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# Support for a Fluid-Continuum Model of Sexual Orientation: A Large-Scale Internet Study

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*In a study with 17,785 subjects obtained over the Internet from the United States and 47 other countries, Kinsey's hypothesis that sexual orientation lies on a continuum was supported. Self-identifications of subjects as gay, straight, bisexual, and other corresponded to broad, skewed distributions, suggesting that such terms are misleading for many people. Sexual orientation range—roughly, how much flexibility someone has in expressing sexual orientation—was also measured. The results support a fluid-continuum model of sexual orientation, according to which genetic and environmental factors determine both the size of the sexual orientation range and the point at which an individual's sexual orientation is centered on the continuum.*

*KEYWORDS sexual orientation, Alfred Kinsey, sexual orientation range, sexual orientation test, mean sexual orientation, sexual orientation continuum, fluid-continuum model of sexual orientation, Epstein Sexual Orientation Inventory, ESOI*

Most people think of sexual orientation as comprising two or at most three categories—heterosexual (straight), homosexual (gay/lesbian), and bisexual—despite groundbreaking research more than 50 years ago by Alfred

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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 and his colleagues 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 in many respects 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 (cf. Drucker, 2010). A recent statement on sexual orientation endorsed by the American Psychological Association and 13 other major organizations acknowledges that "sexual orientation ranges along a continuum" (Just the Facts Coalition, 2008, p. 3), yet the bulk of this document implicitly assumes the integrity of the three-category model.

Contemporary research has also shown that sexual orientation is fluid and dynamic in some respects—that is, that over time it can shift somewhat along the continuum (Chung & Katayama, 1996; Diamond, 2008a; Garnets & Peplau, 2000; Klein, 1993; Rosario, Scrimshaw, Hunter, & Braun, 2006). Yet, as Vrangalova and Savin-Williams (2010) note, researchers sometimes ignore both dimensional and dynamic aspects of sexual orientation, perhaps because society so strongly urges people to adopt one of two or at most three labels to describe their sexual orientation. This could be a situation in which scientific research and theory have been hampered by lay concepts and societal traditions.

Fleshing out and supporting both the continuum and flexibility ideas is important for at least three reasons, we believe: First, these ideas suggest that the angst many people feel regarding their sexual orientation may result from the discrepancy that necessarily exists between the simplistic label they adopt and their actual sexual fantasies, attractions, and behavior (cf. Cohler & Hammack, 2007; Hammack, Thompson, & Pilecki, 2009). For many people, shedding the label in favor of a more valid characterization of sexual orientation might provide considerable relief. Second, if these ideas are correct, the biological debate about sexual orientation needs to be carefully framed to account for them (cf. Gangestad, Bailey, & Martin, 2000; Haslam, 1997). Third, if sexual orientation lies on a continuum and is somewhat flexible, the political debate about sexual orientation, focusing as it often does on the assertion that only one or two types of sexual orientation exist, is clearly inappropriate.

In the present study, we offer a large data set that we believe supports a clear and simple fluid-continuum model of sexual orientation, according to which a) sexual orientation is to some extent fluid and flexible, with individuals having different ranges of flexibility (sexual orientation range or SOR) and

b) people's sexual orientation tendencies are centered at different points on the sexual orientation continuum (SOC). To support both our methodology and the fluid-continuum model, we will first review alternative methods for measuring sexual orientation, along with some of the contemporary evidence that supports both the continuum and flexibility concepts.

## ASSESSING THE CONTINUITY CONCEPT WITH TESTS OF SEXUAL ORIENTATION

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 (hereafter, SS) partners and a man who had merely felt SS 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 asserted a) that the Kinsey scale reduced sexual orientations to a single category based on multiple attributes of the subject being classified, and b) that it inappropriately measured homosexuality and heterosexuality on a single continuum, as if one is necessarily a tradeoff of the other.

Klein (1993) believed that Kinsey's scale did not adequately address the complexity of the concept of sexual orientation and developed a scale with seven different vectors of sexual orientation and a time dimension; however, Klein's approach has been sharply criticized on multiple grounds (Chung & Katayama, 1996; Sell, 1996). Evaluating Klein's (1993) 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 (see Klein, 1993, Appendix B).

Sell (1997a) developed his own 12-item test in an attempt to improve upon the coding system Kinsey developed for his interviews. It used separate scales for heterosexuality and homosexuality and asked 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 in 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 optimistic about the potential the Internet has for reaching "a relatively rare, hidden, and geographically dispersed population (in this case, homosexuals and bisexuals)" (Sell, 1997b, 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. They concluded that "homosexuality is fundamentally a multidimensional phenomenon that has manifold meanings and interpretations, depending on context and purpose" (p. 301).

Through the Internet, the public also now has access to a large number of informal, magazine-style quizzes that purport to measure sexual orientation. At this writing, a Google search for the exact phrase "sexual orientation test" yields 38,800 unique pages. Spot checking through these pages suggests that most of the tests are written by laypeople and presumably have not been assessed scientifically. This is troubling, given that some people may now be using Internet tests to help them understand or label their sexual orientation.

Tests of sexual orientation that measure variables such as same- versus opposite-sex attraction by eliciting a range of possible responses along a scale consistently support Kinsey's assertion that sexual orientation lies on a continuum. There is, perhaps, a circularity problem here, however, because the sexual orientation construct is being defined by those scales; in effect, the tests might guarantee that sexual orientation will appear to be on a continuum because it is defined by scales that elicit a continuum of responses. There is a small but growing body of evidence outside the Kinsey-type testing literature, however, supporting the continuum idea in varying degrees and also suggesting that people have different degrees of flexibility in their ability to shift along that continuum.

## OTHER EVIDENCE FOR THE SEXUAL ORIENTATION CONTINUUM AND FLUIDITY

Recent studies of sexual orientation employing genital and subjective measures of arousal provide some support for the continuum idea, at least in men. Somewhat contrary to what Kinsey might have predicted, Rieger, Chivers, and Bailey (2005) found that self-identified bisexual men generally

"appeared homosexual with respect to genital arousal, although some appeared heterosexual" (p. 579); subjective responses of sexual arousal by these subjects more closely fit the continuum model, suggesting, as the authors note, a lack of correspondence between genital responses and subjective responses with some individuals. According to a recent meta-study by Chivers, Seto, Lalumière, Laan, and Grimbos (2010), human female genitalia respond nearly automatically to a wide range of sexual stimuli, which makes the female genital response a relatively poor indicator of sexual-orientation preference (cf. Meana, 2010). Regarding men, however, the authors conclude that "heterosexual men show greater genital responses to female stimuli and homosexual men show greater genital responses to male stimuli" (Chivers et al., 2010, p. 45), with genital responses occurring on a continuum.

Taxometric analyses have also provided some support for the continuum model. For example, Haslam (1997) demonstrated through several such analyses that sexual orientation for men does not fit cleanly into discrete categories, suggesting that male sexual orientation may be the result of multiple, additive factors that are best described by a continuum (cf. Gangestad et al., 2000).

Also relevant is recent research on so-called ex-gays, people who appear to have changed their sexual orientation from homosexual to heterosexual, sometimes as a result of some form of conversion therapy. The way some people appear to shift orientation is consistent with both the continuum idea and the notion that there is some flexibility in people's ability to express sexual orientation. There are probably limits on that flexibility, however; even after the apparent shift is supposedly complete, about half of males and a third of females report continuing to experience SS fantasies (Spitzer, 2003), and some researchers suggest that reports of a shift to heterosexuality might be exaggerated, with subjects giving in to the same societal pressures that keep many gays closeted in the first place (e.g., Dreschner & Zucker, 2006; Saltzman, 2008; cf. APA Task Force on Appropriate Therapeutic Responses to Sexual Orientation, 2009).

Recent research also supports the view that sexual orientation in women is far more flexible than it is in men (Baumeister, 2000; Diamond, 2007; Garnets & Peplau, 2000; Mosher, Chandra, & Jones, 2005; Peplau, 2001; Rust, 2000; Vrangalova & Savin-Williams, 2010). Perhaps because women often value emotional bonding over physical bonding and because emotional bonds can easily be formed with both males and females, Diamond (2008a) concludes that "bisexual patterns of sexual attraction and behavior . . . are actually more common than exclusive same-sex sexuality among women" (p. 5). Although focusing on self-identified lesbian, bisexual, and unlabeled women, Diamond's research is especially relevant here. Two thirds of her subjects changed their sexual orientation labels over a 10-year period, with many shifting toward bisexual or unlabeled categories and some even adopting a heterosexual label. She also suggests that a "facilitative environment"

may contribute to changes in identity (Diamond, 2008a, p. 11). Diamond argues that her findings support two different concepts of sexual orientation: that "some degree of fluidity in sexuality is a general feature of female sexuality, which may simply be stronger among bisexual women," or that bisexuality may genuinely be a "third type" of sexual orientation (Diamond, 2008a, p. 7).

The complexities of sexual orientation are also revealed in recent research on individuals who tend to label themselves as heterosexual while acknowledging that they have occasional SS attractions, sometimes labeled "mostly heterosexual" or "mostly straight" individuals (e.g., Thompson & Morgan, 2008). In a recent study with 243 college students who identified themselves as heterosexual, Vrangalova and Savin-Williams (2010) found that 51% of male subjects and 84% of female subjects claimed at least one characteristic (either an attraction, fantasy, or behavior) that was inconsistent with heterosexuality, suggesting once again the inadequacy of the label.

## THE CHOICE DEBATE

Whereas a number of tests, inspired by Kinsey's coding system, can help people determine where they lie on the sexual orientation continuum (or, as Shively and DeCecco [1977], Sell [1996], and Vrangalova & Savin-Williams [2010] see it, on two separate continua), at the moment it is not clear that any test measures how much flexibility 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 an individual's expression of sexual orientation.

Flexibility and choice are interrelated but not identical ideas, of course. Flexibility implies a range of possible behaviors and feelings, limited presumably by both genetic and environmental factors; whereas choice implies an act of will, according to which one deliberately shifts within the available range of responses, acting on some impulses and repressing others. Setting aside the choice issue as it occurs in public debate, credible evidence suggests that both genes and societal demands play important roles in determining how sexual orientation is expressed (Baumeister, Catanese, & Vohs, 2001; Epstein, 2006; Friedman & Downey, 1993; Gonsiorek et al., 1995; Hamer, Hu, Magnuson, Hu, & Pttatucci, 1993). Laumann et al. (1994) suggested 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.

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 other countries. The large international sample allows comparisons to be made between sexual orientation in the United States and other countries, as well as breakdowns by gender, race, ethnicity, and other factors. Although the questionnaire summarizes results on a single continuum, it also has features of the dual-continuum scales favored by some researchers. Finally, it utilizes a simple method to yield a credible measure of flexibility in the expression of sexual orientation. The flexibility and continuum data together support the fluid-continuum model.

## METHODS

### Background

Beginning in February 2006, at the Web site http://MySexualOrientation.com, a new test instrument—the Epstein Sexual Orientation Inventory (ESOI)—was made available in connection with investigative research on sexual orientation conducted for *Scientific American* (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, lesbian, and bisexual publications, as well as online, quickly directed many people to the test. More than a 100,000 people have since taken it. The present report focuses on those who took it between February 4 and May 13, 2006 and includes a small control sample of people who took the test between May 20, 2011 and June 29, 2011. The test is now available in several languages, but this report regards only the original English version.

In the original sample of 18,409 people who took the test in early 2006, a number of people took it multiple times, perhaps in an effort to discover the scoring method. 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 and ethnicity (White, Black, Hispanic, Asian, American Indian, or other), and self-labeled sexual orientation (straight, gay/lesbian, bisexual, or other).[1]

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 SOC, the more uncertainty one will have felt about one's sexual orientation. Cultural pressure aside, the greater one's 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, cultural 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.

The test itself includes 18 items, nine focusing on SS interactions and nine focusing on opposite-sex (OS) interactions. (See Table 1 for a detailed breakdown of the items in the order in which they were presented.) The items were similar to questions that Kinsey and his colleagues asked in interviews. In each set, two items focused on attraction, three items focused on fantasy, and four items focused on behavior. Four items in each set focused on the present, and five items in each set focused on the past and present.

After all questions were answered, respondents could view the results by clicking on a 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). 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), which is the midpoint of the SOR, and the SOR.

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 the test taker. The numerical difference between these two values yielded the SOR, which can be understood to be a reasonable estimate of how much flexibility or

**TABLE 1** Breakdown of Items in the ESOI

| 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 |

(*Continued*)

**TABLE 1** (Continued)

| Item number | Item | Response | Attraction, fantasy, or behavior | Time frame |
|---|---|---|---|---|
| 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 |

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 scores on the first half of the test, which measures SS attractions, are independent of scores on the second half of the test, which measures 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 first 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, 2008; 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 5–10% one would expect in the general population (Bagley & Tremblay, 1998; Ellis, Robb, & Burke, 2005; Reimers, 2007).

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 28% for the general population (U. S. Census Bureau, 2011).

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.

Because the instructions given to the user asserted that sexual orientation lies on a continuum, the possibility existed that those instructions might have biased responding so that test scores were more likely to be distributed over a continuum. To control for this possibility, all mention of a continuum was eliminated from the instructions in the English version of the test between May 20, 2011 and June 29, 2011; 1,128 individuals took the test over this period. A random sample of 491 individuals was extracted from this sample in order to match the proportions of self- identified gay, bisexual, and straight individuals in the original sample. A distribution of scores from this random sample was then compared to the distribution of scores in the original sample.

## RESULTS

### Reliability and Validity

Reliability was assessed using Cronbach's alpha, which was 0.88 for all 18 test items. Because items 1–9 and 10–18 can be considered independent tests (for SS and 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, MSO scores on the test instrument should be able to predict self-identified sexual orientation, and indeed a Kruskal-Wallis test[2] yielded highly significant results ($H = 11{,}294.0$, 3 $df$, $p < .001$), 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 1 and 2). 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 deviated from the ideal by one point or more, more than 50% deviated by two points or more, more than 33% deviated by three points or more, and so on, with gays consistently deviating from expected MSO scores more than straights did (Figure 3).

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 ($M = 7.0$) was indeed substantially higher than the mean score for gays and straights combined ($M = 3.3$) ($U = 6{,}872{,}862$, $p < .001$) (Figure 4). No a priori assumption can be made about the SOR score for those identifying

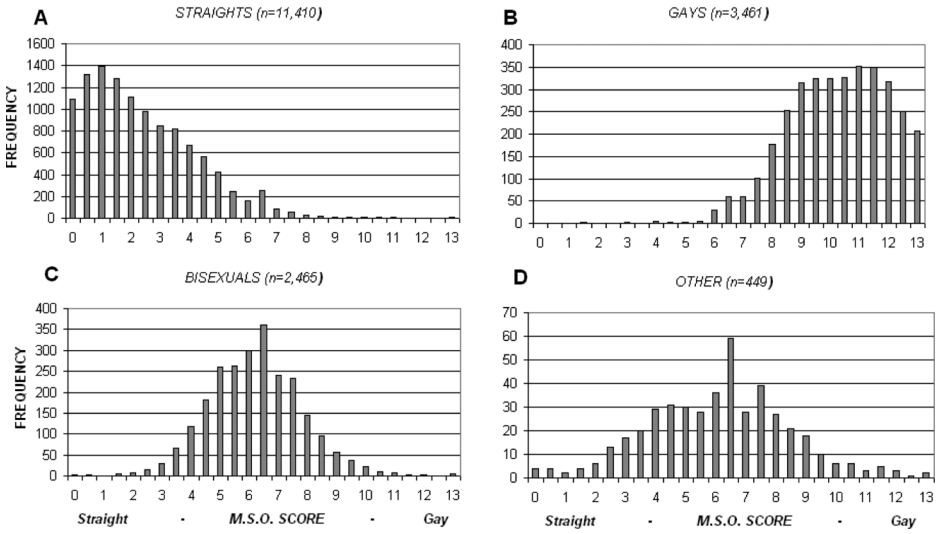


**FIGURE 1** Mean sexual orientation (MSO) scores by self-identified sexual orientation. The graphs show frequency distributions of MSO scores for self-identified (a) straights, (b) gays, (c) bisexuals, and (d) others. Each distribution has a characteristic skew and covers most or all of the sexual orientation continuum (SOC), suggesting that for many people there is a mismatch between self-identified sexual orientation and actual sexual behavior, fantasies, or attractions.

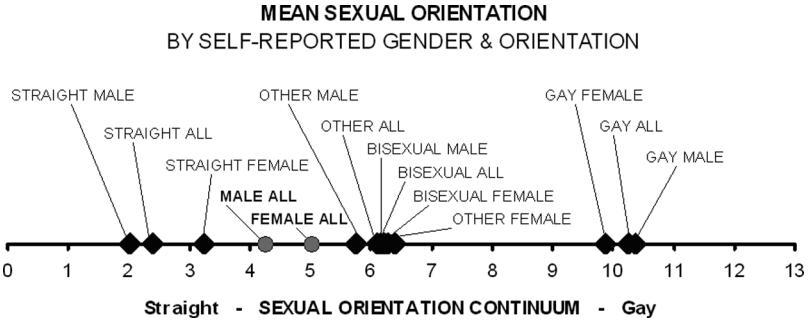


**FIGURE 2** Mean sexual orientation (MSO) scores for self-reported gender and sexual orientation. Note that means for self-identified homosexuals cluster near the gay end of the sexual orientation continuum (SOC), that means for self-identified heterosexuals cluster near the straight end, and that means for those who self-identify as bisexual or other cluster near the center. The mean for females is substantially higher than the mean for males. Means for people identifying their gender as other are not shown because there were few in the study.

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 1).

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

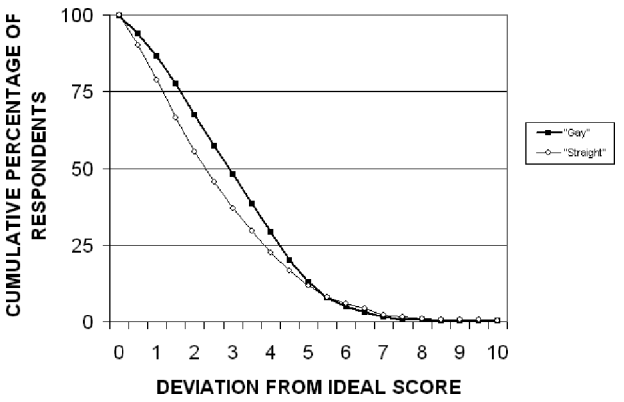


**FIGURE 3** Deviation from ideal mean sexual orientation (MSO) scores (13 for gays and 0 for straights) shown as a function of cumulative percentage of respondents. This graph suggests how commonly people may be mislabeling their sexual orientation. More than 75% of respondents deviate from their ideal scores by at least one point on the sexual orientation continuum (SOC); more than 50% deviate by at least two points; more than 33% deviate by at least three points; and so on. Mislabeling is greater for self-identified gays than for self-identified straights.

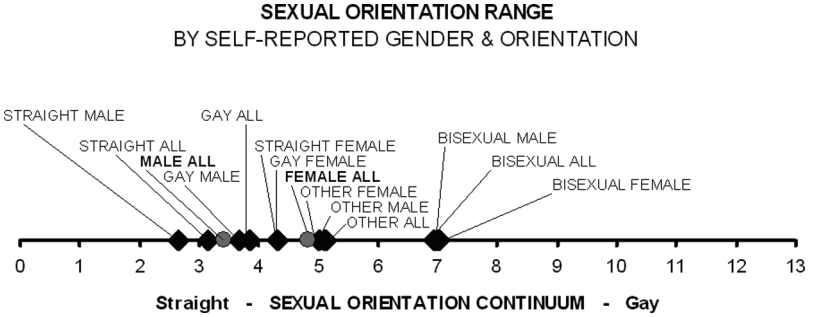


**FIGURE 4** Mean sexual orientation range (SOR) scores for self-reported gender and sexual orientation. Note that means for self-identified bisexuals are substantially higher than the means for other groups and that the mean for females is substantially higher than the mean for males. Means for people identifying their gender as other are not shown because there were few in the study.

correlation between MSO and uncertainty ($\rho = 0.43$, $p < .01$). By this same logic, the mean MSO score for people who have changed their sexual orientation ($M = 7.2$) should be significantly higher than the mean MSO score for people who have not ($M = 4.0$), and indeed that is the case ($U = 9{,}743{,}483.0$, $p < .001$). Cultural pressure aside, uncertainty should also be positively correlated with SOR scores, and that is confirmed by the Spearman test ($\rho = 0.40$, $p < .01$). The mean SOR score for people who have changed their sexual orientation ($M = 6.0$) is also significantly higher than the mean SOR score for people who have not ($M = 3.4$) ($U = 12{,}176{,}109.0$, $p < .001$).

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 (see Discussion section).

## Factor Analysis

A 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 2). 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 1–9 and negative loadings for items 10–18 and, therefore, appears to represent SS attraction. Component 3 is a contrast between the two items that refer to overt SS sexual behavior (6 and 9) and the corresponding items on the second half of the test that refer to overt OS sexual behavior (15 and 18; Table 1). It had substantial negative loadings ($\leq 0.30$) for the former and substantial positive loadings ($> 0.30$) for the latter.

## Distribution of Test Scores

The overall distribution of MSO scores was fairly smooth across the SOC, consistent with the findings of Kinsey et al. (1948; Figure 5). The smoothness

**TABLE 2** Factor Loadings

| | All subjects Component | | | Males Component | | | Females 0 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.

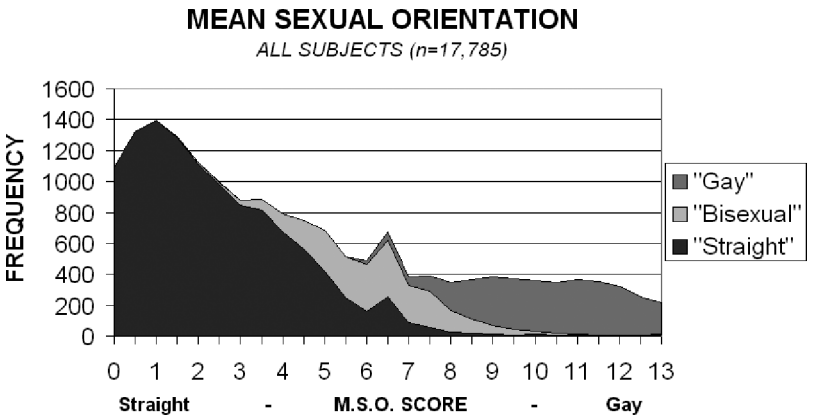


**FIGURE 5** Mean sexual orientation (MSO) scores for all respondents, shown in a frequency distribution. Although the curve is skewed to the left (toward the straight end of the SOC), scores are distributed fairly smoothly across the entire continuum, just as Kinsey et al. (1948, 1953) found. The small spike in the middle of the curve is 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 includes a substantially larger proportion of gays and bisexuals than are known to exist in the general population; however, even if this proportion were reduced, the overall shape of the distribution would be roughly the same.

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 6). 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 7).

SOR scores also varied smoothly on a continuum, with the distribution of scores peaking toward the low end of the range (Figure 8). The mean SOR score for the full sample was 3.9. Similar SOR results were obtained for the United States ($M = 3.8$) and for countries outside the United States ($M = 4.0$).

Mean MSO scores differed significantly by gender, with those identifying themselves in the other category ($M = 6.1$) scoring higher than females ($M = 5.1$), and females scoring higher than males ($M = 4.3$) ($H = 582.8$, 2 $df$, $p < .001$) (Figure 2). 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 6). Mean SOR scores also differed significantly by gender, with those identifying themselves in the other category ($M = 5.1$) scoring higher than females ($M = 4.8$), and females scoring substantially higher than males ($M = 3.4$) ($H = 980.3$, 2 $df$, $p < .001$) (Figure 5). The gender differences in both MSO and SOR scores are consistent with the findings of previous studies (e.g., Baumeister, 2000; Diamond, 2007,

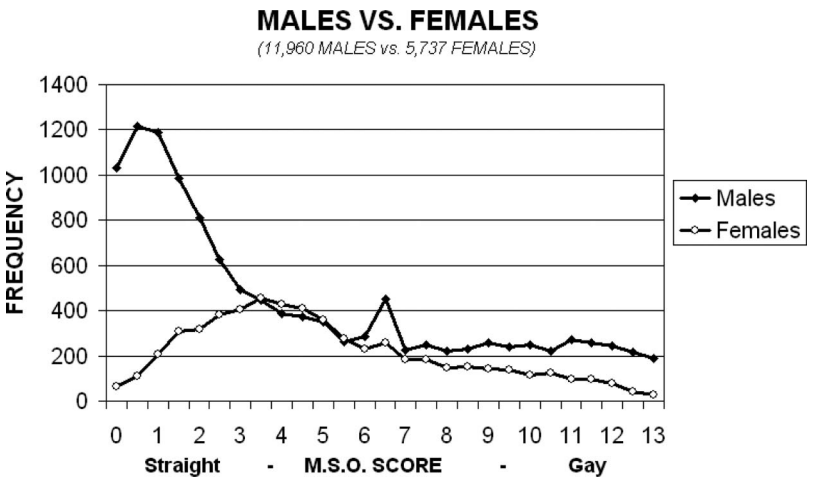


**FIGURE 6** Mean sexual orientation (MSO) scores for all self-identified males and females in the study, shown in a frequency distribution. Each curve skews toward the left (toward the straight end of the SOC); however, males scores skew more sharply.

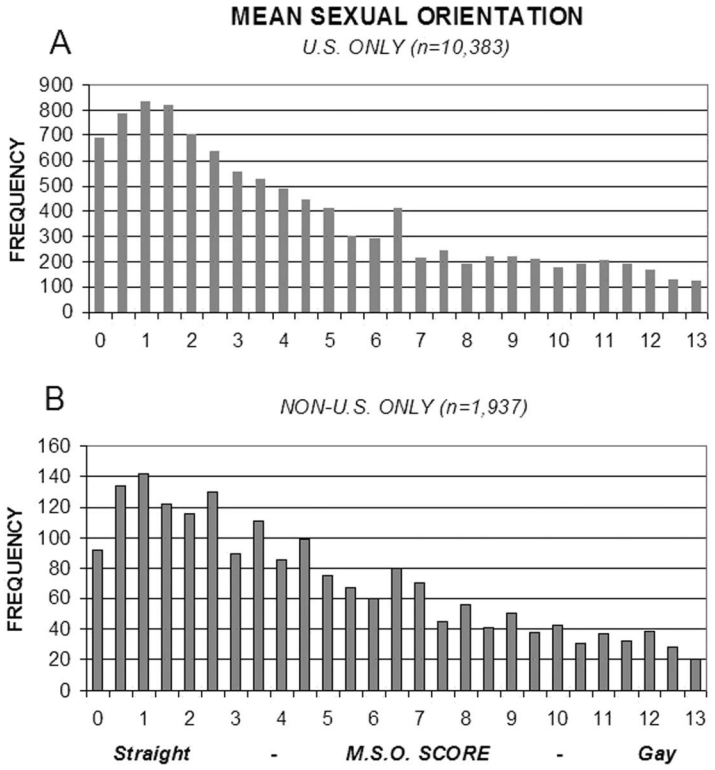


**FIGURE 7** Mean sexual orientation (MSO) scores (a) in the United States and (b) in 47 other countries, shown in a frequency distribution. Note that the curves have similar shapes, although there is more variability in the non-U.S. data, possibly because of the smaller sample size.

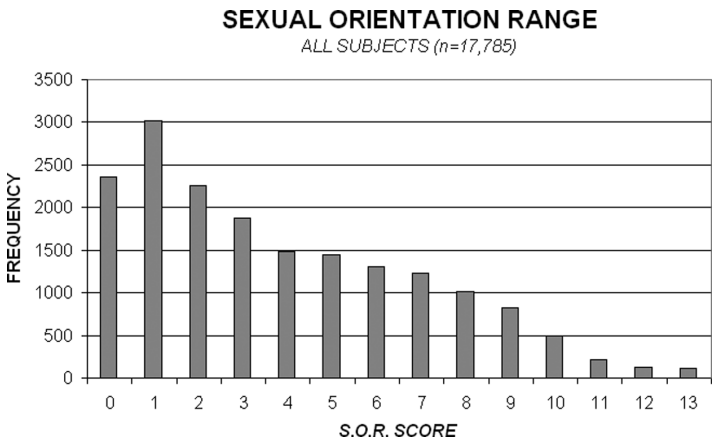


**FIGURE 8** Sexual orientation range (SOR) scores for the entire sample, shown in a frequency distribution. The curve is relatively smooth, with a peak toward the low end.

2008b; Garnets & Peplau, 2000; Mosher et al., 2005; Peplau, 2001; Rust, 2000; Vrangalova & Savin-Williams, 2010).

Mean MSO scores also differed significantly by race and ethnicity, with American Indians ($M = 7.2$) scoring higher than Blacks ($M = 6.1$) and Asians ($M = 6.2$), Blacks and Asians scoring higher than Hispanics ($M = 5.2$), and Hispanics scoring higher than Whites ($M = 4.4$) ($H = 266.6$, 4 $df$, $p < .001$). 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 $df$, $p = .09$).

Mean MSO scores differed significantly with education ($H = 17.5$, 5 $df$, $p < .01$); however, educational level did not predict MSO score ($\rho = .01$, $p = .27$). Mean SOR scores also differed significantly with education ($H = 26.5$, 5 $df$, $p < .001$), and there was a small positive correlation between SOR and educational level ($\rho = .04$, $p < .001$).

As one might expect, there was a small positive correlation between age and MSO score ($\rho = 0.12$, $p < .001$), presumably because as people get older, they care less about societal pressure and are able to act more consistently according to their personal inclinations. Similarly, and probably for the same reason, a small positive correlation was found between age and SOR score ($\rho = 0.10$, $p < .001$). Consistent with these findings, a small negative correlation was found between age and uncertainty ($\rho = -0.07$, $p < .001$). Uncertainty itself was skewed toward low values (Figure 9), 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 10).

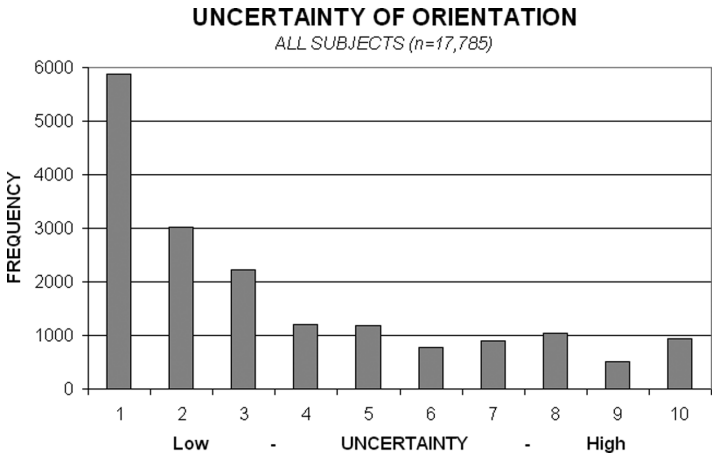


**FIGURE 9** Uncertainty scores for the entire sample, shown in a frequency distribution. The curve is relatively smooth and peaks at its lowest value.

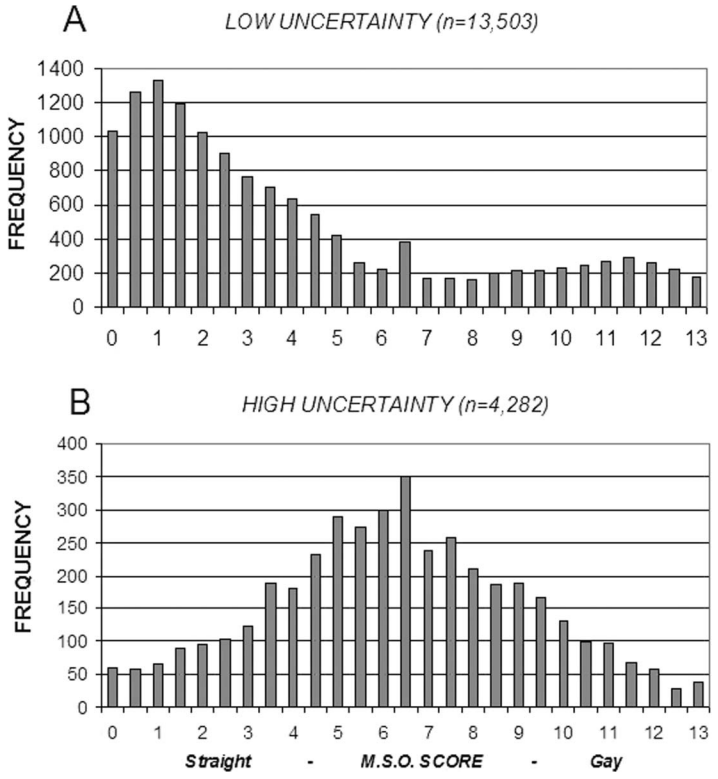


**FIGURE 10** Mean sexual orientation (MSO) scores for (a) respondents reporting relatively low uncertainty regarding their sexual orientation (values 1–5 on a 10-point scale) and (b) respondents reporting relatively high uncertainty regarding their sexual orientation (values 6–10 on a 10-point scale), 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.

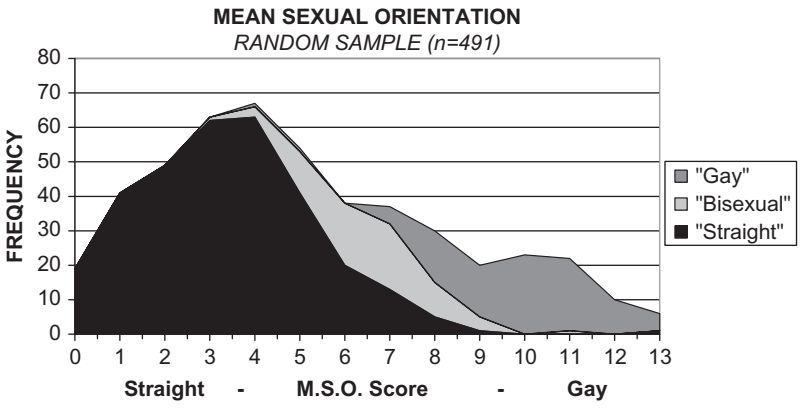


**FIGURE 11** Mean sexual orientation (MSO) scores from a random sample of people who took the test with modified instructions that made no reference to a sexual orientation continuum. Even without that language, scores fell fairly smoothly along a continuum. Compare Figures 5.

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 $df$, $p < .001$).

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 SS and OS 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 ($\rho = -0.49$, $p < .001$), suggesting that the greater one's heterosexual tendencies, the smaller one's homosexual tendencies, and vice versa.

Finally, regarding the control procedure conducted to determine the possible effect of the continuum language in the instructions, scores for the random sample of people who took the test with the modified instructions (containing no mention of a continuum) were distributed fairly smoothly across the SOC, just as they were in the large sample (compare Figures 5 and 11). One difference did emerge, however: in the new sample, scores for self-labeled straights were less skewed toward the straight end of the continuum than were scores for straights in the original sample.

## DISCUSSION

The present study provides support for a fluid-continuum model of sexual orientation, according to which a) people differ in sexual orientation range,

which varies in an orderly way in a population, and b) mean sexual orientation also differs among individuals, varying in an orderly way across a continuum from straight to gay. This model suggests that sexual orientation is best characterized by two values—the MSO and SOR—rather than by a categorical label. The study supports the findings of Kinsey and his colleagues (Kinsey et al., 1948; Kinsey et al., 1953) regarding the continuum concept as it applies to sexual orientation, at least when sexual orientation is measured by self-reported attraction, behavior, and fantasies.

Procedurally, the greatest strength of this study is also its greatest weakness, namely, using the Internet to obtain subjects. The Internet is a low-cost research tool, and it also provides easy access to people worldwide and allows for rapid acquisition of valid data (Reimers, 2007; Riva, Teruzzi, & Anolli, 2003). 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 (cf. Gonsiorek et al., 1995; Laumann et al., 1994).

The present study also suffers from obvious disadvantages of Internet sampling, however. 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 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 et al., 2005; Reimers, 2007). Initial press coverage regarding the online test occurred primarily in a mainstream publication (*Scientific American Mind*), so the coverage itself probably does not account for the unusually large number of self-identified non-heterosexual test takers. Given the strong bias toward heterosexuality in most countries, we believe our sample was skewed toward non-heterosexuals mainly because they would be less reluctant to take a test like this (which reveals non-heterosexual tendencies) than would self-identified heterosexuals.

These important sampling issues aside, the basic finding of the study appears to be undeniable: namely, that sexual orientation—at least as measured by questions regarding attraction, behavior, and fantasy—lies smoothly on a continuum. This finding held overall, as well as for all subgroups analyzed and for a control group given modified instructions that made no mention of the continuum concept. The fact that this pattern was as robust for participants outside the United States as for participants in the United States provides support for the generalizability of the finding.

According to William James (1890), America's first research psychologist, "If we lost our stock of labels we should be intellectually lost in the midst of the world" (p. 444). Labels are indeed important, but they can obscure our thinking just as easily as they can aid it. Scientific research on

sexual orientation began with anchors deeply set into the lay concept that sexual orientation has two types only: heterosexual and homosexual. Given this societal bias, research on bisexuality was understandably lean for many years (Diamond, 2008a). But two or even three labels are not nearly enough. As researchers have taken a closer look at sexual orientation, they have been forced to propose more and more labels to accommodate the range and variability of behaviors and feelings people actually report: mostly heterosexual, mostly straight, fluid lesbian, stable lesbian, stable non-lesbian, primary lesbian, and so on.

The present study suggests that such terms are misleading—that they may in fact be obscuring the orderliness and simplicity of sexual orientation phenomena. If sexual orientation lies on a continuum—in other words, if it is more like height than eye color—why should we try to force it into a small number of categories? Doing so might not only be incorrect, it might also exacerbate many of the societal problems surrounding sexual orientation. The entire debate about sexual orientation choice is based on a fundamental misconception, after all. 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, other, and so on, correspond to broad, skewed distributions of scores on the SOC (Figure 1); 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 (Figure 3).

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 the present sample (which, admittedly, contains an unusually large proportion of non-heterosexuals), only 6.2% of the respondents had a perfect straight score (MSO = 0), and only 1.2% of the respondents 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.

These findings have implications not only for society in general but also for research on sexuality. If this confirmation of Kinsey's findings is valid, 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 (cf. Jordan-Young, 2010). 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.

The value of these suggestions depends, 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 1). 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 1); other tests focus on the present and a restricted recent period of time (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 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. The reasonableness of the SOR measure is suggested by several findings in this study; for example, self-identified bisexuals have a much higher SOR than self-identified gays and straights, and SOR is positively correlated with both the age of the test taker 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 evidence to support that perspective.

The present study does not look at heterosexism, but given the enormous pressure that exists in most societies for people both to behave straight and to label themselves straight, it is tempting to speculate about how scores on the ESOI are probably impacted by that pressure. As Epstein (2006) noted, it is reasonable to assume that in a sexual-orientation neutral society, scores would likely shift away from the heterosexual end of the distribution, meaning that a large number of people would probably live their lives in ways we currently describe with the terms bisexual or gay.

In future studies, both reliability and validity issues need to be addressed further. In the current version of the test, e-mail addresses are now being collected (in a separate data base from the test scores, so that the anonymity of the test takers is preserved). The e-mails can be used to conduct future studies in which both test-retest and concurrent validity can be assessed. Because basic demographic information is also being collected, such studies could also employ stratified samples or use conventional methods to obtain random, representative samples of the general population.

At this writing, the present 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.

## NOTES

1. The term "gay" will be used inclusively for gay/lesbian throughout this article, unless otherwise specified.

2. The Kruskal-Wallis H test is appropriate here because the test scores are on an ordinal scale, not on an interval or ratio scale. Nonparametric statistical tests of this sort, such as Spearman's rho ($\rho$) and the Mann-Whitney U, are, consequently, used throughout this article.

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