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Volunteer Bias in Erotica Research: Effects of Intrusiveness of Measure and Sexual Background

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Volunteer characteristics and volunteer rates across several laboratory experiments of sexual arousal were compared. Conditions were created to assess which component of the experimental setting was responsible for low volunteer rates in experiments using genital measurement. Subjects were 324 male and 424 female undergraduate students who had volunteered for an experiment on sexuality and personality. After completing several measures of sexual experience and attitude, subjects received a written description of one *of the following conditions and were asked if they wished to volunteer: (1) sexual film, (2) sexual film and subjective rating of arousal, (3) sexual film and assessment through forehead temperature, (4) sexual film and assessment with a device that was placed over the clothes and measured genital heat flow, (5) sexual film and assessment with the heat flow device while partially undressed, or (6) sexual film and assessment with the vaginal photoplethysmograph or penile strain gauge while partially undressed. Men were significantly more likely to volunteer than women, and volunteer rates for both men and women decreased significantly when and only when subjects were required to undress. Multivariate analyses of variance revealed that both male and female volunteers were more sexually experienced, reported more exposure to erotic materials, and worried less about their sexual performance than nonvolunteers. No differences in volunteer characteristics occurred across the increasingly intrusive conditions for women while a few differ-*

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ences occurred for men. The present findings suggest that researchers should be cautious about discussing the generality of findings of studies involving exposure to a sexually explicit film alone as well as of experiments that involve self-report or physiological measures of sexual arousal.

KEY WORDS: volunteer bias; male sexual response; female sexual response.

INTRODUCTION

Since the pioneering work of Kinsey and his colleagues (Kinsey *et al.*, 1948, 1953), the study of sexual behavior has changed markedly. While surveys and interviews were the tools of early sex researchers, subjective and objective responses to sexually explicit materials are currently assessed under controlled laboratory conditions. The development of instruments such as the penile plethysmograph (Barlow *et al.*, 1970), vaginal photoplethysmograph (Sintchak and Geer, 1975), thermistor (Henson *et al.*, 1977), and thermogram (Abramson *et al.*, 1981) has allowed a shift in the focus of sex research from describing the prevalence of various sexual attitudes and behaviors to examination of the cognitive and environmental factors influencing sexual arousal.

Studies of sexual behavior that include intrusive measures of sexual arousal necessarily employ volunteers who are informed of the nature of the experiments prior to participation. While this kind of recruitment is necessary for ethical reasons, it raises questions about the nonrepresentativeness of the resulting samples, or in other words, about volunteer bias. Volunteer bias in sex research may be even greater than in other areas of psychology because of the unusual nature of sex experiments (Rosenthal and Rosnow, 1975). Thus, there is a great need for research to examine what differences, if any, exist between volunteers and nonvolunteers and to provide information about the limits of generalizability of laboratory investigations of sexual behavior.

Despite the need for this kind of research, only two studies have compared volunteers and nonvolunteers for experiments using intrusive measures of sexual arousal. In the only study to examine male volunteers for an experiment using the penile plethysmograph, Farkas *et al.* (1978) reported several differences between volunteers and nonvolunteers. Volunteers were less sexually fearful, more sexually experienced, less guilty, and older than nonvolunteers. In addition, a greater percentage of volunteers than nonvolunteers reported erectile difficulties. Studying female volunteers for an experiment using the vaginal photoplethysmograph, Wolchik *et al.* (1983)

demonstrated that volunteers masturbated more frequently, were less sexually anxious, were exposed to erotica at an earlier age, and viewed erotica more frequently than nonvolunteers. Fewer volunteers objected to pornography and more volunteers than nonvolunteers reported sexual trauma. In addition to comparing aspects of sexual behavior and attitudes, both Farkas *et al.* (1978) and Wolchik *et al.* (1983) compared several more general personality characteristics across volunteers and nonvolunteers. As was the case for the results of studies comparing volunteers and nonvolunteers for questionnaire studies of sexual attitudes and behaviors (e.g., Baker and Perlman, 1975; Kaats and Davis, 1971), personality characteristics did not differ between volunteers and nonvolunteers in either study.

In the study by Wolchik *et al.* (1983), only 15% of the female subjects agreed to participate in the experiment using the vaginal plethysmograph (comparable figures are not available for the experiment by Farkas *et al.*, 1978). It is thus apparent, both that the volunteers for experiments employing genital assessment of sexual arousal are a highly select sample and that the overwhelming majority of subjects find aspects of this kind of experiment unpleasant. The experimental situation facing the potential subject comprises many components, and it is unclear which of these account for the low volunteer rate. These components range from exposure to a sexually explicit film to assessment of sexual arousal with genital measures. In the present study, experimental situations were constructed to reflect each of the following components separately in order to assess which component(s) is or are responsible for the low volunteer rate: (a) exposure to a sexually explicit film; (b) knowledge that one's sexual responsiveness is being monitored; (c) assessment procedures that require attachment to a physiological recording instrument; (d) assessment of genital response to sexual material; (e) becoming partially undressed; and (f) attachment of a physiological devise to the genitals. In addition, the present study compared characteristics of volunteers and nonvolunteers across the increasingly intrusive experimental conditions. While Wolchik *et al.* (1983) and Farkas *et al.* (1978) demonstrated that volunteers and nonvolunteers for experiments using intrusive measures of sexual arousal differed on several aspects of sexual behavior, differences between volunteers and nonvolunteers for studies using less intrusive measures of sexual arousal have not been examined.

A final issue of concern involves gender differences. Until recently, it was assumed that men were more responsive to explicit sexual stimuli than women (Kinsey *et al.*, 1953). However, recent laboratory research suggests that men and women may be equally responsive to erotica (Fisher and Byrne, 1978; Schmidt, 1975) or that women may be even more responsive than men (Heiman, 1977). The recent reports of similar responses to erotica across the sexes could be due to cultural changes in the acceptability of sexual arousal

in women over the last few decades. Alternatively, findings such as those of Fisher and Byrne (1978) may be due to the fact that the women in these studies represent a much more select sample than do the men. In order to interpret laboratory comparisons of sexual arousal in men and women accurately, research is needed that examines sex differences in volunteer rates. The previous literature has not adequately addressed this question (see Kenrick *et al.,* 1980), perhaps because the devices used to measure arousal in men and women are noncomparable.

Thus, the present study had the following goals: (1) to examine the influence of components of laboratory investigations of sexual arousal (such as exposure to sexually explicit materials, becoming partially undressed, and attachment of a physiological device to the genitals) on volunteer rates; (2) to compare sexual behaviors and attitudes of volunteers and nonvolunteers across increasingly intrusive experimental conditions; and (3) to examine gender differences in volunteer rates across increasingly intrusive experimental conditions.

The current study examined several aspects of sexual behaviors and attitudes. Personality variables were not included because previous research has demonstrated no significant differences between personality characteristics of volunteers and nonvolunteers for experiments employing either questionnaires about sexual behavior (e.g., Baker and Perlman, 1975) or intrusive measures of sexual arousal (Farkas *et al.,* 1978; Wolchik *et al.,* 1983). The predictor variables, selected on the basis of results of previous research, fell into five categories: (1) sexual experience, (2) sexual difficulties, (3) attitudes toward sexuality, (4) experience with and attitudes toward pornography, and (5) sex-typing. In addition, willingness to participate in an experiment involving exposure to an aversive noise stimulus was included to examine whether volunteering for any sort of unpleasant experiment would predict participation in the sex experiment and to compare the variables that predicted participation in the sex experiment and the noise experiment.

METHOD

Subjects

Subjects were 324 male and 424 female college students[3] recruited from the introductory psychology course in a large Southwestern state university.

[3]Occasionally the results to be reported have *N*'s smaller than this. The difference is due to missing data or bad codes in the data.

Students in this course were required to participate in a number of research studies to fullfill a course requirement, but were given a choice concerning specific studies for which to volunteer. This study was described as a questionnaire study about "sexuality and personality."

Procedure

A mixture of male and female subjects was scheduled for each experimental session, which was conducted by a female experimenter. After signing an informed consent form, subjects were given a questionnaire.

Predictor Variables

The questionnaire contained a number of predictor measures: (1) several measures of sexual experience, including the Bentler Heterosexual Behavior Scale (1968a,b), self-rating of sexual experience relative to same-sex peers, number of partners for sexual intercourse, and number of first dates that included sexual intercourse; (2) several measures of attitudes toward and experience with commercialized erotica including frequency of exposure to sexually explicit magazines, erotic literature, and X-rated or stag films, and objections to viewing sexually explicit films; (3) several measures of attitudes toward sexuality, including a modification of the Bentler Heterosexual Behavior Scale designed to measure sexual anxiety (Wincze and Caird, 1976), ratings of comfort with one's sexuality and curiosity about sexuality relative to same-sex peers; and rating of the value of research on the physiology of sexual response; and (4) two measures of sexual difficulties—difficulties in ejaculatory/erectile responses (males) or experience of sexual trauma (females), and worry about inability to obtain erections (male) or inability to become physiologically aroused during sexual activity (females). In addition, (5) a measure of sex-role sex-typing, the Personality Attributes Questionnaire (Spence *et al.*, 1974), which produced masculinity and femininity scores,[4] was used. Finally, (6) a question was included that assessed the subject's willingness to participate in an allegedly unrelated experiment that was somewhat aversive because it included noise bordering on "being painful to listen to."

[4]It also yielded sex-type categorizations (i.e., androgynous, masculine, feminine, undifferentiated). However, since use of the sex-type categories produced no significant interaction effects, scores on masculinity and femininity scales were used instead.

Manipulation of Aspects of Sex Experiment

A "solicitation" for participation in an additional research project was placed at the end of the questionnaire. The experiment was described in all cases as one that involved watching "erotic movies depicting explicit sexual scenes," with the subject "alone sitting in a reclining chair facing a movie screen." Subjects were informed that they would not be observed and that all data would be completely confidential. In the *film* group, no further information was provided. Five additional groups were created by varying the remaining portions of the description.

For the *subjective arousal* group, subjects were informed that they would rate their sexual arousal subjectively on a 1-7 scale "several times." In the *nongenital* group, subjects were told that their sexual arousal would be assessed by an electrode measuring "changes in forehead temperature which are correlated with sexual arousal." The *clothed* group was told that their sexual arousal would be measured by a "thermogram," a device that "looks like a heating pad and assesses, through its heat sensors, changes in genital blood flow and volume." The thermogram was described as "fitting on one's lap, over the clothing." In the *unclothed* group, the description was as above with the exception that the subject would be "partially undressed (from the waist down)." Subjects were informed that they would put the instrument in place after the experimenter left the room. Finally, in the *intrusive* group, the penile strain gauge (males) or vaginal photoplethysmograph (females) was described, and subjects were told that the instrument would be inserted or attached after the experimenter left the room. These instruments were described as "harmless and unnoticed once applied."

Subjects were assigned randomly to only one of the above groups and were asked whether or not they wished to volunteer for the particular study described. Those who did were asked to give their name and phone number on a separate form in order to be contacted later if chosen (randomly determined). In order to ensure confidentiality of subjects' decision to participate, all subjects were instructed to detach this last sheet and place it in a sealed box.

RESULTS

Volunteer Rates

The proportion of individuals volunteering for the different sex experiments is presented in Table I.

Multidimensional contingency table analysis (FUNCAT), using a generalized least squares approach in order to get main and interaction effects

Table I. Proportion of Volunteers for Sex Experiment, by Condition and Gender[a]

	Film	Subjective	Nongenital	Clothed	Unclothed	Intrusive	*M*
Females	.49	.44	.41	.38	.13	.13	.31
	(69)	(69)	(70)	(72)	(68)	(72)	(420)
Males	.50	.57	.66	.67	.30	.26	.50
	(52)	(56)	(55)	(55)	(50)	(54)	(322)

[a]*N* is given in parentheses.

on the dichotomous dependent variable, revealed a significant main effect for gender (χ^2 (1) = 25.86, $p < 0.001$) and for experimental condition (χ^2 (5) = 59.54, $p < 0.001$), but no significant interaction effect (χ^2 (5) = 3.57, N.S.). In order to ascertain the nature of the experimental condition effect, a series of 1 df χ^2 analyses were conducted, comparing the proportions volunteering in adjacent conditions. These analyses showed that all adjacent proportions were nonsignificant (in fact, $\chi^2 < 1$) except the comparison between the clothed and unclothed conditions, which was highly significant ($\chi^2 = 24.00$, $p < 0.001$). This basic conclusion held as well for the male and female subjects analyzed separately. It should be noted, for comparison purposes, that the proportions volunteering for the aversive noise experiment were 0.35 and 0.41 for females and males, respectively (χ^2 (1) = 2.54, N.S.).

Volunteer Characteristics

In order to examine the individual difference variables that predicted volunteering, the data were analyzed using a multivariate analysis of variance. For this analysis a 2 × 6 × 2 MANOVA was conducted in which the factors were volunteering vs. nonvolunteering, experimental condition, and gender. However, this analysis yielded a significant triple interaction, $F(80, 2455) = 1.58$,[5] $p < 0.001$. In order to clarify further this complex pattern, separate 2 × 6 (volunteering × condition) MANOVA's were conducted for each gender.

Females

The results for females demonstrated a highly significant multivariate effect for volunteering, $F(19, 299) = 579$, $p < 0.001$, but no significant in-

[5]All multivariate *F*'s reported in this paper are tested by Pillai's criterion (Olson, 1976). The df's are approximations.

Table II. Significant Predictors of Volunteering among Females

	Volunteers	Nonvolunteers	$F(1, 317)$
Sexual experience			
Bentler experience	17.17	14.18	19.93[i]
Sexual experience[b]	2.90	2.63	7.44[h]
Number of sex partners[c]	3.04	2.37	22.51[i]
First-date sex[c]	1.83	1.48	11.31[i]
Sexual difficulties			
Trauma[a]	.17	.07	6.52[g]
Worry[d]	1.92	2.17	4.01[g]
Attitudes toward sexuality			
Sexual curiosity[b]	3.16	2.91	10.52[i]
Value of sex research[e]	3.91	3.74	4.37[g]
Attitudes/experience, commercialized erotica			
Magazines[f]	3.08	2.40	29.15[i]
Literature[f]	2.82	2.42	12.11[i]
Objections to commercialized erotica[a]	.21	.45	26.40[i]
Volunteer for noise experiment[a]	.53	.28	21.25[i]

[a]Proportion saying "yes."
[b]2 = less than the average student, 3 = about average, 4 = more than the average student.
[c]1 = none, 2 = 1, 3 = 2-5, 4 = 6-10.
[d]1 = none, 2 = slight, 3 = some.
[e]3 = somewhat valuable, 4 = moderately valuable.
[f]2 = 1, 3 = 2-5, 4 = 6-20 times in the past year.
[g]$p < 0.05$.
[h]$p < 0.01$.
[i]$p < 0.001$.

teraction effect. The variables for which significant univariate effects were found are presented in Table II.

As can be seen from Table II, female volunteers were more sexually experienced than nonvolunteers on all four variables (the Bentler experience instrument, self-reported sexual experience, number of sex partners, and first-date sex). Both measures of sexual difficulties produced volunteer effects. Volunteers worried less about their arousal than nonvolunteers but reported more sexual trauma. Volunteers and nonvolunteers differed significantly on two of the four variables measuring attitudes toward sexuality. Volunteers reported more sexual curiosity and valued sex research more than nonvolunteers. Volunteers also had more experience with commercialized erotica as measured by three of these four variables (magazines, literature, and objections). Finally, volunteers were about twice as likely as nonvolunteers to agree to participate in the experiment involving aversive noise.

In order to examine whether volunteers differed among themselves depending on condition, a second analysis was conducted. Recall that the analysis of Table I suggested that the first four conditions did not differ among

themselves in terms of the rate of volunteering, nor did the last two, but that these two clusters of conditions differed very significantly. Accordingly, for the present analysis, the first four conditions and the last two conditions were collapsed and contrasted against one another. The first four conditions are termed the *clothes-on* conditions and the last two are labeled *clothes-off.*

While the resulting multivariate contrast on a simple effect was highly significant, $F(19, 299) = 2.47$, $p < 0.001$, on only two of the predictors reported in Table II was a significant univariate effect found. Number of sex partners, $F(1, 317) = 9.88$, $p < 0.01$, and first-date sex, $F(1, 317) = 5.40$, $p < 0.05$, differed significantly. Volunteers in the clothes-off conditions reported higher values than volunteers in the clothes-on conditions for both first-date sex ($M = 2.40$ vs. $M = 1.74$) and number of sex partners ($M = 4.07$ vs. $M = 2.87$). In both of these cases, there were no significant residual effects after this contrast was removed (F's < 1).

Males

The results for males yielded a significant multivariate volunteer × condition interaction, $F(95, 1080) = 1.61$, $p < 0.001$, as well as a significant multivariate difference between volunteers and nonvolunteers, $F(19, 212) = 2.97$, $p < 0.001$. With respect to the interaction, the results are best interpreted as meaning that predictors of volunteering are differentially effective depending on the specific experimental condition.

The following five predictors showed significant univariate interactions: literature, $F(5, 230) = 2.95$, $p < 0.05$; objection to pornography, $F(5, 230) = 2.96$, $p < 0.05$; self-rated sexual experience, $F(5, 230) = 4.41$, $p < 0.001$; Bentler experience, $F(5, 230) = 5.27$, $p < 0.001$; and masculinity, $F(5, 230) = 2.27$, $p < 0.05$. Unfortunately, examination of the means failed to disclose a meaningful pattern. For example, when the volunteer mean minus nonvolunteer mean was computed, the clothed condition was found to be the largest on 4 out of the 5 measures but the fourth largest on the fifth measure, objection to commercialized erotica. Additionally, the intrusive condition was found to show a negative difference (i.e., the nonvolunteer group having a *higher* mean than the volunteer group) on 3 of the 5 measures but to be the third or fourth largest positive difference on the remaining two measures. Because of the lack of any consistent pattern, these interactions will not be interpreted further.

The main effect of volunteering was examined by exploration of the variables that had significant univariate F's. As shown in Table III, volunteers were significantly more experienced sexually on three of the four measures than nonvolunteers. Volunteers reported more difficulties with ejaculation or erection, reported more sexual curiosity and less sexual anxiety, and valued sex research more than nonvolunteers. Volunteers also had been exposed to more erotica and objected less to commercialized erotica than

Table III. Significant Predictors of Volunteering among Males

	Volunteers	Nonvolunteers	$F(1, 230)$
Sexual experience			
Bentler experience	16.11	14.12	11.18[i]
Sexual experience[b]	3.13	2.74	11.22[i]
Number of sex partners[c]	3.20	2.67	9.23[h]
Sexual difficulties			
Erectile/ejaculatory difficulties[a]	.25	.16	3.95[g]
Attitudes toward sexuality			
Sexual curiosity[b]	3.39	3.11	6.88[h]
Bentler anxiety	50.90	56.06	3.93[g]
Value of sex research[d]	3.98	3.68	6.37[g]
Attitudes/experience, commercialized erotica			
Magazines[e]	3.84	3.24	10.21[h]
Literature[e]	3.07	2.63	7.30[h]
Movies[f]	2.94	2.43	5.04[g]
Objection to commercialized erotica[a]	.10	.20	4.14[g]
Sex-typing			
Masculinity score	31.76	30.61	6.29[g]
Volunteer for noise experiment[a]	.52	.28	13.94[i]

[a]Proportion responding "yes."
[b]2 = less than the average student, 3 = about average, 4 = more than the average student.
[c]2 = one, 3 = 2-5, 4 = 6-10.
[d]3 = somewhat valuable, 4 = moderately valuable.
[e]2 = 1, 3 = 2-5, 4 = 6-20 times in past year.
[f]2 = 1, 3 = 2 times in past year.
[g]$p < 0.05$.
[h]$p < 0.01$.
[i]$p < 0.001$.

nonvolunteers. Similar to females, approximately twice the proportion of volunteers as nonvolunteers also were willing to participate in the noise experiment. Finally, male volunteers had significantly higher masculinity scores than nonvolunteers.

To ascertain whether volunteers differed among themselves depending on which sex experiment they were volunteering for, an analysis paralleling that presented for females (involving the contrast between clothes-on and clothes-off conditions) was conducted on the male volunteers. For the males, however, the multivariate contrast was not quite significant, $F(7, 219) = p < 0.06$. On only one of the predictors reported in Table III, exposure to pornographic literature, was the univariate contrast significant, $F(1, 235) = 7.67$, $p < 0.01$. Volunteers in the clothes-off conditions read more pornographic literature ($M = 3.74$) than volunteers in the clothes-on conditions ($M = 2.88$). A second variable was significant in this analysis, though not in the analysis reported in Table III. Volunteers in the clothes-on conditions

reported a higher frequency of sex on first dates ($M = 2.14$) than volunteers in the clothes-off conditions ($M = 1.59$), $F(1, 235) = 3.88$, $p < 0.05$. In both of these cases, the residual variation, after the contrast was removed, was clearly nonsignificant (F's < 1).

The final analysis was suggested by the close relationship between volunteering for the noise experiment and volunteering for the erotica experiment.[6] This analysis examined which of these variables were related to volunteering for the noise experiment. The analysis was a 2 × 6 MANOVA (separately for each gender) in which the independent variables were volunteering vs. not volunteering for the noise (rather than the sex) experiment and experimental condition. For females, there was a significant multivariate effect only of volunteering for the noise experiment, multivariate $F(18, 302) = 1.64$, $p < 0.05$. There were two variables on which significant univariate effects were found. These were movies, $F(1, 319) = 9.69$, $p < 0.01$, and sexual curiosity, $F(1, 319) = 5.56$, $p < 0.05$. Of these, only the latter also significantly predicted volunteering for sex experiments (see Table II). For males, neither the multivariate test for volunteering nor the interaction effect approached significance. Hence, no report will be made of the three variables on which univariate significance was found, following Hummel and Sligo (1971).

DISCUSSION

The current results suggest that although men are more likely than women to volunteer for laboratory experiments of sexual arousal, both male and female volunteers differ significantly from their peers who do not choose to participate. Also, volunteer rates for conditions that require subjects to become partially undressed were significantly lower than those in less intrusive conditions for both men and women. Finally, although volunteer rates decreased as the method of assessment of sexual arousal became more intrusive, the volunteers across these conditions differed little in terms of sexual behaviors and attitudes.

The study of sexual arousal in the laboratory is one of the few areas of behavioral research in which males are more likely to volunteer to participate than females. This reversal of the general finding that women are more likely to volunteer than men (Rosenthal and Rosnow, 1975) must be interpreted in light of the components of the current experimental task. Recent research suggests that women are exposed to less pornography than men (e.g.,

[6]Because of this close relationship, we computed parallel 2 × 6 multivariate analyses of covariance with volunteering for the noise experiment as the covariate separately for men and women in order to assess the effects associated with volunteering for *sex* research over and above volunteering for *any* research. In these analyses, all variables that were significant in the MANOVAs remained significant.

Fisher and Byrne, 1978) and report less positive response to such stimuli than men (e.g., Griffit and Kaiser, 1978; Schmidt and Sigusch, 1973). These factors may be responsible for the low volunteer rate for experiments in which exposure to sexually explicit material is required.

Although a greater percentage of men than women volunteered across all experimental conditions, volunteer rates for the condition that required only exposure to a sexually explicit film were surprisingly similar: 49% of the women and 50% of the men volunteered. These data are discrepant with those reported by Kenrick *et al.* (1980). Employing phone calls to recruit subjects for an experiment involving exposure to erotic films, Kenrick *et al.* (1980) reported that 51% of the women and 75% of the men contacted volunteered. In the current study, the commitment to volunteer was made privately. It appears that public commitment enhances volunteering for men but has little effect for women.

Similar to previous research by Farkas *et al.* (1978) and Wolchik *et al.* (1983), volunteers and nonvolunteers differed on several dimensions. Examining the results of men and women together, volunteers for laboratory experiments involving exposure to sexually explicit films or exposure to such films and assessment of sexual arousal are more sexually liberal than the nonvolunteers. More specifically, volunteers were more sexually experienced, reported more exposure to and less objection to erotica, and worried less about sexual performance. Also, volunteers valued the study of sexual responding more than nonvolunteers.

It is interesting and somewhat counterintuitive that female volunteers reported more sexual trauma (e.g., rape, attempted rape, child molestation), replicating the finding of Wolchik *et al.* (1983), and that male volunteers reported more erectile difficulties than nonvolunteers. Differences between the groups in reporting or defining sexual difficulties may explain these findings. Alternatively, experiences such as rape or erectile difficulties may heighten concern with monitoring one's sexual responses, leading to higher levels of participation.

Unlike their female counterparts, the male volunteers and nonvolunteers differed on sex-typing scores, with the volunteers scoring higher on the masculinity scale than the nonvolunteers. This observation is consistent with the finding by Kenrick *et al.* (1980) that 91% of the sex-typed males volunteered for an experiment involving exposure to erotica.

Finally, both male and female volunteers were more likely to agree to participate in the noise experiment than nonvolunteers. It is possible that those subjects who volunteer for sexual experiments have a higher commitment to participating in research of any kind or that they are more likely to seek out new and unusual experiences more often than nonvolunteers. Although the current predictor variables showed almost no overlap in their

relationship to volunteering for the two experiments, measures of personality variables such as sensation seeking (Zuckerman, 1971) might predict volunteering for both of these experiments.

It appears that men and women are differentially affected by increases in the intrusiveness of the assessment procedures. For men, increasing the intrusiveness of the assessment procedures affected both volunteer rate and volunteer characteristics. Men were less likely to volunteer for the experimental conditions that required becoming partially undressed than for the experimental conditions in which they remained fully clothed. Unfortunately, the impact of increased intrusiveness of assessment procedures on volunteer characteristics cannot be readily understood, since a clear pattern of findings did not occur in the significant interaction effect.

Although women, too, were less likely to volunteer for experiments that required partial undressing than for the less intrusive conditions, unlike for men the sexual behaviors and sexual attitudes of the volunteers did not differ as the assessment procedures became more intrusive. Only when conditions that did not require undressing were combined and contrasted to the conditions that required partial undressing did differences emerge. Even then only two measures of sexual experience, number of sexual partners and number of first dates on which sex had occurred, differed. Thus, on nearly all measures the sexual behaviors and attitudes of the volunteers in the most extreme condition (vaginal photoplethysmograph) are very similar to those in the least intrusive condition (film only).

The component of the experimental situation that appears to produce the low volunteer rates in experiments using typical measures of genital arousal, such as the vaginal photoplethysmograph or the penile strain gauge, seems to be the requirement to become partially undressed. Volunteer rates dropped from 38% to 13% for women and 67% to 30% for men once they were required to become partially undressed. Development of physiological measures that can be employed while the subject remains dressed would lead to higher volunteer rates. Volunteer rates might also increase when measures (e.g., thermograph) that require the subject to undress for only short periods of time are used. However, it is important to note that increasing the number of volunteers will not necessarily lead to an increase in the representativeness of the sample.

The current results support the cautions about the limits of generalizability of the results of studies employing genital measures of sexual arousal such as the vaginal photoplethysmograph or the penile strain guage that have been raised by Farkas *et al.* (1978) and Wolchik *et al.* (1983). Unfortunately, the present results suggest that this caution must be extended to experiments of a less intrusive nature. Subjects who are willing to watch a sexually explicit film in a laboratory are more sexually liberal on a number of dimen-

sions than those who refuse. In considering these results, it is important to note that some self-selection had already occurred in that all of the subjects in the current study had already volunteered for a questionnaire study of personality and sexuality.

The current data clearly question the conclusion of Fisher and Byrne (1978) that women who volunteer for experiments involving exposure to erotica are a representative sample. It appears that we must be as cautious about generalizing results of experiments requiring only exposure to erotic material as we are about the results of those experiments that require genital monitoring of sexual arousal. Such caution applies equally to studies of men and women.

REFERENCES

Abramson, P. R., Perry, L. B., Seeley, T. T., Seeley, D. B., and Rothblatt, A. B. (1981). Thermographic measurement of sexual arousal. A discriminant validity analysis. *Arch. Sex. Behav.* 10: 171-176.

Baker, W. J., and Perlman, D. (1975). Volunteer bias and personality traits in sexual standards research. *Arch. Sex. Behav.* 4: 161-171.

Barlow, D. H., Becker, R., Leitenberg, H., and Agras, W. S. (1970). A mechanical strain gauge for recording penile circumference change. *J. Appl. Behav. Anal.* 6: 355-367.

Bentler, P. M. (1968a). Heterosexual behavior assessment. I. Males. *Behav. Res. Ther.* 6: 21-25.

Bentler, P. M. (1968b). Heterosexual behavior assessment. II. Females. *Behav. Res. Ther.* 6: 27-30.

Farkas, G. M., Sine, L. F., and Evans, I. M. (1978). Personality, sexuality, and demographic differences between volunteers and nonvolunteers for a laboratory study of male sexual behavior. *Arch. Sex. Behav.* 7: 513-520.

Fisher, W. A., and Byrne, D. (1978). Sex differences in response to erotica? Love versus lust. *J. Pers. Soc. Psychol.* 36: 117-125.

Griffit, W., and Kaiser, D. L. (1978). Affect, sex guilt, gender and the rewarding effects of erotic stimuli. *J. Pers. Soc. Psychol.* 36: 850-858.

Heiman, J. R. (1977). A psycho-physiological exploration of sexual arousal patterns in females and males. *Psychophysiology* 14: 266-274.

Henson, D. E., Rubin, H. B., Henson, C., and Williams, J. R. (1977). Temperature change of the labia minora as an objective measure of human female eroticism. *J. Behav. Ther. Exper. Psychiat.* 8: 401-410.

Hummel, T. J., and Sligo, J. R. (1977). Empirical comparison of univariate and multivariate analysis of variance procedures. *Psychol. Bull.* 76: 49-57.

Kaats, G. R., and Davis, K. E. (1971). Effects of volunteer biases in studies of sexual behavior and attitude. *J. Sex Res.* 7: 26-34.

Kenrick, D. T., Stringfield, D. O., Wagenhals, W. L., Dahl, R. H., and Ransdell, H. J. (1980). Sex differences, androgyny, and approach responses to erotica: A new variation on the old volunteer problem. *J. Pers. Soc. Psychol.* 38: 517-524.

Kinsey, A., Pomeroy, W., and Martin, C. (1948). *Sexual Behavior in the Human Male.* W. B. Saunders, Philadelphia.

Kinsey, A., Pomeroy, W., Martin, C., and Gebhard, P. (1953). *Sexual Behavior in the Human Female.* W. B. Saunders, Philadelphia.

Olson, C. L. (1976). On choosing a test statistic in multivariate analysis of variance. *Psychol. Bull.* 83: 579-586.

Rosenthal, R., and Rosnow, R. L. (1975). *The Volunteer Subject.* Wiley, New York.

Schmidt, G. (1975). Male-female differences in sexual arousal and behavior during and after exposure to sexually explicit stimuli. *Arch. Sex Behav.* 4: 353-364.

Schmidt, G., and Sigusch, V. (1973). Women's sexual arousal. In Zubin, J., and Money, J. (eds.), *Contemporary Sexual Behavior: Critical Issues in the 1970's.* Johns Hopkins University Press, Baltimore.

Sintchak, G., and Geer, J. (1975). A vaginal photoplethysmograph system. *Psychophysiology,* 12: 113-115.

Spence, J. T., Helmreich, R., and Stapp, J. (1974). The personality attributes questionnaire: A measure of sex role stereotypes and masculinity and femininity. *Journal Supplement Abstract Service Catalog of Selected Documents in Psychology,* 4: 43.

Wincze, J. P., and Caird, W. K. (1976). The effects of systematic desensitization and video desensitization in the treatment of essential sexual dysfunction in women. *Behav. Ther.* 7: 335-392.

Wolchik, S. A., Spencer, S. L., and Lisi, I. S. (1983). Volunteer bias in research employing vaginal measures of sexual arousal: Demographic, sexual and personality characteristics. *Arch. Sex Behav.* 12: 399-408.

Zuckerman, M. (1971). Dimensions of sensation seeking. *J. Consult. Clin. Psychol.* 36: 45-52.