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A Momentary Sampling Study of the Affective Experience Following Coital Events in Adolescents

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Abstract

Purpose— The purpose of this study was to describe the affective experience following sexual intercourse among sexually active adolescents. We hypothesized that these youth would experience more positive and less negative affect following sexual intercourse than at other times in their daily lives.

Methods— Approximately every three waking hours, sexually active adolescents aged 15–21 years used a handheld computer to report current affect and recent sexual intercourse in response to random signals. Participants also completed a report after sexual intercourse. Affect was determined by eight states, as well as composite variables for positive and negative affect. Generalized estimating equations compared affect on reports that did and did not include sexual intercourse. Each model included average affect, affect variability (standard deviation), and significant interactions with the occurrence of sexual intercourse. Based on their distribution, outcome variables were modeled as presence/absence of affect.

Results— Sixty-seven youth completed 1385 random and 392 event reports. There were 266 unique coital reports (median 2.6/participant/week); 94% were with a main partner and 49% involved condom use. Youth were more likely to report positive affect and less likely to report negative affect when they were also reporting recent sexual intercourse, as compared to non-coital reports. In multivariate analyses, participants had greater odds of reporting well-being and alertness and lower odds of reporting stress and anger following sexual intercourse compared to other times.

Conclusions— Adolescents report improvement in specific positive and negative affective states following sexual intercourse. Determining how feeling more positive and less negative after sexual intercourse may motivate or reinforce sexual intercourse will be important in understanding adolescent sexual behavior.

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Keywords

Adolescents; Sexual intercourse; Coitus; Affect; Sexual behavior; Momentary sampling

Introduction

By young adulthood, the majority of adolescents have had sexual intercourse.[1] Much of the research on adolescent sexual behavior has focused on its adverse outcomes, including sexually transmitted infections (STIs), unplanned pregnancy, other risk behaviors, and mental health problems. As such, there has been limited exploration into potential positive consequences of sexual intercourse that would provide a more comprehensive understanding of adolescent sexual behavior.

In particular, little is known about adolescents' affective states subsequent to sexual intercourse. The limited research has suggested that the perceived and actual affective experience of sexual intercourse may be positive as well as negative and is associated with future sexual behaviors. For example, a large study of adolescents found that girls (but not boys) who expected to have positive emotions after sex were more likely to initiate sexual activity.[2] If sexual intercourse is a positive experience and therefore effective in producing improved affect, then the individual is likely to pursue future coital experiences. A study of adolescent girls found that 37% of those who were not virgins indicated that "I like having sex" was a reason that they were sexually active.[3]

Conversely, negative experiences with sexual intercourse may deter sexual intercourse or result in less safe sex. Women's negative emotional responses to coitus, such as anxiety, guilt, and fear, may inhibit intercourse or interfere with the use of effective contraception.[4] Adolescent and young adult STI clinic patients who reported less positive (e.g., feeling good about oneself after sex half the time or less) and more negative feelings (feeling angry) after having sex were more likely to be diagnosed with an STI.[5] Of note, these emotional variables were greater predictors of STI than sexual history or frequency of condom use.

Previous studies have typically examined perceived affective consequences of sex,[2] actual affective experiences of sex in general[5] or the associations of daily affect with coitus,[6] and thus could not study actual affect following specific coital events. Other studies have examined only the first experience with sexual intercourse[5, 7–11] and thus have relied on recall of a distant event. The majority of studies have examined the affective experience of sexual intercourse for women, but not men.[5, 7–11]

Momentary sampling (MS) methods[12, 13] are uniquely suited to measuring highly variable phenomena, such as affect, in relation to specific behavioral events, such as sexual intercourse. MS methods were developed to add ecological validity to the study of the feelings, thoughts, and behaviors of daily life by capturing a representative sample of momentary states.[12, 14] MS reports are completed in "real time" and thus are unaffected by recall bias. Compared to diaries, MS is better able to detect within-day fluctuations in affect as well as situational factors influencing affect. Additionally, participants can be asked to record a report as soon as possible after they identify a target behavior ("self-monitoring," used in studies of smoking[15] and drinking[16, 17]).

Understanding what youth feel after having sexual intercourse may yield insight into what motivates or deters their future sexual behavior, information that can guide the development of effective interventions to promote healthy sexuality and to prevent adverse outcomes. The objective of this study was to use MS methods to examine affective states following coital

events in a sample of sexually active adolescents. We hypothesized that adolescents experience more positive and less negative affect following sexual intercourse than at other times in their daily lives.

Methods

Study Sample

Patients of a large adolescent clinic in an urban children's hospital were invited by their clinical provider to participate if they were age 15 to 21 years and reported penile-vaginal sexual intercourse at least once a week, on average. Sexual intercourse was the sexual behavior of interest because it affords the greatest risk of adverse outcomes and because it is a discrete, clearly defined event well suited for evaluation using MS methods. Patients who were in emotional crisis at the time of recruitment were excluded but could be invited to enroll later, when they were emotionally stable. Eligible, interested youth completed the informed consent process in a private clinic room. The study was approved by the hospital's institutional review board with a waiver of the requirement for parental consent in accordance with the federal regulations governing research.[18]

Baseline Assessment

Each participant was asked to complete a 30-minute baseline assessment battery by audio computer-assisted self-interview (ACASI) and a timeline follow-back (TLFB) calendar[19] administered by the research assistant.

Demographic information—Sex, age, date of birth, race and ethnicity, highest grade completed, and type of health insurance were collected.

Sexual history—Age of first sexual intercourse, number of sexual partners (lifetime and past three months), coital frequency (weekly average and in the past week), and history of STI treatment were assessed.

Baseline affect—Baseline affect was evaluated using the Mood Adjective Scale (MAS)[20, 21] and the Positive and Negative Affect Scale (PANAS).[22] Because adjective scales provide greater variability in response within-participant than numerical scales, the MAS was developed for momentary assessment of affect in youth.[20, 21] The baseline MAS was used to establish average levels of affect for the week before collecting momentary MAS data and to evaluate for possible reactivity to the MS method. The MAS consists of eight mood scales of five ordered adjectives each plus the option of "None" (range for each scale 0–5). For this study, composite variables were created for positive affect (Happiness, Well-being, Alertness; composite score range 0–15) and negative affect (Sadness, Anxiety, Stress, Fatigue, Anger; composite score range 0–25).

On the PANAS, a valid and reliable self-report affect measure,[22–24] respondents rate on a 5-point Likert-type scale the extent to which they feel each of 10 positive and 10 negative affective states. Responses are summed separately for positive affect and negative affect (range for each 10–50). The well-established PANAS was correlated with the MAS to assess convergent validity.

Frequency of sexual intercourse—Participants were asked to indicate their coital frequency in an average week and over the past seven days.

Depressive symptoms—Nearly one-half of sexually active youth may report high levels of depressive symptoms.[25] To examine the potential moderating effect of depressive

symptoms on the coitus-affect relationship, severity of depressive symptoms in the past week was assessed using the Beck Depression Inventory (BDI),[26] a self-report instrument consisting of 21 groups of four graded statements each (score for each item 0–3). The BDI has good psychometric properties[27] and is valid and reliable in adolescents.[28]

After each participant completed the baseline assessment, the research assistant scored the BDI. A medical or mental health clinician was notified of high BDI scores (≥16 out of a possible 63),[29] as well as any suicidal ideation, and followed up according to standard clinic practice.

Past-week recall calendar—Using a TLFB calendar for the past seven days, participants indicated their best, worst, and other notable affective states, using the affect terms from the PANAS, and any occurrence of sexual intercourse, along with event-specific sexual partner type and whether a condom was used.

MS Data Collection

Participants were asked to complete reports for one week using a handheld computer that had The Experience Sampling Program (University of California, Irvine), with all other functions locked out. Research staff trained participants in the use of the computer using verbal instructions, hands-on practice, and a training manual.

Random reports—The handheld computer was programmed to emit an auditory signal at random within 3-hour intervals during the participant's self-identified waking hours (4–6 signals/day). Signals could not be emitted closer than 30 minutes apart. Participants were instructed to respond to a signal as soon as possible. If no report was completed, the computer would emit up to three reminder signals at 1-minute intervals. Entries were time-coded and could not be completed after the final reminder signal. Participants were asked to identify in advance times when they knew that they would not be willing or able to respond, up to a maximum of 77 hours per week. The computer was programmed not to emit a signal during these times.

The random reports assessed environmental context, substance use and coital events since last signal, and affective states. Each report took 1–3 minutes to complete, depending on the occurrence of risk events. For the purposes of this report, the questions and responses related to context and to substance use are not presented.

Coital events Participants were asked if sexual intercourse had occurred since the last signal.

Coital event-specific type of sexual partner and condom use If participants responded affirmatively that they had sexual intercourse, they were asked with what type of partner (main, other (non-main or casual), or new) and whether a condom was used (yes, no).

Affective states Current positive and negative affective states were measured using the MAS.[20, 21]

Event reports—Participants were asked to complete an event report as soon as possible after coital and substance use events. Data collected regarding sexual intercourse included type of sexual partner and whether a condom was used, as described for random reports. Each event report took approximately two minutes to complete.

Participants were provided with a business card with the name and telephone number of the research assistant that they could present if they were questioned regarding their study participation.[30] If contacted, the research assistant confirmed that the participant was in this study. No further information was provided. Between 24 and 48 hours after beginning data

collection, research staff contacted the participant to answer questions and resolve any problems.

Follow-up Visit

At the second study visit, participants were asked to recollect their affect, substance use, and coital events using a TLFB calendar for the same 1-week period that data were collected by MS. Because it would be difficult to recall the specifics of affect on any given day, participants were asked to give a general impression of their affect for each of the seven days, noting in particular days with the best and the worst affective states. They were also asked to complete the MAS by ACASI for that week. The interview and questionnaire took approximately 20 minutes to complete.

Participants were then offered a general mall gift card as remuneration for their time and efforts: $10 for the baseline assessment, $10 if they responded to less than 80% of the random signals or $20 if they responded at least 80% of the random signals, and $10 for the follow-up assessment.

Data Analysis

The positive affect subscale of the PANAS was moderately correlated (r=.48) with MAS composite positive affect and the PANAS negative affect subscale was highly correlated (r=.76) with MAS composite negative affect ($p<0.01$ for both). Using the momentary MAS assessments, the mean and standard deviation for each of the eight affect scales, plus the composite positive and negative affect variables, were calculated for each participant.

Bivariate associations between the occurrence of sexual intercourse and each affect variable were examined. Multivariate regression analyses were performed using generalized estimating equations (GEE) to account for each participant contributing multiple reports. For each of the eight affective states, plus the positive and negative affect composite variables, a model compared the affect variable on reports with and without sexual intercourse and included average affect, affect variability (standard deviation), as well as significant interactions with the occurrence of sexual intercourse. The affect outcomes were modeled as dichotomous, with a cutpoint at 0 or 1 depending on distribution of each affective state. If sexual intercourse was reported on a random report and on a self-initiated event report within the subsequent six hours, then only self-initiated report data were included in the models. Interactions between the affect variables and gender were examined to determine if gender differences in postcoital affect were present. The models were similarly evaluated for potential moderation by BDI score. The effects of condom use on affective states were explored among those reports that included sexual intercourse. Significance was defined as a 2-sided p-value less than 0.05.

To assess the possibility that frequent reporting of sexual intercourse via MS could alter the behavior (reactivity), the number of coital events in the previous week reported on the baseline TLFB calendar (the week prior to MS data collection) was compared to the number of coital events in the previous week reported of the follow-up TLFB calendar (the week of MS data collection), using an appropriate test for paired data.

Results

Of the 70 youth enrolled, 67 (97%) completed the study. The participants had a mean±SD age of 18±1.8 years (range, 15 to 21 years). The majority (76%) was female and African American race (57%); 33% of the sample reported Hispanic or Latino ethnicity. Most participants (96%) had completed at least some high school education. More than one-half of the sample (58%)

had Medicaid insurance, received free care, or had no insurance; 19% did not know what kind of health insurance they had.

On the baseline ACASI assessment, participants reported a mean (±SD) coital frequency in an average week of 3.04 (±1.9), with a mean (+SD) of 1.88 (±1.5) coital events in the past seven days. Their median age of first sexual intercourse was 15 years. They had a median of four sexual partners in their lifetime and a median of one sexual partner in the past three months. More than one in four participants (27%) reported having been treated for an STI.

During MS data collection, the participants completed 1777 reports, 1385 in response to a random signal (response rate, 52%) and 392 self-initiated following an episode of sexual intercourse or substance use. Examination of the signal data revealed no evidence of systematic non-response.

A total of 266 unique coital events were identified (median 2.6, range 0–11 per participant per week). Most (249/266, 94%) of the coital events were with a main partner and approximately one-half (129/266, 49%) involved use of a condom.

The correlations between baseline positive affect and negative affect on the PANAS and on the MAS were small and not significant (0.02 and −0.11, respectively), indicating that positive affect and negative affect should be evaluated as independent states. Table 1 shows the means of the participant-level means and standard deviations for the eight affective states and two composite affect variables assessed on response to the random signals. On average, the adolescents reported moderate levels of positive affect and very low levels of negative affect.

Figures 1 and 2 show the bivariate associations between the occurrence of sexual intercourse and the positive and negative affect variables, respectively. Participants were more likely to report positive affect when they were reporting that sexual intercourse had occurred since last signal than they were when they did not report sexual intercourse. For example, youth reported positive affect on 93% of reports in which they indicated recent sexual intercourse, as compared to 82% of non-coital reports. The reverse tended to be true for the negative affective states. Participants were, in general, less likely to report any negative affect, stress, anger, and sadness when they reported a coital event than when they did not; the difference achieved significance only for anger.

Table 2 shows the odds ratio for the presence of each affect variable, as predicted by the occurrence of sexual intercourse, adjusted for the mean and standard deviation of the affect variable. For example, adjusting for the mean and standard deviation of happiness, participants had 3.4 times the odds of reporting happiness when they reported sexual intercourse had occurred than at other times during the week. Following sexual intercourse, the odds of reporting positive affective states were all greater than one and the odds of reporting negative affective states were all less than one, with the exception of fatigue. Significant findings were seen for all the positive affect variables and for composite negative affect, stress, and anger. The magnitude of the odds ratios suggests that there was a stronger association between sexual intercourse and positive affect vs. negative affect.

There were no gender differences in post-coital affect, i.e., none of the interaction terms between sexual intercourse and gender was significant (all $p \geq 0.20$). Similarly, there was no significant moderation by BDI score. There were no differences in the associations between sexual intercourse and any of the affect variables based on whether a condom was used.

More coital events were reported on the follow-up TLFB calendar than the baseline TLFB calendar (Wilcoxon rank sum test $p = 0.0014$).

Conclusions

In this study, adolescents reported measurable improvement in both positive and negative affective states following a coital event, compared with other times during a week. Specifically, participants had greater odds of experiencing alertness, happiness, and well-being and lower odds of experiencing anger, anxiety, and stress following sexual intercourse than at other times. Further, the findings suggest stronger effects for positive as compared to negative postcoital affect. The study used MS methods to obtain actual affective states in real time as opposed to measuring recalled affect that was thus cognitively processed and potentially altered.[12, 14] Furthermore, the study examined specific coital events and thus could temporally relate these events to subsequent affective states.

Research on the affective experience of sexual intercourse is limited and has focused largely on first coitus.[5, 7–11] In addition, few studies have examined positive as well as negative affective consequences of sexual intercourse. Our findings are consistent with previous research suggesting the importance of separately examining positive and negative affect.[23, 31]

The development of sexual intimacy and healthy sexual expression is one of the major tasks for adolescents as they emerge into adults capable of romantic relationships fulfilling the needs for affiliation, attachment, caretaking, and reproduction.[32, 33] Yet research on adolescent sexual behaviors has long neglected to consider the developmental context of these behaviors, and instead has focused solely on risk.[34, 35] Young people's successful negotiation of the developmental path to becoming sexually competent adults able to sustain intimacy may depend on acquisition of experience with sexual relationships.[34] For example, frequent sexual behaviors have been found to contribute to the longevity of adolescent romantic relationships.[36] The association of sexual intercourse with subsequent improved affect may be an important marker of adolescents' developing healthy intimate relationships and warrants further consideration in research on adolescents' maturation into sexually healthy adults.

Unlike previous studies,[7–11] we did not find gender differences in affect following sexual intercourse. Our study may have been limited in its ability to detect gender differences owing to the relatively small number of male participants. It is also possible that gender differences in affective reactions to first intercourse, such has men experiencing more pleasure and anxiety and women experiencing more guilt,[10] are not as pronounced or not present among youth who are regularly sexually active or in regular relationships, as were most participants in our study. One study of male and female undergraduate students found that although females reported more guilt and less satisfaction as a result of their first coital experience than males, there were no gender differences in guilt and satisfaction with current sexual intercourse.[8] Both genders have reported more pleasure and less guilt when first coitus has occurred in close versus casual relationships.[9] Additionally, orgasm, which at least partially mediates the association between coitus and sexual satisfaction,[10] is more likely to occur among women in established relationships, thereby reducing gender differences observed with first coitus.

We observed improved post-coital affect regardless of whether a condom was used during the coital event. Previous research in college students has suggested that condom use is associated with more positive experience with sexual encounters with a steady partner, compared to no condom use.[37] A study of condom use during the first coital encounter with a new partner similarly found that students who insisted on condom use reported positive feelings, including feeling safer, having more respect for their partner, and experiencing less regret.[38] Condom usage was also associated with perceiving the relationship as more intimate.[38] Rather than using hypothetical scenarios, our study assessed actual experience in "real time" and asked about affective states separately from questions about specific coital events. Therefore, it is

possible that the findings are less prone to bias associated with socially desirable responding, where individuals may report more positive feelings about sexual intercourse when a condom is used because they feel that that is the responsible or appropriate thing to do.

The findings of this study must be interpreted with caution. First, the sample was limited to youth drawn from a single adolescent clinic who were having sexual intercourse at least weekly and therefore generally in a monogamous relationship, and included relatively few males and only heterosexually active youth. The results may not be generalizable to adolescents from different settings, in different types of sexual relationships, or engaging in other forms of sexual contact. Second, the signal response was low. Despite this, a large number of reports were accrued, including a substantial number of reports with coital events, and there was no evidence of systematic non-response to the signals. Third, the psychometric characteristics of the affect scale and other items on the MS questionnaire have not been fully explored. Fourth, the exact time of sexual intercourse was not collected, so we could not determine how affect changed as the time from sexual intercourse increased.

There are also limitations of the MS method, including its reliance on self-report, the potential of self-selection bias, and the possibility that the method influences the phenomena being measured.[12, 14] Self-monitoring data may be particularly prone to distortion owing to reactivity to the act of recording the behavior, although previous studies of sexual behavior[39, 40] have suggested that the magnitude of reactivity with self-monitoring may be small. Although the increase in coital events reported on the TLFB calendar could represent a true increase in coital behavior, it is possible that the increase could signify an increase in reporting owing to decrease in recall bias (as seen in diet reporting), decrease in social desirability bias (as participants became more comfortable with reporting sexual behavior), and increase in desire to please the investigator (by reporting more coital events than actually occurred to aid in achieving study goals). Even if reactivity to MS existed, it would have had to produce a change in the affect-coitus association to be of relevance to the findings. That is, that coitus that occurred in response to self-monitoring was related to affect differently than coitus not related to the method, a premise for which we have no theoretical or empirical support.

There are at least two important implications of this work for safer sex interventions. First, efforts to modify adolescent sexual behavior need to consider possible affective benefits of sexual intercourse. Awareness that one may feel better after sexual intercourse may motivate or reinforce continued sexual activity, as suggested by affect regulation or motivational models of behavior.[41] Additionally, substance use research has found that perceived benefits of alcohol were a better predictor of adolescents' drinking six months later than perceived risks.[42] Safer sex messages may be more appealing and considered more seriously by youth if these messages are more balanced and reflective of adolescents' own experiences in presenting the advantages as well as disadvantages of sexual intercourse and if they discuss alternative means of achieving the affective benefits associated with sexual intercourse. Affectionate sexual behaviors such as hand-holding and kissing have been associated with positive relationship qualities in late adolescent couples[36] and thus may offer a means of accomplishing sexual development tasks related to intimacy while minimizing risk.

Second, the affective experience of sexual intercourse is a proximal, personally relevant factor that has been shown to influence risk for STI when it is less positive and more negative.[5] Affect following sexual intercourse is also a potentially modifiable risk factor in that STI preventive interventions can aim to reduce adolescents' exposure to coital experiences that may be associated with poorer affect. Female college students who felt most guilty after their first sexual intercourse were more likely to have had the experience at an earlier age, with a casual partner, and after drinking alcohol;[43] use of drugs and sex in public settings have also been

associated with negative affect following first coitus in a similar population.[7] Additional research may identify similar sexual situations that may produce worse affect among youth with ongoing sexual activity. This more targeted approach to modifying adolescent sexual risk may prove more effective than a global abstinence message in promoting healthy sexual development and reducing adverse outcomes.[34, 44]

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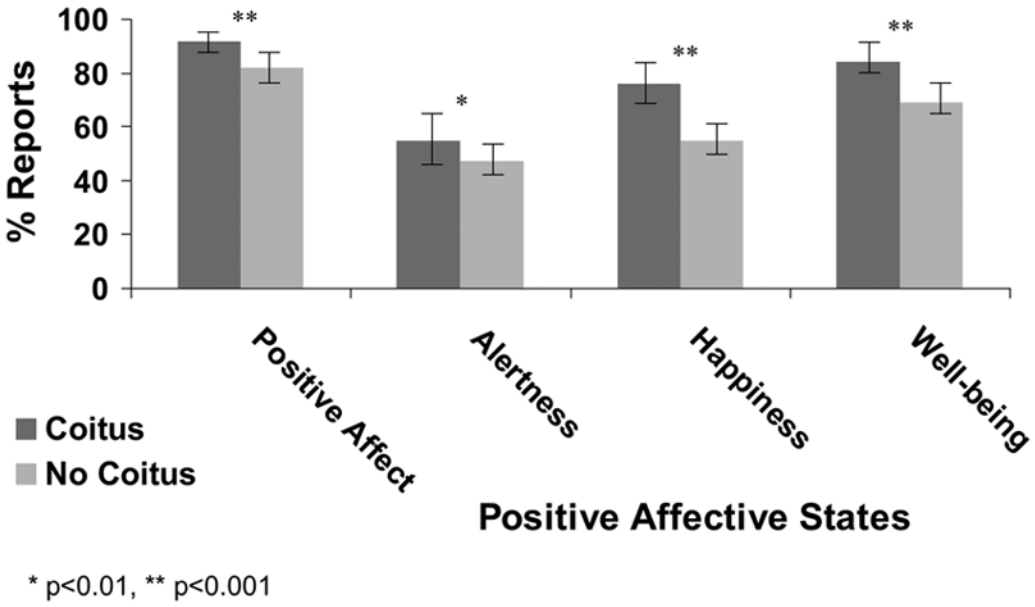

Figure 1.
Presence of Positive Affect by Occurrence of Coitus

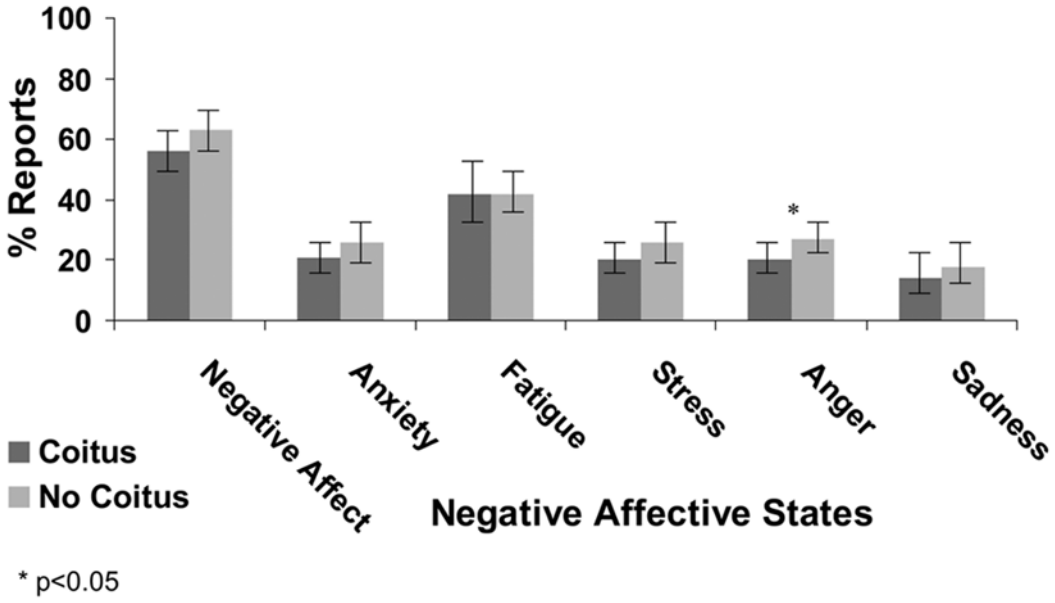

Figure 2.
Presence of Negative Affect by Occurrence of Coitus

Table 1

Mean Participant-Level Means and Standard Deviations of Affective States Assessed on Momentary Sampling Random Reports (N=67)

Affect Variable (score range)	Participant-Level Mean	Participant-Level Standard Deviation
Composite Positive Affect (0–15)	6.1	2.5
Alertness (0–5)	1.6	1.1
Happiness (0–5)	2.1	1.3
Well-being (0–5)	2.3	1.1
Composite Negative Affect (0–25)	3.9	3.4
Anger (0–5)	0.6	0.9
Anxiety (0–5)	0.5	1.0
Fatigue (0–5)	1.6	1.4
Sadness	0.4	0.6
Stress	0.8	1.1

Table 2

GEE Models Predicting Presence of Affect Following Occurrence of Sexual Intercourse

Affect Variable	Adjusted Odds Ratio	95% Confidence Interval
Composite Positive Affect	3.0	1.9 – 4.6
Alertness	1.5	1.1 – 2.2
Happiness	3.4	2.4 – 4.8
Well-being	2.8	2.0 – 4.2
Composite Negative Affect	0.7	0.5 – 0.9
Anger	0.6	0.4 – 0.9
Anxiety	0.7	0.4 – 1.1
Fatigue	1.0	0.7 – 1.4
Sadness	0.6	0.4 – 1.1
Stress	0.6	0.4 – 0.9

GEE = generalized estimating equation