Sexual Orientation Lies Smoothly on a Continuum:

Verification and Extension of Kinsey's Hypothesis in a Large-Scale Internet Study

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Suggested running head: Sexual Orientation Lies on a Continuum

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Abstract

In a study with nearly 18,000 subjects obtained over the Internet in several countries, Kinsey's hypothesis that sexual orientation lies on a continuum from heterosexual to homosexual was confirmed. Using a new 18-question inventory that posed questions about attraction, behavior, and fantasies, Mean Sexual Orientation (MSO) scores were distributed relatively smoothly on a 14-point scale (the Sexual Orientation Continuum, or SOC). The continuum was constructed in a way that preserves information about same-sex and opposite-sex attractions as if they are on separate scales. Self-identifications of subjects as "gay," "straight," "bisexual," and "other" corresponded to broad, skewed distributions on the continuum, suggesting that such terms are misleading for many people. The new inventory also allowed the measure of Sexual Orientation Range (SOR)—roughly, how much flexibility someone has in expressing sexual orientation. SOR was found to differ from one person to another and to vary smoothly from a high to a low value across the subject population. Significant differences in MSO (but not SOR) were found for different ethnic groups. MSO and SOR scores were higher for females than males. The shape of the distribution of scores for subjects in the United States was similar to the shape of the aggregate distribution of scores for subjects in more than 40 countries outside the United States. The study suggests that less than 10 percent of the population has the exclusive kinds of attractions suggested by the terms "straight" and "gay."

Keywords: sexual orientation; Alfred Kinsey; sexual orientation range; sexual orientation test; sexual orientation continuum; homosexuality; heterosexuality; gays; straights; bisexuals

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Most people think of sexual orientation as falling into only two, or at most three, categories—heterosexual ("straight"), homosexual ("gay/lesbian"), and "bisexual"—this despite groundbreaking research more than 50 years ago by Alfred Kinsey and his colleagues which suggested that sexuality lies on a continuum and cannot be so easily categorized. After analyzing responses obtained in over 12,000 face-to-face interviews, Kinsey concluded, "It is the fundamental of taxonomy that nature rarely deals with discrete categories.… The living world is a continuum in each and every one of its aspects. The sooner we learn this concerning human sexual behavior the sooner we shall reach a sound understanding of the realities of sex" (Kinsey, Pomeroy, & Martin, 1948, p. 639). Although Kinsey's research dramatically changed the way sexual behavior is understood and studied, his message regarding the sexual orientation continuum has been largely ignored by the general public and even, perhaps, by some researchers.

Based on self-reports of physical attraction, behavior, and fantasies, Kinsey placed each individual's sexual orientation on a seven-point scale, with scores ranging from 0 to 6. A 0 indicated that someone was "exclusively heterosexual with no homosexual" [sic], and a 6 indicated that someone was "exclusively homosexual," with intermediate scores indicating degrees in between. A score of 3 indicated that someone was "equally heterosexual and homosexual" (Kinsey et al., 1948, p. 638; cf. Kinsey, Pomeroy, Martin, & Gebhard, 1953, p. 470).

Over the years, Kinsey's perspective on sexual orientation has been criticized on several grounds. For example, Masters and Johnson (1979) expressed concern about the possibly arbitrary way in which subjects were placed into Kinsey's seven categories, especially the middle three, and some have expressed concern about the distortions that can occur in face-to-face interviews (e.g., Gonsiorek, Sell, & Weinrich, 1995). Others have noted that Kinsey's methodology made it possible to place people with radically different histories into the same category: for example, a man with hundreds of same-sex partners and a man who had merely felt same-sex attraction (Sell, 1997a; Weinberg, Williams, & Pryor, 1994; Weinrich et al., 1993). Sell (1997a) has also noted that the Kinsey scale is not a true continuum, given that it contains only seven discrete categories. Concerned that the Kinsey scale fails to make appropriate distinctions, Sell (1997a) also asserts (1) that the Kinsey scale reduces sexual orientations to a single category based upon multiple attributes of the subject being classified, and (2) that it inappropriately measures homosexuality and heterosexuality on a single continuum, as if one is necessarily a tradeoff of the other.

A number of different sexual orientation scales have been developed over the years, reflecting the complexities of the concept. In pamphlets published in the 1860s, early gay activist Karl Heinrich Ulrichs (1994) proposed one of the first sexual orientation classification schemes for men, separating orientation into three basic categories, *Dionings*, *Urnings*, and *Urandionings*. *Dionings* was comparable to the term heterosexual, *Urnings* to homosexual, and *Uranodionings* to bisexual. Within the *Urnings* category Ulrichs had four sub-categories, corresponding to how "manly" or effeminate one was. Ulrichs also suggested a set of questions that could be used to identify homosexuality, focusing mainly on self-reports of attraction. Later,

Mayne (1908) devised a longer series of questions used to identify orientations using Ulrichs's classifications.

Shively and DeCecco (1977) suggested that in measuring sexual orientation, "affectional preference"—"preference for male and/or female emotional partners" (p. 45)—should be considered in addition to physical attraction. They did not develop a measuring instrument to test the utility of their proposal, however, and several researchers have expressed concern about this (e.g., Chung & Katayama, 1996; Sell, 1997a), suggesting that affectional preference should probably be best considered in the context of friendship (where one gender or the other may indeed be preferred) rather in the context of sexual orientation.

Arguing that Kinsey's scale did not adequately address the complexity of the concept of sexual orientation, Klein (1993) developed a scale with seven different "vectors" of sexual orientation, the first three corresponding to Kinsey's criteria and the fourth, emotional preference, to Shively and DeCecco's (1977) affectional preference concept. Klein also proposed that the concept of sexual orientation include "social preference" (which gender one prefers to socialize with), "lifestyle" (the sexual identity of the people one chooses to social with), and "self-identification" (how one chooses to label oneself). Klein (1993) also added a time dimension, noting that a person's sexual orientation can change over time. A snapshot of present tendencies is not an adequate measure of sexual orientation, according to his view, and Klein therefore suggested that the seven vectors be evaluated separately according to one's past, present, and "ideal future."

Klein's (1993) categorization scheme has been sharply criticized. Chung and Katayama (1996) have suggested that Klein's time dimension is unnecessary and problematic and that Klein's overall scale is more a measure of changing sexual identity rather than of sexual

orientation. Sell (1996) has argued that "the Klein scale is unsatisfactory because the relative importance of each dimension in measuring sexual orientation has not been thoroughly investigated or grounded in theory, and like Kinsey, Klein required subjects to make trade-offs between heterosexuality and homosexuality on his scale" (p. 299). Sell (1996) also suggests that the more dimensions a scale has, the less practical it becomes. Evaluating Klein's categories has also proved difficult because he has presented little validation data, relying mainly on a survey of 144 people, 127 of whom identified themselves as bisexual (Klein, 1993, Appendix B).

Sell (1997a) developed his own 12-item test in an attempt to improve upon Kinsey's. It uses separate scales for heterosexuality and homosexuality and asks questions about sexual identity, as well as about sexual contact and sexual attraction (but not sexual fantasies) over the past year. In a preliminary study, Sell (1997b) contacted 351 individuals at random on two online newsgroups, alt.politics.homosexuality and talk.politics.medicine, 198 of whom took his test. He acknowledged that the respondents were not representative of the general population but was also optimistic about the potential the Internet has for reaching "a relatively rare, hidden, and geographically dispersed population (in this case, homosexuals and bisexuals)" (p. 297).

Laumann, Gagnon, Michael, and Michaels (1994) used a combination of forms and interviews to explore many aspects of sexuality, including sexual orientation, which was characterized by behavior, desire, and identity. Their study of 3,432 subjects was limited to people living in households in the United (as opposed to group quarters such as college dorms or institutions) and to fluent English speakers. They concluded that "homosexuality is fundamentally a multidimensional phenomenon that has manifold meanings and interpretations, depending on context and purpose" (p. 301).

In the *Handbook of Sexuality-Related Measures*, Davis, Yarber, Bauserman, Schreer, and Davis (1998) identified a number of measuring instruments used to assess various facets of sexuality and sexual orientation, among them: the Gay Identity Questionnaire (Brady, 1998), intended for use by clinicians and researchers to identify men in the coming out stages of being gay, the Sex-Linked Behaviors Questionnaire (McConaghy, 1998), which investigates the incidence of heterosexual and homosexual feelings and their relationship to sex-linked interests and behaviors, and the Gender Identity and Erotic Preference in Males scales (Freund & Blanchard, 1998), a set of six scales that assess erotic preference, erotic anomalies, and gender identity. There are no Kinsey-type measures of sexual orientation per se in the Davis et al. volume, however.

Through the Internet, the public also now has access to a large number of informal, magazine-style quizzes that purport to measure sexual orientation. OKCupid.com alone, for example, offers more than 2,800 "user-written" sexuality-related tests, including "The Sexuality Spectrum Test," "The Kinsey-n-Klein Orientation Test," "The Am I Gay Test," and "The New Am I Gay Test." Such tests have presumably not been assessed scientifically.

Whereas a number of tests, following Kinsey, can help people determine where they lie on the sexual orientation continuum (or, as Shively and DeCecco [1977] and Sell [1996] see it, on two separate continua), at the moment it appears that no test measures how much flexibility or "choice" one has in expressing one's orientation—an issue that has long been the subject of intense public debate, with some factions insisting that people have no choice about how they express their orientation and other factions insisting that sexual orientation (or at least sexual lifestyle) is entirely a matter of choice. Kinsey himself expressed concern about the choice issue, noting that "society demands that there be a particular choice in this matter, and does not so often

dictate one's choice of food or of clothing" (Kinsey et al., 1948, p. 661). In other words, societal pressure to be heterosexual undoubtedly distorts natural expressions of sexual orientation.

The truth undoubtedly lies somewhere between the two extreme positions that characterize the public debate about choice. Credible evidence suggests that although genes play an important role in determining sexual orientation (at least for males), societal expectations do as well (Epstein, 2006; Friedman & Downey, 1993; Gonsiorek et al.,1995; Hamer, 1993). Laumann et al. (1994) suggest that sexuality is "scripted" within a culture, with that culture providing principles guiding every aspect of sexual behavior. In turn, individuals sometimes depart from these principles and thereby change the sexual culture of their society. In any case, no matter what we might conclude about choice in aggregate populations, it is likely that some individuals have very little choice in the way they express their sexual orientation, whereas other individuals have a great deal of choice.

The present study does not explore all of the complexities of sexual orientation but rather extends Kinsey's original research in several specific ways: Retaining his focus on attraction, behavior, and fantasy as central features of sexual orientation, this study utilizes a new 18-item Internet-based questionnaire to obtain a large sample of respondents both in the United States and in other countries around the world. The large international sample allows comparisons to be made between sexual orientation in the United States and in other countries, as well as breakdowns by gender, race, ethnicity, and other factors. Although the questionnaire presents results on a single continuum, it also has features of the dual-continuum scales favored by Shively and DeCecco (1977) and Sell (1996). Finally, it utilizes a simple method to yield a credible measure of flexibility or choice.

METHODS

Background

Beginning in February 2006, at the website http://MySexualOrientation.com, a new test instrument was made available in connection with investigative research on sexual orientation being conducted for *Scientific American Mind* magazine (Epstein, 2006). The report that was ultimately published included the URL address of the new test, and subsequent press coverage in both the mainstream press and in gay and lesbian publications, as well as online, quickly directed many people to the test. More than 50,000 people have since taken the test. The present report focuses on those who took it between February 4 and May 13, 2006. The test is now available in several languages; the present report regards only the original version of the test, which is in English.

In the original sample of 18,409 people who took the test during this period, a number of people took it multiple times, perhaps in an effort to discover the scoring method. These individuals were easily identified by identical demographic characteristics and, in some cases, by IP addresses. Only the very first score of such individuals was counted in the study. When duplicates were eliminated, the total sample size was reduced to 17,785.

Test Construction

The online test begins with brief instructions, as follows: "Although most people believe that virtually everyone is either 'straight' (heterosexual) or 'gay' (homosexual), sexual orientation actually exists on a continuum. To determine where you are on the Sexual Orientation Continuum, take this simple quiz." Five demographic questions are then asked,

regarding age, educational level, gender (Male, Female, or Other), race/ethnicity (White, Black, Hispanic, Asian, American Indian, or Other), and self-labeled sexual orientation (Straight, Gay, Bisexual, or Other). Although self-labeled sexual orientation can be considered a demographic question, responses to this question should also be predictable to some extent from test scores, and it therefore can also be considered a criterion variable for validation purposes.

Two criterion questions followed. First, on a scale from 1 to 10, where 1 was labeled "Low" and 10 was labeled "High," respondents were asked, "Over the years, how much uncertainty have you felt about your sexual orientation?" Presumably, because of cultural pressures to live one's life as a heterosexual, the farther one is toward the gay end of the Sexual Orientation Continuum (hereafter, SOC), the more uncertainty one will have felt about one's sexual orientation. Cultural pressure aside, the greater one's Sexual Orientation Range (hereafter, SOR)—a new measure yielded by the test—the more uncertainty one will presumably have felt regarding one's sexual orientation.

Second, respondents were asked, "Over the years, has your sexual orientation changed?" Again, presumably because of pressure to be straight, the farther one is toward the gay end of the SOC, the more likely it is that one will have changed one's orientation (by changing actual behavior or lifestyle, or at least by changing how one identifies one's sexual orientation). Again, culture pressure aside, the greater one's SOR, the more likely it is that one will, in one sense or another, have changed one's orientation at some point.

The test itself includes 18 items, nine focusing on same-sex interactions and nine focusing on opposite-sex interactions. The items were similar to questions that Kinsey and his colleagues asked in interviews. In each set, two items focused on attraction (e.g., "Have you ever felt attracted to a member of the same sex?"), three items focused on fantasy (e.g., "How

frequent are your opposite-sex fantasies or dreams?"), and four items focused on behavior (e.g., "Have you ever voluntarily had sexual contact [such as kissing or petting] with a member of the same sex?"). Four items in each set focused on the present (e.g., "How strongly are you attracted to members of the opposite sex?"), and five items in each set focused on the past and present (e.g., "Have you ever had a dream about a sexual encounter with a member of the same sex?"). Some items required yes/no answers, whereas other required answers on a scale. See Table I for a detailed breakdown of the items.

Insert Table I About Here

After all questions were answered, respondents could view the results by clicking on the "Submit" button. The results page supplied a graphical display showing a scale representing the SOC, with values labeled from 0 (for heterosexual) to 13 (for homosexual) (Figure 1). Above the scale, a shaded bar indicated a range of values for that individual, and two numerical values were also presented: the Mean Sexual Orientation (MSO) and the Sexual Orientation Range (SOR).

Insert Figure 1 About Here

Following suggestions by Shively and DeCecco (1977) and Sell (1996), scores were computed separately for heterosexuality and homosexuality. The first nine items in the test yielded a score between 0 and 13 for homosexuality, and the final nine items in the test yielded a score between 0 and 13 for heterosexuality, which was then reversed (in other words, the range

was changed from 13 to 0). Each score was placed on the SOC, and the distance between them yielded the shaded bar shown to respondents (Figure 1). The numerical difference between these two values yielded the SOR, which can be understood to be a reasonable estimate of how much flexibility or choice one has in expressing one's sexual orientation. The numerical average of these two values yielded the MSO: roughly, a central location for where one lies on the SOC. In effect, this scoring method overlays two separate continua, one for heterosexuality and one for homosexuality.

If homosexual and heterosexual tendencies are indeed independent of each other, just as preference for Japanese food is presumably independent of preference for Mexican food, we should find that MSO scores on the first half of the test, which measures same-sex (SS) attractions, are independent of MSO scores on the second half of the test, which measures opposite-sex (OS) attractions. If, instead, these two tendencies are positively related—in other words, if someone is more sexually inclined in one area, he or she will also be more sexually inclined in the other—we should find a positive correlation between the scores on each half of the test. If, however, these two tendencies are negatively related—suggesting a tradeoff between heterosexual and homosexual tendencies—we should find a negative correlation between the two scores.

Demographics

In the sample of 17,785 individuals who took the online test in the time period mentioned above, participants ranged in age from 11 to 98, with a mean age of 28.5. 11,960 (67.2 %) identified themselves as male, 5,737 (32.3%) as female, and 88 (0.5%) as other. The high proportion of males, as well as some other aspects of the sample that appear to be unrepresentative of the general population, are a typical artifact of Internet sampling (cf. Lippa,

2007; Reimers, 2007; Sell, 1997b). While Internet access and usage is now largely equal for males and females (Servon, 2002), they tend to use the Internet for different activities. Males may be more concerned about sexual-orientation labels in our culture than females are, presumably because of differential cultural pressures.

Again, as might be expected in an Internet sample, respondents were mainly white, with 16,255 (91.4%) identifying themselves as such. Of the remainder, 731 (4.1%) identified themselves as Asian, 242 (1.4%) as Hispanic, 214 (1.2%) as black, 40 (0.2%) as American Indian, and 303 (1.7%) as other.

Of the 11,410 (64.2%) participants who identified themselves as straight, 7,949 (69.7%) identified themselves as male, 3,451 (30.2%) as female, and 10 (0.1%) as other. Of the 2,465 (13.9%) participants who identified themselves as bisexual, 1,376 (55.8%) identified themselves as male, 1076 (43.7%) as female, and 13 (0.5%) as other. 3,461 (19.5%) of the participants identified themselves as gay, and of those, 2,434 (70.3%) identified themselves as male, 1,003 (29.0%) as female, and 24 (0.7%) as other. In the sexual orientation category, the remaining 449 (2.5%) individuals identified themselves as other, and 201 (44.8%) of those identified themselves as male, 207 (46.1%) as female, and 41 (9.1%) as other. In total, 35.8% of respondents identified themselves as gay, bisexual, or other—far greater than the 5-to-10% one would expect in the general population (Bagley & Tremblay, 1998; Ellis, Robb, & Burke, 2005; Reimers, 2007). Again, this is presumably an artifact of Internet sampling, as well as of self-selection brought about by the nature of the test, matters to be discussed further below.

The educational backgrounds of the respondents varied greatly, with 619 (3.5%) people indicating that they had no education and 928 (5.2%) people indicating that they had doctoral degrees. Of the remaining participants, 4,742 (26.7%) had a high school education, 1,121 (6.3%)

had an associate's degree, 6,378 (35.9%) had completed college, and 3,997 (22.4%) had a master's degree. Again, as is typical in Internet studies, educated people were overrepresented in the sample; 63.5% of the people in the sample had at least a college education, compared to about 27% for the general population (U. S. Census Bureau, 2004).

Participants came from 48 countries but were mainly from the United States. Participants were not explicitly asked to identify their location; however, several weeks after data collection began, IP addresses were collected, and they were used to identify the current locations of about 70% of the participants. 10,383 (84.3% of those with IP addresses) were from the United States, 1,479 (12.0%) from European countries, and 458 (3.7%) from elsewhere around the world.

RESULTS

Reliability and Validity

Reliability was assessed using Cronbach's alpha, which was 0.88 for all 18 test items. Because items 1 through 9 and 10 through 18 can be considered independent tests (for same-sex [SS] and opposite-sex [OS] attractions, respectively), alpha was also computed separately for each. Alpha(SS) was 0.90, and alpha(OS) was 0.87, suggesting that consistency of responding was slightly higher in the first part of the test. Because subjects were obtained over the Internet, test-retest reliability could not be assessed.

Predictive validity was assessed in a several ways. First and foremost, MSO scores on the test instrument should be able to predict self-identified sexual orientation, and indeed a Kruskal-Wallis test yielded highly significant results ($H=11,294.0$, 3 d.f., $p<.01$), meaning that the mean MSO scores for self-identified sexual orientation were highly significantly different from one another. That said, there was also considerable variability in MSO scores for each of

the four sexual orientation categories (Figures 2 and 3). Using 0 as an ideal score for self-labeled heterosexuals and 13 as an ideal score for self-labeled homosexuals, more than 75% of respondents deviate from the ideal by 1 point or more, more than 50% deviate by 2 points or more, more than 33% deviate by 3 points or more, and so on, with self-identified gays consistently deviating from expected MSO scores more than self-identified straights (Figure 4).

Insert Figures 2, 3, and 4 About Here

It is also reasonable to assume, a priori, that SOR scores for self-identified bisexuals should be substantially higher than SOR scores for self-identified gays and straights. The mean SOR score for bisexuals (mean=7.0) was indeed substantially higher than the mean score for gays and straights combined (mean=3.3) ($U=6{,}872{,}862$, $p<.01$) (Figure 5). No a priori assumption can be made about the SOR score for those identifying their sexual orientation as "other"; however, the distribution of MSO scores for individuals in this category proved to be nearly identical with those identifying themselves as bisexuals (Figure 2).

Insert Figure 5 About Here

As mentioned earlier, because of cultural pressure to be straight, people with higher MSOs should also feel greater uncertainty regarding their sexual orientation, and indeed a Spearman test shows a relatively high positive correlation between these two variables ($\rho=0.43$, $p<.01$). By this same logic, the mean MSO score for people who have changed their sexual orientation (mean=7.2) should be significantly higher than the mean MSO score for people who

have not (mean=4.0), and indeed that is the case (U=9,743,483.0, p<.01). Cultural pressure aside, uncertainty should also be positively correlated with SOR scores, and that is confirmed by the Spearman test (ρ=0.40, p<.01). The mean SOR score for people who have changed their sexual orientation (mean=6.0) is also significantly higher than the mean SOR score for people who have not (mean=3.4) (U=12,176,109.0, p<.01).

Because the entire sample was obtained through the Internet, other types of validity, such as concurrent validity, could not be established in the present study.

Factor Analysis

An unrotated principal-axis factor analysis was performed for all 18 items for all participants, and then separate factor analyses were performed for males and females. Each of the three analyses yielded three interpretable components (Table II). Component 1 in each analysis had relatively high positive loadings for all items and appears to represent overall sexuality (roughly, "sex drive"). In the analysis with all subjects, factor loadings were relatively high (>0.30) for all but for two items, 10 and 15. Loadings for these items were substantially higher (>0.50) in Component 2, which had positive loadings for items 1 through 9 and negative loadings for items 10 through 18 and therefore appears to represent same-sex attraction. Component 3 is a contrast between the two items that refer to overt same-sex sexual behavior (6 and 9) and the corresponding items on the second half of the test that refer to overt opposite-sex sexual behavior (15 and 18) (Table I). It had substantial negative loadings (<-0.30) for the former and substantial positive loadings (>0.30) for the latter.

Insert Table II About Here

Distribution of Test Scores

The overall distribution of MSO scores was fairly smooth across the SOC, consistent with Kinsey, Pomeroy, and Martin's (1948) findings (Figure 6). The smoothness of the distribution is interrupted mainly at its center, where there is a small spike created by an excess of roughly 150 individuals (out of 17,785 respondents) with MSO scores of 6.5. These appear to be real people, and they are mostly males (Figure 7). The same pattern, without the center spike and only slightly less smooth overall, appears in the distribution of scores obtained from individuals outside the United States (Figure 8).

Insert Figures 6, 7, and 8 About Here

SOR scores also varied smoothly on a continuum, with the distribution of scores peaking toward the low end of the range (Figure 9). The mean SOR score for the full sample was 3.9. Similar SOR results were obtained for the United States (mean=3.8) and for countries outside the United States (mean=4.0).

Insert Figure 9 About Here

Mean MSO scores differed significantly by gender, with those identifying themselves in the "other" category (mean=6.1) scoring higher than females (mean=5.1), and females scoring higher than males (mean=4.3) ($H=582.8$, 2 d.f., $p<.01$) (Figure 3). Except for the spike in male scores mentioned above, MSO scores for both males and females were distributed fairly smoothly across the SOC, with the curve for males skewed more toward the low (straight) end of

the continuum (Figure 7). Mean SOR scores also differed significantly by gender, with those identifying themselves in the "other" category (mean=5.1) scoring higher than females (mean=4.8), and females scoring substantially higher than males (mean=3.4) ($H=980.3$, 2 d.f., $p<.01$) (Figure 5).

Mean MSO scores also differed significantly by race and ethnicity, with American Indians (mean=7.2) scoring higher than blacks (mean=6.1) and Asians (mean=6.2), blacks and Asians scoring higher than Hispanics (mean=5.2), and Hispanics scoring higher than whites (mean=4.4) ($H=266.6$, 4 d.f., $p<.01$). Given the relatively small number of non-whites in the study, however (only 8.6% of respondents), it is not clear that this finding is applicable to the general population. Mean SOR scores did not differ significantly by race and ethnicity ($H=8.0$, 4 d.f., $p=.09$).

Mean MSO scores differed significantly with education ($H=17.5$, 5 d.f., $p<.01$); however, educational level did not predict MSO score ($\rho=.01$, $p=.27$). Mean SOR scores also differed significantly with education ($H=26.5$, 5 d.f., $p<.01$), and there was a small positive correlation between SOR and educational level ($\rho=.04$, $p<.01$).

As one might expect, there was a small positive correlation between age and MSO score ($\rho=0.12$, $p<.01$), presumably because as people get older, they care less about societal pressure and are able to act more consistently according to their natural inclinations. Similarly, and probably for the same reason, a small positive correlation was found between age and SOR score ($\rho=0.10$, $p<.01$). Consistent with these findings, a small negative correlation was found between age and uncertainty ($\rho=-0.07$, $p<.01$). Uncertainty itself was skewed toward low values (Figure 10), and individuals expressing low uncertainty regarding their sexual orientation had MSO scores peaking toward the straight end of the SOC, whereas individuals expressing high

uncertainty regarding their sexual orientation had MSO scores peaking toward the middle of the SOC (Figure 11).

Insert Figures 10 and 11 About Here

It was noted earlier that MSO scores differed significantly with respect to self-identified sexual orientation and that SOR scores for self-identified bisexuals were substantially higher than SOR scores for self-identified gays and straights combined. In addition, mean SOR scores were found to be significantly different for all four categories of sexual orientation ($H=2,753.9$, 3 d.f., $p<.01$).

MSO and SOR scores were positively correlated ($\rho=0.30$, $p<.01$), as should be expected. MSO and SOR are derived from the same values (scores on the SS and OS portions of the test), and SOR scores are constrained by MSO scores; the closer the MSO score is to either end of the SOC, the smaller the possible SOR.

The statistical relationship between scores on the first half of the test (SS) and scores on the second half of the test (OS) proved to be especially informative. As noted earlier, depending on one's perspective about the relationship between same-sex and opposite-sex attractions, one could predict a positive correlation, a negative correlation, or no correlation between scores on the two halves of the test. In fact, a fairly strong negative relationship was found ($\rho=-0.49$, $p<.01$), suggesting that the greater one's heterosexual tendencies, the smaller one's homosexual tendencies, and vice versa.

DISCUSSION

The greatest strength of this study is also its greatest weakness, namely using the Internet to obtain subjects. The Internet is a cost-effective research tool, and it is available worldwide. It also allows for extremely fast acquisition of data. For something as personal and private as sexual orientation, the anonymity of the Internet might also yield more reliable and accurate information than face-to-face interviews. Gonsiorek et al. (1995) have suggested that participants in face-to-face interviews might underreport their same-sex orientation because of social bias, although a study by Laumann et al. (1994) suggests that results obtained in face-to-face interviews might be at least as accurate as results obtained using anonymous written questionnaires.

The present study also suffers from obvious disadvantages of Internet sampling. Only 8.6% of the participants were non-white; only 32.3% were female; and only 36.5% lacked a college education, meaning that the sample skewed heavily toward educated white males. Individuals without computer access are automatically excluded from this type of study. Of greater concern, 35.8% of the subjects identified their sexual orientation as gay, bisexual, or other, a number substantially higher than one would expect to find in the general population (Bagley & Tremblay, 1998; Ellis, Robb, & Burke, 2005; Reimers, 2007).

These important sampling issues aside, the basic finding of the study appears to be undeniable: namely, that sexual orientation—at least as measured by Kinsey-like questions regarding attraction, behavior, and fantasy—lies smoothly on a continuum. This finding held overall, as well as for all subgroups analyzed. The fact that this pattern was as robust for participants outside the United States as for participants in the United States provides strong support for the generalizability of the finding.

This study suggests, consistent with Kinsey's perspective, that the commonly used terms "gay," "straight," and "bisexual" are misleading for many people. Indeed, if sexual orientation lies on a continuum—in other words, that it is more like height than eye color (which itself is not truly categorical)—it is not clear that there are any advantages to forcing it into a small number of categories. In fact, it could be argued that doing so creates many of the societal problems surrounding sexual orientation—that the entire debate about sexual orientation is based on a fundamental misconception. The assertion that everyone is naturally straight becomes impossible when we recognize that sexual orientation lies on a continuum. The pain that some individuals suffer around sexual orientation may be based less on societal pressure to be straight than on the nearly impossible task of assigning a single label to tendencies that cannot accurately be categorized that way. The terms "gay," "straight," "bisexual," and "other" correspond to broad, skewed distributions of scores on the SOC (Figure 2). Putting this another way, an individual using one of these labels could have an MSO score almost anywhere on the continuum, and in fact MSO scores often deviate from ideal scores substantially, with about one in ten respondents deviating from their ideal score by 6 points—nearly half the length of the SOC (Figure 4). Presumably, a self-identified straight with an MSO of 8 would be every bit as uncomfortable as a self-identified gay with an MSO of 4.

The present study also challenges the widely held belief that more than 90% of the population is straight, with a much smaller percentage gay or bisexual. In fact, the present data suggest that *more than 90% of the population experiences both same-sex and opposite-sex attractions*; only 6.2% of the present sample had a perfect straight score (MSO=0), and only 1.2% of the present sample had a perfect gay score (MSO=13), leaving 92.6% of the sample with past or present attractions to both SS and OS individuals. Even among self-identified straights,

the modal MSO score was 1, not 0, and among self-identified gays, the modal MSO score was 11, not 13, once again suggesting the inadequacy of these labels (Figure 2).

These findings have implications not only for society in general but also for research on sexuality. If this confirmation of Kinsey's findings is sound, it could be argued that researchers have a special obligation to view sexual orientation from the continuum perspective. Currently, when individuals are recruited into studies of sexuality—or into any studies that use sexual orientation as a variable—self-identified sexual orientation is often assumed to have both specific meaning and integrity as a categorical variable. If, instead, sexual orientation were measured as a continuous variable using an objective measuring instrument, our understanding of some sexuality-related issues might prove to be quite different.

These suggestions depend, of course, on the adequacy of the present test, which can certainly be questioned. Following Kinsey, this test uses only a small number of questions regarding sexual attraction, behavior, and fantasies (Table I). As mentioned earlier, some researchers have suggested that other variables should be considered when measuring sexual orientation, including sexual identity, affectional preference, social preference, and lifestyle (Klein, 1993; Sell, 1996; Shively & DeCecco, 1977). The present measure also blends past and present fairly liberally (Table I); other tests focus on the present and a restricted recent period of time (e.g., Sell, 1996).

One advantage of the present test is that it measures OS and SS attractions separately, ultimately combining the two measures into a single score while preserving information about the two separate tendencies. In so doing, the test yields a new measure of sexual orientation—Sexual Orientation Range—which appears to be both reasonable and robust. The difference between the MSO score for OS attraction and the reversed score for SS attraction appears to be a

reasonable measure of the flexibility people have in expressing their sexual orientation; in effect, it is a rough measure of "choice," a controversial concept debated hotly by thought leaders and policy makers, with some people claiming that sexual orientation is entirely a matter of choice and others insisting that some people have no choice whatsoever in how they express their orientation. Once again, the present study suggests that the debate is based on a misconception. If SOR is a reasonable measure of choice, then choice, like sexual orientation itself, lies on a continuum; for a wide range of MSOs, flexibility might be small, large, or any value in between.

The reasonableness of the SOR measure is suggested by consistently positive corroborative feedback received by the author, as well as by statistical findings: for example, that self-identified bisexuals have a much higher SOR than self-identified gays and straights and that SOR is positively correlated with both age and the uncertainty people report regarding their sexual orientation.

It is possible that both MSO and SOR have a genetic component, but the present study is not designed to shed light on this issue. The fact that both measures are similar in U.S. and non-U.S. populations is consistent with the genetic perspective but by no means evidentiary.

In future studies, both reliability and validity issues need to be addressed further. A small study with on-hand subjects should be conducted to determine test-retest reliability, for example. Such a study could also be employed to determine concurrent validity. Preferably, such a study would employ a stratified sample or use conventional methods to obtain a random, representative sample of the general population. The present test could also be employed in a long-term longitudinal study to determine whether MSO and SOR scores change over time.

At this writing, the test is available online in English, French, Spanish, German, Hungarian and Japanese, with other versions under development. The present study compared

the scores of U.S. and non-U.S. test takers using only the English version of the test; the number of test-takers for whom English was not a first language is unknown. In a future report, it will be possible to compare scores of non-English-speaking people taking the test in their native language, which will provide further insights about the universality of the present findings. A future report will also summarize the findings of a much larger number of English-speaking test-takers; however, an initial examination of scores obtained after May 13, 2006, suggests that the results will be substantially the same as those reported herein.

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Figure Captions

Figure 1. Sample display of results for the online test.

Figure 2. Mean Sexual Orientation (MSO) scores by self-identified sexual orientation. The graphs show frequency distributions of MSO scores for self-identified (a) straights, (b) gays, (c) bisexuals, and (d) others. Each distribution has a characteristic skew and covers most or all of the Sexual Orientation Continuum (SOC), suggesting that for many people there is a mismatch between self-identified sexual orientation and actual sexual behavior, fantasies, or attractions.

Figure 3. Mean MSO scores for self-reported gender and sexual orientation groupings. Note that means for self-identified homosexuals cluster near the gay end of the SOC, that means for self-identified heterosexuals cluster near the straight end, and that means for those who self-identify as bisexual or "other" cluster the center. The mean MSO score for females is substantially higher than the mean for males (grey circles). Means for people identifying their gender as "other" are not shown because there were few in the study.

Figure 4. Deviation from ideal MSO scores (13 for gays, 0 for straights) shown as a function of cumulative percentage of respondents. This graph suggests how common it is for people to mislabel their sexual orientation. More than 75% of respondents deviate from their ideal scores by at least 1 point on the SOC; more than 50% deviate by at least 2 points; more than a third deviate by at least 3 points; and so on. Mislabeling is greater for gays than for straights.

Figure 5. Mean SOR scores for self-reported gender and sexual orientation groupings. Note that means for self-identified bisexuals are substantially higher than the means for other groups and that the mean for females is substantially higher than the mean for males (grey circles). Means for people identifying their gender as "other" are not shown because there were few in the study.

Figure 6. Mean Sexual Orientation (MSO) scores for all respondents, shown in a frequency distribution. Although the curve is skewed to the left (toward the straight end of the SOC), scores are distributed fairly smoothly across the entire continuum, just as Kinsey found. Note the spike in the middle of the curve, caused by an excess of approximately 150 males with scores of 6.5—presumably an anomaly of Internet sampling. The shaded areas show how the distribution breaks down into self-identified gays, bisexuals, and straights. The sample appears to include a much larger proportion of gays and bisexuals than exist in the general population; however, even if this proportion were reduced, the overall shape of the distribution would be roughly the same.

Figure 7. MSO scores for all self-identified males and females in the study, shown in a frequency distribution. Each curve skews toward the left (toward the straight end of the SOC); however, males scores skew more sharply.

Figure 8. MSO scores (a) in the United States and (b) in 47 other countries, shown in a frequency distribution. Note that the curves have similar shapes, although there is more variability in the non-U.S. data, possibly because of the relatively small sample size.

Figure 9. Sexual Orientation Range (SOR) scores for the entire sample, shown in a frequency distribution. The curve is relatively smooth, with a peak toward the low end.

Figure 10. Uncertainty scores for the entire sample, shown in a frequency distribution. The curve is relatively smooth and peaks at its lowest value.

Figure 11. MSO scores for (a) respondents reporting relatively low uncertainty regarding their sexual orientation (values 1 to 5 on a 10-point scale) and (b) respondents reporting relatively high uncertainty regarding their sexual orientation (values 6 to 10 on a 10-point scale), shown in two frequency distributions. For the former respondents (graph A), the distribution peaks toward the low end of the SOC; for the latter respondents (graph B), the distribution peaks toward the center.

Table I. Breakdown of Items in the Test

Item Number	***Item***	***Response***	***Attraction, Fantasy, or Behavior***	***Time Frame***
Same-Sex Interactions				
1	Have you ever felt sexually attracted to a member of the same sex?	Yes, No	Attraction	Past and Present
2	How strongly are you attracted to members of the same sex?	Very Strongly, Moderately, Not at all	Attraction	Present
3	Have you ever had a dream about a sexual encounter with a member of the same sex?	Yes, No	Fantasy	Past and Present
4	Have you ever had a waking fantasy about a sexual encounter with a member of the same sex?	Yes, No	Fantasy	Past and Present
5	Have you ever felt sexually aroused when you've had any exposure to two people of your same gender having a sexual encounter (through gossip, a video, or some other means)?	Yes, No	Behavior	Past and Present
6	Have you ever voluntarily had sexual contact (such as kissing or petting) with a member of the same sex?	Yes, No	Behavior	Past and Present
7	Would you be willing to have sexual relations with someone of the same sex?	Yes, Maybe, No	Behavior	Present
8	How frequent are your same-sex fantasies or dreams?	Never have them, Rare or occasional, Frequent	Fantasy	Present
9	How frequent are your same-sex encounters?	Never have them, Rare or occasional, Frequent	Behavior	Present
Opposite-Sex Interactions				
10	Have you ever felt sexually attracted to a member of the opposite sex?	Yes, No	Attraction	Past and Present
11	How strongly are you attracted to members of the opposite sex?	Very Strongly, Moderately, Not at all	Attraction	Present
12	Have you ever had a dream about a sexual encounter with a member of the opposite sex?	Yes, No	Fantasy	Past and Present
13	Have you ever had a waking fantasy about a sexual encounter with a member of the opposite sex?	Yes, No	Fantasy	Past and Present
14	Have you ever felt sexually aroused when you've had any exposure to someone of your gender having a sexual encounter with someone of the opposite sex (through gossip, a video, or some other means)?	Yes, No	Behavior	Past and Present
15	Have you ever voluntarily had sexual contact (such as kissing or petting) with a member of the opposite sex?	Yes, No	Behavior	Past and Present
16	Would you be willing to have sexual relations with someone of the opposite sex?	Yes, Maybe, No	Behavior	Present
17	How frequent are your opposite-sex fantasies or dreams?	Never have them, Rare or occasional, Frequent	Fantasy	Present
18	How frequent are your opposite-sex encounters?	Never have them, Rare or occasional, Frequent	Behavior	Present

Table II. Factor Loadings

	ALL SUBJECTS Component			**MALES** Component			**FEMALES** Component		
Item	1	2	3	1	2	3	1	2	3
1	0.59	-0.45	0.11	0.65	-0.43	0.07	0.54	-0.44	0.14
2	0.78	-0.26	0.01	0.80	-0.23	0.01	0.76	-0.26	0.01
3	0.54	-0.45	0.19	0.59	-0.44	0.19	0.48	-0.44	0.16
4	0.62	-0.48	0.21	0.66	-0.48	0.15	0.61	-0.44	0.26
5	0.57	-0.46	0.23	0.66	-0.44	0.14	0.45	-0.44	0.34
6	0.52	-0.39	-0.51	0.60	-0.36	-0.38	0.45	-0.40	-0.60
7	0.74	-0.40	-0.04	0.77	-0.38	-0.06	0.74	-0.37	-0.03
8	0.72	-0.41	0.17	0.75	-0.42	0.13	0.70	-0.39	0.19
9	0.65	-0.26	-0.43	0.70	-0.24	-0.32	0.61	-0.26	-0.51
10	0.29	0.59	-0.05	0.34	0.56	-0.04	0.20	0.60	-0.02
11	0.68	0.44	0.01	0.73	0.40	0.02	0.62	0.51	0.01
12	0.48	0.53	-0.16	0.55	0.49	-0.23	0.36	0.58	-0.07
13	0.54	0.54	-0.17	0.62	0.51	-0.19	0.42	0.57	-0.15
14	0.35	0.51	-0.24	0.42	0.50	-0.29	0.25	0.53	-0.20
15	0.28	0.54	0.49	0.33	0.50	0.57	0.20	0.57	0.42
16	0.63	0.52	-0.01	0.67	0.50	-0.01	0.59	0.55	-0.01
17	0.63	0.48	-0.06	0.72	0.42	-0.05	0.48	0.57	-0.07
18	0.53	0.49	0.35	0.58	0.40	0.44	0.45	0.57	0.24

Extraction method: principal component analysis. All initial eigenvalues >1.0.

Figure 1.

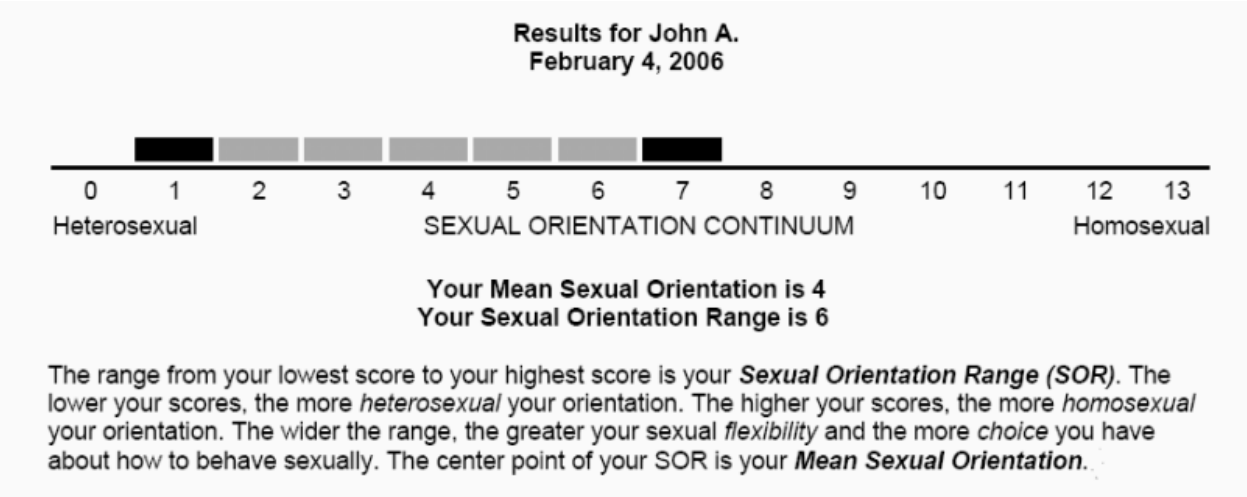

Results for John A.
February 4, 2006
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Heterosexual
SEXUAL ORIENTATION CONTINUUM
Homosexual
Your Mean Sexual Orientation is 4
Your Sexual Orientation Range is 6
The range from your lowest score to your highest score is your Sexual Orientation Range (SOR). The lower your scores, the more heterosexual your orientation. The higher your scores, the more homosexual your orientation. The wider the range, the greater your sexual flexibility and the more choice you have about how to behave sexually. The center point of your SOR is your Mean Sexual Orientation.

Figure 2.

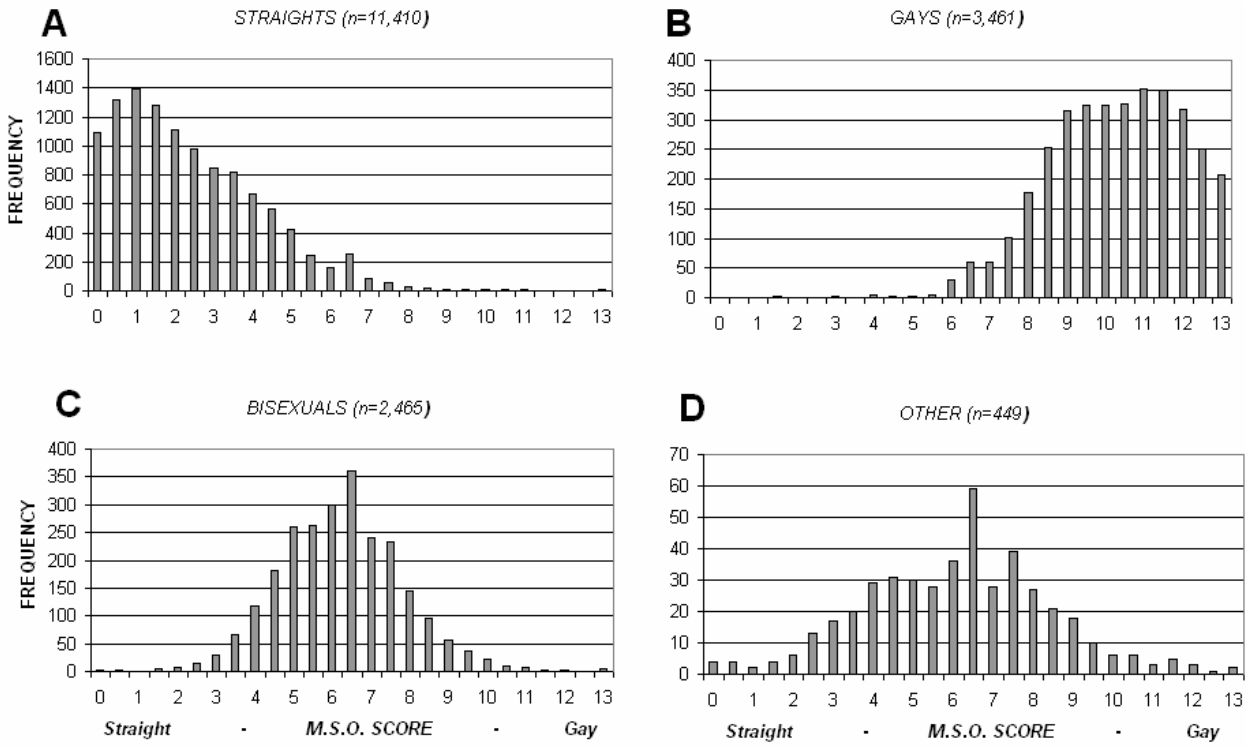

A
STRAIGHTS (n=11,410)
FREQUENCY
B
GAYS (n=3,461)
C
BISEXUALS (n=2,465)
FREQUENCY
D
OTHER (n=449)
Straight - M.S.O. SCORE - Gay
Straight - M.S.O. SCORE - Gay

Figure 3.

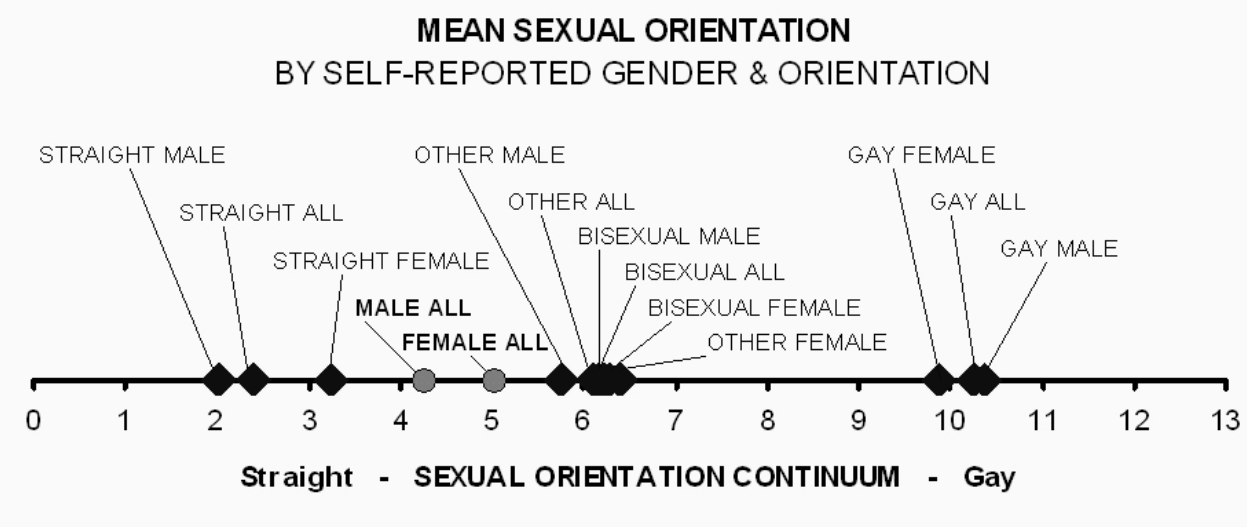

MEAN SEXUAL ORIENTATION
BY SELF-REPORTED GENDER & ORIENTATION
STRAIGHT MALE
STRAIGHT ALL
STRAIGHT FEMALE
MALE ALL
FEMALE ALL
OTHER MALE
OTHER ALL
BISEXUAL MALE
BISEXUAL ALL
BISEXUAL FEMALE
OTHER FEMALE
GAY FEMALE
GAY ALL
GAY MALE
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Straight - SEXUAL ORIENTATION CONTINUUM - Gay

Figure 4.

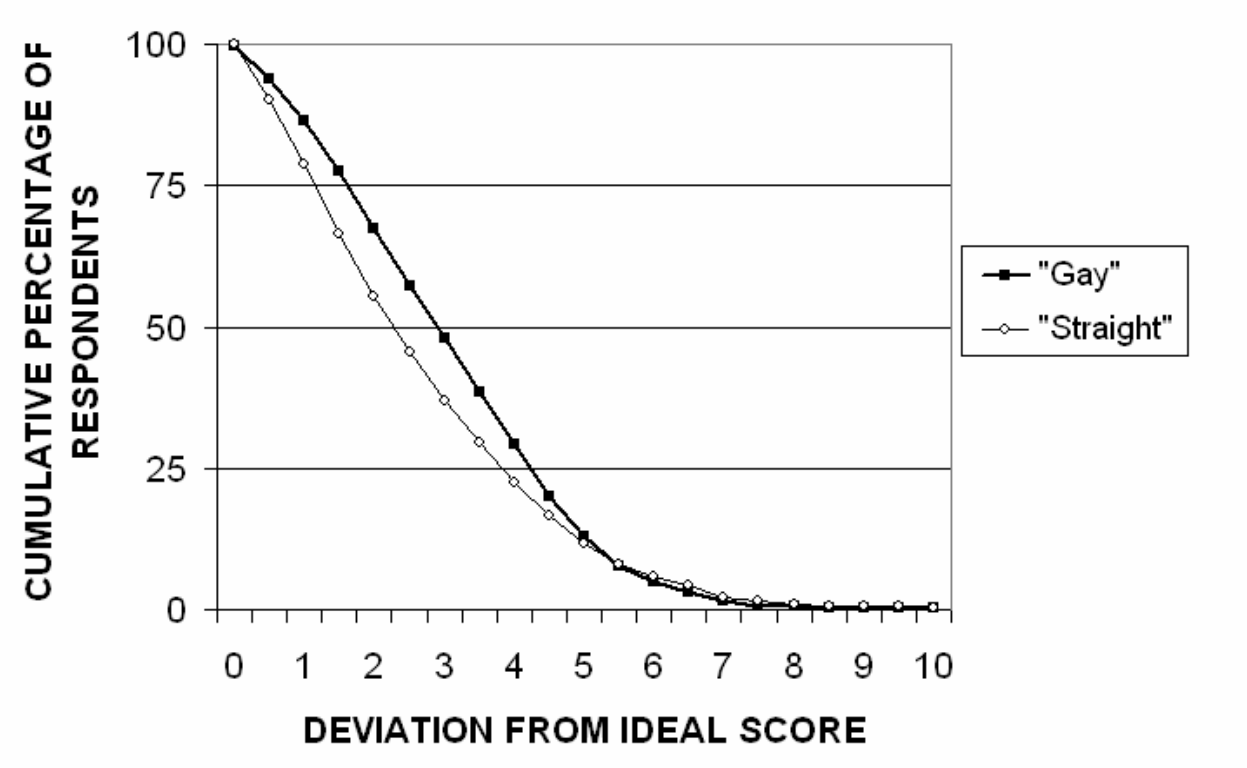

CUMULATIVE PERCENTAGE OF RESPONDENTS
100
75
50
25
0
0 1 2 3 4 5 6 7 8 9 10
DEVIATION FROM IDEAL SCORE
"Gay"
"Straight"

Figure 5.

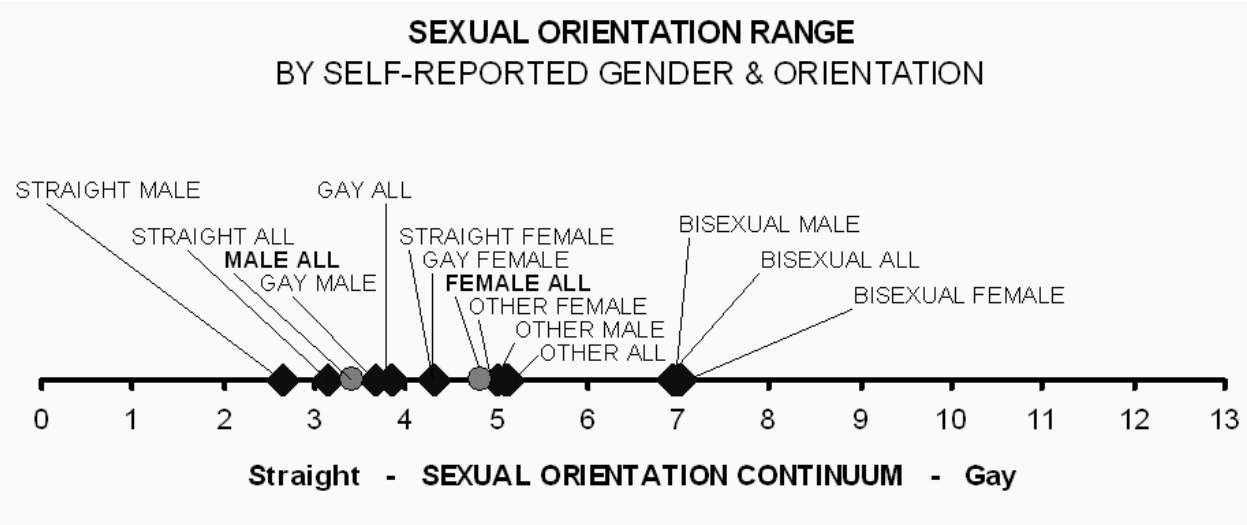

SEXUAL ORIENTATION RANGE
BY SELF-REPORTED GENDER & ORIENTATION
STRAIGHT MALE
GAY ALL
STRAIGHT ALL
MALE ALL
GAY MALE
STRAIGHT FEMALE
GAY FEMALE
FEMALE ALL
OTHER FEMALE
OTHER MALE
OTHER ALL
BISEXUAL MALE
BISEXUAL ALL
BISEXUAL FEMALE
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Straight - SEXUAL ORIENTATION CONTINUUM - Gay

Figure 6.

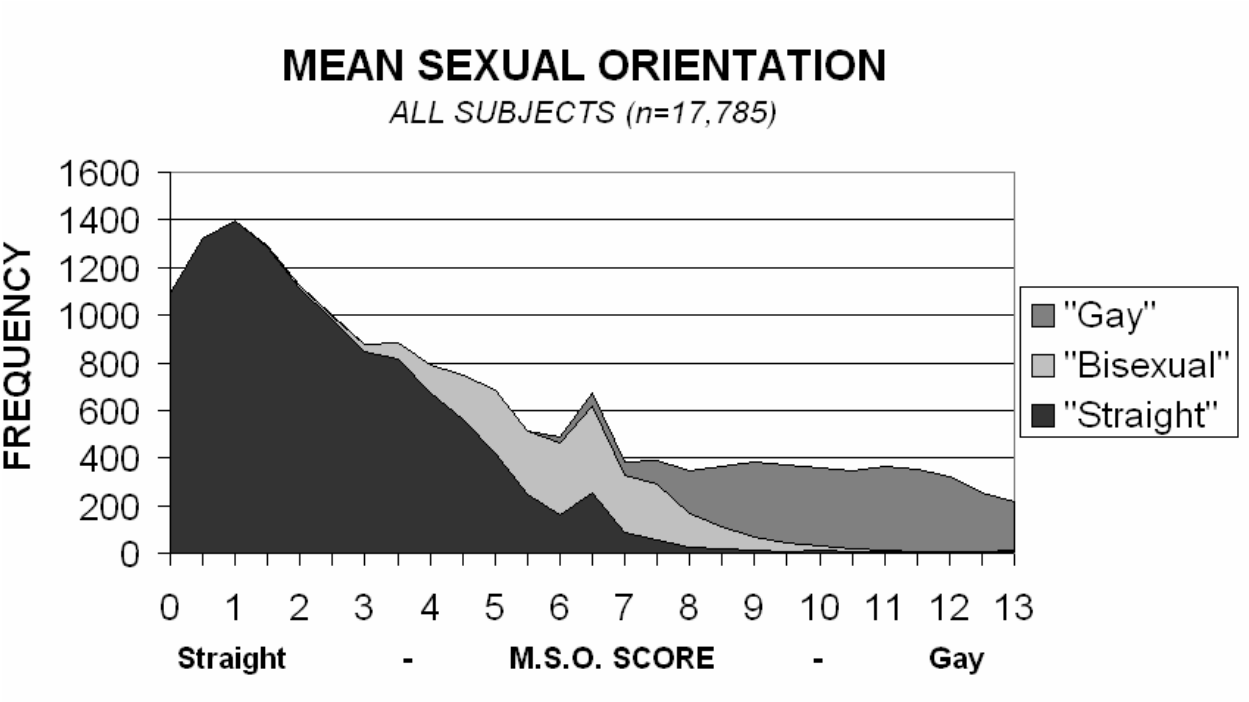

MEAN SEXUAL ORIENTATION
ALL SUBJECTS (n=17,785)
FREQUENCY
1600
1400
1200
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Straight - M.S.O. SCORE - Gay
"Gay"
"Bisexual"
"Straight"

Figure 7.

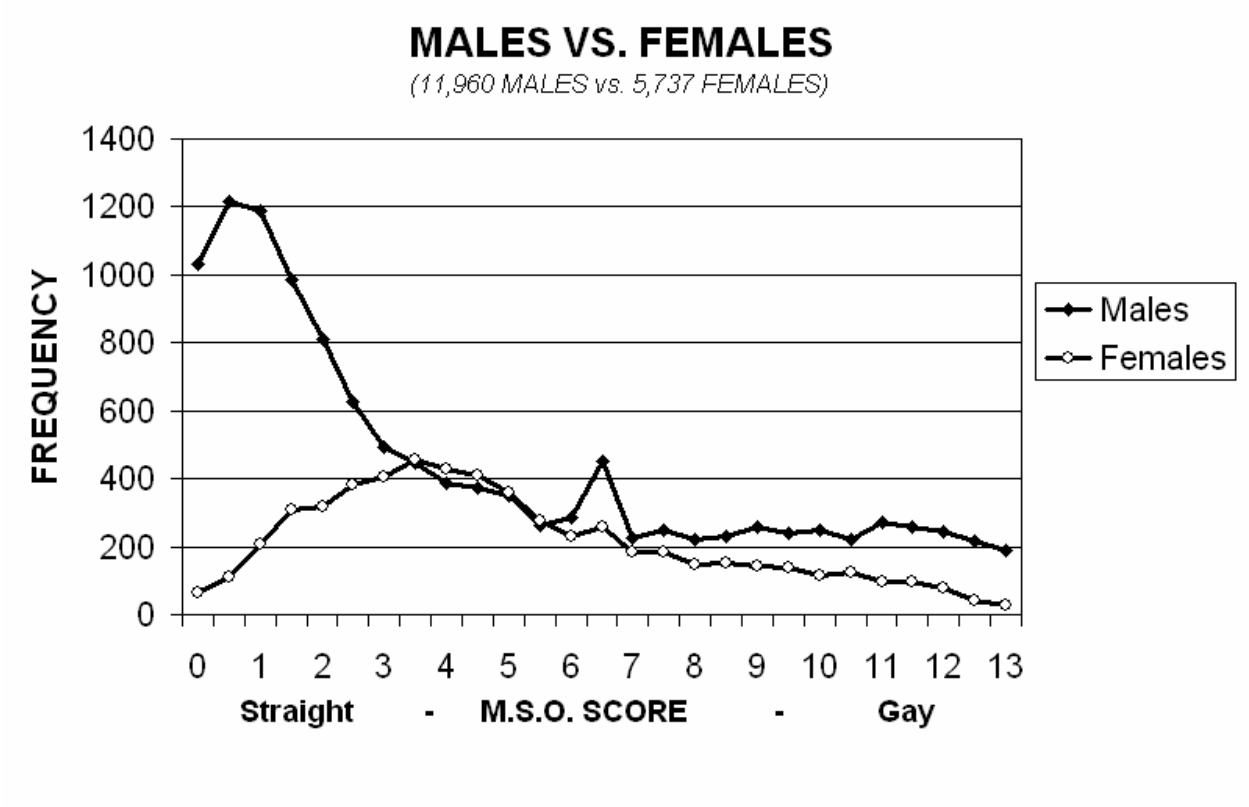

MALES VS. FEMALES
(11,960 MALES vs. 5,737 FEMALES)
FREQUENCY
1400
1200
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Straight - M.S.O. SCORE - Gay
Males
Females

Figure 8.

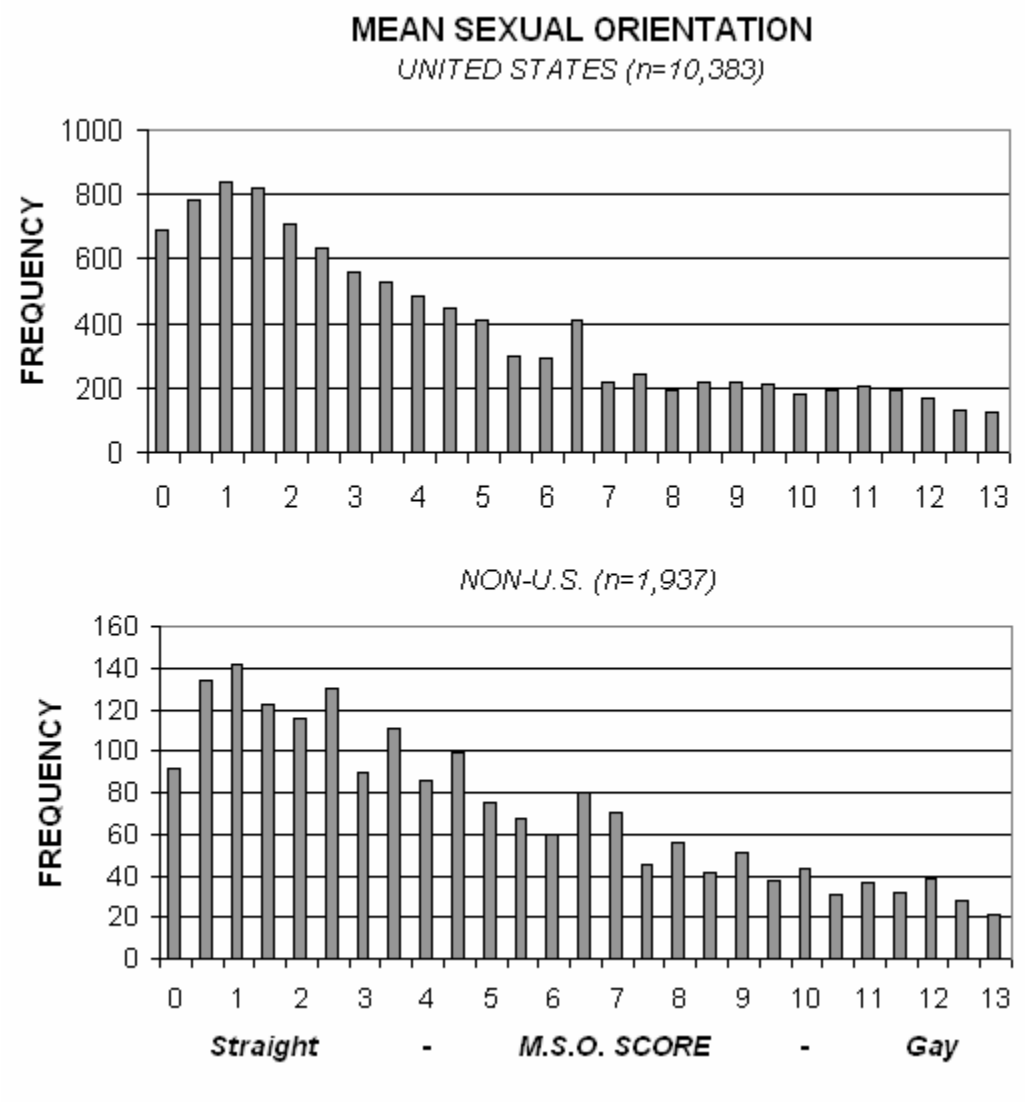

MEAN SEXUAL ORIENTATION
UNITED STATES (n=10,383)
FREQUENCY
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
NON-U.S. (n=1,937)
FREQUENCY
160
140
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Straight - M.S.O. SCORE - Gay

Figure 9.

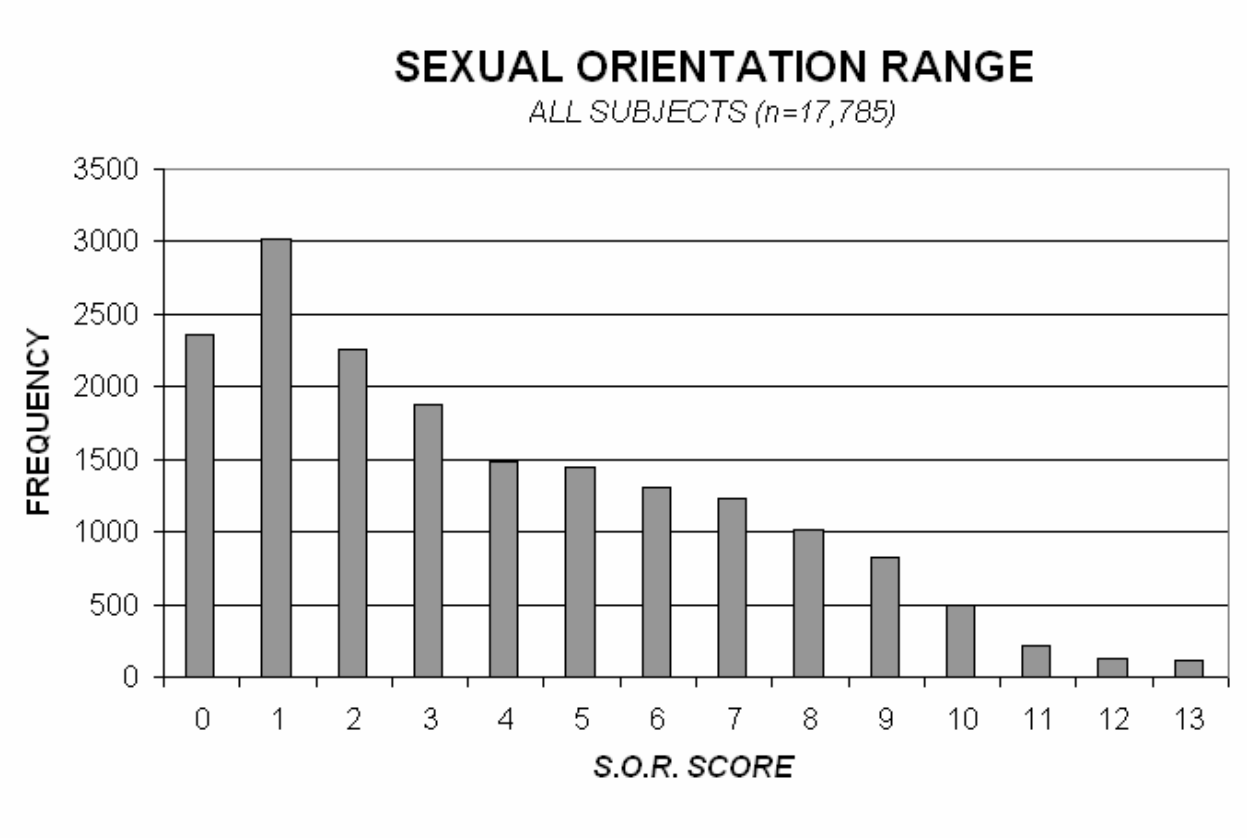

SEXUAL ORIENTATION RANGE
ALL SUBJECTS (n=17,785)
FREQUENCY
3500
3000
2500
2000
1500
1000
500
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
S.O.R. SCORE

Figure 10.

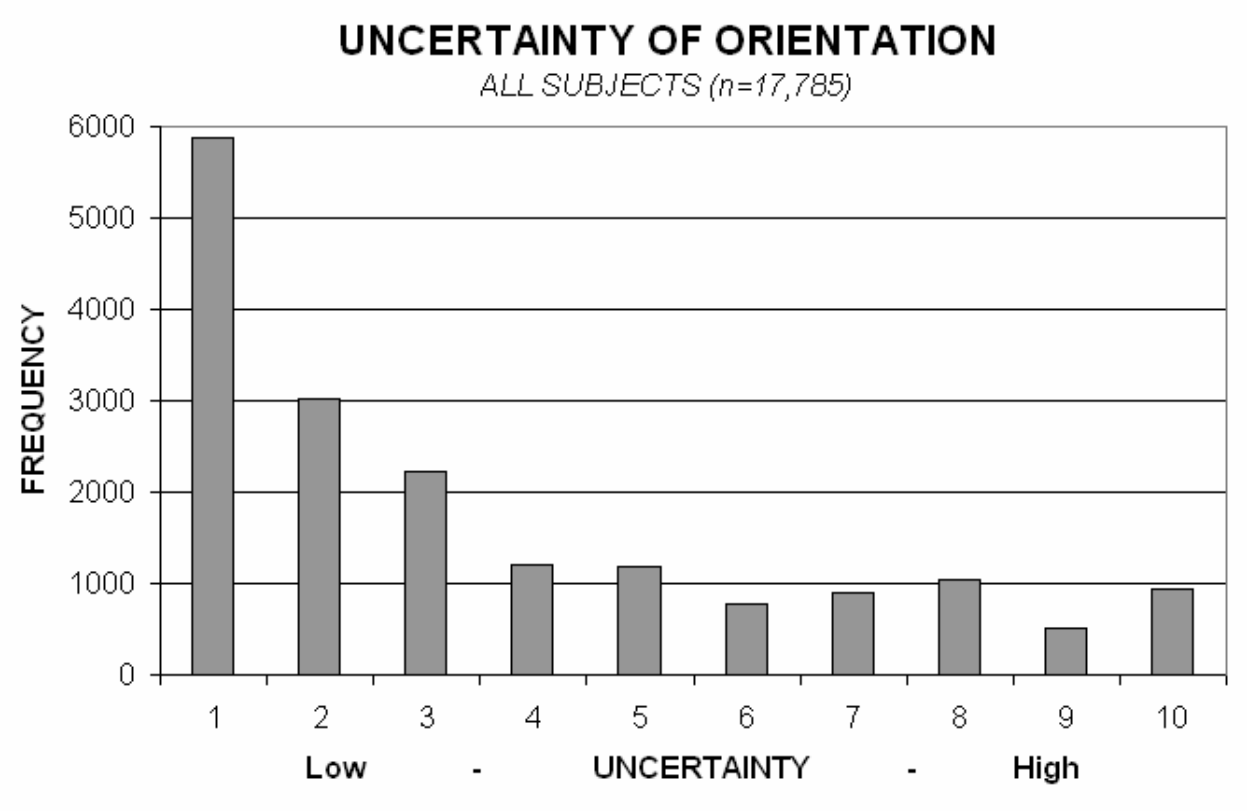
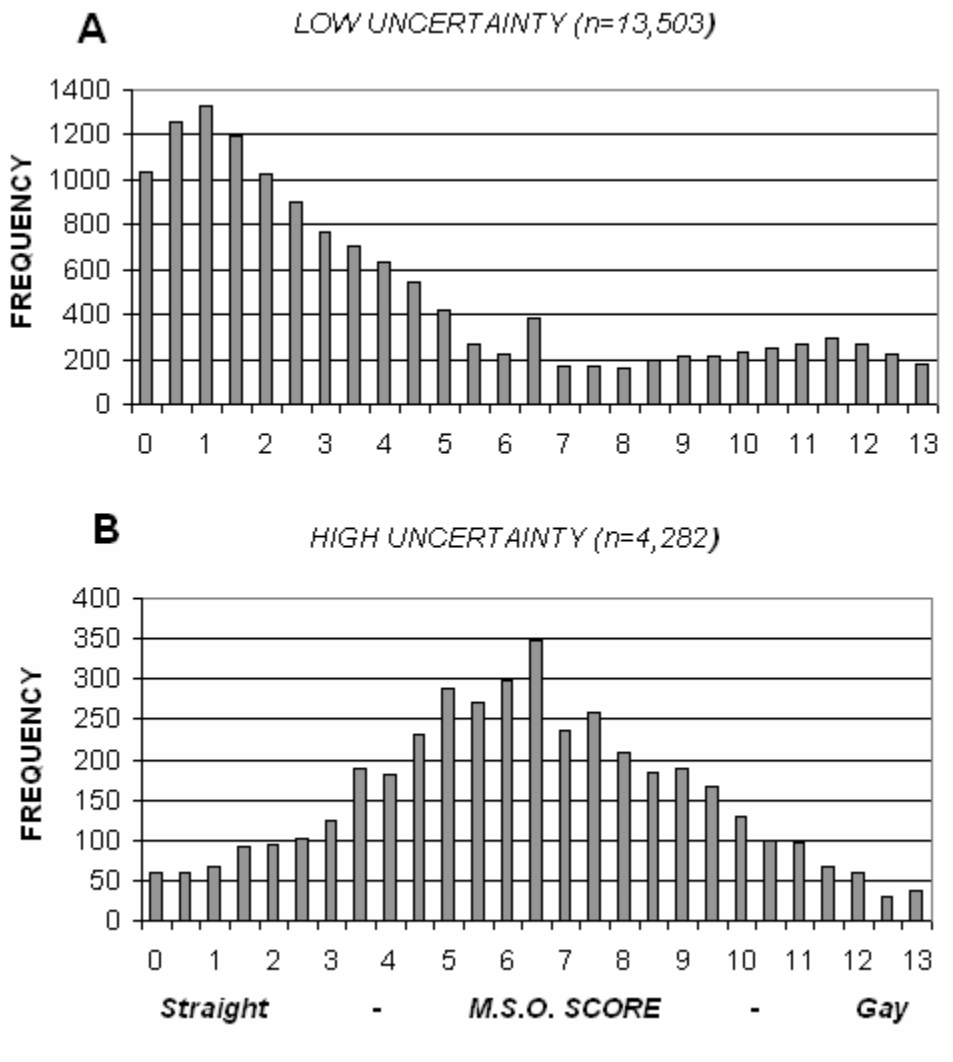

UNCERTAINTY OF ORIENTATION
ALL SUBJECTS (n=17,785)
FREQUENCY
6000
5000
4000
3000
2000
1000
0
1
2
3
4
5
6
7
8
9
10
Low - UNCERTAINTY - High

Figure 11.


A
LOW UNCERTAINTY (n=13,503)
FREQUENCY
1400
1200
1000
800
600
400
200
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
B
HIGH UNCERTAINTY (n=4,282)
FREQUENCY
400
350
300
250
200
150
100
50
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13
Straight - M.S.O. SCORE - Gay