managers and Facebook advertising guidelines were followed. We oversampled men with CAEP by targeted flyers that asked: “Do condoms interfere with your erections?” and “Do condoms interfere with your arousal?” Eligibility criteria included having access to the Internet, being between 18 and 24 years old, self-identifying as heterosexual, having used a condom for PVI within the past 90

days, and the ability to read English. Additionally, men were excluded if they had been in a sexually exclusive (monogamous) relationship for 1 month or longer, as condom use has been found to drop off within the first month of relationships [16]. Men reporting CAEP were oversampled. We asked respondents a specific question at the end of the survey about whether they had taken the questionnaire seriously and whether their information should be used; only 1.2% responded that they did not take the survey seriously and we excluded their data.

The final sample consisted of 479 young men. Written informed consent was obtained from all participants and the university's Institutional Review Board approved all study procedures.

Measures

Primary Outcome Measures

EPs When Not Using Condoms: Two questions assessed EPs when men were not using condoms. Participants were asked to "Think about the times when you had penile–vaginal intercourse in the PAST 90 DAYS and you did NOT use a condom." This was followed by two questions, "How often did you lose or start to lose your erection before penetration (before putting your penis in the vagina)?" and "How often did you lose or start to lose your erection while you were having vaginal intercourse (before you were done)?" Response alternatives were: "never," "occasionally," "less than half the time," "most of the time," "always," and "I can't answer because I always used a condom." These two variables are referred to as EPs before penetration (EP-Before) and EPs during PVI (EP-PVI), respectively. For each variable, men were classified as "Yes" if they answered occasionally or more often and "No" if they answered never.

IIEF-5 **[17]—**The IIEF-5 is a shortened version of the 15-item IIEF, used as a brief diagnostic tool to assess ED. A summative score was generated for each of the five items and used for analysis. Based on these scores, men were then classified as having no ED (22–25), mild ED (17–21), mild to moderate ED (12–16), moderate ED(8–11), or severe ED(5–7), following the criteria suggested by Rosen and colleagues [17].

Primary Participant Grouping Variables

CAEPs: Two forms of CAEP were each assessed by single items. First, men were asked, "How often in the past 90 days did you lose or start to lose your erection while putting the condom on before vaginal intercourse?" Response alternatives were: "never," "occasionally," "less than half the time," "most of the time," and "always." Next, men were asked, "How often in the past 90 days did you lose or start to lose your erection while wearing a condom during vaginal intercourse?" Response alternatives were: "never," "occasionally," "less than half the time," "most of the time," and "always." These two variables are referred to as CAEP-Application (CAEP during condom application) and CAEP-PVI (CAEP when using a condom for PVI), respectively. For each variable, men were classified as "Yes" if they answered occasionally or more often and "No" if they answered never. Four groups were created using these two variables: No-CAEP, CAEP-Application only, CAEP-PVI only, and CAEP-Both.

Sample Descriptors and Potential Correlates: In addition to the eligibility and exclusion criteria described earlier, the following sample descriptor variables and potential correlates of outcomes were assessed: race, Hispanic/Latino ethnicity, education, religiosity, income, size of home town, circumcision status, lifetime history of STI, whether participant had ever unintentionally impregnated someone, and whether he had ever been taught to use a male condom. Current health problems (diabetes, epilepsy, depression/anxiety, multiple sclerosis, muscular dystrophy, high blood pressure, heart condition, other) and use of medications (for attention deficit hyperactivity disorder/attention deficit disorder [ADHD/ADD], diabetes, heart, depression, anxiety, hormonal, other) were also assessed as well as whether the participant had been treated for a sexual problem in the previous 12 months. Using a 90-day recall period, the following variables were measured: whether the participant had been in a program to change condom use behavior or one to change sexual behavior, use of other contraceptive methods, whether he had been trying to impregnate his partner(s), and how often he had used phosphodiesterase type 5 inhibitors (PDE-5i) during sexual activity when he was and was not using a condom.

Data Analysis

Chi-squared tests were used to determine associations between CAEP group classifications (No-CAEP, CAEP-Application only, CAEP-PVI only, and CAEP-Both) as well as the answers to the two questions about erections when not using a condom, IIEF-5 categories (no ED to severe ED), and other categorical variables. Given that the small to zero observed frequencies in some cells violated the assumptions for chi-squared analyses, we carried out 4 ×· 2 (never vs. any experience of EPs during the reporting period). Following this, post-hoc comparisons were conducted using 2 × 2 chi-squared tests.

Analysis of variance was used to compare IIEF-5 and other continuous scores across groups with Scheffé's tests used for post-hoc comparisons. Significance was established at $P < 0.05$. Analyses were performed using SPSS Version 21 (IBM SPSS statistics for Windows, version 21.0; IBM Corp., Armonk, NY, USA).

Results

The mean age was 20.43 years (standard deviation = 1.63). The majority identified as white (80.1%), 6.8% as Asian, 4.7% as African American/ black, and the remainder as other racial groups. Hispanic/Latino ethnicity was reported by 4.2% of the men. The majority (66.5%) indicated their highest level of education as college/technical school, 3.8% advanced degree, 29.4% high school, and 0.4% did not complete high school. Just over one-half (54.7%) indicated their personal income level was lower-middle class or less and 53.0% grew up in medium to large cities. The majority had been circumcised (87.3%), had never been diagnosed with an STI (97.3%), and had been taught how to use a male condom (63.0%). Unintentional impregnation was reported by 9.2%.

Of the 479 men, 184 (38.4%) were classified as No-CAEP, 66 (13.8%) as CAEP-Application only, 75 (15.7%) as CAEP-PVI only, and 154 (32.2%) as CAEP-Both. No group differences were found for age, race, Hispanic/Latino ethnicity, education, religiosity,

income, size of hometown, circumcision status, lifetime history of STI, whether ever unintentionally impregnated someone, and whether ever been taught to use a male condom.

Given the low frequency of current health problems and medication use, the data from all men reporting any CAEP were combined (any CAEP group) and compared with those from men reporting no CAEP. The only group difference found was for depression/anxiety, with 12.9% of men in the CAEP group reporting this compared with 4.9% of men in the No-CAEP group ($\chi^2 = 8.14$, degrees of freedom [df] 1, $P = 0.004$). There were, however, no group differences in reported medication use for depression (3.2%) or anxiety (2.9%). The only group difference in medication use was for ADHD/ADD medication, with 3.3% of the No-CAEP group and 8.9% of the any CAEP group reporting use of these medications ($\chi^2 = 5.62$, df1, $P = 0.018$). Less than 1% reported diabetes (0.8%), epilepsy (0.8%), multiple sclerosis (0.2%), muscular dystrophy (0.2%), heart condition (0.9%); a similar low proportion used diabetes medication (0.8%), heart medication (0.4%), and hormone medications (0.9%). Slightly more participants indicated high blood pressure (2.1%), other medical problems (1.7%), and treatment for sexual problems in the past 12 months (1.5%).

In the past 90 days, few participants had been in programs to change their condom use (1.7%) or sexual behavior (1.3%) and few had used PDE-5i for sexual activity with (1.9%) or without condoms (1.9%).None were trying to get a partner pregnant. More than half of the men indicated that they relied on male condoms for birth control (54.9%) and/or that they used male condoms with other forms of birth control (59.1%) at least some of the time in the past 90 days. No group differences were found for any of these variables. Significantly more men in the any CAEP group (17.3%) than in the No-CAEP group (9.8%) reported that they had relied on a form of birth control other than condoms on at least some occasions in the past 90 days ($\chi^2 = 5.18$, df 1, $P = 0.023$).

The mean number of times men used condoms inthe90-day recall period was 10.8 (standard deviation = 14.3) and this did not differ significantly across the four groups. The consistency of condom use, however, was significantly lower for the CAEP-Both group (73.4%) compared with the No-CAEP group (82.4%) ($F(3,471) = 3.44$, $P = 0.017$), with the other groups intermediate and not significantly different from each other (CAEP Application Only 82.1%; CAEP-PVI Only 77.7%).

EPs When Not Using Condoms

Approximately one-quarter of the sample (23.0%) indicated that they could not answer these questions because they had always used condoms. Table 1 presents the analyses for the remaining men. Because few men indicated frequent experiences of EPs when condoms were not used, chi-squared analysis compared the four CAEP groups on the percentages classified as “Yes” vs. “No” for EP-Before and EP-PVI. The CAEP groups differed significantly on the EP-Before variable ($\chi^2 = 40.14$, df 3, $P < .001$). The percentage of men reporting at least occasional EP before penetration in the No-CAEP, CAEP-Application only, CAEPP-VI only, and CAEP-Both groups, were 9.9, 35.7, 23.6, and 43.0, respectively. In post-hoc analyses, the No-CAEP group had significantly fewer men reporting EPs before penetration when not using a condom compared with the other groups. Table 1 presents results of all of the post-hoc comparisons.

CAEP groups also differed significantly for EP-PVI (χ^2 = 8 3.00, df 3, P < .001). The percentage of participants reporting at least occasional EP during PVI were 4.9, 14.3, 56.4, and 45.4 for the No-CAEP, CAEP-Application only, CAEP-PVI only, and CAEP-Both groups, respectively. In post-hoc analyses, significantly fewer men in the No-CAEP group reported having EPs during PVI when not using a condom compared with all other groups. The CAEP-PVI Only and CAEP-Both groups had the highest percentages and were not significantly different from one another. The percentage of men in the CAEP-Application Only group having at least occasional EP during PVI was intermediate and significantly different from all other groups.

IIEF-5

Cronbach's alpha for the IIEF-5 for this sample was 0.76. As shown in Table 2, IIEF-5 scores differed significantly across CAEP groups (F(3,475) = 15.40, P < .001). The mean scores for all groups were above 21 (in the nonclinical range) [17]. The No-CAEP group had the highest score (23.92) (indicating better erectile functioning), significantly different from the CAEP-PVI only (22.93) and CAEP-Both groups (22.12), but not from the CAEP-Application only (23.20). The mean score for the CAEP-Both group was not significantly different from that of the CAEP-PVI only group, but was significantly different from the other two groups. The mean scores of the CAEP Application only and CAEP-PVI-only groups were also not significantly different.

Using the IIEF-5 scores, men were then classified from no ED to severe ED using the criteria reported by Rosen et al. [17] (see Table 2). Because so few men were classified as mild to moderate ED or above, we combined men with any ED into a single group. Comparing the four CAEP groups on the percentages classified as no ED vs. any ED, there was a significant association (χ^2 = 28.98, df 3, P < .001). The percentage of participants classified as any ED were 8.7, 18.2, 22.7, and 31.8 for the No-CAEP, CAEP-Application only, CAEP-PVI only, and CAEP-Both groups, respectively. Table 2 superscripts indicate the results of post-hoc analyses demonstrating that the No-CAEP group included significantly fewer men with any ED than the other groups.

Discussion

In this sample of young, heterosexual, condom-using men, CAEPs were associated with more generalized, yet mostly subclinical (mild) levels of erectile difficulties. Men reporting any form of CAEP (during application and/or during PVI) were significantly more likely than the No-CAEP group to also report erection difficulties before penetration and during intercourse when not using a condom. Men who reported CAEP during PVI only or during both application and PVI scored significantly lower on the IIEF-5 than men reporting no CAEP. All groups reporting CAEP were significantly more likely to be classified as having mild to moderate ED than the No-CAEP group. Nonetheless, even in the CAEP-Both group, which had the highest rates of IIEF-5-identified ED, the majority (68.2%) of men did not meet the clinical criteria for having ED.

There is a range of possible explanations for these findings. First, it would not be surprising if men with ED also have EPs when using condoms. Second, while speculative, it is possible

that men who first experience loss of erection when they use condoms might worry about experiencing erections more generally and hence be more vulnerable to experiencing more generalized ED [18]. This would be consistent with other research suggesting the importance of cognitive and emotional factors such as worry and distraction in the etiology and maintenance of ED [19].

Men who reported use of ADHD medication were significantly more likely to report CAEP. Previous studies have reported high rates of risky sexual behavior among young adults with ADHD [20] and men using ADHD medication sometimes report erectile problems as a side effect of the medication [21].

Limitations

Generalizability of our findings may be limited. The sample was limited by design to young adult, heterosexual, condom-using men currently not in a long-term sexually exclusive relationship, who spoke English, and had Internet access. Thus, the findings may not be generalizable to men outside of these eligibility criteria. Our rationale for excluding men who were in sexually exclusive relationships for one month or longer was that research has demonstrated that men in the 18–24 year age group report much lower condom use with established partners than with casual partners [22]. Men in the 18–24 age group are also at high risk of STI and HIV transmission [23], despite high rates of condom use [24].

Given that condom use was an eligibility criterion, men who had previously used condoms but discontinued use, perhaps because of CAEP or other problems, were not represented in our sample. An additional limitation is that while we used a validated tool to assess severity of erectile problems, we did not assess an individual's distress about the problem; criteria for diagnosis of male erectile disorder requires the presence of clinically significant distress about the symptoms [25]. Our aim in this study was not, however, to report prevalence rates of erectile disorder, but to establish whether men who report CAEP also report experiencing EPs when not using condoms and whether the IIEF scores differ from men not reporting CAEP.

Our findings suggest that of the men reporting CAEP in our sample, approximately 18–32% met IIEF criteria for mild to moderate ED (depending on whether they reported CAEP during application of condoms only, during PVI, or during both application and PVI). Although the majority of these participants were classified in the "mild" ED category, there are nonetheless clear clinical implications of these findings. EPs have been linked to less consistent and incomplete condom use, [9] which in turn are associated with risk of STI/HIV acquisition; thus, improving men's experiences of condom use is important. This group of men may benefit from some type of brief behavioral intervention to reduce their erectile difficulties. Although pharmacological treatments for ED are often a "first-line" approach for men with erectile difficulties, previous studies have suggested that PDE-5i do not necessarily overcome CAEP [26]. Furthermore, PDE-5i use may be a risk factor for condom breakage [27].

In view of the findings that men with CAEP may need more time to become aroused than men not reporting CAEP, Janssen and colleagues [11] recommended that men with CAEP

should be encouraged to take sufficient time to become aroused and ensure that they receive adequate stimulation, particularly when using condoms. Recent pilot studies of a self-guided home-based intervention to promote condom use among young men (requiring only minimal clinician input) reported increased confidence in men's ability to use condoms, self-efficacy for condom use, and condom comfort as well as a reduction in breakage and EPs post-intervention [28,29]. There is also a need for better instruction in correct condom use. More than one-third (37%) of the current sample of condom-using men had never been taught how to use a condom correctly. Clinicians should assess whether men using condoms experience CAEP and where appropriate, make referrals for psychosexual therapy or provide condom skills education [28,29].

Conclusion

The findings suggest that men who report CAEP are also more likely to experience more generalized erection difficulties. Although the EPs may not meet clinical criteria for ED, clinicians should assess whether men using condoms experience CAEP and where appropriate, refer for psychosexual therapy or provide condom skills education.

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Table 1

Frequency of erection problems when not using condoms compared across CAEP groups

	Groups			
Erection problems when not using a condom	**No-CAEP (*n* = 142)**	**CAEP-Application only (*n* = 42)**	**CAEP-PVI only (*n* = 55)**	**CAEP-Both (*n* = 128)**
Before penetration				
Never (%)	90.1[a]	64.3[b,c]	75.4[b]	57.0 [c]
Occasionally (%)	4.9	28.6	16.4	30.5
Less than half the time (%)	3.5	7.1	5.5	8.6
Most of the time (%)	1.4	0	1.8	3.9
Always (%)	0	0	0	0
During PVI				
Never (%)	95.1[a]	85.7[b]	43.6 [c]	54.6 [c]
Occasionally (%)	3.5	11.9	40.0	33.1
Less than half the time (%)	1.4	2.4	12.7	7.7
Most of the time (%)	0	0	1.8	4.6
Always (%)	0	0	1.8	0

[*] $P < 0.001$

Superscripts indicate results of post-hoc comparisons using $P < 0.05$ criteria. Groups that share a letter are not significantly different. Those not sharing a letter are significantly different.

CAEP = condom-associated erection problem; PVI = penile–vaginal intercourse.

Table 2

IIEF-5 scores and ED classifications by CAEP groups

	No-CAEP (*n* = 184)	CAEP-Application only (*n* = 66)	CAEP-PVI only (*n* = 75)	CAEP-Both (*n* = 154)
Mean (SD) IIEF-5 score *	23.92 (2.24)[a]	23.20 (2.51)[a,b]	22.93 (2.56)[b,c]	22.12 (2.54)[c]
Classification of IIEF-5 Score *				
No ED (%)	91.3[a]	81.8[b]	77.3[b,c]	68.2 [c]
Mild ED (%)	7.1	15.2	20.0	28.6
Mild to moderate ED (%)	0.5	3.0	1.3	3.2
Moderate ED (%)	1.1	0	1.3	0
Severe (%)	0	0	0	0

* $P < 0.001$

Superscripts indicate results of post-hoc comparisons using $P < 0.05$ criteria. Groups that share a letter are not significantly different. Those not sharing a letter are significantly different.

CAEP = condom-associated erection problem; ED = erectile dysfunction; IIEF-5, International Index of Erectile Function; PVI = penile–vaginal intercourse; SD = standard deviation.