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SOME EVIDENCE FOR HEIGHTENED SEXUAL ATTRACTION UNDER CONDITIONS OF HIGH ANXIETY¹

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Male passersby were contacted either on a fear-arousing suspension bridge or a non-fear-arousing bridge by an attractive female interviewer who asked them to fill out questionnaires containing Thematic Apperception Test pictures. Sexual content of stories written by subjects on the fear-arousing bridge and tendency of these subjects to attempt postexperimental contact with the interviewer were both significantly greater. No significant differences between bridges were obtained on either measure for subjects contacted by a male interviewer. A third study manipulated anticipated shock to male subjects and an attractive female confederate independently. Anticipation of own shock but not anticipation of shock to confederate increased sexual imagery scores on the Thematic Apperception Test and attraction to the confederate. Some theoretical implications of these findings are discussed.

There is a substantial body of indirect evidence suggesting that sexual attractions occur with increased frequency during states of strong emotion. For example, heterosexual love has been observed to be associated both with hate (James, 1910; Suttie, 1935) and with pain (Ellis, 1936). A connection between "aggression" and sexual attraction is supported by Tinbergen's (1954) observations of intermixed courting and aggression behaviors in various animal species, and a series of experiments conducted by Barclay have indicated the existence of a similar phenomenon in human behavior. In one study, Barclay and Haber (1965) arranged for students in one class to be angered by having their professor viciously berate them for having done poorly on a recent test; another class served as a control. Subsequently, both groups were tested for aggressive feelings and for sexual arousal. A manipulation check was successful, and the angered group manifested significantly more sexual arousal than did controls ($p < .01$) as measured by explicit sexual content in stories written in response

to Thematic Apperception Test (TAT)-like stimuli. Similar results were obtained in two further studies (Barclay, 1969, 1970) in which fraternity and sorority members were angered by the experimenter. The 1970 study employed a female experimenter, which demonstrated that the aggression-sexual arousal link was not specific to male aggression; the 1969 study provided additional support for the hypothesis by using a physiological measure of sexual arousal (acid phosphatase content in urine samples).

Barclay has explained his findings in terms of a special aggression-sexuality link and has cited as support for his position Freud's (1938) argument that prehistoric man had to physically dominate his potential mates and also a study by Clark (1952) in which increased sexual arousal produced by viewing slides of nudes yielded increased aggression in TAT responses. Aron (1970), on the other hand, argued that an aggression-sexuality link exists, but it is only a special case of a more general relationship between emotional arousal of all kinds and sexual attraction. To demonstrate this point, he designed a study in which instead of anger, residual emotion from intense role playing was the independent variable. In this experiment, each of 40 male subjects role played with the same attractive female confederate in either a highly emotional or a minimally emotional situation.

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Subjects enacting highly emotional roles included significantly more sexual imagery in stories written in response to TAT-like stimuli ($p < .01$) and indicated significantly more desire to kiss the confederate ($p < .05$) than did subjects in the control condition. One possible explanation is suggested by Schachter's theory of emotion (Schachter, 1964; Schachter & Singer, 1962). He argued that environmental cues are used, in certain circumstances, to provide emotional labels for unexplained or ambiguous states of arousal. However, it is notable that much of the above-cited research indicates that a sexual attraction-strong emotion link may occur even when the emotions are unambiguous. Accordingly, taking into account both the Schachter position and findings from sexual attraction research in general, Aron (1970) hypothesized that strong emotions are re-labeled as sexual attraction whenever an acceptable object is present, and emotion-producing circumstances do not require the full attention of the individual.

The present series of experiments is designed to test the notion that an attractive female is seen as more attractive by males who encounter her while they experience a strong emotion (fear) than by males not experiencing a strong emotion. Experiment 1 is an attempt to verify this proposed emotion-sexual attraction link in a natural setting. Experiments 2 and 3 are field and laboratory studies which attempt to clarify the results of Experiment 1.

EXPERIMENT 1

Method

Subjects

Subjects were males visiting either of two bridge sites who fit the following criteria: (a) between 18 and 35 years old and (b) unaccompanied by a female companion. Only one member of any group of potential subjects was contacted. A total of 85 subjects were contacted by either a male or a female interviewer.

Site

The experiment was conducted on two bridges over the Capilano River in North Vancouver, British Columbia, Canada. The "experimental" bridge was the Capilano Canyon Suspension Bridge, a five-foot-wide, 450-foot-long, bridge constructed of wooden boards attached to wire cables that ran

from one side to the other of the Capilano Canyon. The bridge has many arousal-inducing features such as (a) a tendency to tilt, sway, and wobble, creating the impression that one is about to fall over the side; (b) very low handrails of wire cable which contribute to this impression; and (c) a 230-foot drop to rocks and shallow rapids below the bridge. The "control" bridge was a solid wood bridge further upriver. Constructed of heavy cedar, this bridge was wider and firmer than the experimental bridge, was only 10 feet above a small, shallow rivulet which ran into the main river, had high handrails, and did not tilt or sway.

Procedure

As subjects crossed either the control or experimental bridge, they were approached by the interviewer.³

Female interviewer. The interviewer explained that she was doing a project for her psychology class on the effects of exposure to scenic attractions on creative expression. She then asked potential subjects if they would fill out a short questionnaire. The questionnaire contained six filler items such as age, education, prior visits to bridge, etc., on the first page. On the second page, subjects were instructed to write a brief, dramatic story based upon a picture of a young woman covering her face with one hand and reaching with the other. The instructions and the picture (TAT Item 3GF) employed were adapted from Murray's (1943) *Thematic Apperception Test Manual*. A similar measure of sexual arousal has been employed in the Barclay studies (1969, 1970; Barclay & Haber, 1965), and in other sex-related experiments (Aron, 1970; Clark, 1952; Leiman & Epstein, 1961). The particular TAT item used in the present study was selected for its lack of obvious sexual content, since projective measures of sexual arousal based on explicit sexual stimuli tend to be highly sensitive to individual differences due to sexual defensiveness (Clark & Sensibar, 1955; Eisler, 1968; Leiman & Epstein, 1961; Lubin, 1960). If the subject agreed, the questionnaire was filled out on the bridge.

Stories were later scored for manifest sexual content according to a slightly modified version of the procedure employed by Barclay and Haber (1965). Scores ranged from 1 (no sexual content) to 5 (high sexual content) according to the most sexual reference in the story. Thus, for example, a story with any mention of sexual intercourse received 5 points; but if the most sexual reference was "girl friend," it received a score of 2; "kiss" counted 3; and "lover," 4.

On completion of the questionnaire, the interviewer thanked the subject and offered to explain the experiment in more detail when she had more time. At this point, the interviewer tore the corner off a

³ The interviewers were not aware of the experimental hypothesis in order to prevent unintentional differential cueing of subjects in experimental and control groups.

sheet of paper, wrote down her name and phone number, and invited each subject to call, if he wanted to talk further. Experimental subjects were told that the interviewer's name was Gloria and control subjects, Donna, so that they could easily be classified when they called. On the assumption that curiosity about the experiment should be equal between control and experimental groups, it was felt that differential calling rates might reflect differential attraction to the interviewer.

Male interviewer. The procedure with the male interviewer was identical to that above. Subjects were again supplied with two fictitious names so that if they phoned the interviewer, they could be classified into control or experimental groups.

Results

Check on Arousal Manipulation

Probably the most compelling evidence for arousal on the experimental bridge is to observe people crossing the bridge. Forty percent of subjects observed crossing the bridge walked very slowly and carefully, clapping onto the the handrail before taking each step. A questionnaire was administered to 30 males who fit the same criteria as the experimental subjects. Fifteen males on the experimental bridge were asked, "How fearful do you think the average person would be when he crossed this bridge?" The mean rating was 79 on a 100-point scale where 100 was equal to extremely fearful. Fifteen males on the control bridge gave a mean rating of 18 on the same scale ($t = 9.7$, $df = 28$, $p < .001$, two-tailed). In response to the question "How fearful were you while crossing the bridge?" experimental-bridge males gave a rating of 65 and control-bridge males a rating of 3 ($t = 10.6$, $p < .001$, $df = 28$, two-tailed). Hence, it can be concluded that most people are quite anxious on the experimental bridge but not on the control bridge. To prevent suspicion, no checks on the arousal of experimental subjects could be made.

Thematic Apperception Test Responses

Female interviewer. On the experimental bridge, 23 of 33 males who were approached by the female interviewer agreed to fill in the questionnaire. On the control bridge, 22 of 33 agreed. Of the 45 questionnaires completed, 7 were unusable either because they were incomplete or written in a foreign language. The remaining 38 questionnaires (20 experi-

mental and 18 control) had their TAT stories scored for sexual imagery by two scorers who were experienced with TAT scoring. (Although both were familiar with the experimental hypothesis, questionnaires had been coded so that they were blind as to whether any given questionnaire was written by a control or experimental subject.) The inter-rater reliability was $+ .87$.

Subjects in the experimental group obtained a mean sexual imagery score of 2.47 and those in the control group, a score of 1.41 ($t = 3.19$, $p < .01$, $df = 36$, two-tailed). Thus, the experimental hypothesis was verified by the imagery data.

Male interviewer. Twenty-three out of 51 subjects who were approached on the experimental bridge agreed to fill in the questionnaire. On the control bridge 22 out of 42 agreed. Five of these questionnaires were unusable, leaving 20 usable in both experimental and control groups. These were rated as above. Subjects in the experimental group obtained a mean sexual imagery score of .80 and those in the control group, .61 ($t = .36$, ns). Hence the pattern of result obtained by the female interviewer was not reproduced by the male interviewer.

Behavioral Data

Female interviewer. In the experimental group, 18 of the 23 subjects who agreed to the interview accepted the interviewer's phone number. In the control group, 16 out of 22 accepted (see Table 1). A second measure of sexual attraction was the number of subjects who called the interviewer. In the experimental group 9 out of 18 called, in the control group 2 out of 16 called ($\chi^2 = 5.7$, $p < .02$). Taken in conjunction with the sexual imagery data, this finding suggests that subjects in the experimental group were more attracted to the interviewer.

Male interviewer. In the experimental group, 7 out of 23 accepted the interviewer's phone number. In the control group, 6 out of 22 accepted. In the experimental group, 2 subjects called; in the control group, 1 subject called. Again, the pattern of results obtained by the female interviewer was not replicated by the male.

TABLE 1

BEHAVIORAL RESPONSES AND THEMATIC APPERCEPTION TEST IMAGERY SCORES FOR EACH EXPERIMENTAL GROUP

Interviewer	No. filling in questionnaire	No. accepting phone number	No. phoning	Usable questionnaires	Sexual imagery score
Female					
Control bridge	22/33	16/22	2/16	18	1.41
Experimental bridge	23/33	18/23	9/18	20	2.47
Male					
Control bridge	22/42	6/22	1/6	20	.61
Experimental bridge	23/51	7/23	2/7	20	.80

Although the results of this experiment provide *prima facie* support for an emotion-sexual attraction link, the experiment suffers from interpretative problems that often plague field experiments. The main problem with the study is the possibility of different subject populations on the two bridges. First, the well-advertised suspension bridge is a tourist attraction that may have attracted more out-of-town persons than did the nearby provincial park where the control bridge was located. This difference in subject populations may have affected the results in two ways. The experimental subjects may have been less able to phone the experimenter (if they were in town on a short-term tour) and less likely to hold out the possibility of further liaison with her. If this were the case, the resulting difference due to subject differences would have operated *against* the main hypothesis. Also, this difference in subject populations could not affect the sexual imagery scores unless one assumed the experimental bridge subjects to be more sexually deprived than controls. The results using the male interviewer yielded no significant differences in sexual imagery between experimental and control subjects; however, the possibility still exists that sexual deprivation could have interacted with the presence of the attractive female experimenter to produce the sexual imagery results obtained in this experiment.

Second, differences could exist between experimental and control populations with respect to personality variables. The experimental population might be more predisposed to thrill seeking and therefore more willing to chance phoning a strange female to effect a liaison. Also, present knowledge of personality theory does not allow us to rule out the

combination of thrill seeking and greater sexual imagery. Accordingly, a second experiment was carried out in an attempt to rule out any differential subject population explanation for the results of Experiment 1.

EXPERIMENT 2

Method

Subjects

Subjects were 34 males visiting the suspension bridge who fit the same criteria as in Experiment 1.

Procedure

The chief problem of Experiment 2 was choosing a site that would allow contact with aroused and nonaroused members of the same subject population. One possibility was to use as a control group suspension-bridge visitors who had not yet crossed the bridge or who had just gotten out of their cars. Unfortunately, if a substantial percentage of this group subsequently refused to cross the bridge, the self-selecting-subject problem of Experiment 1 would not be circumvented. Alternatively, males who had just crossed the bridge could be used as a control. The problem with this strategy was that this group, having just crossed the bridge, may have felt residual anxiety or elation or both, which would confound the study. To avoid this latter problem, control subjects who had just crossed the bridge and were sitting or walking in a small park were contacted at least 10 minutes after crossing the bridge. This strategy, it was hoped, would rule out residual physiological arousal as a confounding factor. Except that a different female experimenter was used in Experiment 2 and no male interviewer condition was run, all other details of the study were identical to Experiment 1.

Results

Check on Arousal Manipulation

As with Experiment 1, no arousal manipulation check was given to experimental subjects in order not to arouse suspicion about the real intent of the experiment. Data for a

group of nonexperimental subjects of the same age and sex as experimental subjects are reported in Experiment 1.

Thematic Apperception Test Responses

In the experimental group, 25 of 34 males who were approached agreed to fill in the questionnaire. In the control group, 25 out of 35 agreed. Of the 50 questionnaires completed, 5 were unusable because they were incomplete. The remainder (23 experimental and 22 control) were scored for sexual imagery as in Experiment 1. The interrater reliability in Experiment 2 was +.79.

Subjects in the experimental group obtained a mean sexual imagery score of 2.99 and those in the control group, a score of 1.92 ($t = 3.07$, $p < .01$, $df = 36$, two-tailed). Thus the experimental hypothesis was again verified by the imagery data.

Behavioral Data

In the experimental group, 20 of the 25 subjects who agreed to the interview accepted the interviewer's phone number. In the control group, 19 out of 23 accepted. In the experimental group, 13 out of 20 called, while in the control group, 7 out of 23 phoned ($\chi^2 = 5.89$, $p < .02$). Thus the behavioral result of Experiment 1 was also replicated.

Experiment 2 enables the rejection of the notion of differential subject populations as an explanation for the control-experimental-bridge differences for female interviewers in Experiment 1. However, some additional problems in the interpretation of the apparent anxiety-sexual attraction link require the superior control afforded by a laboratory setting.

First, although the female experimenter was blind to the experimental hypothesis and her behavior toward the subjects was closely monitored by the experimenter, the possibility of differential behavior toward the subjects occurring was not excluded. Distance of the interviewer from the subjects was controlled in both Experiments 1 and 2, but more stable nonverbal forms of communication (such as eye contact) could not be controlled without cueing the female interviewer to the experimental hypothesis.

Second, even if the interviewer did not

behave differentially in experimental and control conditions, she may have appeared differently in the two conditions. For example, the gestalt created by the experimental situation may have made the interviewer appear more helpless or frightened, virtually a "lady in distress." Such would not be the case in the control situation.

If this different gestalt led to differences in sexual attraction, the apparent emotion-sexual arousal link might prove artifactual. Accordingly, a laboratory experiment was run in which tighter control over these factors could be obtained. This experiment involved a 2×2 factorial design, where (a) the male subject expected either a painful or nonpainful shock (subject's emotion was manipulated) and (b) the female confederate also expected either a painful or nonpainful shock (the lady-in-distress gestalt was manipulated).

EXPERIMENT 3

Method

Subjects

Eighty male freshmen at the University of British Columbia took part in this experiment. All subjects were volunteers.

Much of the initial phase of the procedure was patterned after that used in Schachter's (1959) anxiety and affiliation research. Subjects entered an experimental room containing an array of electrical equipment. The experimenter welcomed the subject and asked him if he had seen another person who looked like he was searching for the experimental room. The experimenter excused himself "to look for the other subject," leaving the subject some Xeroxed copies "of previous studies in the area we are investigating" to read. The articles discussed the effects of electric shock on learning and pain in general.

The experimenter reentered the room with the "other subject," who was an attractive female confederate.⁴ The confederate took off her coat and sat

⁴ The female confederate knew that the study involved sexual attraction but did not know the experimental hypothesis. Her every action in the experimental room was carefully rehearsed to avoid any possibility of differential behavior among experimental conditions. Spacing of the confederate's chair from the subject's was carefully controlled, and the confederate was instructed to avoid any eye contact with the subject after their initial introduction. Hence, eye contact was restricted to the confederate's entering the room and returning to her chair after removing her coat. Both the confederate's and the subject's chairs faced the same direction (toward the experimenter), so that eye contact was

on a chair three feet to the side and slightly in front of the subject. The experimenter explained that the study involved the effects of electric shock on learning and delivered a short discourse on the value and importance of the research. At the end of this discourse, the experimenter asked if either subject wanted out of the experiment. As expected, no subject requested to leave.

The experimenter then mentioned that two levels of shock would be used in the experiment, describing one as quite painful and the other level as a "mere tingle, in fact some subjects describe it as enjoyable," and concluded by pointing out that the allocation of subjects to shock condition had to be "completely random so that personality variables won't affect the outcome." At this point, the experimenter asked both subjects to flip a coin to determine which shock level they would receive.⁵ Hence, the subject reported "heads/tails," the confederate reported "heads/tails," and the experimenter said, "Today heads receives the high shock level." The experimenter then described the way in which the shock series would take place, the method of hooking subjects into electrodes, etc.

The experimenter then asked if the subjects had any questions, answered any that arose, and then said:

It will take me a few minutes to set up this equipment. While I'm doing it, I would like to get some information on your present feelings and reactions, since these often influence performance on the learning task. I'd like you to fill out a questionnaire to furnish us with this information. We have two separate cubicles down the hall where you can do this—you will be undisturbed and private, and I can get this equipment set up.

The confederate then got up, walked in front of the subject to her coat, which was hanging on the wall, rummaged around for a pencil, and returned to her chair. The experimenter then led the subject and the confederate to the cubicles, where they proceeded to fill out the questionnaires.

Results

A three-part questionnaire constituted the dependent measure of this study. Part 1 (feelings about the experiment) included a check on the anxiety manipulation, Part 2 (feelings toward your co-subject) included two attrac-

easily avoided. In addition, the confederate's chair was somewhat closer to the experimenter than was the subject's chair, so that the subject could see the confederate while the experimenter delivered the instructions.

⁵ Toward the end of the experiment, the confederate was told to report either the same result as the subject or a different result (of the coin flip) to facilitate obtaining equal *ns* for experimental conditions as quickly as possible.

TABLE 2
REPORTED ANXIETY IN EXPERIMENTAL CONDITIONS

Subject expects:	Female confederate to get strong shock	Female confederate to get weak shock	No female confederate
Strong shock	3.17	3.05	3.80
Weak shock	2.42	2.28	

Note. *n* per cell = 20.

tion questions found to be most sensitive in experimental situations of this sort (Aron, 1970), and Part 3 included the TAT picture used in Experiments 1 and 2, which was again scored for sexual imagery.

Anxiety

Anxiety was measured by the question "How do you feel about being shocked?" (cf., Schachter, 1959) to which subjects could respond on a 5-point scale where scores greater than 3 indicated dislike. (The greater the score, the greater the anxiety.) Table 2 presents the results on this measure. In conditions where the subject anticipated receiving a strong shock, subjects reported significantly more anxiety than in conditions where the subject anticipated receiving a weak shock ($t = 4.03$, $p < .001$, $df = 39$, one-tailed). In conditions where the subject anticipated receiving a strong shock with the female co-subject present, subjects reported significantly less anxiety than in a control condition ($n = 20$), where two male subjects were run ($t = 2.17$, $p < .025$, $df = 19$, one-tailed). No significant differences in the subject's anxiety occurred as a function of the confederate receiving a strong versus a weak shock (see Table 2).

Attraction to Confederate

Two questions assessed attraction to the confederate in this study: (a) How much would you like to ask her out for a date? and (b) how much would you like to kiss her? (An alternative set of questions was provided for those subjects who ostensibly had a male copartner. The experimenter instructed subjects in this condition to overlook these.) Attraction ratings were established by taking the mean rating made by subjects on these two questions. Table 3 shows the results, by

TABLE 3

ATTRACTION RATINGS BY EXPERIMENTAL CONDITION

Subject expects:	Female confederate to get strong shock	Female confederate to get weak shock
Strong shock	3.7	3.4
Weak shock	2.9	2.7

Note. Strongest attraction rating is 5.

condition, of those ratings. A 2×2 analysis of variance revealed a significant main effect for subjects anticipating strong shock to themselves on attraction ratings ($F = 22.8$, $p < .001$). Subjects' expectations of strong versus weak shock to the female confederate produced no significant increase in attraction ($F = 2.61$, *ns*). (There was no significant interaction.) Hence, the lady-in-distress effect on attraction did not seem to appear in this study.

Thematic Apperception Test Responses

Sexual imagery scores on the TAT questionnaire were obtained as in Experiments 1 and 2 and are shown in Table 4. In the present study, sexual imagery was higher when the subject expected strong shock but only when the female confederate also expected strong shock ($F = 4.73$, $p < .05$). When the female confederate expected weak shock, differences in sexual imagery scores as a function of strength of shock anticipated by the subject failed to achieve significance ($F = 4.22$, $p = .07$).

GENERAL DISCUSSION

The results of these studies would seem to provide a basis of support for an emotion-sexual attraction link. The Barclay studies (Barclay, 1969, 1970; Barclay & Haber, 1965) have already demonstrated such a link for aggression and sexual arousal, and the present findings seem to suggest that the link may hold for fear as well. Indeed, the present

outcome would seem to be particularly satisfying in light of the very strong differences obtained from the relatively small subject populations, and because these results were obtained, in Experiments 1 and 2, outside of the laboratory in a setting in which real-world sexual attractions might be expected to occur.

The strong result of Experiment 3 supports the notion that strong emotion per se increases the subject's sexual attraction to the female confederate. Brehm, Gatz, Goethals, McCrimmon, and Ward (1967) obtained results consistent with Experiment 3 in a similar study. They also had male subjects threatened by impending electric shock in two experimental groups and not threatened in the control group. They obtained an F significant at the 5% level for differences between the threat and no-threat groups.

The theoretical implications of these results are twofold. In the first place, they provide additional support in favor of the theoretical positions from which the original hypothesis was derived: the Schachter and Singer (1962) tradition of cognitive labeling of emotions and the Aron (1970) conceptual framework for sexual attraction processes. In the second place, these data seem to be inconsistent with (or at least unpredictable by) standard theories of interpersonal attraction. Both the reinforcement (Byrne, 1969) and the cognitive consistency (Festinger, 1957; Heider, 1958) points of view would seem to predict that a negative emotional state associated with the object would *decrease* her attractiveness; and neither theory would seem to be easily capable of explaining the arousal of a greater sexual emotion in the experimental condition of the present experiments.

Although the present data support the cognitive relabeling approach in general, they are consistent with more than one interpretation of the mechanics of the process. The attribution notions of Nisbett and Valins (1972), self-perception theory (Bem, 1972), and role theory (Sarbin & Allen, 1968) can all provide possible explanations for the anxiety-sexuality link. A further possible explanation is that heightened emotion, instead of being relabeled as sexual, serves merely to disinhibit the expression of preexistent sexual

TABLE 4

SEXUAL IMAGERY SCORES BY EXPERIMENTAL CONDITION

Subject expects:	Female confederate to get strong shock	Female confederate to get weak shock
Strong shock	2.27	2.19
Weak shock	1.52	1.69

Note. Strongest imagery score is 5.

feelings. It is known that inhibition and sexual defensiveness influence sexual content in TAT stories (Clark, 1952), and this alternative cannot be ruled out by the present data. Yet another alternative suggested by Barclay (personal communication, 1971), is that the aggression-sexuality and anxiety-sexuality links may be independent phenomena and not necessarily subcases of a general emotion-sexuality link.

Some evidence for the mechanics of the anxiety-sexual arousal link in the current research may be obtained from the fear ratings made by subjects in Experiment 3. When subjects anticipated receiving a strong shock and the female confederate was present during the anxiety manipulation, subjects reported significantly less fear than when no potential sexual object was present ($t = 2.17$, $df = 19$, $p < .025$). Since the questionnaires were filled out in private in both groups, it is unlikely that subjects' reporting merely reflects appropriate behavior in the presence of the opposite or same sex. One possible explanation for this result is that, having relabeled anxiety as sexual arousal, the subject is less likely to feel anxious. A more conclusive explanation of the mechanics of the anxiety-sexual arousal link must await the conclusion of present laboratory studies designed specifically to investigate this problem. However, regardless of the interpretation of the mechanics of this link, the present research presents the clearest demonstration to date of its existence.

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