Multiple Aspects of Sexual Orientation: Prevalence and Sociodemographic Correlates in a New Zealand National Survey

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Abstract

Sexual orientation consists of multiple components. This study investigated both sexual identity and same-sex sexual behavior. Data came from the New Zealand Mental Health Survey, a nationally representative community sample of New Zealanders aged 16 years or older, interviewed face-to-face ($N = 12,992$, 48% male). The response rate was 73.3%. Self-reported sexual identity was 98.0% heterosexual, 0.6% bisexual, 0.8% homosexual, 0.3% "Something else," and 0.1% "Not sure." Same-sex sexual behavior with a partner was more common: 3.2% reported same-sex sexual experience only and 1.9% reported both experience and a relationship. For analysis of childhood and lifecourse, five sexuality groups were investigated: homosexual, bisexual, and heterosexual divided into those with no same-sex sexual experience, experience only, and experience and relationship. The non-exclusively heterosexual groups were more likely to have experienced adverse events in childhood. Educational achievement and current equivalized household income did not differ systematically across the sexuality groups. Only 9.4% of the exclusively heterosexual lived alone, compared with 16.7% of bisexuals and 19.0% of homosexuals. Heterosexuals were more likely than bisexuals or homosexuals to have ever married or had biological children, with differences more marked for males than for females. Heterosexuals with no same-sex sexual experience were more likely to be currently married than the other two heterosexual groups. Restricting comparisons to heterosexual, bisexual, and homosexual identification ignores the diversity within heterosexuals. Differences between the bisexual and homosexual groups were small compared with the differences between these groups and the exclusively heterosexual group, except for sex (80.8% of bisexuals were female).

Keywords

Sexual orientation; Same-sex sexual behavior; Epidemiology

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Introduction

Studies of same-sex sexuality have faced two major problems: first, how to define same-sex populations and, secondly, how to access them (Savin-Williams, 2008). The introduction of sexual orientation questions into large scale surveys has made possible access to same-sex populations and comparisons with the rest of the population. However, the definitions and hence the actual questions asked have differed.

Studies of adolescents and young adults have often emphasized multiple aspects of sexual orientation in the development of sexual identity (Worthington, Navarro, Savoy, & Hampton, 2008). The three aspects most commonly measured have been sexual attraction, sexual behavior, and sexual identity or self-labeling (Berg-Kelly, 2003; Hegna & Larsen, 2007; Marshal, Friedman, Stall, & Thompson, 2009; Remafedi, French, Story, Resnick, & Blum, 1998; Silenzio et al., 2007; Thompson & Morgan, 2008; Worthington et al., 2008). In some studies, multiple aspects were recorded but results were presented for combined categories because of small numbers (Fergusson, Horwood, & Beautrais, 1999; Hatzenbuehler, Corbin, & Fromme, 2008). With young people, "romantic attraction" may be asked about rather than "sexual attraction" (Russell, Seif, & Truong, 2001) or "sexual fantasies" rather than "sexual behavior" (Narring, Huwiler, & Michaud, 2003). These different aspects of sexuality are not always aligned and they also can change as young people develop, as shown in longitudinal studies (Diamond, 2008; Dickson, Paul, & Herbison, 2003; Fergusson, Horwood, Ridder, & Beautrais, 2005). Nonetheless, a consistent finding is that same-sex behavior is more common than same-sex identity (bisexual or homosexual).

In surveys of adults, the purpose of the study has often been not a broad understanding of aspects of sexual orientation through the lifecourse, but rather measurement for a particular purpose. Aspinall and Mitton (2008) argued that, in order to monitor discrimination against sexual minority groups and to assess equality of opportunity, it is necessary to assess sexual identity rather than sexual behavior. In contrast, surveys concerned about sexually transmitted infections, particularly HIV, have focused on sexual behavior, particularly recent sexual behavior (Cochran & Mays, 2000; Paul et al., 1995). Such U.S. surveys are summarized in Keyes, Rothman, and Zhang (2007). Nonetheless, some mental health surveys have also defined sexual orientation by recent sexual behavior (Gilman et al., 2001; Sandfort, de Graaf, & Bijl, 2003; Sandfort, de Graaf, Bijl, & Schnabel, 2001), although, Jorm, Korten, Rodgers, Jacomb, and Christensen (2002) measured only identity: heterosexual, bisexual or homosexual. Two studies have reported on sexual identity, sexual attraction, and sexual behavior, and discrepancies between these, with the Australian study (Smith, Rissel, Richters, Grulich, & Visser, 2003) reporting on lifetime sexual behavior whereas the Massachusetts study measured behavior in the past 12 months (Keyes et al., 2007). Tao (2008) investigated a variety of combinations of sexual behavior and identity as predictors of sexually transmitted infections, rather than investigating interrelationships between the measures directly. In summary, there has been little research on adults which has explored both sexual identity and sexual behavior together, let alone correlates of behavior not congruent with reported identity.

This study examined sexual identity and same-sex sexual behavior in a large nationally representative sample aged 16 years or older, namely the New Zealand Mental Health Survey (NZMHS). This survey was part of the World Mental Health Survey Initiative (http://www.hcp.med.harvard.edu/wmh/). The standard interview contained one question on sexual identity but, by providing definitions for heterosexual, bisexual, and homosexual which mention attraction, this question could be said to conflate identity and attraction. In New Zealand, two questions were added about sexual experience and sexual relationships

with a partner of the same sex, using questions from the Christchurch Health and Development Study age 25 interview (Fergusson et al., 2005). Therefore, prevalence could be estimated for different sexual identities and for same-sex sexual behavior, and the relationship between identity and behavior could be investigated. In addition, it was possible to study some childhood correlates and current sociodemographic correlates in order to describe the lifecourse for groups defined by sexual identity and behavior.

Previously, family structure has been examined mainly to evaluate the maternal immune hypothesis about male sexual orientation, which postulates that the number of older brothers increases the risk of male homosexuality. Francis (2008), using the largest and most representative sample to date, from the Longitudinal Study of Adolescent Health (ADD Health), found no evidence in support of this hypothesis. However, he did find that family background which departed from the traditional two biological parent configuration was associated with non-exclusively heterosexual identity, same-sex behavior, and romantic attraction. In the New Zealand Mental Health Survey, it was possible to investigate family structure defined by number and type of parents, to see if Francis' results could be replicated with a sample across a wider age range from another country. It was not possible to study associations with birth order and sex of siblings as these were not recorded.

Childhood adversity has been shown to be associated with adult sexual orientation. Jorm et al. (2002) found that both bisexuals and homosexuals had more childhood adversity than heterosexuals. Julien et al. (2008) found that early negative life events were more highly associated with current psychological distress in non-heterosexual women than in heterosexual women. Austin, Roberts, et al.(2008) have documented a higher prevalence of sexual abuse in bisexual and lesbian young women and both sexual abuse and physical abuse in bisexual and lesbian women in the Nurses' Health Study (Austin, Jun, et al., 2008). A prospective 30-year study of abused children and controls showed that those with documented childhood sexual abuse were more likely to later report having ever had same-sex partners (Wilson & Widom, 2010). Because the New Zealand Mental Health Survey measured 29 types of adverse events, with age of onset, it was possible to investigate associations between childhood adverse events and later sexual identity and same-sex behavior, for both males and females.

Educational attainment in parents was used as a proxy for socioeconomic status during childhood and also because of the possibility that prejudice against homosexuality might be less among better educated parents, making it easier for their children to identify as bisexual or homosexual (Smith et al., 2003).

Current sociodemographic characteristics were investigated to see whether those not exclusively heterosexual might be disadvantaged through failure to obtain educational qualifications or through inadequate income. Past and current marriages and living arrangements were studied, as well as the number of children, to obtain a picture of the life course. Schmitt (2008) has reviewed economic studies in the U.S. which indicate that homosexual men earn less than heterosexual men whereas lesbian women earn more than their heterosexual counterparts. These studies have examined individual earnings, to see if discrimination could be detected. Without taking account of household income in relation to the numbers in the household, they have not provided information on income adequacy.

The following information provides cultural and historical context for the New Zealand Mental Health Survey (NZMHS). Homosexual acts between consenting males aged 16 years or older were decriminalized in 1986 (Homosexual law reform in New Zealand, http://www.nzhistory.net.nz/culture/homosexual-law-reform, Ministry for Culture and Heritage). As in the United Kingdom, there was no legislation referring to lesbian sexual

behavior. In 1993, the Human Rights Act included sexual orientation as one of the unlawful grounds for discrimination (http://www.hrc.co.nz/home/hrc/humanrightsenvironment/humanrightsinnewzealand/ humanrightsact.php). In 2005, the year after the NZMHS, the Civil Union Act came into law, allowing couples of the same or opposite sex to enter into legal relationships with the same legal protections and arrangements as apply to marriage (http://www.dia.govt.nz/diawebsite.nsf/wpg_URL/Services-Births-Deaths-and-Marriages-Civil-Union?OpenDocument). Thus, the legal and political climate in New Zealand is broadly similar to that in Australia, the UK, and other European countries.

The aims of this study were to report: (1) the prevalence of sexual identity and same-sex sexual behavior and to investigate the relationship between identity and behavior; (2) the childhood correlates for sexuality groups defined by identity and behavior; (3) the lifecourse of these groups in terms of sociodemographic measures, such as education, income, marriage, and children.

Method

Participants

Participants were selected through a multistage area probability sample of the population aged 16 years or older, living in permanent private dwellings throughout New Zealand (the sampling frame covered 99.99% of the total population). The primary sampling units were "meshblocks," areas originally containing 40–70 households used for each census of population and dwellings. There were 1320 meshblocks selected from a total of 38,365. Within each meshblock, households were selected systematically and then one person was selected per household (Kish, 1965). The response rate was 73.3% with 12,992 interviews, 5634 from males (48% male after weighting).

Procedure

Ethics approval for the New Zealand Mental Health Survey was obtained from all 14 regional health ethics committees and written informed consent was obtained from each participant. A report to the New Zealand Ministry of Health provides full details of materials and methods (http://www.moh.govt.nz/moh.nsf/ fefd9e667cc713e9cc257011000678d8/3195f8d3155e1c2acc2571fc00131a6d? OpenDocument) (Oakley Browne, Wells, & Scott, 2006; Wells, McGee, & Oakley Browne, 2006). The full interview is also available on the website. Field work was carried out from late 2003 until the end of 2004.

A laptop computer assisted personal interview (CAPI) was used face-to-face. It consisted of the Composite International Diagnostic Interview Schedule (CIDI 3.0) plus some additional New Zealand demographic questions. All participants were asked Part 1 sections of the interview, including demographics, but only a subset were also asked Part 2 sections. Any participant who had ever experienced depression or anxiety disorders, hospital treatment for mental problems or made a suicide plan or attempt went on to Part 2 as did a random selection of other participants, selected with probability inversely proportional to the number of eligibles in the household. The Post-Traumatic Stress Disorder section was in Part 2.

Measures

Sexuality Measures

Sexual Orientation: To deal with the possible sensitivity of this question, participants were asked, "Could you read the question on showcard 43 and then tell me the letter

corresponding to your answer?" The following was on showcard 43: Which of the following best describes your sexual orientation?

A. *Heterosexual*: Primarily attracted to members of the opposite sex—straight

B. *Homosexual*: Primarily attracted to members of your own sex—gay

C. *Bisexual*: Attracted to both men and women

D. Something else

E. Not sure

Same-Sex Sexual Experience with a Partner: This was based on two questions following the sexual orientation question, "Have you ever had any kind of sexual experience with a partner of the same sex?" and "Have you ever had a sexual relationship with a partner of the same sex?" Responses were combined into a three category variable of same-sex sexual behavior: none, experience only, experience and relationship.

Childhood Correlates (Prior to Age 16)

Composition of Family of Origin up to Age 16 Years: Four categories were used: both biological parents, one biological parent and one opposite-sex step-parent, two other parent figures (male and female), single parent figure or other situation (17 with no parent figures, which suggests institutional upbringing, and 10 with missing data for father figure, mother figure or both).

Parental Education: For each male and each female parent (or parent figure), education was reported as primary only, secondary or tertiary. Parental education was the highest education reported for either parent.

Adverse Events: The Post-Traumatic Stress Disorder section asked if each of 29 types of adverse event had been experienced and an age of first occurrence. Adverse events prior to age 16 were investigated for four individual types of adverse event and for a composite of any other adverse events. In addition, there was a count of the number experienced out of these five. The four individual types of adverse event were being badly beaten by a parent or parent-figure, witnessing other violence at home, sexual assault, and rape. The 25 other adverse events included a life-threatening vehicle accident, a life-threatening illness, a major natural disaster, or "having someone very close to you die unexpectedly."

Current Sociodemographic Status

Participant's Education: The age of leaving school and responses to census questions on educational qualifications were used to produce four levels of years of completed education: ≤10 (no qualifications), 11–12 (some high school qualifications and no post-school qualifications), 13–14 (final high school year qualification or post-school trade qualification), 15+ (diploma or degree).

Current Income: Because 13% of household income was missing, multiple regression was used to produce imputed values. Income was then equivalized to take into account the number of adults and children in the household (Wells et al., 2006). Cutpoints at half the median, the median, and twice the median produced four income categories: low, low-mid, mid-high, and high.

Marriage: One classification was whether or not a person had ever been married. The second classified current status based on living arrangements as married, living with a partner, or single.

Children: Participants reported the number of biological children they had and the number of non-biological children whom they had adopted, been a step-parent to or had parented for at least five years.

Statistical Analysis

All estimates were weighted according to study design variables with adjustment for non-response and post-stratification to the 2001 Census of Population and Dwellings by age, sex, and ethnicity. Part 2 data were also weighted to take into account the differential selection into Part 2. Because of the complex survey design, Taylor Series Linearization was used to produce estimates, taking account of stratification, clustering, and weighting. SUDAAN 9.0 was used for all analyses.

Multinomial logistic regressions were used to predict sexuality groups from each childhood covariate individually, adjusted for age, sex, and age by sex. Models were also run with a covariate by sex interaction. Results were presented separately for males and females only if this interaction was significant at the .01 level (Cohen, Cohen, & Brook, 1995). To predict current status from sexuality groups, logistic or multinomial logistic regressions were used, adjusted for age, sex, and age by sex. In all these regressions, models were restricted to prevent over-fitting by ensuring that the number of outcome events was around 10 or more per predictor variable (including dummy variables and interactions) (Harrell, Lee, & Mark, 1996). Predicted marginals were presented from the models instead of simple descriptive percentages. These predicted marginals were adjusted for other terms in the model. For each level of a covariate, the predicted marginal shows the percentage expected to be in an outcome category, if the distributions of the variables adjusted for were those found in the whole sample (Graubard & Korn, 1999; Korn & Graubard, 1999).

Results

Table 1 shows the proportion of the population according to reported sexual identity, and the percentage of each sexual identity group who reported each type of same-sex sexual behavior. Self-reported sexual identity was predominantly heterosexual (98.0%) with only 0.6% reporting that they were bisexual and 0.8% homosexual. In addition, 0.3% reported that they were "Something else," 0.1% reported that they were "Not sure/don't know," and less than 0.1% refused to answer (not shown in Table 1).

Same-sex sexual behavior (5.1%) was more common than bisexual or homosexual identity (1.4%), with 3.2% reporting same-sex sexual experience only and 1.9% reporting same-sex sexual experience and relationship. Consequently, as shown in Table 1, same-sex sexual relationships were reported by nearly as many heterosexuals ($n = 118$) as by bisexuals and homosexuals combined ($n = 133$), and the number reporting same-sex sexual experience without a relationship was much higher for heterosexuals ($n = 374$) than for bisexuals and homosexuals combined (<30). No-one responded "Don't know" to the same-sex sexual behavior questions and the same 0.1% refused to answer both questions.

There were 14 participants who reported a same-sex sexual relationship but not a same-sex sexual experience. It was not known if they had responded correctly, having had a same-sex sexual relationship but without sex acts, or if they had misunderstood the questions or changed their minds about what to reveal between the experience question and the

relationship question. In Table 1, they were included with those reporting no same-sex sexual behavior but in all subsequent analyses they were excluded.

The "Something else" group ($n = 50$) appeared to be heterogeneous. It may have included people who were transgender, intersex, transsexual or asexual but it is possible that physically disabled people were also in this small group. Fifteen percent reported a same-sex sexual relationship and 18% experience only. None were currently married. Six percent said that they were unable to work because of a physical disability (1% for the total population).

For all subsequent analyses, only those who reported a heterosexual, bisexual or homosexual identity were included. Although there were nine possible combinations of identity and same-sex sexual behavior, the numbers did not permit further analysis of all of these. The five groups were bisexual, homosexual, and three heterosexual groups classified by same-sex sexual behavior. This classification gives priority to sexual identification but makes use of information on same-sex sexual behavior to subdivide the very large heterosexual group.

As well as presenting the prevalence of each of the five sexuality groups, Table 2 also shows the age distribution, mean age, and percentage female for each of these groups. The two youngest age groups were heterosexuals with same-sex sexual experience only, that is, without a same-sex sexual relationship (M age, 38.7 years), and the bisexual group (M age, 39.4 years), whereas the overall mean age was 44.0 years. The percentage over 60 years of age was particularly low among heterosexuals with same-sex experience only (6.8% compared with 20.4% overall). The percentage female was markedly higher among bisexuals (80.8% female) and also among heterosexuals with same-sex sexual experience and relationship (69.3%). These results indicate that it is necessary in NZMHS to take account of age and sex in analyses of relationships between childhood correlates and membership of the different sexuality groups, and relationships between these sexuality groups and current sociodemographic correlates.

An alternative presentation of sexual identity and same-sex sexual behavior is shown in Fig. 1. Here identity was simplified to the percentage reporting non-heterosexual identity, and sexual behavior to the percentage reporting same-sex sexual behavior. Logistic regressions were used to predict each of these outcomes (non-heterosexual identity or same-sex behavior) from age group and sex. For males, the proportion reporting non-heterosexual identity was constant across the four age groups whereas it appeared to be higher for younger females although the interaction between age and sex was not significant (interaction $F = 2.2$, $df = 3$, $p = .09$). The picture was more complicated for same-sex sexual behavior. For females, there was a linear increase for younger age groups whereas for males the peak was in the 45–59 age group, who would have been 16–30 years old in the mid-1970s when sexual mores were becoming more liberal, and 27–41 in 1986 when male homosexual behavior was decriminalized. This age by sex interaction was highly significant ($F = 11.6$, $df = 3$, $p < .0001$). Therefore, all subsequent analyses included an age by sex interaction.

Childhood Correlates (Prior to 16 Years) and Sexuality

The association between childhood sociodemographic characteristics and sexuality groups is shown in Table 3. Because of the relationships between age, sex, and sexuality groups, each correlate was adjusted for age, sex, and an age by sex interaction.

Parental educational level was unrelated to membership of the five different sexuality groups ($p = .30$), but those whose parents had only primary education were slightly more likely to report being heterosexual with no same-sex experience (96.2%) than those where at least one parent had secondary education (94.5%) or tertiary education (94.2%) ($p < .02$ for

both comparisons). Family of origin was associated with membership of different sexuality groups ($p = .001$) but the pattern was complicated. Compared with those brought up by both biological parents, those with a biological parent and an opposite-sex step-parent were about twice as likely to be heterosexual with same-sex experience only, whereas those brought up by two other opposite-sex parent-figures were more than twice as likely to be homosexual and marginally more likely to be bisexual. Those from single parent families did not differ in sexual orientation or behavior from those brought up by two biological parents.

The association of childhood adverse events with the sexuality groups is shown in Table 4. Physical violence either to the child or within the home was associated with an increase in the likelihood of belonging to any of the sexuality groups which were not exclusively heterosexual (overall $p \leq .008$). The odds ratios were modest (1.2–2.8) and varied across the sexuality groups, although all 95% CIs overlapped considerably. Rape before age 16 and sexual assault before age 16 were more strongly associated with belonging to any of the non-exclusively heterosexual groups (OR 1.8–5.0, overall $p < .0001$). The presence of any other adverse event, of a possible 25 types, was only weakly associated with these sexuality groups (OR 1.1–1.8, overall $p = .01$). Although for any individual type of adverse event the 95% CIs overlapped extensively between the sexuality groups, it is of interest that over the five types of adverse event in Table 5, heterosexuals with a same-sex sexual relationship had higher ORs than did those with same-sex experience only, and homosexuals had lower ORs than bisexuals. However, a safer conclusion is to note that each type of adverse event was associated with an increase in the OR for each non-exclusively heterosexual sexuality group and that there were no clear-cut differences in the extent of these associations across the sexuality groups. In addition to reporting results for each type of adverse event individually, controlling for age and sex, a cumulative count was also developed. The more types of adverse events experienced in childhood, the higher the ORs for each sexuality group (the exception was the anomalously low OR for homosexuality in those who had experienced two types of adverse events). The percentage in the exclusively heterosexual group is shown for each type of adverse event or cumulated adverse event score. The more types of adverse events experienced, the lower the percentage in the exclusively heterosexual group, but even for those with three or more such types of events the great majority (80.2%) still reported exclusively heterosexual identity and behavior. For all in the sample reporting adverse events before age 16, the unweighted medians were age 7 for beatings and for other violence in the home, 9 for both sexual adverse events, and 10 for other adverse events, well before puberty or adolescence.

Sexuality and Current Sociodemographic Status

The five sexuality groups were compared on current sociodemographic characteristics: completed years of education, number in the household, household income equivalized to take account of the number in the household, the percentage ever married, current relationship status based on living arrangements, and the presence of biological or non-biological children, regardless of whether or not they lived with the parent. All these comparisons were adjusted for age, sex, and age by sex; if there was a significant interaction between sexuality and sex, separate models were run for each sex. It can be difficult to interpret odds ratios for multinomial regression when there are several levels of the covariate (Korn & Graubard, 1999) and this is particularly so when the percentage in the reference category varies markedly across the levels and the outcomes are all common so that odds ratios can diverge markedly from relative risks. Therefore, the results are shown in Table 5 as predicted marginals.

The relationship between the sexuality groups and educational attainment was only marginally significant and there were no obvious consistent trends. To consider the adequacy of household income, it was necessary to take account of the size and composition

of the household. Household varied significantly across the sexuality groups. Those reporting homosexual identity were the group most likely to live on their own (19.0%) and the least likely (25.8%) to live in large households (4 or more). In contrast only 9.4% of the exclusively heterosexual group lived alone and 40.3% lived in large households. Equivalized household income differed little between the sexuality groups ($p = .09$) and, while the bisexual and homosexual groups had the highest percentages in the top equivalized income group, the homosexual group also had the highest percent in the lowest income group.

The percentage ever married was lowest for the homosexual group, followed by the bisexual group, with only small differences between the three heterosexual groups. This pattern held for males and females but was more marked for males with only 13.3% of homosexual males having ever married whereas 43.6% of homosexual females had married. Analysis of current relationship status showed, as expected, that those not exclusively heterosexual were less likely to be living with a legal spouse (the survey was completed in 2004, the year before civil unions came into force, so legal spouses were of the opposite sex). More of those not exclusively heterosexual, particularly those reporting homosexual orientation, lived with a partner but this was not sufficient to balance the lower proportion not married. Consequently, those who were not exclusively heterosexual were more likely to be single, in terms of living arrangements, and this was particularly true for those of bisexual and homosexual orientation. Results for having had biological children follow those for having ever been married with differences between the sexuality groups being much more marked for males than for females. The pattern for non-biological children followed that for biological children for males whereas for females there was no overall significant difference across the sexuality groups.

Discussion

In the NZMHS, 0.6% of participants reported bisexual identity and 0.8% reported homosexual identity. The percentage who reported ever having had a sexual relationship with a same-sex partner was 1.9% and another 3.2% reported a same-sex sexual experience without a relationship. People brought up with a step-parent or by two non-biological parents were less likely to be exclusively heterosexual (defined by heterosexual identity with no same-sex behavior). Adverse events in childhood, particularly sexual assault and rape, were associated with increased likelihood of belonging to all of the non-exclusively heterosexual groups. Current living arrangements, marital history, and the existence of biological children differed across the groups defined by sexual identity and same-sex sexual behavior.

The NZMHS prevalence for non-heterosexual identity were slightly lower than those found in most other large population surveys, although they were similar to those found in U.S. National Surveys in the 1990s (Black, Gates, Sanders, & Taylor, 2000). Surveys from 2002 to 2006 in Massachusetts (Keyes et al., 2007) found a prevalence of 1.9% for homosexual identity and 1.0% for bisexual identity compared with New Zealand estimates of 0.8 and 0.6%, respectively. These differences were statistically significant because the surveys were so large. UK prevalence reported by Aspinall and Mitton (2008) varied from 2 to 6.1% for lesbian/gay/bisexual (LGB) identity but the largest study they quoted of 47,000 participants found a prevalence of 1.9% for homosexual identity and 1.1% for bisexual identity, just as in Massachusetts (Keyes et al., 2007). In Australia, the relevant prevalence was 1.6 and 0.9% for males and 0.8 and 1.4% for females (Smith et al., 2003).

The NSMHS found same-sex sexual behavior (5.1%) to be reported more commonly than same-sex sexual identity (1.4%). A higher prevalence of same sex behavior than non-heterosexual identity has also been found in Australia (Smith et al., 2003), Norway (Hegna

& Larsen, 2007; Wichstrom & Hegna, 2003), and the U.S. (Black et al., 2000; Keyes et al., 2007). There are several possible reasons for this finding. One is that it arises as the consequence of providing only three categories (heterosexual, bisexual, and homosexual) in addition to "not sure." Fergusson et al. (2005) used five categories when interviewing 25 year olds, splitting "heterosexual" into "100% heterosexual" and "mostly heterosexual" and found that the number reporting "mostly heterosexual" (8.4%) was many times that reporting "bisexual" (0.8%), "mostly homosexual" (0.8%), and "100% homosexual" (0.9%). With 26 year olds, Dickson et al. (2003) found the number reporting sexual attraction "more often to opposite sex, at least once to same sex" was considerably greater than the combined number reporting equal attraction to both sexes or more often or only to same sex. Similar results were obtained across the full adult age range by Smith et al. (2003). Some researchers have used a 7-point scale (Busseri, Willoughby, Chalmers, & Bogaert, 2008). Therefore, the apparent contradiction between sexual identity and sexual behavior may, in part, be a methodological artifact. Another explanation is that sexual identity consolidates for some people after sexual experience or even relationships with either sex (Floyd & Bakeman, 2006) so that people report being heterosexual because that reflects their current status. Some evidence of this is seen in the results for the percentage ever married, which was similar across the three heterosexual groups.

In order to monitor discrimination due to sexual orientation, there is consideration of how to measure the sexual orientation of the population or employment groups such as public servants. The consensus reported by Aspinall and Mitton (2008) to use the terms gay, lesbian, and bisexual suggests that only those prepared to report their sexual orientation in those terms will be counted yet surely the aim of human rights legislation is not just to protect those who are sure of their orientation but also those who are exploring it or who are predominantly but not exclusively heterosexual, even though the legislation, at least in New Zealand (http://www.hrc.co.nz/index.php?p=308), is restricted to those terms.

This survey found more same-sex behavior among young women than among young men, as has also been found previously in New Zealand (Dickson et al., 2003; Fergusson et al., 2005) and Australia (Jorm et al., 2002). More explicit same-sex behavior and sexual arousal was also found in young Norwegian women whereas young men reported more same-sex romantic attachments (Hegna & Larsen, 2007).

It is always difficult to determine temporal trends from a cross-sectional survey because of the possibility of differential reporting due to changes in social mores, differential recall, or even differential loss to the cohort. These potential confounders would all be expected to produce lower rates of reported non-heterosexual orientation or behavior in people born earlier. Nonetheless, this survey found relatively little change in the prevalence of non-heterosexual orientation across birth cohorts even though the legislation that criminalized male homosexual behavior was repealed in 1986 and sexual orientation is now included in NZ human rights legislation. Larger changes have occurred in the percentage of people reporting same-sex sexual experience, but with different temporal patterns for males and females.

Childhood correlates of sexual identity and same-sex behavior in the NZMHS agreed with and extended those found previously. The NZMHS showed that, across the full adult age range, some non-traditional childhood family structures were associated with same-sex behavior or identity, adding to the findings of Francis (2008) with young adults. Previous studies have shown for women that sexual abuse and physical abuse were associated with being lesbian or bisexual (Austin, Jun, et al., 2008; Austin, Roberts, et al., 2008). Wilson and Widon (2010) found that childhood sexual abuse was associated with having had a same-sex sexual partner. The NZMHS showed that these results hold for men and women,

whether sexuality is defined by identity or by same-sex behavior. Sandfort et al. (2003) defined homosexuality by same-sex behavior in the previous year and also showed much higher rates of childhood neglect or sexual abuse. Jorm et al. (2002) found more childhood adversity in those with bisexual or homosexual identity.

These associations appear to be replicable but are open to a number of interpretations. First of all, they are descriptions of relationships, sometimes adjusted for age and sex but not for other background factors or correlates. Nonetheless, even if there is a causal element in these relationships it is debatable as to what might be causal. It is possible that sexual violation is the only causal factor and physical abuse or other adverse events are associated with subsequent sexuality only because they are associated with sexual violation. There were inadequate numbers to explore this hypothesis in the NZMHS in a multivariable model, while retaining all five sexuality groups, but one argument against it is that the group with three or more types of adverse event had the highest odds ratios, and sexual violation could only count as a maximum of two (rape and sexual assault). An alternative is a vulnerability model in which those who will go onto same-sex behavior or attraction have characteristics even in childhood which make them more likely to be victims of abuse or other adverse events (a reverse causality model). Another possibility is that a child treated in ways which go against the conventional morals and mores of a society becomes an adult less restricted by those morals and mores, so that if they feel same-sex sexual attraction they may act upon it.

At the time of interview, the five groups defined by sexual identity and same-sex sexual behavior did not differ in any consistent way in terms of educational achievement or equivalized household income. Other studies have focused on personal income to try to determine if there is discrimination (Schmitt, 2008). Instead, the NZMHS considered the opportunity to earn well, as indicated by educational attainment, and the adequacy of income for the household. By these measures, in New Zealand the non-exclusively heterosexual groups were neither advantaged nor disadvantaged. In Australia (Smith et al., 2003), higher levels of education were associated with homosexual identity but not bisexual identity. For men, there was no association between sexual identity and household income whereas low income women were more likely to report bisexuality.

In the NZMHS, there were marked differences between the sexuality groups in terms of living arrangements, as has also been found by others (Black et al., 2000; Sandfort et al., 2001). What appears to be previously unreported is the difference between males and females in the percentage ever married in the bisexual and homosexual groups (>40% for females but ≤20% for males), with similar percentages for having had biological children. Also, through subdividing the heterosexual identity group by reports of same-sex behavior, it was possible to see that, although all three heterosexual groups were similar in the percentage ever married, the same-sex sexual experience group and the same-sex sexual relationship groups were less likely to be currently married and more likely to be living without a partner.

The advantages of the NZMHS are that it was large, with nearly 13,000 people interviewed, nationally representative, the overall response rate of 73.3% was good for a community survey, and there was very little non-response on the sexuality questions (<0.1%). Because both sexual identity and sexual behavior were reported, it was possible to differentiate between several groups as recommended by Savin-Williams (2008), instead of being restricted to the common binary split of heterosexual/non-heterosexual. Nonetheless, even with this sample size, the numbers reporting that they were homosexual or bisexual were too small to subdivide them further by same-sex sexual behavior or relationships other than to observe that most homosexuals reported relationships, with a minority reporting no same-

sex behavior and almost none reporting experience only whereas bisexuals were more evenly spread across those three categories. Moreover, there was no detailed information on same-sex sexual behavior such as age of onset, and the extent and timing of same-sex sexual experience or relationships. Nor was there any such information for opposite-sex sexual relationships other than what can be inferred from age at first marriage and number of marriages. The large sample did enable the heterosexual group to be subdivided by sexual behavior.

The NZMHS has enabled national estimates of the prevalence of bisexual and homosexual identity for the first time in New Zealand. It has replicated previous findings in the international literature on the association between childhood adverse events, especially abuse, and non-exclusive heterosexuality and has shown that the increased odds applied not only to groups defined by bisexual or homosexual identity but also to heterosexuals who reported same-sex sexual experience or relationships. Moreover, these heterosexual groups were less likely to be currently married or living with a partner than those who have been exclusively heterosexual. The survey has also shown that for the bisexual and homosexual identity groups, females were much more likely to have ever been married and to have had children.

Acknowledgments

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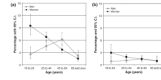
Fig.1.
Same-sex sexual behavior and non-heterosexual identity by age for males and females. **a** Same-sex sexual behavior; **b** non-heterosexual identity (bisexual or homosexual)

Table 1

Same-sex sexual behavior in each sexual identity group (*N* = 12,992)

Sexual identity	Same-sex sexual behavior			Combined	Males	Females
	None	Experience only	Experience and relationship			
Heterosexual						
N	12186	374	118	12703	5511	7192
%[a]	95.9	3.0	0.9	98.0	98.3	97.8
SE (%)	0.23	0.20	0.10	0.16	0.19	0.24
Bisexual						
N	28	24	49	101	24	77
%[a]	30.3	25.8	43.9	0.6	0.3	1.0
SE (%)	5.89	5.67	6.67	0.08	0.07	0.15
Homosexual						
N	19	<10	84	106	57	49
%[a]	18.6	2.6	78.8	0.8	0.9	0.7
SE (%)	7.23	1.59	7.22	0.11	0.15	0.17
Total						
N	12289	404	261	12992	5634	7358
%[a]	94.7	3.2	1.9	100.0	100.0	100.0
SE (%)	0.25	0.20	0.15	–	–	–

[a] All percentages were calculated out of the total number eligible but, because of small numbers, those reporting "Something else," "Not sure," "Don't know," or "Refused" are not shown

Table 2

Population prevalence, age distribution and mean age, and the percentage female for each sexuality group ($N = 12{,}885$)

Sexuality group	N	Population prevalence %[a] (SE)	Age distribution				Age M (SE)	Female % (SE)
			16–29 (n = 2535) %[b] (SE)	30–44 (n = 4258) %[b] (SE)	45–59 (n = 3132) %[b] (SE)	60+ (n = 2960) %[b] (SE)		
Heterosexual, no same-sex sexual experience	12,186	94.7 (0.26)	23.5 (0.68)	31.5 (0.58)	24.1 (0.53)	21.0 (0.55)	44.2 (0.28)	51.7 (0.60)
Heterosexual, same-sex sexual experience only	374	3.0 (0.19)	29.9 (3.19)	37.7 (3.02)	25.6 (2.79)	6.8 (1.42)	38.7 (0.94)	52.9 (3.13)
Heterosexual, same-sex sexual experience and relationship	118	0.9 (0.10)	20.0 (4.78)	32.5 (5.08)	28.4 (5.71)	19.0 (4.04)	44.4 (1.79)	69.3 (5.64)
Bisexual	101	0.8 (0.11)	36.1 (5.81)	28.0 (5.59)	23.0 (4.91)	12.9 (3.47)	39.4 (2.03)	80.8 (4.68)
Homosexual	106	0.6 (0.09)	23.6 (5.96)	35.0 (5.45)	29.0 (5.34)	12.4 (3.72)	42.4 (1.90)	47.6 (7.10)
Total	12,885	100.0 (–)	23.7 (0.67)	31.7 (0.57)	24.2 (0.52)	20.4 (0.53)	44.0 (0.27)	52.0 (0.59)

[a] Percentage in each sexuality group, based on the 12,885 included in this table

[b] Percentage in each age group, for each sexuality group

Table 3

Childhood correlates and sexuality groups, adjusted for age and sex[a] ($N = 12,885$)

Correlate	Level	N	Population prevalence of correlate level %[b] (SE)	Sexuality groups				
				Heterosexual			Bisexual OR (95% CI)	Homosexual OR (95% CI)
				No same-sex behavior %[c] (SE)	Same-sex sexual experience only OR (95% CI)	Same-sex sexual experience and relationship OR (95% CI)		
Highest parental education	Primary	2541	14.4 (0.4)	96.2 (0.6)	1.0	1.0	1.0	1.0
	Secondary	6517	52.4 (0.6)	94.5 (0.4)	1.5 (0.9, 2.4)	1.5 (0.8,2.9)	1.1 (0.6,2.0)	2.0 (0.8,4.8)
	Tertiary	3434	33.2 (0.7)	94.2 (0.5)	1.8 (1.0,3.0)	1.4 (0.7,3.0)	0.8 (0.4, 1.7)	1.9 (0.8,4.7)
	Overall test[d]				$F = 1.2, df = 8, p = .30$			
Family of origin up to age 16	2 biological parents	10521	85.2 (0.4)	95.0 (0.3)	1.0	1.0	1.0	1.0
	1 biological + step-parent	744	5.5 (0.3)	92.4 (0.1)	2.0 (1.3.3.1)	1.0 (0.4,2.2)	2.0 (0.8.5.1)	0.5 (0.1.2.1)
	2 other parent figures (Male + Female)	1014	5.4 (0.2)	92.3 (0.7)	1.2 (0.7,1.8)	1.7 (0.9,3.3)	2.3 (0.9, 5.8)	2.6 (1.4,4.8)
	Single parent or other	606	3.9 (0.2)	94.0 (1.0)	1.5 (0.9, 2.6)	0.5 (0.1,1.4)	1.6 (0.5, 5.2)	0.9 (0.3, 2.7)
	Overall test[d]				$F = 2.7, df = 12, p = .001$			

[a] Modelled using multinomial logistic regression with sexuality group as the outcome and heterosexuals with no same-sex sexual experience as the reference group, using a single correlate, 4 age groups (16–29/30–44/45–59/60+), sex and an age by sex interaction

[b] Percentage at each correlate level ($N = 12,885$ except for parental education for which $N = 12,492$)

[c] Percentage is the percentage in the reference category (heterosexual, no same-sex sexual experience) for each level of the childhood correlate, produced as a predicted marginal from the model

[d] Overall test provides the significance of the covariate in the model with age, sex, and age by sex

Table 4

Adverse events experienced prior to age 16 and sexuality groups[a] ($N = 7{,}371$)

Adverse event prior to 16	Level	N	Population prevalence of adverse event %[b] (SE)	Sexuality groups				
				Heterosexual			Bisexual (n = 74) OR (95% CI)	Homosexual (n = 76) OR (95% CI)
				No same-sex behavior (n = 6857) %[c] (SE)	Same-sex sexual experience only (n = 281) OR (95% CI)	Same-sex sexual experience and relationship (n = 83) OR (95% CI)		
Beaten at home	Yes	929	6.2 (0.3)	88.4 (1.4)	1.7 (1.1, 2.4)	2.8 (1.5, 5.3)	2.1 (1.1,4.0)	2.2 (0.9, 5.4)
	Test[d]				$F = 6.0, df = 4\ p = .0004$			
Other violence in the home	Yes	1346	10.6 (0.5)	90.7 (1.0)	1.2 (0.8, 1.7)	2.1 (1.1, 3.8)	2.4 (1.2, 4.7)	1.7 (0.9, 3.3)
	Test[d]				$F = 3.4, df = 4, p = .008$			
Rape	Yes	588	3.9 (0.2)	84.7 (1.8)	2.5 (1.6, 3.7)	4.4 (2.3, 8.3)	3.7 (2.0, 7.0)	1.8 (0.8, 4.2)
	Test[d]				$F = 12.7, df = 4, p <.0001$			
Sexual assault	Yes	923	7.7 (0.4)	82.6 (1.6)	3.7 (2.7, 5.1)	5.0 (2.6, 9.5)	3.1 (1.6, 6.0)	2.7 (1.4, 5.1)
	Test[d]				$F = 23.8, df = 4, p <.0001$			
Other adverse event	Yes	2689	33.2 (0.9)	91.6 (0.6)	1.5 (1.1, 2.0)	1.8 (1.0, 3.1)	1.6 (0.9, 2.9)	1.1 (0.6, 1.9)
	Test[d]				$F = 3.1, df = 4, p = .01$			
Cumulated adverse event score[e]	0	5096	75.0 (0.6)	94.8 (0.4)	1.0	1.0	1.0	1.0
	1	1258	15.2 (0.5)	90.0 (1.1)	1.6 (1.1, 2.3)	3.0 (1.4, 6.2)	2.5 (1.1, 5.3)	2.8 (1.4, 5.5)
	2	659	6.7 (0.4)	89.5 (1.5)	2.1 (1.3, 3.3)	3.4 (1.5, 7.5)	2.4 (1.0, 5.6)	1.2 (0.4, 3.8)
	3+	358	3.0 (0.2)	80.2 (2.6)	3.7 (2.4, 5.9)	8.7 (4.0, 19.0)	6.2 (2.7, 13.9)	3.8 (1.5, 9.5)
	Test[d]				$F = 7.3, df = 12, p <.0001$			
Overall				94.8 (0.4)				

[a] Modelled using multinomial logistic regression with sexuality as the outcome and heterosexuals with no same-sex sexual experience as the reference group, using the correlate, 4 age groups (16–29/30–44/45–59/60+), sex and age by sex, among those who completed Part 2 of the interview which contained questions on adverse events

[b] Percentage is the percentage of the population at each level of the covariate, namely the prevalence of an event or adverse event count ($N = 12{,}885$)

[c] Percentage is the percentage in the reference category (heterosexual, no same-sex sexual experience) for each level of the childhood correlate, produced as a predicted marginal from the model

[d] Test provides the overall significance of the covariate in the model with age, sex and age by sex

[e] The cumulated adverse event score is a count of the number of types of adverse events experienced before age 16, as listed above

Table 5

Sexuality groups and current sociodemographic characteristics[a] (N = 12,885)

Sexuality groups	Current sociodemographic characteristics			
	Completed years of education			
	≤10 %[b] (SE)	**11–12** %[b] (SE)	**13–14** %[b] (SE)	**15+** %[b] (SE)
Heterosexual, no same-sex sexual experience	22.5 (0.5)	28.3 (0.6)	30.6 (0.7)	18.6 (0.5)
Heterosexual, same-sex sexual experience only	24.9 (2.7)	28.7 (2.8)	32.9 (3.1)	13.6 (2.0)
Heterosexual, same sex sexual experience and relationship	17.1 (4.4)	19.3 (4.5)	43.5 (5.6)	20.2 (4.2)
Bisexual	19.2 (4.7)	30.9 (5.9)	25.6 (5.0)	24.3 (5.3)
Homosexual	22.0 (5.1)	18.0 (4.8)	43.4 (5.6)	16.6 (4.6)
			$F = 1.7, df = 12, p = .05$	

Sexuality groups	Number living in the household (adults + children)			
	1	**2**	**3**	**4+**
Heterosexual, no same-sex sexual experience	9.4 (0.3)	31.8 (0.6)	18.5 (4.7)	40.3 (0.7)
Heterosexual, same-sex sexual experience only	14.3 (1.7)	32.9 (2.7)	19.3 (24.4)	33.6 (2.8)
Heterosexual, same sex sexual experience and relationship	11.8 (2.6)	29.2 (4.9)	21.7 (4.8)	37.3 (5.8)
Bisexual	16.7 (3.9)	28.8 (5.0)	26.9 (5.2)	27.6 (5.0)
Homosexual	19.0 (3.7)	39.6 (5.4)	15.5 (4.2)	25.8 (5.8)
			$F = 3.7, df = 12, p < .0001$	

Sexuality groups	Equivalized household income[c]			
	Low	**Low-mid**	**Mid-high**	**High**
Heterosexual, no same-sex sexual experience	26.8 (0.7)	24.9 (0.5)	28.7 (0.6)	19.6 (0.6)
Heterosexual, same-sex sexual experience only	26.6 (2.9)	23.8 (2.6)	25.4 (2.9)	24.2 (2.7)
Heterosexual, same sex sexual experience and relationship	30.3 (5.3)	14.5 (4.0)	32.7 (5.2)	22.6 (4.0)
Bisexual	22.0 (6.0)	19.3 (4.8)	28.4 (5.6)	30.3 (5.9)
Homosexual	32.9 (5.5)	15.3 (4.0)	23.1 (5.1)	28.7 (5.4)
			$F = 1.6, df = 12, p = .09$	

Current sociodemographic characteristics

Completed years of education

	≤10 %[b] (SE)	11–12 %[b] (SE)	13–14 %[b] (SE)	15+ %[b] (SE)

Sexuality groups

	Ever married[d]		Current relationship[e]		
	Males	Females	Married	Living together	Single
Heterosexual, no same-sex sexual experience	66.4 (0.9)	69.4 (0.9)	51.6 (0.7)	12.9 (0.4)	35.6 (0.7)
Heterosexual, same-sex sexual experience only	57.4 (3.9)	62.8 (2.8)	38.1 (2.9)	16.5 (2.2)	45.4 (2.9)
Heterosexual, same sex sexual experience and relationship	65.0 (6.8)	63.0 (3.8)	38.5 (4.7)	11.3 (3.2)	50.4 (4.6)
Bisexual	20.0 (8.1)	45.9 (5.8)	19.6 (5.1)	18.2 (5.0)	62.2 (6.3)
Homosexual	13.3 (4.7)	43.6 (5.7)	8.5 (4.3)	33.3 (5.9)	58.3 (0.6)
	$F = 23.8, df = 4, p<.0001$	$F = 13.5, df = 4, p<.0001$	$F = 9.9, df = 8\ p<.0001$		

Sexuality groups

	1 or more biological children[f]		1 or more non-biological children[g]	
	Males	Females	Males	Females
Heterosexual, no same-sex sexual experience	63.4 (1.0)	72.6 (0.9)	13.5 (0.6)	10.9 (0.5)
Heterosexual, same-sex sexual experience only	53.9 (3.8)	71.0 (2.8)	14.6 (3.0)	12.5 (2.6)
Heterosexual, same sex sexual experience and relationship	60.0 (8.3)	69.0 (4.4)	7.4 (0.5)	20.8 (5.4)
Bisexual	28.0 (10.0)	64.5 (7.7)	0.9 (0.9)	13.9 (4.6)
Homosexual	13.5 (4.3)	47.6 (6.8)	3.4 (2.5)	13.0 (5.3)
	$F = 20.0, df = 4, p<.0001$	$F = 5.1, df = 4, p = .0005$	$F = 3.1, df = 4, p = .01$	$F = 1.5, df = 4. p = .21$

[a] Modelled using multinomial logistic regression with the correlate as the outcome, using sexuality, 4 age groups (16–29/30–4/45–59/60+), sex and age by sex, with those heterosexuals with no same-sex sexual experience as the reference group. If a test of sexuality by sex was significant in a model with the above terms plus that interaction, at the .01 level, then separate models were run for each sex, with sexuality and 4 age groups as predictors, and results are presented separately for each sex. Test results are for an overall test of sexuality as a predictor of the outcome

[b] Percentage of a sexuality group at each level of the outcome variable, produced as a predicted marginal from the model

[c] Household income equivalized taking account of the numbers of adults and children (Wells et al., 2006) and split at half the median, the median, and twice the median

[d] Results presented from separate models for males and females because of sexuality by sex interaction ($F = 4.4, df = 4, p = .002$) in standard model plus that interaction

[e] Based on household composition information

[f] Results presented from separate models for males and females because of sexuality by sex interaction ($F = 4.0$, $df = 4$, $p = .003$) in standard model plus that interaction

[g] Results presented from separate models for males and females because of sexuality by sex interaction ($F = 3.7$, $df = 4$, $p = .005$) in standard model plus that interaction