Sexual Orientation and Mental Health in a Birth Cohort of Young Adults

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ABSTRACT

Background: This paper sought to examine the relationship between sexual orientation and mental health in a New Zealand birth cohort studied to age 25 years.

Methods: The analysis is based on a sample of 967 participants (469 males; 498 females) in the Christchurch Health and Development Study. As part of this study information was gathered on: a) measures of sexual orientation, same sex behaviour and sexual attraction obtained at ages 21, 25 years; b) measures of mental disorders and suicidal behaviours over the interval 21-25 years; c) measures of childhood and family background.

Results: Latent class analysis was used to combine indicators of sexual orientation, same sex behaviour and attraction to form an empirically based classification of sexual orientation. The best fitting model classified the sample into three groups: exclusively heterosexual orientation (87.6%); predominantly heterosexual but with same sex inclinations or experience (9.6%); predominantly homosexual (2.8%). Proportionately more women than men were classified as predominantly heterosexual (14.2% vs 4.8% respectively) or predominantly homosexual (3.9% vs 1.5% respectively). Cohort members with a predominantly homosexual orientation had rates of mental disorder and suicidal behaviours that were between 1.5 to 12 times higher than for those with an exclusively heterosexual orientation. These associations persisted after adjustment for confounding. The associations between sexual orientation and mental health were more marked for males than females.

Conclusions: The findings suggest a continuum of sexual preferences amongst young adults. Variations in sexual orientation were clearly associated with mental health. These associations tended to be stronger for males.

In recent years there has been growing research into sexual orientation and the linkages between sexual orientation and mental health, in particular, risk for suicide. This research has established that people with gay, lesbian or bisexual orientations form a minority of the population that is at increased risk for mental health problems (Bagley and Tremblay 1997; Cochran *et al.* 2003; Fergusson *et al.* 1999; Garofalo *et al.* 1998; King *et al.* 2003; Mills *et al.* 2004; Remafedi *et al.* 1998; Sandfort *et al.* 2001; Skegg *et al.* 2003; van Griensven *et al.* 2004; Wichstrom and Hegna 2003).

A recurrent concern for this area of research has been that of devising adequate measures of sexual orientation (Chung and Katayama 1996; Gonsiorek *et al.* 1995; Russell 2003; Sell 1997; Working Groups Workshop on Suicide and Sexual Orientation 1995). In many studies, researchers have used self-descriptions of sexual orientation; i.e. heterosexual, homosexual, bisexual or unsure (e.g. Cochran *et al.* 2003; Garofalo *et al.* 1998; Jorm *et al.* 2002). Other studies have used measures of sexual activity with a same sex partner as a measure of sexual orientation (e.g. Fergusson *et al.* 1999; Herrell *et al.* 1999; Sandfort *et al.* 2001; Sorenson 1973). Finally, other workers have suggested using measures of sexual attraction, sexual fantasy, or emotional attachments to determine sexual orientation (Coleman 1987; Klein *et al.* 1985; Laumann *et al.* 1994; Shively and DeCecco 1993). The possibility of using multiple criteria to classify sexual orientation raises two issues. The first is that the use of different criteria leads to differing estimates of the population prevalence of gay, lesbian and bisexual individuals, with estimates ranging from as low as 1% (Jorm *et al.* 2002) to as high as 15 % (Bagley and Tremblay 1998; Kinsey *et al.* 1948; Sell *et al.* 1995; Sorenson 1973) depending on the criteria used. The second is the need to reconcile the different criteria that have been used to identify sexual orientation.

In this paper, we describe an approach to resolving some of these issues by using latent class modelling to devise a classification of sexual orientation in a birth cohort of young adults. This study has two features that may aid in the clarification of sexual orientation. First, the criteria used in the study span multiple, widely recognized domains of sexual orientation including self-

classification, sexual behaviour and attraction. In addition, the design of the study is longitudinal, giving respondents multiple opportunities to disclose their sexual orientation.

The present study is based on data gathered on a birth cohort of 1265 New Zealand young people who have now been studied to age 25 years. At ages 21 and 25, members of this cohort were questioned about their sexual orientation and mental health. The aims of the present study were twofold. The first aim was to develop an empirically based classification of sexual orientation within the cohort with this classification being based on reported patterns of: a) sexual behaviour; b) stated sexual preference; and c) reported sexual attraction. The second aim was to extend and confirm previous research on this cohort showing that young people reporting gay, lesbian, and bisexual orientation were at increased risks of mental health problems.

METHOD

Participants

The data were gathered during the course of the Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of an unselected birth cohort of 1265 children (635 boys; 630 girls) born in the Christchurch (New Zealand) urban region in mid-1977. This cohort has now been studied over 25 years. All phases of data collection have been conducted only with the signed and informed consent of research participants and for all aspects of the study, ethical consent has been obtained from the local ethics committee. The present analysis is based on a sample of 967 participants (469 males; 498 females) for whom complete information was available. This sample represented 76% of the original cohort of 1265 participants.

Sexual Orientation

When sample members were age 21 and 25 years, the young people were questioned about aspects of their sexual and partner relationships. This questioning included a number of items relating to sexual orientation. At age 21 sexual orientation was assessed on the basis of two items. (1) Sample members were asked to nominate their sexual orientation using a 3-fold classification:

heterosexual; bisexual; or homosexual (gay or lesbian). (2) In addition, participants were asked whether they had ever had a sexual relationship with a partner of the same sex. At age 25, questioning on sexual orientation was expanded to include more detailed measures based on the items described by Remafedi et al (1992). This provided a further four items for the present analysis. (1) Sample members were asked to nominate their sexual orientation on a 5-point scale: (a) 100% heterosexual (attracted to persons of the opposite sex); (b) mostly heterosexual; (c) bisexual (equally attracted to men and women); (d) mostly homosexual; (e) 100% homosexual (gay/lesbian; attracted to persons of the same sex). (2) The extent of sexual attractions was also assessed on a 5-point scale as follows: (a) I am only attracted to people of the same sex as me and will only be sexual with people of the same sex as me; (b) I am strongly attracted to people of the same sex as me and most of my sexual experiences will be with people of the same sex as me; (c) I am equally attracted to men and women and would like to be sexual with both; (d) I am strongly attracted to people of the opposite sex and most of my sexual experience will be with people of the opposite sex; (e) I am only attracted to people of the opposite sex and I will only be sexual with people of the opposite sex. (3) Sample members were asked whether they had ever had any kind of sexual experience with a partner of the same sex. (4) Sample members were also asked if they had ever had a sexual relationship with a partner of the same sex. There was thus a total of six items available to describe the individual's sexual orientation and same sex behaviour, with these items being assessed at two ages. In all cases, questioning was conducted by trained survey interviewers recruited for the project. Interviews were administered personally and in private.

Mental Health Problems

At age 25 years, sample members were interviewed on a structured mental health interview designed to assess aspects of psychosocial adjustment since the previous assessment at age 21. As part of this interview components from the Composite International Diagnostic Interview (CIDI) (World Health Organization 1993) were used to assess DSM-IV diagnostic criteria for the following disorders: major depression; anxiety disorders including generalised anxiety disorder, panic

disorder, agoraphobia, social phobia and specific phobia; alcohol dependence; cannabis and other illicit drug dependence. Questioning was conducted about psychiatric symptoms occurring in the previous 12 months (24-25 years) and in the interval from 21-24 years. These data were combined to construct DSM-IV diagnoses for the following classes of disorder over the interval from 21-25 years: major depression; any anxiety disorder; alcohol dependence; illicit drug dependence. At age 25 participants were also asked whether they had experienced suicidal thoughts or made a suicide attempt over the interval from 21-25 years.

Social, Family and Childhood Factors

To examine the extent to which any associations between sexual orientation and adult mental health could be explained by the possible confounding effects of other childhood or family factors that were correlated with sexual orientation and also related to later mental health, a large range of social, family and individual characteristics were considered for inclusion in the analysis. Following preliminary analysis, these factors were refined down to the following measures, all of which were associated with sexual orientation.

Changes of parents (0-15 years). Comprehensive information on changes of parents was collected at annual intervals throughout childhood. This information was used to construct a measure of family instability during childhood based on a count of the number of changes of parents experienced by the child from birth to age 15 years. All changes of parents resulting from divorce/separation, reconciliation, remarriage, parental death, and any other change of custodial parents (e.g. fostering) were included.

Childhood physical abuse (0-16 years). At ages 18 and 21 sample members were questioned about the frequency of parental use of physical punishment during childhood (<16years). Ratings were made on a 5-point scale that ranged from ‘parent never used physical punishment’ to ‘parent treated me in a harsh and abusive manner’ (Fergusson and Lynskey 1997). Separate questioning was conducted for mothers and fathers. Sample members were classified as having experienced childhood physical abuse if they reported, at either age 18 or 21, that at least one of their parents

had used physical punishment too often or too severely or had treated them in a harsh and abusive manner: 6.6% of the sample met this criterion.

Childhood sexual abuse (0-16 years). At ages 18 and 21 years, sample members were also questioned about their exposure to sexual abuse during childhood (<16 years) (Fergusson *et al.* 1996). Participants were first questioned on a series of 15 screening items that assessed exposure to a range of abusive experiences from episodes of non-contact abuse (e.g. indecent exposure), through incidents involving contact with the perpetrator (e.g. inappropriate touching, fondling), to incidents involving attempted or completed oral, anal or vaginal intercourse. Individuals who reported a sexually abusive experience were then further questioned about the extent and nature of the abuse, the characteristics of the perpetrator(s) and related matters. Sample members were classified as having experienced sexual abuse if they reported, at either age 18 or 21, any episode of contact sexual abuse. Contact sexual abuse was reported by 11.9% of the sample.

Parental attachment (15 years). The quality of parental attachments during adolescence was assessed at age 15 years using the parental attachment scale devised by Armsden & Greenberg (1987). The reliability of this measure, assessed using coefficient alpha, was .87.

Parental criminality (15 years). When sample members were aged 15 years, parents were questioned about their history of involvement in criminal offending. If any parent reported involvement in offending the sample member was classified as having a parental history of criminality: 13.1% of the sample met this criterion.

Parental illicit drug use (11 years). When sample members were aged 11 years, parents were questioned about their use of cannabis and other illicit drugs. Sample members were classified as having a parental history of illicit drug use if any parent reported the use of an illicit drug: 24.2% of the sample met this criterion.

Novelty seeking (16 years). The extent of novelty seeking behaviour was assessed at age 16 years using the novelty seeking scale of the Tridimensional Personality Questionnaire (Cloninger 1987). The reliability of this scale, assessed using coefficient alpha, was .76.

Statistical Analysis

Latent class models were fitted to the joint distribution of the six measures of sexual orientation gathered at ages 21 and 25. Two-class to 6-class models were fitted to the data using PANMARK 3 (van de Pol *et al.* 1999). All models included gender as a grouping factor to permit examination of possible gender differences in model parameters. The assessment of model fit was based upon the log likelihood ratio chi square goodness of fit statistic and the Bayesian Information Criterion (BIC) values for the fitted models (Raftery 1995). The model with the lowest value of BIC was selected as the best fitting model. The results of this model were then used to classify participants into groups representing the extent of heterosexual or same sex orientation. Classification was based on the posterior probabilities of group membership estimated from the fitted model conditional on the observed response pattern to the measures of sexual orientation. A potential limitation of this approach is that the assignment of subjects to groups may contain error. However, in this instance the classification accuracy was high (98.7%).

The associations between the latent class measure of sexual orientation and measures of mental health problems were assessed separately for males and females. The strength of association was assessed using the Mantel-Haenszel chi square test of linear trend for dichotomous outcomes and poisson regression for the count of number of mental health problems. Finally, the associations between sexual orientation and mental health outcomes were adjusted for covariates by fitting logistic and poisson regression models in which each outcome was modeled as a function of sexual orientation, gender and the covariates.

RESULTS

Distribution of Observed Responses

Table 1 shows the distribution of the observed response variables; a) self-defined sexual orientation at 21 and 25 years; b) reported sexual attraction at age 25; and c) same sex contact at 21 and 25 years. The distributions are given separately for males, females and the total sample.

1. *Measures of same sex experience:* By age 25, just over 8% of respondents reported having some form of sexual experience with a partner of the same sex and 2.9% reported a sexual relationship with a partner of the same sex. Reported same sex activity was significantly higher for females than for males: 12.4% of females reported some form of same sex experience by age 25 compared to 3.6% of males ($\chi^2(1) = 25.1$; $p<.0001$); and 4.4% of females reported a same sex relationship compared to 1.3% of males ($\chi^2(1) = 8.5$; $p<.005$).

2. *Measures of self reported sexual orientation:* By age 25, just under 90% of the cohort described themselves as being exclusively heterosexual, 8% described themselves as mostly heterosexual and 2% described themselves in varying degrees as bisexual, gay or lesbian. By this age, there were also clear gender differences emerging in sexual orientation, with the reported rates of bisexual or homosexual orientation amongst females being more than twice those of males ($\chi^2(4) = 18.3$; $p<.01$).

3. *Sexual attraction:* At age 25, approximately 10% of the cohort reported some degree of attraction to members of the same sex. Rates of same sex attraction were significantly higher amongst females ($\chi^2(4) = 24.7$; $p<.001$).

TABLE 1 ABOUT HERE

The Latent Class Model

A latent class model was fitted to the joint distribution of these measures in Table 1 using PANMARK 3 (van de Pol *et al.* 1999) (see Methods). A range of models was fitted with the number of latent classes varying between 2 to 6. Examination of goodness of fit measures including the log likelihood ratio chi square and Bayesian Information Criterion (BIC) for the fitted models suggested that a 3-class model provided the most parsimonious and well fitting representation of the data. The fitted model parameters are shown in Table 2. This gives estimates of: a) the proportion of the sample in each latent class; and b) the probability distribution of each of the observed measures of sexual orientation conditional on latent class membership. The model produces a clearly interpretable set of results:

1. Those in latent class 1 were those reporting a consistent, exclusively heterosexual sexual profile at age 21 and 25. This group comprised 87.6% of the cohort.

2. Those in latent class 2 comprised 9.6% of the population and were young adults who reported that their sexual orientation was predominantly heterosexual but admitted to some same sex experience or attraction. This group appears to include those who reported limited same sex attraction and who may have engaged in some degree of experimental bisexual activity.

3. Those in latent class 3 comprised 2.8% of the cohort and were a group who by age 25 described themselves as predominantly homosexual.

TABLE 2 ABOUT HERE

Gender Differences in Sexual Orientation

Log likelihood ratio chi square tests were conducted to test the equivalence of the latent class distribution and response probabilities across males and females. Comparison of the response probabilities suggested that these parameters were not significantly different between males and females ($LR\chi^2(27) = 31.8$; $p>.20$). However, there were highly significant gender differences in the latent class distribution ($LR\chi^2(2) = 28.4$; $p<.0001$): 14.2% of women were classified as predominantly heterosexual and 3.9% as predominantly homosexual compared to 4.8% and 1.5% respectively for males.

Sexual Orientation and Mental Health

Respondents were assigned to one of three classes (exclusively heterosexual; predominantly heterosexual; predominantly homosexual) on the basis of the posterior probabilities of latent class membership conditional on the individual's pattern of observed responses. The estimated rate of correct classification 98.7%. Table 3 shows the associations between this classification and a series of measures of mental health problems over the interval from age 21-25 years. Separate results are shown for males and females. Each comparison is tested for statistical significance using the Mantel-Haenszel chi square test of linearity for the dichotomous outcomes and poisson regression for the count of problems. The Table shows that with the exception of alcohol dependence, there

were clear and significant ($p<.01$) trends, amongst both sexes, for rates of disorder to increase with increasing non-exclusive heterosexual orientation. Furthermore, these associations appeared to be stronger for males than for females. This can be seen most clearly from examination of the overall number of problems. Males classified as predominantly homosexual had an overall rate of problems that was over 5 times the rate for exclusively heterosexual males (3.00 vs 0.56 problems respectively): in comparison the rate of problems amongst predominantly homosexual females was only 2.3 times that of exclusively heterosexual females (1.40 vs 0.62 problems respectively).

TABLE 3 ABOUT HERE

The associations between the measure of sexual orientation and the mental health outcomes were then modelled using logistic regression for dichotomous outcomes and poisson regression for the rate of disorders. The fitted models included a series of covariate factors that were known to be significantly related to sexual orientation (child abuse, changes of parents, parental attachment, novelty seeking, parental criminality and illicit drug use) and also permitted gender x sexual orientation interactions. Table 4 shows the covariate adjusted associations between sexual orientation and mental health outcomes for males and females. The Table leads to the following conclusions:

1. *Main effects:* The analysis showed that there were clear and significant trends for rates of disorder to increase with increasing non-heterosexual orientation, with those in the predominantly homosexual group having rates of disorder that ranged between 1.5 to 12 times those of the exclusively heterosexual group after adjustment for covariates.

2. *Interactions:* In four of the six comparisons (major depression; anxiety disorder; suicidal ideation; number of disorders) there were significant ($p<.05$) gender x sexual orientation interactions. These interactions were all indicative of the fact that sexual orientation was more strongly related to mental health in males than in females.

3. *Covariates:* In all cases the associations between sexual orientation and mental health persisted after statistical control for covariate factors.

TABLE 4 ABOUT HERE

DISCUSSION

This research has used data gathered on a birth cohort of young adults to examine variations in sexual orientation and the linkages between sexual orientation and mental health. The major findings and their implications are summarized below.

The Assessment of Sexual Orientation

The first stage of the research attempted to reconcile the use of various criteria for assessing sexual orientation by developing a latent class model that combined data on self reported sexual behaviours, self-classification and sexual attraction. The latent class model showed that measures could be summarized by a 3-group model with groups of: exclusively heterosexual young adults; those who were predominantly heterosexual but who had some degree of same sex attraction or experience; and those who were predominantly homosexual in their orientation. This model suggested the presence of a spectrum model of sexual orientation in which involvement in same sex sexual behaviours ranged from none to many. The model suggested that in the region of 12% of young adults had a non exclusively heterosexual sexual orientation, with 3% of these being predominantly homosexual.

These estimates clarify some of the debates about the prevalence of same sex sexual behaviour since it is clear that the prevalence of such behaviours will depend on the stringency of the criteria applied. What the present results suggest is that in the region of 1 in 8 young adults have some same sex inclination or experience but that the fraction of the population that is predominantly homosexual is in the region of 3%. These findings are broadly consistent with previous research into the prevalence of gay, lesbian or bisexual behaviours. In particular, estimates based on reports of same sex attraction have suggested that between 8% (Smith *et al.* 2003) and 15% (Bagley and Tremblay 1998) of the population has same sex tendencies. The value of 12% obtained in this study falls within this range. Similarly, other studies of same sex relationships and behaviours suggest that

in the region of 1% (Jorm *et al.* 2002) to 10.7% (Sell *et al.* 1995) of the population report having relationships with a partner of the same sex, or self-identify as being gay or lesbian. Our estimate of 3% of the sample having a predominantly same sex orientation falls within this range.

In agreement with findings from recent Australasian studies (e.g. Dickson *et al.* 2003; Jorm *et al.* 2002; Skegg *et al.* 2003; Smith *et al.* 2003), there were clear gender differences in sexual orientation with nearly 20% of women having some same sex inclination or experience compared to 6% of males. These gender differences have not been reported for US or European comparisons (Sell *et al.* 1995) and suggest that there may be cross cultural differences in the reported rates of some sexual attraction and behaviour. These could arise in two ways. First, cultural factors may encourage or discourage the reporting of same sexed behaviours by males and females. Second, cultural factors may influence the expression of same sexed attraction and behaviour. For these reasons it is unclear whether the gender differences found in this study reflect gender differences in the reporting of same sexed attractions and behaviour or whether they reflect actual gender differences in same sexed behaviours and attraction.

The fitted model also suggested that individual recognition of same sex attraction tends to unfold during young adulthood. For example, of the group who were predominantly homosexual, 59% described themselves as heterosexual at age 21, but at age 25, only 25% described themselves as mostly heterosexual and none as exclusively heterosexual.

Sexual Orientation and Mental Health

There have been ongoing debates about the extent to which same sex or bisexual sexual orientation is associated with increased risks of mental health problems (e.g. D'Augelli 1996; Gonsiorek 1988; McDaniel *et al.* 2001; Russell 2003; Savin-Williams 2001). These problems span: major depression, suicidal ideation, suicide attempt, anxiety disorders, and substance abuse. The present study confirms the findings of a previous study of this cohort suggesting that those who are not exclusively heterosexual are an at-risk population for mental health problems (Fergusson *et al.* 1999). The present study extends these findings in at least two ways. First, the results suggest that

the extent of risk of mental health problems varies with the extent of same sex participation and identity, with those individuals who were predominantly homosexual having higher rates of disorder than those in the predominantly heterosexual group. Also, there has been interest in whether there are gender differences in the association between mental health and sexual orientation (Garofalo *et al.* 1998; Remafedi *et al.* 1998; Skegg *et al.* 2003). The present study clearly supports this view and there was consistent evidence to suggest that homosexual orientation was more strongly associated with mental health problems for males than for females. These findings are consistent with the view that the greater stigma attached to male homosexual behaviour may make male homosexuals more vulnerable to psychiatric disorder and distress.

Strengths and Limitations

The present study has a number of strengths that centre around the use of data from a moderately large and well studied birth cohort (the use of a representative sample, the repeated assessment of sexual orientation, and prospective assessment of covariate factors). Despite these strengths, the study is not without limitations. The strongest of these is the absence of external evidence to cross-validate self-reported sexual behaviours, orientation and preferences. While the latent class model produces a coherent classification that is systematically related to mental health outcomes, the extent to which the study findings may be distorted by systematic misreporting of sexual orientation, experience and attraction remains unclear.

Applied Implications

The present findings add to a growing body of evidence linking same sex preferences and activity to increased mental health risks with this linkage being particularly marked for males. There are several possible pathways by which associations between sexual orientation and mental health may arise. First, it may be suggested that this association reflects the effects of social prejudices, homophobic attitudes, victimization and harassment in increasing the vulnerability of bisexual, gay and lesbian young people to mental health problems (e.g. D'Augelli 1996; McDaniel *et al.* 2001). Alternative explanations include: 1) the possibility that the association is artefactual, as

a result of measurement errors or other research design problems; 2) the possibility of reverse causality in which young people prone to psychiatric disorders are more prone to experience same sex attraction; or 3) the possibility that lifestyle choices made by young people of non-heterosexual orientation place them at greater risks of adverse life events, stresses and similar factors that may increase risks of mental health problems. Irrespective of these uncertainties there is now more than sufficient evidence to conclude that young people who report that they are not exclusively heterosexual are an at risk population for mental health problems. The present study suggests that these difficulties may be most marked for males who are exclusively or predominantly homosexual.

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Declaration of Interest

The authors declare that they have no conflict of interest.

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TABLE 1. Distribution of Observed Responses to Questions Relating to Sexual Orientation at Age 21, 25 Years.

Measure	Males % (N)	Females % (N)	Total % (N)
Sexual Orientation (21 years)			
Heterosexual	98.1 (460)	98.2 (489)	98.1 (949)
Bisexual	1.7 (8)	1.4 (7)	1.6 (15)
Homosexual	0.2 (1)	0.4 (2)	0.3 (3)
Sexual Orientation (25 years)			
100% heterosexual	93.6 (439)	85.7 (427)	89.6 (866)
Mostly heterosexual	5.1 (24)	11.5 (57)	8.4 (81)
Bisexual	0.2 (1)	1.4 (7)	0.8 (8)
Mostly homosexual	0.9 (4)	0.8 (4)	0.8 (8)
100% homosexual	0.2 (1)	0.6 (3)	0.4 (4)
Sexual Attraction (25 years)			
Only attracted to the opposite sex	94.2 (442)	84.5 (421)	89.3 (863)
Strongly attracted to the opposite sex	4.3 (20)	12.1 (60)	8.3 (80)
Equally attracted to men and women	0.2 (1)	1.2 (6)	0.7 (7)
Strongly attracted to the same sex	0.6 (3)	1.0 (5)	0.8 (8)
Only attracted to the same sex	0.6 (3)	1.2 (6)	0.9 (9)
Any kind of sexual experience with partner of same sex (ever by 25 years)			
Yes	3.6 (17)	12.4 (62)	8.2 (79)
No	96.4 (452)	87.6 (436)	91.8 (888)
Ever had a sexual relationship with partner of same sex (21 years)			
Yes	1.9 (9)	3.0 (15)	2.5 (24)
No	98.1 (460)	97.0 (483)	97.5 (943)
Ever had a sexual relationship with partner of same sex (25 years)			
Yes	1.3 (6)	4.4 (22)	2.9 (28)
No	98.7 (463)	95.6 (476)	97.1 (939)

TABLE 2. Fitted Latent Class Model Parameters (Standard Errors) for 3-Class Model.

Measure	Latent Class		
	Exclusively Heterosexual (1)	Predominantly Heterosexual (2)	Predominantly Homosexual (3)
Latent Class Probabilities			
Probability of class membership	.876 (.013)	.096 (.012)	.028 (.006)
Response Probabilities			
Sexual Orientation (21 years)			
Heterosexual	.999 (.001)	.938 (.027)	.589 (.097)
Bisexual	.001 (.001)	.062 (.027)	.299 (.090)
Homosexual	.000 (-) [a]	.000 (-) [a]	.112 (.061)
Sexual Orientation (25 years) [b]			
100% heterosexual	.995 (.004)	.246 (.067)	.000 (-) [a]
Mostly heterosexual	.005 (.004)	.754 (.067)	.255 (.095)
Bisexual/homosexual	.000 (-) [a]	.000 (-) [a]	.745 (.095)
Sexual Attraction (25 years) [b]			
Only attracted to opposite sex	.995 (.005)	.214 (.060)	.000 (-) [a]
Strongly attracted to opposite sex	.003 (.004)	.748 (.062)	.294 (.097)
Equally attracted to men and women/more attracted to same sex	.002 (.002)	.038 (.022)	.706 (.097)
Any kind of sexual experience with partner of same sex (ever by 25 years)			
Yes	.011 (.005)	.458 (.060)	1.000 (-) [a]
No	.989 (.005)	.542 (.060)	.000 (-) [a]
Ever had a sexual relationship with partner of the same sex (21 years)			
Yes	.001 (.001)	.146 (.040)	.367 (.096)
No	.999 (.001)	.854 (.040)	.633 (.096)
Ever had a sexual relationship with partner of same sex (25 years)			
Yes	.000 (-) [a]	.037 (.025)	.914 (.058)
No	1.000 (-) [a]	.963 (.025)	.086 (.058)

[a] Parameter converged to zero or one during estimation, standard errors are not estimable.

[b] For the purpose of the latent class analysis the measures of sexual orientation and sexual attraction at age 25 were reduced to 3 levels as shown above in order to minimise difficulties due to data sparseness in the response patterns.

TABLE 3. Rates (%) of Mental Health Problems (21-25 years) by Latent Class Sexual Orientation and Gender.

Measure	Exclusively Heterosexual	Predominantly Heterosexual	Predominantly Homosexual	p [a]
Major depression				
Males	14.5	42.9	71.4	<.0001
Females	24.3	37.3	50.0	<.01
Anxiety disorder				
Males	10.2	28.6	85.7	<.0001
Females	21.2	34.3	40.0	<.005
Alcohol dependence				
Males	7.3	14.3	0.0	>.80
Females	3.2	6.0	0.0	>.80
Illicit drug dependence				
Males	11.1	28.6	42.9	<.001
Females	2.4	10.5	10.0	<.005
Suicidal ideation				
Males	10.9	28.6	71.4	<.0001
Females	9.7	20.9	30.0	<.001
Suicide attempt				
Males	1.6	0.0	28.6	<.001
Females	1.5	4.5	10.0	<.005
Mean number of problems				
Males	0.56	1.43	3.00	<.0001
Females	0.62	1.13	1.40	<.0001
Sample size				
Males	441	21	7	
Females	411	67	20	

[a] Mantel-Haenszel chi square test of linear trend for dichotomous outcomes, poisson regression for number of problems.

TABLE 4. Rates (%) of Mental Health Problems (21-25 years) by Latent Class Sexual Orientation and Gender After Adjustment for Covariates.

Measure	Exclusively Heterosexual	Predominantly Heterosexual	Predominantly Homosexual	Main Effect p [a]	Interaction p [b]	Significant Covariates [c]
Major depression						
Males	14.2	42.3	75.5	<.0001	<.01	1-4
Females	24.9	32.7	41.6			
Anxiety disorder						
Males	9.5	32.7	69.2	<.0001	<.005	1, 2, 6
Females	21.6	26.9	33.0			
Illicit drug dependence						
Males	11.4	23.9	42.3	<.01	>.50	1, 5, 6
Females	2.9	5.4	9.6			
Suicide ideation						
Males	10.1	34.1	70.3	<.0001	<.05	3, 4
Females	9.9	17.0	27.4			

Measure	Exclusively Heterosexual	Predominantly Heterosexual	Predominantly Homosexual	Main Effect p [a]	Interaction p [b]	Significant Covariates [c]
Suicide attempt						
Males	1.4	5.4	17.6	<.05	>.15	3
Females	1.4	2.1	3.1			
Mean number of problems						
Males	0.55	1.21	2.66	<.0001	<.001	2-5, 7
Females	0.64	0.85	1.14			

[a] Test of significance of main effect of sexual orientation.

[b] Test of significance of gender x sexual orientation interaction.

[c] Significant covariates: 1 = gender; 2 = sexual abuse (0-16 years); 3 = physical abuse (0-16 years); 4 = parental illicit drug use (11 years); 5 = novelty seeking (16 years); 6 = parental criminality (15 years); 7 = parental attachment (15 years).