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Authors

Weinrich, James D

Klein, Fritz

McCutchan, J Allen

et al.

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Cluster Analysis of the Klein Sexual Orientation Grid in Clinical and Nonclinical Samples: When Bisexuality Is Not Bisexuality

James D. Weinrich, Ph.D.[1], **Fritz Klein, M.D.**[3], **J. Allen McCutchan, M.D.**[1], **Igor Grant, M.D.**[1], and **the HNRC Group**[1]

[1]HIV Neurobehavioral Research Center, University of California, San Diego

Abstract

We used a cluster analysis to empirically address whether sexual orientation is a continuum or can usefully be divided into categories such as heterosexual, homosexual, and bisexual using scores on the Klein Sexual Orientation Grid (KSOG) in three samples: groups of men and women recruited through bisexual groups and the Internet (Main Study men; Main Study women), and men recruited for a clinical study of HIV and the nervous system (HIV Study men). A five-cluster classification was chosen for the Main Study men (n = 212), a four-cluster classification for the Main Study women (n = 120), and a five-cluster classification for the HIV Study men (n = 620).

We calculated means and standard deviations of these 14 clusters on the 21 variables composing the KSOG. Generally, the KSOG's overtly erotic items (Sexual Fantasies, Sexual Behavior, and Sexual Attraction), as well as the Self Identification items, tended to be more uniform within groups than the more social items were (Emotional Preference, Socialize with, and Lifestyle). The result is a set of objectively identified subgroups of bisexual men and women along with characterizations of the extent to which their KSOG scores describe and differentiate them.

The Bisexual group identified by the cluster analysis of the HIV sample was distinctly different from any of the bisexual groups identified by the clustering process in the Main Sample. Simply put, the HIV sample's bisexuality is not like bisexuality in general, and attempts to generalize (even cautiously) from this clinical Bisexual group to a larger population would be doomed to failure. This underscores the importance of recruiting non-clinical samples if one wants insight into the nature of bisexuality in the population at large. Although the importance of non-clinical sampling in studies of sexual orientation has been widely and justly asserted, it has rarely been demonstrated by direct comparisons of the type conducted in the present study.

Keywords

sexual orientation; bisexuality; cluster analysis; Internet; Klein Sexual Orientation Grid

Correspondence to: James D. Weinrich.

[3]Private practice, San Diego, CA; deceased

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INTRODUCTION

Sexual orientation is one of sexology's thorniest concepts (Weinrich, 1987/2013). Seemingly simple—is someone sexually attracted to or aroused by members of her or his own sex, or by the other sex?—it is philosophically extremely complex (Klein, 1993). How are homosexuality, heterosexuality, and bisexuality properly defined? Using self-report? Genital plethysmography? Interviewer ratings? Taking into account fantasies? Behaviors? Ideals?

This complexity is rarely embedded in the design of scientific experiments. Scientists are aware of the philosophical difficulties of a dichotomous division into "homosexual" and "heterosexual" categories, yet many scientists (even, at times, the senior author of this paper) press ahead with the analysis of their data using dichotomous categories in spite of this awareness. Sometimes this could be done with some justification—for example, when researchers divide a sample into "tall people" and "short people" even though they know that the distinction is relative, and that any dichotomization is arbitrary. But sometimes such a strategy is undertaken without serious comprehension of the consequences.

Understanding bisexuality is the key to understanding sexual orientation. On many sexual orientation measures, bisexuality is intermediate between homosexuality and heterosexuality, as it is in the widely used "Kinsey scale" (a bipolar scale ranging from 0 to 6; see Kinsey, Pomeroy, & Martin, 1948; McWhirter, Reinisch, & Sanders, 1990). In a bipolar measure the two poles can only be averaged, not combined (e.g., no one can be both tall and short with respect to the same measure at the same time). With other measures, bisexuality is a category applied to individuals who have high levels of sexual interest in both men and women. (This is analogous to the "androgynous" category of Bem's masculinity and femininity scales: Bem, 1981.) In this latter view, bisexuality is the combination of homosexuality and heterosexuality, not a compromise between the two.

The present paper uses the exploratory statistical technique of cluster analysis to empirically assign individual participants to discrete sexual orientation categories. It is one in a series of reports that use this clustering solution (e.g., Weinrich & Klein, 2002; Klein & Weinrich, 2014). The two Main Study samples (male and female) were both drawn from two sources (see Methods): bisexual meetings and support groups, and through electronic interest groups and newsgroups (including private commercial networks such as CompuServe and public ones such as Usenet). These participants certainly do not constitute a random sample of any population. We chose this method of recruitment because we wanted male and female samples spanning the sexual orientation spectrum that would be roughly uniformly distributed across that spectrum—and for that purpose such convenience sampling is adequate (sampling issues will be addressed in the Discussion). Moreover, this method is relatively inexpensive.

For some analyses, we compare our findings to those obtained in an even larger sample for which sexual orientation information is available: the HIV Neurobehavioral Research Center (HNRC) at the University of California, San Diego. This HIV Study sample consists of men only, and contains only a modest proportion of heterosexuals. Although a homosexual

sexual orientation was not a prerequisite for participation in this study—and bisexuals were welcome—it was recruited in a context in which it would be reasonably accurate to call it a predominantly gay sample.

In this paper, we describe the sampling and cluster analyses in detail. Then we calculate the mean and standard deviation of each cluster's scores on the 21 items used in the cluster analysis itself. Next, we present each cluster's scores on demographic variables and on three simple questions of sexual activity.

Finally, we discuss the meaning of these results and draw conclusions about the nature of sexual orientation variability in our samples. We believe that this report is one of the first to use cluster analysis to discern discrete sexual orientation categories empirically.

METHOD

Participants and Procedures: Main Study (Women and Men)

The first participants were recruited at a meeting of a social discussion group aimed at bisexuals in a large city in the US southwest. The first two authors attended the meeting, explained the purposes of the study, and distributed questionnaires. Responses were entirely voluntary and confidential. Most participants completed the questionnaire before leaving; a few returned them by mail. Although we did not calculate a precise response rate, the study was received enthusiastically; we estimate that over 90% of those attending the meeting completed the study.

The second batch was recruited in New York by the second author, who attended a large 1994 political event in which many bisexuals participated. One day of this event was devoted to a series of workshops and speeches on bisexual issues. Questionnaires were made available near the site of these events, and this author encouraged passersby to complete the questionnaire. Most who accepted the questionnaire completed it, and dropped it into a specified box; a few questionnaires were returned later by mail. Again, there was no formal return rate calculated, because it would be difficult to decide what is the proper base rate upon which to base this percentage. If it were to be calculated with respect to attendance as a whole, response rate would be very low; if with respect to the number of those accepting a questionnaire, it was probably over 75%.

We decided we wanted a larger sample of bisexuals, and hit upon the idea of recruiting more participants through the Internet (an idea which a few thousand academics seemed to hit upon independently at approximately the same time). Of course, the Internet contains several electronic meeting places through which bisexuals can contact each other and discuss issues pertaining to bisexuality. The Internet, we thought, might also permit us to contact heterosexuals and homosexuals roughly comparable to the bisexual sample with little expenditure of resources on questionnaire distribution, data entry, and so on.

Accordingly, we prepared a brief description of the topics covered by, and the purpose of, our study and distributed it through several commercial on-line services' special interest groups for sexual topics (a Human Sexuality Forum, Gay and/or Bisexual Interest Groups,

and so on). This description was also posted to several Usenet (i.e., Internet) Newsgroups (soc.singles, soc.couples, soc.motss [members of the same sex], soc.bi, alt.homosexuality, alt.bi, and alt.polyamory). The description invited readers to e-mail a request for the questionnaire to the first author, who examined the request and verified that it contained a statement that the sender wished to receive the questionnaire and was 18 or older. Those whose e-mail did not contain this information, or who did not specify their sex, were sent a reminder to return a complete request. We did not reply to the one person who stated that he was not yet 18. These recruitment materials, as well as the questionnaires themselves, are given in an Appendix to this paper.

The questionnaire materials began with a description of the study, and then moved to a lengthy discussion of confidentiality issues. Participants were warned that returning their completed questionnaires through the Internet or the commercial service would not by any means guarantee their confidentiality. (Most Internet devotees know that their e-mail messages are about as private as postcards sent through the mail; most arrive unread but outsiders can probably read one if they are highly motivated to do so.) Nevertheless, most respondents chose this route. A somewhat more secure alternative, used by about a dozen respondents, was to print their completed questionnaire and then fax it back to the senior author. Participants had been warned that this, too, was risky if complete anonymity was desired. The rest of the questionnaires (fewer than 10) were returned anonymously by U.S. mail.

To assure confidentiality and to prevent identification based upon identifiers linked to the participants, we gathered only a minimum of demographic information from each person. When the earliest few respondents turned out to be predominantly male, we waited to e-mail questionnaires to women until a sufficient number of requests had accumulated so that the arrival of a completed female questionnaire would not betray its origins. Once the data were safe in the databanks, all identifiers (e-mail addresses, etc.) were removed from the electronic forms and destroyed; we can no longer identify which questionnaire recipients actually returned responses. The response rate from the electronically distributed questionnaires was approximately 50%.

Faxed responses were reconverted to computer-readable ASCII characters by using optical character recognition software from Expervision, Inc. Electronic responses were converted to database format automatically by a parsing program written by the first author. Printed questionnaires were entered into the databanks by hand.

Initial recruitment produced a sample that was roughly 75% male and 25% female. We had been warned that the ratio would probably be about 90/10, so we were gratified, but we wished to boost the percentage of women respondents even more. We re-posted the invitation on the same commercial and Internet interest groups (adding a new newsgroup, soc.women), summarizing our recruitment results to date and specifically asking for more women to respond. This improved the sex ratio substantially.

For the analyses, men and women were separated, and will be referred to as Main Study Men (MS men) and Main Study women (MS women). However, everyone in these samples

was recruited at the same times, using the same procedures, as described above. Demographic and other information about the participants will be presented in the Results.

Participants and Procedures: HIV Study

The HIV sample had already been recruited from the membership of a previous longitudinal study of HIV in San Diego, by advertisements placed in local newspapers, by word of mouth, and by referral from the HIV care facilities associated with large local hospitals. Inclusion criteria were: Male, aged 18–49 at entry, and having more than 9 years of education. Exclusion criteria were: History of alcohol or other psychoactive substance use disorders in the past 12 months, intravenous drug use (ever), clinical diagnosis of AIDS Dementia Complex, chronic medical illness (e.g., chronic obstructive pulmonary disease), or neurologic disorder unrelated to HIV (e.g., head trauma). Because this was an HIV study, most of the participants were HIV positive, but about 25% were recruited as HIV negative controls. Participants were screened in a face-to-face interview and signed a consent form. Most—but far from all—participants reported a sexual orientation of homosexual or bisexual. Participants used in the present study were the 620 who had completed the Klein Sexual Orientation Grid (see below).

Instruments

Participants in both samples completed the Klein Sexual Orientation Grid (KSOG; Klein, Sepekoff, & Wolf, 1985). As shown in Figure 1, this questionnaire consists of 21 items grouped into 7 variables (labeled A through G). For each variable participants rate themselves three times (for Present, Past, and Ideal) on a scale from 1 to 7, where 1 indicates the most other-sex or heterosexual response and 7 represents the most same-sex or homosexual response. (Note that on our questionnaire and in our tabulations, these three time-related aspects are listed in the order of Present, Past, and Ideal. This is different order than the one used on the original Klein Grid, namely Past, Present, and Ideal.)

Participants in the Main Study completed a few additional questionnaires whose items will be analyzed in future papers. The full set of questionnaires is available as an appendix.

Demographic information was also gathered: in all samples, age, education, and (heterosexual) marital status; in the Main Study (both sexes), employment status and homosexual relationship status (coupled or uncoupled). Finally, participants were asked for past-month totals of masturbation frequency, frequency of sexual contact with another person, and number of different sexual partners.

Analyses

Data were entered into computers, scored, and analyzed using JMP version 3.0.1 from the SAS Institute.

One of the major goals of this study was to devise an empirical method to assess sexual orientation categories using the Klein Grid in a statistically more sophisticated way than has been done in the past. Correlations among some Klein Grid items are typically very high, especially in samples of a predominant sexual orientation (e.g., in male AIDS samples such

as that described by Weinrich, Snyder, Pillard, Grant, Jacobson, Robinson, & McCutchan, 1993). In the present case they were high enough that we were unable to perform a factor analysis of Klein Grid scores due to the high statistical interdependence of some of these items.

Instead, we performed a cluster analysis of the 21 KSOG items, using hierarchical agglomerative clustering by participant. Clustering was done separately for each of the three samples: Main Study women, Main Study men, and HIV Study men. In agglomerative clustering, each participant begins in his/her own, single-member "cluster." The two clusters (individuals) with the most similar scores on the KSOG are then agglomerated into a single cluster, and cluster distances are recomputed. Then the two next most similar clusters are combined and distances recomputed. This process continues until all clusters are combined. Finally, a dendrogram (cluster tree) is generated showing the history of how clusters were combined.

This type of clustering is an exploratory data technique. It does not generate any statistical test, and interpretation of the tree is not always unambiguous. However, certain qualitative characteristics of the dendrogram can be informative and suggest further analyses—some of which might reveal important relationships.

If the underlying distribution is bimodal (or even discrete), then the agglomeration pattern will reveal the existence of those subgroups empirically. For example, a cluster analysis of the heights of all the human beings in an elementary school building will reveal short people (students) and tall people (teachers) segregating in two different clusters. In contrast, a stair-step pattern of agglomeration, in which individuals are added mostly one at a time to an increasingly large main cluster, strongly suggests that there is no "graininess" in the underlying distribution.

RESULTS

Demographic tabulations for the samples are presented in Table 1. The Main Sample was about 2/3 male, young middle-aged, and very highly educated. Most were employed full-time or were students; about half had been married at least once, and about 1/7 were currently in a homosexual relationship. About 1/3 were recruited through the bisexual samples, 2/3 through the Internet. The MS women were on average about 4 years younger than the MS men, were twice as likely to be students, and about 2/3 as likely to be employed full time—the only statistically significant demographic differences between the sexes.

Compared to the participants in the Main Studies, the HIV sample was (by design) 100% male, about the same age as the MS women (that is, about 4 years younger than the MS men), more likely to have only a high school education, much less likely to have a college or postgraduate degree, and much less likely to have ever been married.

Most other studies of bisexuality have identified participants' sexual orientation by self-report. One of the 21 KSOG items closely resembles this measure: a participant's Present Self-Identification as heterosexual, bisexual, or homosexual on a 7-point Kinsey-like scale (ranging from 1 to 7 instead of Kinsey's 0 to 6). By this criterion, as shown in Table 2 we

succeeded in attracting Main Samples that were only moderately weighted toward heterosexual participants. Just over 40% of the participants were completely or nearly completely heterosexual; the others were roughly evenly distributed across the sexual orientation spectrum. The MS women were twice as likely as the MS men to report that they were equally homosexual and heterosexual (i.e., bisexual); the men were over 4 times as likely to report that they were entirely homosexual. This finding is consistent with previous suggestions (see Weinrich, 1987/2013, pp. 41–42, for a review) that women are more likely than men to report bisexuality and less likely to report homosexuality. Note that even though our sample cannot be considered random or representative, none of our recruitment methods were biased toward such a finding—that is, we did not recruit from sources known to have a disproportion of homosexual men and/or bisexual women.

Table 2 also shows the distribution of the HIV sample's KSOG scores on the Present Identity question. Not surprisingly (due to its recruitment methods), it is strongly U-shaped, with peaks at the two ends (1 and 7). Less than 20% of those men rated themselves as 1, 2, or 3 on this KSOG item (corresponding to Kinsey's 0, 1, and 2).

In cluster analysis, it is usually deemed unfortunate if the sample's clustering consists of a "stair-step" pattern in which each additional cluster splits off only one or two more individuals from the main body of the sample. A stair-step pattern typically suggests a continuous underlying distribution—as would probably result, for example, if one were to cluster on the heights of people attending a university. Instead, in satisfactory clustering one typically hopes that the top levels will reveal a pattern that divides the total sample into discrete subgroups, each with a substantial number of members. For example, clustering on the heights of people in an elementary school would identify two nearly non-overlapping subgroups: tall adults and short children. It is especially intriguing if the clustering then turns out to correlate significantly with some outside variables not used in the clustering process, because this would suggest that the clustering is not merely a statistical fiction, convenience, or quirk. The status distinction of "teacher" versus "student" would be revealed in a cluster analysis by height in an elementary school, but not in a university.

The cluster analysis for the MS female participants was highly satisfactory, showing, at the top end, an easily interpreted division into four subgroups (which is actually the bottom-most part of the bottom left corner of Figure 2). Figure 2 also shows the women's scores, averaged by cluster, on the 21 KSOG items. Examination of these patterns led us to name the four female subgroups "Lesbian," "Bi-Lesbian," "Bi-Heterosexual," and "Heterosexual."

The cluster analysis for the MS male participants likewise showed an easily interpreted division into five subgroups (bottom left corner of Figure 3). Figure 3 also shows the men's scores, averaged by cluster, on the 21 KSOG items. Examination of these patterns led us to name the five male subgroups "Homosexual," "Bi-Homosexual," "Bisexual," "Bi-Heterosexual," and "Heterosexual."

The cluster analysis for the HIV-study participants was (1) conducted on a total of 620 men who were (2) far more likely to be homosexual than were our Main Study men. These two facts combined to produce a 5-cluster solution with little detail on the bisexual and

heterosexual end of the spectrum and a much finer division of the homosexual end. Figure 4 shows the average KSOG scores in a way corresponding to Figures 2 and 3. One cluster was clearly heterosexual; another bisexual (to a degree that might correspond to the "Bi-Homosexual" group in the Main Study). The remaining three groups were labeled homosexual; two of those three were more consistently homosexual than the third (and are labeled "GG1" and "GG2" in the charts). These three groups differ in ways that will be discussed further below.

Figures 5, 6, and 7 present the standard deviations for participants in the three samples. In the Discussion, we address the importance of looking not only at the cluster means, but also at the variability about each mean.

DISCUSSION

Initial Observations

Examine Figures 2 and 3. As expected, for both Main Study women and Main Study men, each of the 21 Klein Grid bar charts shows a monotonic increasing pattern by cluster membership. Almost without exception, as one moves from the heterosexual cluster through the bisexual clusters to the homosexual cluster, the average value of the Klein Grid dependent variable increases. Almost always, each such difference is statistically significant (statistical tests not shown).

The only exceptions occur in the "Socialize With" variable (E). None of these group differences are statistically significantly different by cluster membership for either women or men. For men, at least, this confirms our previous factor analysis of the Klein Grid using the HIV sample (Weinrich et al., 1993), in which the three Socialize With items loaded onto a different factor than the Sexual Attraction, Sexual Fantasy, and Sexual Behavior items.

The corresponding comparisons in the HIV Study are interesting. Just as before, the Emotional Preference and Socialize With variables show little variation among the subgroups. The three homosexual groups differ scarcely at all on Self-Identification and scarcely at all on all three of the Sexual variables (Attraction, Behavior, Fantasies). A similar pattern holds for the Lifestyle items. The heterosexual group is, of course, completely different. Although the bisexual group's means are almost always intermediate between those of the Heterosexuals on the one hand and the three G groups on the other, their means usually are quite a bit closer to the homosexual groups' means than to the heterosexual group's. (The minor exceptions are those pesky Present and Past Emotional Preference and Socialize With items.) Interestingly, the Bi means are almost exactly halfway between the Heterosexual and Gay groups' means (and thus not closely resembling the homosexual groups) for three Ideal variables: Sexual Behavior, Sexual Fantasies, and Sexual Self-Identification.

In this sample, then, there is some empirical support for a particularly durable stereotype: that bisexual men are (pardon the expression) "really" gay men whose erotic Ideal scores are more heterosexual than gay men's are—more bluntly, that bisexual men are (pardon again) "really" gay men who just want to be straight. This stereotype is emphatically not reflected

in the Main Study men; the means of the bisexual men in that sample are clearly distinguishable from those of the gay men. Those data do not support an interpretation that the bisexual men are mostly homosexually-oriented individuals who want to become more heterosexual or bisexual in their future Ideal. These differences between the two male samples will be addressed in a later section of this Discussion.

The Importance of Standard Deviations

As hinted above, however, cluster means are not the whole story. The standard deviations (or standard errors, which support essentially the same conclusions in our dataset) help identify which of the 21 KSOG items were quintessential to the classification scheme computed by the analysis and which were peripheral. A cluster with a high standard deviation on a particular item is composed of members who tend to differ from each other on that item much more than members of clusters with low standard deviations. Statistically speaking, such facts are elementary, but they are frequently overlooked in the rush to compare means.

If the standard deviation in a cluster is low then members of that cluster are quite similar to each other on that item, and the mean value of that item more or less represents the members of that cluster. It involves only a slight degree of stereotyping to use the mean value in describing the cluster's characteristics. If on the other hand the standard deviation for an item is high, the cluster's mean score on that item tells us little about each member (i.e., there are a lot of "exceptions"). Using the mean value to describe that cluster involves a significant amount of stereotyping (albeit a stereotype with a grain of truth in it).

For example, consider the HIV Study's means and standard deviations for the Present Sexual Attraction item (Figures 4 and 7). According to the means (upper left corner of Figure 4), the three Gay groups are virtually identical, and the "Bi" group almost the same. But the standard deviations (upper left corner of Figure 7) reveal that the Bi cluster is far more variable than any of the other four. This implies that the heterosexual and homosexual groups are composed of individuals who are much more similar to each other in terms of their Present Sexual Attractions than the members of the Bi group are. On this item, some of the members of the Bi cluster are indeed bisexual, but a fair number rated themselves as homosexual 7s or even heterosexual 1s. Most of the members of the Ht cluster are heterosexual 1s and 2s, and most of the members of the two GG clusters are homosexual 6s and 7s.

The meaning of this pattern will be discussed below. Then we move on to a more detailed examination of the results in each sample.

The Female Main Study Sample

Begin with the heterosexual cluster in this sample (Ht). Examination of Figures 2 and 5 show that these women are very similar to each other in the strongly heterosexual nature of their sexual attractions, behaviors, and self-identification—throughout life and in their ideal. They also preferred to socialize fairly equally with men and women in the present and past. Note that although these women on average have heterosexual Fantasies, lead a heterosexual Lifestyle, and Emotionally tend to like and love men, they are quite varied on these items

(i.e., the standard deviations in Figure 5 are high). This suggests that many heterosexual women have a higher capacity for bisexual or homosexual responsivity than the word "heterosexual" would imply.

Even though the Lesbian cluster's members on average clearly score near the lesbian end of the spectrum on each of the 21 KSOG items, they resemble each other closely (i.e., their scores have low standard deviations) on just three items: Present Sexual Attraction, Present Sexual Fantasies, and Self-Identification. Moreover, this cluster has the lowest standard deviation on Present Sexual Fantasies; all three of the other clusters (even the heterosexual cluster) are more variable on this important item. It appears that the lesbian women are more uniform in their sexual object choices than the heterosexual women are.

The two bisexual clusters have mean scores intermediate to the heterosexual and homosexual clusters on all 21 of the KSOG items, but standard deviations are relatively high for nearly all items, too. There are only two exceptions: the bi-lesbian cluster is almost as uniform in its Present Sexual Fantasies as the lesbian cluster is, and the bi-heterosexual cluster is quite uniform in their Ideal Emotional Preference (which is for men and women equally). Apparently the bisexual women are more varied in their preferences than the heterosexuals or lesbians are.

The Male Main Study Sample

In this sample, note first that the Emotional Preference and Socialize With variables have fairly high standard deviations (Figure 6) regardless of cluster membership; this shows that the clustering procedure tended to ignore these variables in making its clustering assignments. Therefore, in our remarks below we will mostly ignore the clusters' mean scores on these items.

We see in Figures 3 and 6 that the heterosexual cluster is very consistently heterosexual in all 5 of the other KSOG variables: Sexual Attractions, Behaviors, Fantasies, Lifestyle, and Self-Identification. The gay cluster is almost as consistent in 4 of the same 5 KSOG variables—Lifestyle being the exception. Although the homosexual cluster reports the most homosexual Lifestyle on average, it is quite varied on this parameter.

The three bisexual clusters' means on the 21 items are almost always intermediate between those of the heterosexuals and the homosexuals. The Bi-bisexual cluster seems to resemble the Bi-Gay and the Gay clusters in their high (mean) levels of Sexual Attraction to and Sexual Fantasies about men, but their actual Sexual Behaviors with men average about the same as the Heterosexual and Bi-heterosexual clusters. However, because the standard deviations in these three clusters are almost always high, such generalizations overlook individual variations.

The (Male) HIV Study

In this sample (see Figures 4 and 7), the Emotional Preference and Socialize With variables tend to have high standard deviations regardless of cluster membership—although there is a trend for the homosexual clusters to have lower variance in their Emotional Preference scores than the heterosexual clusters do. In the Present Emotional Preference item, for

example, the scores indicate that heterosexual men tend to like and love women, although many heterosexual men deviate from this pattern. The gay men more consistently like and love men.

The Heterosexual cluster is very consistent in its heterosexual preferences for Sexual Attraction, Behavior, Fantasies, and Self-Identification in the Present, Past, and Ideal. The GG1 gay cluster is just as consistent in its corresponding homosexual preferences, and GG2 is nearly so—the exception being Past Self-identification for the GG2 group, which is nearly twice as variable as GG1 on this parameter. With this sole exception, the two GG clusters are erotically nearly indistinguishable.

Prominent in many of the charts in Figure 7 is the Bisexual cluster, which usually has the highest standard deviation of any of the clusters under discussion (Emotional Preference and Socialize With variables excluded). Although on average this cluster resembles the three homosexual clusters more closely than it does the heterosexual cluster, these high variances show that the members of this cluster are very diverse.

The middle cluster of the five, labeled “G,” has mean scores that are very close to those of the two GG clusters. But the pattern of standard deviations is intriguing. Members of the G cluster resemble each other quite closely for Present Sexual Attraction, Behavior, and Fantasy (almost as much as the GG clusters do), but they show as much variability on these items in the Past as the Bisexual cluster did, and a bit more variability for the Ideal items than the GG groups did. The G group, then, was in the Past more ambivalently gay than the GG1 or GG2 groups were, whereas the Bisexual cluster had a more bisexual Ideal than the three gay clusters.

General Discussion

With such a wealth of detail, seeking patterns might seem a futile exercise. Yet there are many interesting generalizations that emerge from this dataset.

First consider the dendrograms (lower left corners of Figures 2, 3, and 4). Working from the bottom up, the first split in each case is a division between heterosexuals and homosexuals. In the female Main Study sample, each of these two major groups then splits into a more bisexual cluster and a less bisexual cluster. In the male Main Study bi/heterosexual cluster, an initially confusing first split is followed by an easily interpretable second split; this in turn results in a Heterosexual cluster and two others. Each of those two others then splits (as with the women) into a more bisexual and a less bisexual cluster. In the HIV Study, the heterosexual cluster does not divide further; instead, a consistently gay cluster is split off on the homosexual side (GG2), then the bisexual cluster (Bi) emerges, and finally the remaining cluster splits into two homosexual clusters (one labeled G and the other GG1).

These general patterns of clustering result, we believe, from two factors: some facts about the world and some details of our sample recruitment. The facts about the world are fairly obvious: (1) there are many people who are very consistently heterosexual; (2) there are people who are very consistently homosexual; and (3) there are people whose behaviors and fantasies are not accurately described by either group (1) or (2)’s patterns. A goal of the

present study, obviously, is to better characterize group 3—the Bi-Heterosexuals, the Bi-bisexuals, and the Bi-homosexuals in the Main Study, and the Bisexuals in the HIV Study.

Here it is important to consider our sample recruitment procedures. Our cluster analysis found two or three kinds of bisexual in the Main Study samples (male and female), where we specifically tried to emphasize recruitment of bisexuals (and others) from the Internet at large, which is a non-clinical source. This sample yielded bisexual clusters that were fairly simply interpretable based on their mean scores on certain KSOG items. The HIV Study sample, on the other hand, was a clinical (AIDS-related) sample recruited with no such special goal; in that sample, the bisexual cluster identified was so statistically variable that no single KSOG item could be used to characterize the group; in that sample, the bisexual cluster identified was so statistically variable that no single KSOG item could be used to characterize the group.

Recall, from the initial Discussion, the fact that the bisexual men in the HIV sample (the Bi cluster) seemed to fit the stereotype of “behaviorally gay men who have a bisexual Ideal,” but the bisexuals in the Main Study men did not. One is tempted to hypothesize that the gay men in our HIV sample were fairly densely involved in the gay community, and that the bisexual men they knew through this community were indeed more gay than bisexual—that is, their bisexual friends involved in the gay community resembled the Bisexual cluster identified in the gay-community based HIV Study. There are a lot of “ifs” in this interpretation, but if it is correct, it would be consistent with the common (albeit inaccurate) opinion about bisexuals held by many members of the gay community.

The fact that the HIV sample was, of course, recruited through a study of the medical effects of HIV, and that the Main Study men were not, very tentatively suggests that the “more bisexual” bisexuals in the Main Study were not densely connected to gay social networks likely to refer each other to an HIV study. Such (pardon the expression) “truer” bisexuals would not have gotten involved in the HIV Study to the same extent to which they became involved in the Main Study. If this speculation is correct and reflects a corresponding truth about the social networks of gay and bisexual men in general, we may have highlighted empirically a pattern often thought prevalent in early studies of homosexuality: that clinical samples produce different results than non-clinical samples do.

In the early days of the Gay Liberation movement, scientific studies were often criticized for being biased, by virtue of being conducted using clinical samples. Better studies using better samples were then proposed, funded, and carried out. Rarely, however, were clinical samples directly compared with non-clinical samples in the same study, using the same procedures. Thus, the assertion that clinical samples were biased samples, although reasonable, was rarely tested directly. The present study constitutes an (admittedly tardy) empirical verification of this clinical-bias hypothesis. This is not an earth-shattering conclusion, but note that it is based on categories using empirically delineated subgroups.

Moreover, note how misleading it would be to try to extrapolate, even allowing for sample recruitment biases, from the HIV Study to the population of bisexual men at large (as represented, arguably, by the Main Study). Simply put, HIV Study bisexuality is not Main

Study bisexuality. The Bisexual group identified by the cluster analysis of the HIV sample was distinctly different from any of the bisexual groups identified by the clustering process in the Main Sample men. Attempts to generalize (even cautiously) from the HIV sample's Bisexual group to a larger population would be doomed to failure.

In the HIV Study, the data seem to imply that the bisexual men with HIV who were recruited to the HIV Study were qualitatively different from bisexual men who did not have HIV. That implies that there may be another group of bisexual men with HIV disease who did not get recruited in corresponding numbers to the HIV study. If this speculation is correct, it suggests that HIV outreach workers might want to design separate outreach programs to the gay and the bisexual communities with regard to medical problems shared by both communities. And it suggests that the common misperception that bisexual men are "really" gay men who want to be less gay may have some limited validity in clinical samples.

Moving on, note that there are some remarkable patterns when we compare results across all three of the samples. First, the Socialize With variable was almost never important in characterizing a cluster. Next, for all three samples, Sexual Attraction, Sexual Behavior, and Self-Identification were extremely useful in differentiating the clusters (as might be expected a priori). It was remarkable how unvarying the heterosexual women were on Sexual Attraction, Behavior, and Self-Identification, but how much more variable they were on Sexual Fantasies. In contrast, in the two male samples, patterns of the means and variances of Sexual Attraction, Behavior, and Fantasy are almost identical.

In all three samples, the bisexual clusters tended to vary much more in their Present Attractions, Behaviors, and Fantasies than the heterosexual or homosexual clusters. In theory, this could be due to a variety of factors, but first let us note that this result is not necessarily a result of the definition of bisexuality or of the clustering process. One could imagine a world in which there were three sexual orientations—bisexual, heterosexual, and homosexual—and in which each of these orientations would be unvarying: heterosexuals would only be attracted to members of the other sex, homosexuals to their own sex, and bisexuals to both sexes. If this were the case (and adding some random error to our sampling and measurement instruments), then the variation within each bisexual group would have been about as low as the variation within the heterosexual and homosexual groups. Such was not the case for even one of the bisexual groups. Although there may indeed be some bisexuals in our bisexual clusters who fit this description, there were others clustered with them whose characteristics on several of the KSOG items were at odds with the ideal "type." We cannot decide from the present data whether the bisexual clusters contained many, few, or none of these ideal bisexual types—only that many of the mixed type were present in the samples.

For this reason, it seems that bisexuality can indeed be thought of as a continuum. Though we found two female and three male bisexual groups through cluster analysis, the higher variability in the bisexual groups shows that individual bisexuals do not neatly fit into an ideal pattern of discrete groups.

In an earlier paper on a related topic (Weinrich et al., 1993), we described scientists studying sexual orientation as being either “lumpers” or “splitters.” Lumpers tend to minimize individual differences on sexual orientation parameters; they will be pleased to see a heterosexual/homosexual dichotomy emerging as the first split in each of our three samples. Splitters tend to revel in the differences; they will be pleased to see that distinguishable subgroups of bisexuals emerged in the samples in which we increased the probability of their participation. Further clarity in this debate must await further papers in the present series, as we report some continuities and some surprising discontinuities in the specific sexual acts and scenarios that members of these clusters enjoy (Klein & Weinrich, 2014).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Biographies

James D. Weinrich, PhD, is currently the editor of the Journal of Bisexuality and former Principal Investigator of the Sexology Project at the HNRC (HIV Neurobehavioral Research Center). He collaborated with Fritz Klein on some innovative studies of bisexuality in the early years of the Journal.

Fritz Klein, MD, was the founding editor of the Journal of Bisexuality. He passed away in 2006.

J. Allen McCutchan, MD, was the Principal Investigator of the Medical Core of the HNRC at the time of the preparation of this paper.

Igor Grant, MD, is the founding Principal Investigator of the HNRC.

The HNRC Group is a research arm of the Department of Psychiatry at the School of Medicine at the University of California, San Diego (http://hnrc.hivresearch.ucsd.edu/). A great many individuals at the HNRC vitally contributed to aspects of this research.

References

Bem, SL. The Bem sex role inventory. Palo Alto, CA: Consulting Psychologists Press; 1981.

Kinsey, AC.; Pomeroy, WB.; Martin, CE. Sexual behavior in the human male. Philadelphia, PA: Saunders; 1948.

Klein, F. The bisexual option. 2. New York, NY: Haworth Press; 1993.

Klein F, Weinrich JD. Homogeneous gynephiles and heterogeneous androphiles: A factor analysis of differences and similarities in attractions to the sexes as a function of sexual orientation. Journal of Bisexuality. 2014; 14:000–000.

McWhirter, DP.; Sanders, SA.; Reinisch, JM. Homosexuality/heterosexuality: Concepts of sexual orientation. New York, NY: Oxford University Press; 1990.

Weinrich, JD. Sexual landscapes: Why we are what we are, why we love whom we love. New York, NY: Scribners; 1987/2013. Available on demand from CreateSpace.com

Weinrich JD, Klein F. Bi-gay, bi-straight, and bi-bi: Three bisexual subgroups identified using cluster analysis of the Klein Sexual Orientation Grid. Journal of Bisexuality. 2002; 2(4):109–139.

Weinrich JD, Snyder PJ, Pillard RC, Grant I, Jacobson DL, Robinson SR, McCutchan JA. A factor analysis of the Klein Sexual Orientation Grid in two disparate samples. Archives of Sexual Behavior. 1993; 22:157–168. [PubMed: 8476335]

	Klein variable	Present	Past	Ideal
A	Sexual Attraction			
B	Sexual Behavior			
C	Sexual Fantasies			
D	Emotional Preference (whom you love and like)			
E	Socialize with (men vs. women)			
F	Lifestyle (sexual orientation of people with whom you spend time)			
G	Self-identification			

Definitions of rating scale values

Value	Scale for A – E	Scale for F – G
1	Other sex only	Heterosexual only
2	Other sex mostly	Heterosexual mostly
3	Other sex somewhat more	Heterosexual somewhat more
4	Both sexes equally	Heterosexual/homosexual equally
5	Same sex somewhat more	Homosexual somewhat more
6	Same sex mostly	Homosexual mostly
7	Same sex only	Homosexual only

Figure 1.
Klein Sexual Orientation Grid

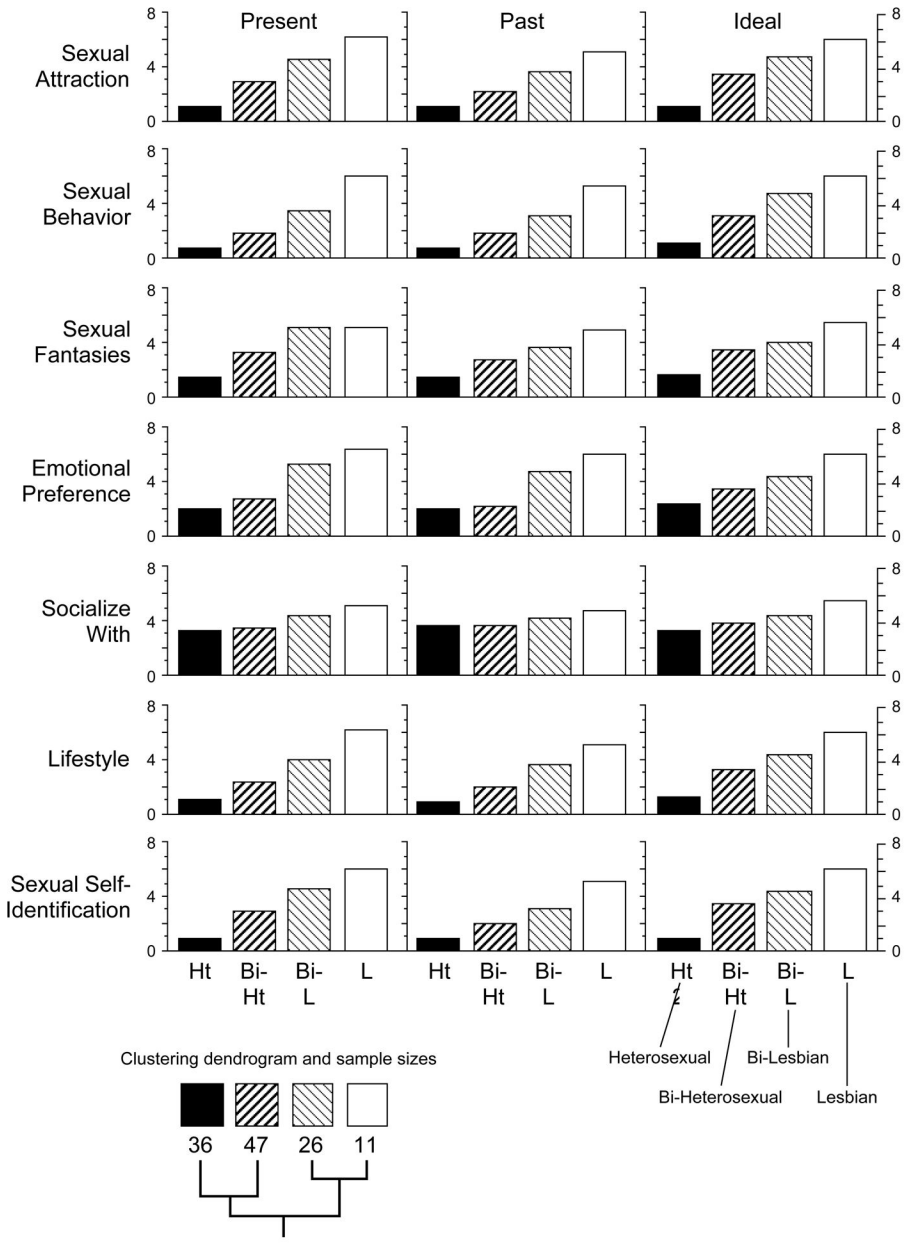

Figure 2.
Klein Grid Item Means by Sexual Orientation Clusters (Main Study Women)

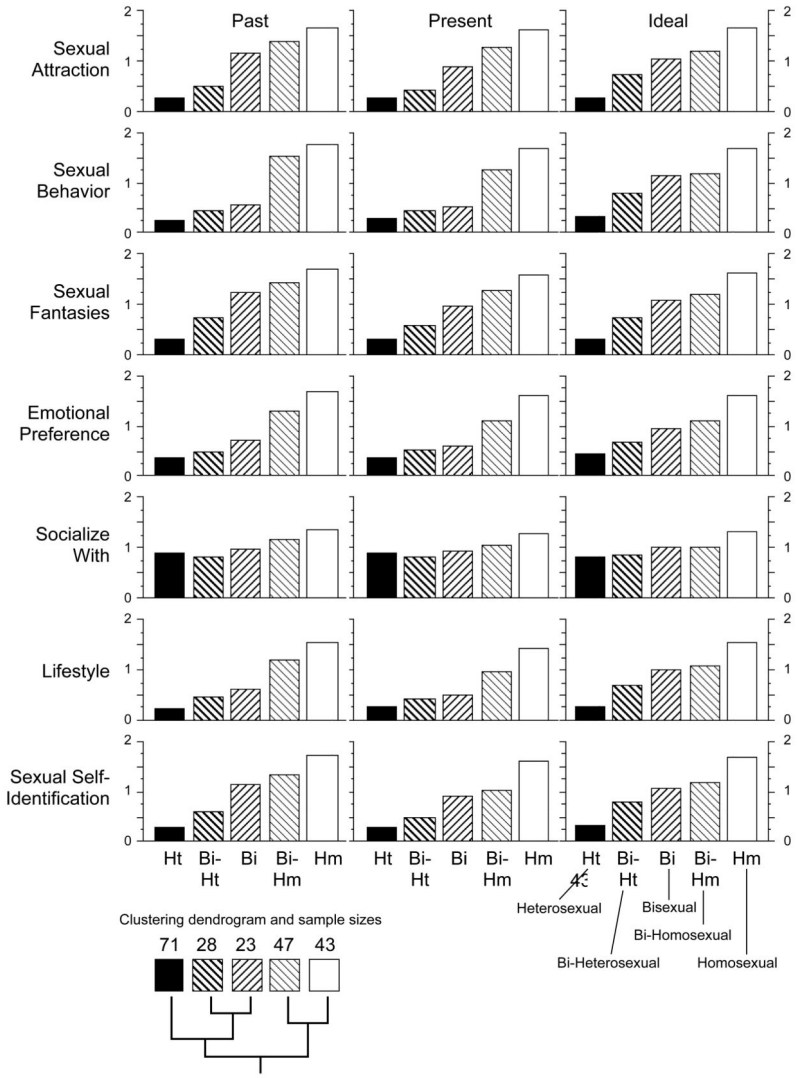

Figure 3.

Klein Grid Item Means by Sexual Orientation Clusters (Main Study Men)

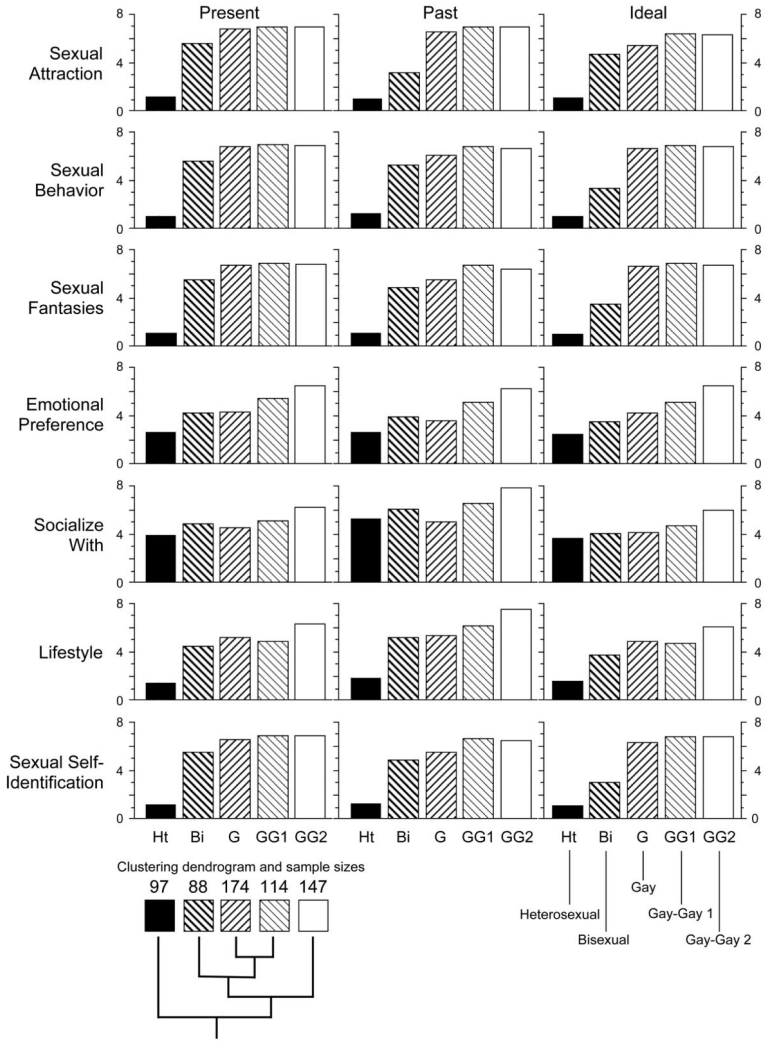

Figure 4.
Klein Grid Item Means by Sexual Orientation Clusters (HIV Men)

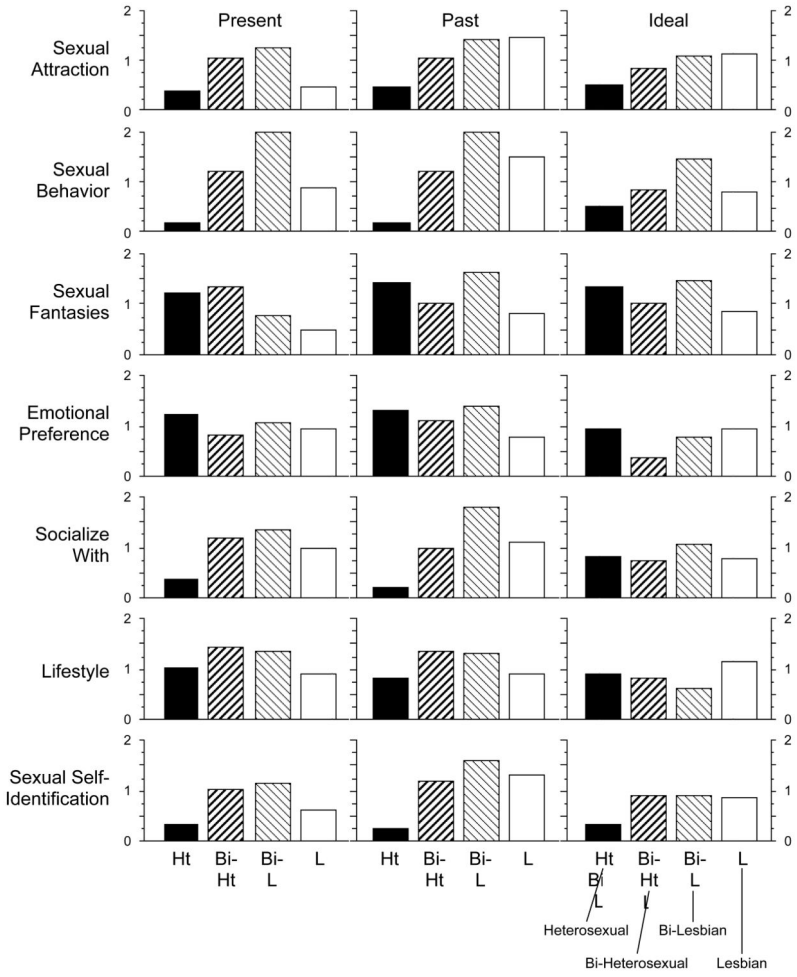

Figure 5.
Klein Grid Standard Deviations by Sexual Orientation Clusters (Main Study Women)

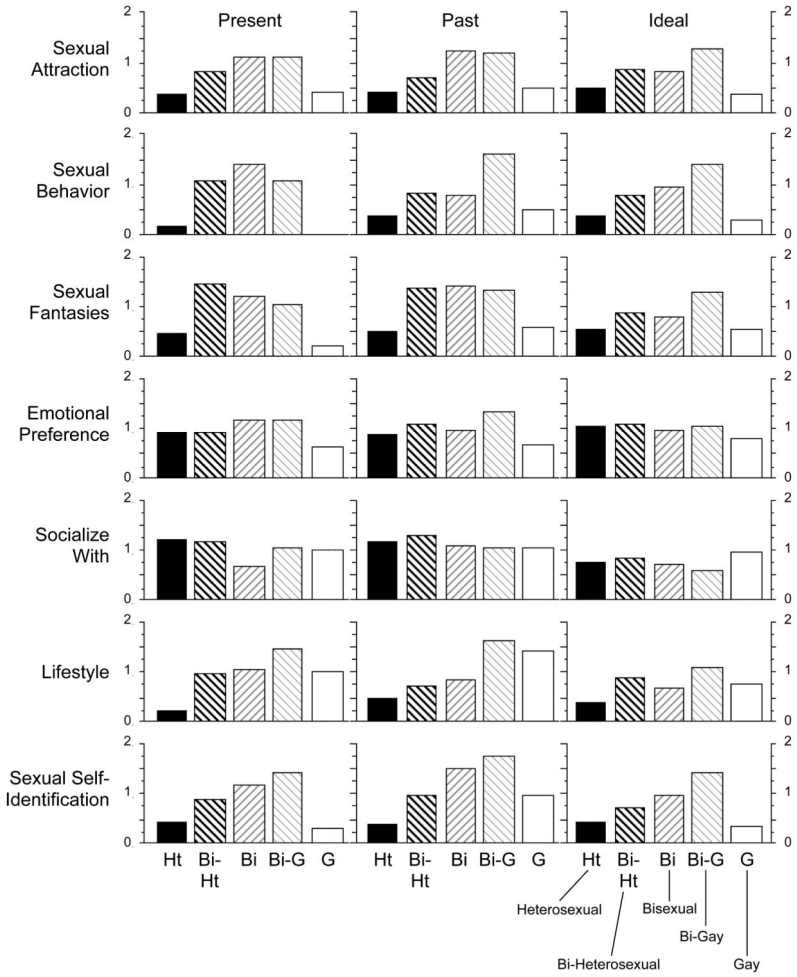

Figure 6.
Klein Grid Standard Deviations by Sexual Orientation Clusters (Main Study Men)

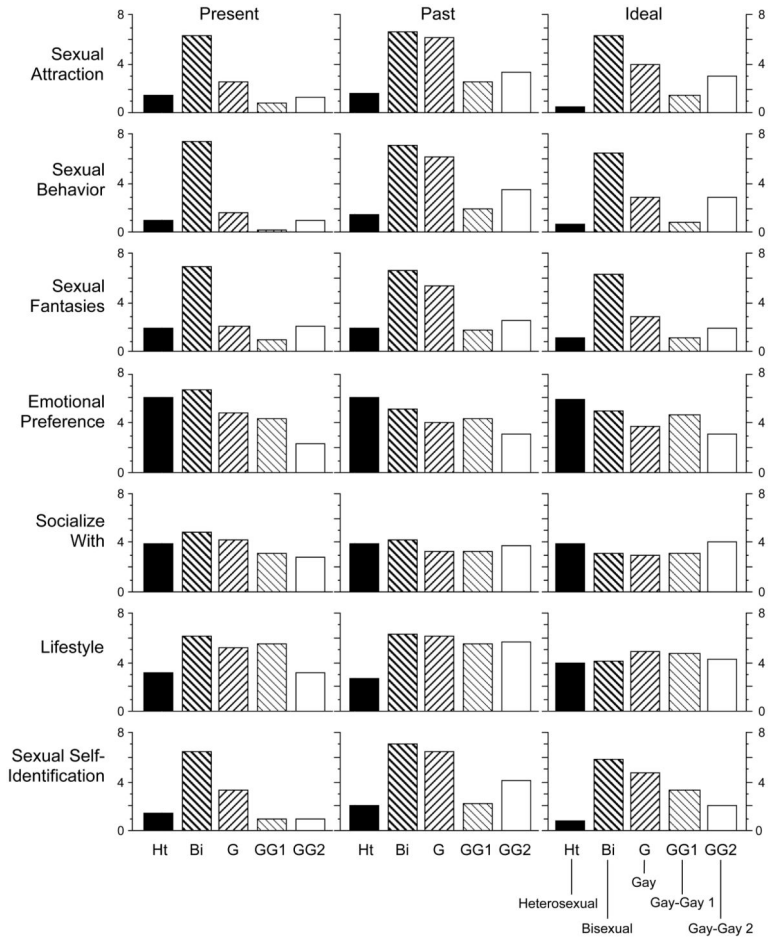

Figure 7.
Klein Grid Standard Deviations by Sexual Orientation Clusters (HIV Men)

Table 1

Demographic Characteristics of the Samples

	Females	Main study males	HIV males	Females vs. males		Main vs. HIV	
N	120	212	620				
				Statistic	p	Statistic	p
Age							
Mean	32.0	36.2	32.5	12.4 F	.0005	37.1 F	.0001
SD	± 10.0	± 10.5	± 7.3				
Minimum	18	18	18				
Median	30	35	31				
Maximum	61	66	60				
Education							
Some HS	0%	1%	2%	2.2 X	n.s.	133.6 X	.0001
HS grad	2%	4%	29%				
Some college	31%	27%	40%				
College grad	35%	38%	22%				
Higher degree	32%	31%	7%				
Employment				30.0 X	.0001		
Full time	48%	74%					
Part time	17%	7%					
Retired	0%	2%					
Student	28%	14%					
Unemployed	8%	3%					
Marital status				0.98 X	n.s.	57.0 X	.0001
Single	46%	51%	75%				
Married	40%	35%	12%				
Divorced	14%	14%	13%				
Homosexual relationship status				0.80 X	n.s.		
Coupled	14%	18%					
Not coupled	86%	82%					
Recruitment source				0.03 X	n.s.		
Bisexual groups	32%	33%					

	Females	Main study males	HIV males	Females vs. males	Main vs. HIV
Internet	68%	67%			

F: F ratio

X: Chi-square

Percentages may not add to 100% due to rounding error.

Table 2

Klein Sexual Orientation Grid Present Identity

	Main Study			HIV HM	Significance	
	Total	**Females**	**Males**	**Males**	**F v. M (p)**	**M v. HM (p)**
Mean ± SD	3.56 ±2.26	3.20 ±1.87	3.76 ±2.44	5.73 ±2.19	4.81 F (.03)	
Breakdown by category (%)					27.2 X (.0001)	146.4 X (.0001)
1: Heterosexual only	30.7	28.3	32.1	14.7		
2: Heterosexual mostly	10.8	12.5	9.9	1.6		
3: Heterosexual somewhat more	8.1	12.5	5.7	1.1		
4: Heterosexual/homosexual equally	16.9	24.2	12.7	3.1		
5: Homosexual somewhat more	6.6	8.3	5.7	3.6		
6: Homosexual mostly	9.0	8.3	9.4	9.7		
7: Homosexual only	17.8	5.8	24.5	66.3		

F: F ratio

X: Chi-square

Percentages may not add to 100% due to rounding error.