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Sexual orientation measurement, bisexuality, and mental health in a sample of men who have sex with men in Vancouver, Canada

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Abstract

This cross-sectional study used a validated index (i.e., Hospital Anxiety and Depression Scale) to measure anxiety and depression (caseness score: 8) among men who have sex with men recruited via respondent-driven sampling in Vancouver, Canada (n=774), and investigated whether differences in mental health outcomes varied by sexual orientation measure (i.e., identity, attraction, behavior). Of the sample, 15.5% identified as bisexual, 33.4% reported any bisexual attraction, and 22.7% reported any bisexual sexual activity. More bisexual than gay men met the case definition for anxiety and depression, across all sexual orientation measures. In adjusted multivariable models, bisexual men had higher odds of anxiety by attraction and identity and higher odds of depression by identity. Findings highlight the value of measuring multiple sexual orientation dimensions in surveys and routine surveillance, and the need to ensure sexual minority groups and sexual orientation dimensions are not considered commensurate for mental health prevention and treatment.

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Keywords

Bisexuality; Measurement; Men Who Have Sex with Men; Anxiety; Depression

Introduction

In Canada, 10%-20% of the general population experience mental health disorders (Pearson, Janz, & Ali, 2013; Smetanin et al., 2011). Consequently, mental health morbidity is an important population and public health concern. Poor mental health is associated with a range of social problems (e.g. poverty, homelessness, etc.) (CIHI, 2007; Mawani & Gilmour, 2010), physical and mental health comorbidities (e.g. disability, problematic substance use, chronic illness, etc.) (Lim, Jacobs, Ohinmaa, Schopflocher, & Dewa, 2008; Patten et al., 2005; Rush et al., 2008), premature death (Chesney, Goodwin, & Fazel, 2014), and economic burden (Public Health Agency of Canada, 2015; Smetanin et al., 2011). Depression is the most common mental health disorder, affecting 5.4% of Canadians in 2012 while 2.6% met the criteria for generalized anxiety disorder, according to the Canadian Community Health Survey- Mental Health 2012 (Pearson et al., 2013).

In the past decade, there has been a growing literature on mental health outcomes among bisexual people. There is evidence that sexual minorities generally experience poorer lifetime and past year mental health outcomes compared with heterosexuals (Bostwick, Boyd, Hughes, & McCabe, 2010; Hottes, Ferlatte, & Gesink, 2014; King et al., 2008; Pakula & Shoveller, 2013; Pakula et al., 2016). Within sexual minority populations, there is growing evidence bisexual people experience heightened risk for mental health morbidity compared to other non-heterosexual groups (King et al., 2008; Pakula et al., 2016). Among men, there is evidence that bisexual men experience poorer mental health outcomes compared with heterosexual men including mood and anxiety disorders (Bostwick et al., 2010; Marshal et al., 2011), other mental health disorders, self-harm, and suicide (King et al., 2008; Marshal et al., 2011; Meyer, 2003), and compared with gay men including psychiatric morbidity (Cochran & Mays, 2009), overall mental health problems and problematic substance use (Friedman, Dodge, Schick, & Herbenick, 2014; Roth et al., 2018).

Investigation of the anxiety and depression burden among bisexual men is impeded by a number of methodological challenges. No pre-existing sampling frame exists from which to draw representative samples for this population (Heckathorn, 1997) as sexual orientation has historically not been collected in routine health surveillance and census data in Canada and elsewhere. Difficulties when attempting to include sexual minorities in routine data collection (Blair, 1999), small sample sizes, and the impact of stigma and discrimination on participation and disclosure also contribute to this challenge (Ferlatte, Hottes, Trussler, & Marchand, 2017; Hottes, Ferlatte, & Gilbert, 2015; Meyer & Wilson, 2009). There is a dearth of research into mental health outcomes for bisexual populations that have both disaggregated bisexual from gay/lesbian groups and looked at men and women separately. A recent systematic review and meta-analysis of anxiety and depression prevalence among bisexual people found only eight studies that had disaggregated bisexual men from women. In gender-specific meta-analysis, the same review found elevated disparity for bisexual

compared with both gay and heterosexual men, for both anxiety and depression (Ross et al., 2017). In addition to these difficulties is the challenge of inconsistent sexual orientation measurement, which can alter study samples and makes comparisons between studies challenging.

Sexual orientation is conceptualized as a three part construct consisting of identity, behavior and attraction (IOM (Institute of Medicine), 2011; Laumann, Gagnon, Michael, & Michaels, 1994). Most epidemiological surveillance and health research employs measurement of only one construct, often a behavioral measure in men who have sex with men (MSM) and HIV research. In the above referenced systematic review, the study team found that the majority of studies investigating anxiety and depression among bisexual populations used an identity measure (78.8%), 13.5% an attraction measure, and 7.7% a behavior measure (Ross et al., 2017). While there is a growing body of literature examining the impact of sexual orientation measurement on health outcomes (Bauer & Brennan, 2013; Bauer & Jiram, 2008; Bostwick et al., 2010; McCabe, Hughes, Bostwick, West, & Boyd, 2009; McCabe, Hughes, Bostwick, & Boyd, 2015; Midanik, Drabble, & Trocki, 2007; Plöderl, Kralovec, & Fartacek, 2010; Scheer et al., 2008), the literature specifically investigating the impact of sexual orientation dimension measurement on anxiety and depression among bisexual men is limited, particularly that using Canadian data. Canadian data is important as the environment of greater socio-legal support for sexual minorities in Canada (38th Parliament of Canada, 2005; Pew Research Center, 2013) compared to the United States may impact cross-national differences in health outcomes such as mental health. Further, there is a need to better understand how sexual orientation measurement may impact assessment of mental health burden among this vulnerable population.

The present study aimed to extend current knowledge on mental health for bisexual men by addressing the above named challenges in the existing literature, specifically: 1) inconsistent sexual orientation measurement, 2) mixed gender samples, and 3) US-focused studies. Using cross-sectional data from a respondent-driven sampling recruited Canadian study of men who have sex with men that included measures of all three major sexual orientation dimensions, this study examined anxiety and depression among the sample and investigated whether differences in mental health outcomes varied by sexual orientation measure.

Methods

Data source

Cross-sectional data for this study were provided by the Momentum Health Study, a bio-behavioral HIV study of cisgender and transgender men who have sex with men in Vancouver, Canada. Participants were recruited via respondent-driven sampling (RDS), a form of snowball sampling designed to produce more representative samples with hard-to-reach populations. Initially, key community members are selected as the first study participants or 'seeds' and subsequently recruit additional waves of study participants from within their social and sexual networks (Heckathorn, 1997). Participants were enrolled between February 2012 and February 2015 and provided study data via computer-assisted self-interview (CASI). Eligibility criteria included being aged 16 years or older, identifying as a man, reporting sex with other men (regardless of sex with women) in the 6 months prior

to the study visit, residing in Metro Vancouver, and being able to complete a questionnaire in English. The survey instrument major domains included demographics, HIV testing, sexual behavior, attitudes and beliefs, substance use, and mental health. Study methods have been described further elsewhere (Moore et al., 2016).

Measures

Sexual orientation—Sexual orientation dimensions were measured using self-reported current identity and past two-year recall attraction and behavior measures. Current sexual identity was asked as “How would you describe your sexual orientation?” with response options “Gay,” “Bisexual,” “Straight,” “Questioning,” “Queer,” “Lesbian,” or “Other.” No respondents identified as straight while one reported lesbian sexual identity. Those that reported identifying as other than “gay” or “bisexual” ($n=46$) were excluded from the sexual identity variable in this analysis, to create a dichotomous gay/bisexual identity variable. Subsequently, the sexual identity based models relied on this dichotomous variable of those who identified as either gay or bisexual while the behavior and attraction based models included those who identified as other than gay or bisexual. Sexual attraction was ascertained via a past two-year fantasy measure, asked in the survey as “In the past two years, who have you had sexual fantasies about?” Response options included “Fantasize only about sex with males,” “Fantasize mostly about sex with males,” “Fantasize more about sex with males than with females,” “Fantasize about equally sex with males and females,” “Fantasize more about sex with females than with males,” “Fantasize mostly about sex with females,” and “Fantasize only about sex with females.” Of note, no respondents reported exclusively fantasizing about sex with women. Those who reported fantasizing “only about sex with males” were categorized as gay attracted and all others were categorized as bisexually attracted. Past two-year sexual behavior was measured via the survey question “In the past two years, who have you had sexual activities with?” Response options consisted of “Had sex only with male partners,” “Had sex mostly with male partners,” “Had sex more with male partners than with female partners,” “Had sex about equally with both male and female partners,” “Had sex more with female partners than with male partners,” “Had sex mostly with female partners,” and “Had sex only with female partners.” As with the attraction item, no respondents reported sexual behavior exclusively with women in the past two years. Those reporting “sex only with male partners” were categorized as behaviorally gay and all others as behaviorally bisexual.

Mental health outcomes—Anxiety and depression were measured via the widely-used validated Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). The HADS consists of two subscales assessing anxiety (study $\alpha=0.84$) and depression (study $\alpha=0.79$) via self-reported symptomatology in the past week. Anxiety is measured via items assessing symptoms such as tension (e.g., “I feel tense or ‘wound up’”) and worry (e.g., “Worrying thoughts go through my mind”). Items assessing enjoyment (e.g., “I still enjoy the things I used to”) and cheerfulness (e.g., “I feel cheerful”) are included (reverse-coded) in the depression sub-scale. Endorsement of each statement is measured via four-point scales from most to least or least to most agreement, depending on the item wording. Each subscale is comprised of 7 items and possible scores range from 0 to 21. The current study used a validated anxiety and depression ‘caseness’ definition of a score of 8 or greater for each

subscale, a cut-off optimized for sensitivity and specificity balance based on a literature review of 71 studies using the HADS (Bjelland, Dahl, Haug, & Neckelmann, 2002).

Demographics and other covariates—Demographic and other covariates included in the current study were age (continuous), annual income (<\$30,000/\$30,000-\$59,999/\$60,000 CAD), ethnicity (White/Asian/Indigenous/Latino or Other), educational attainment (High school education/>High school education), regular partner status (No/Yes or Married), and self-reported current HIV serostatus (Negative/Unknown or Positive). Number of sexual partners (men and women) in the past 6 months was included as a continuous variable in a sensitivity analyses described below.

Data analysis

All analyses were conducted in SAS statistical software version 9.4. (SAS software version 9.4, 2014). Figures were developed with use of eulerAPE software (Micallef & Rodgers, 2014). RDS-II weights (Heckathorn, 2002) were generated in RDSAT software version 7.1 (Respondent-Driven Sampling Analysis Tool (RDSAT) Version 7.1, 2012) and applied to all analyses to account for recruiter-recruit homophily and participant network size, to produce more representative population estimates. Both crude and RDS-adjusted estimates are included in the descriptive statistics, while RDS-adjusted data were used in all bivariable and multivariable analyses.

Descriptive statistics characterized the baseline study sample demographic and other covariates, and estimated the prevalence of anxiety, depression, and sexual orientation dimension. Chi-squared tests and non-parametric Spearman rank correlations assessed bivariable associations between sexual orientation dimensions. Multivariable logistic regression (Allison, 2012) modeled the independent relationship between sexual orientation dimensions and anxiety and depression, in respective models, adjusted for important confounders. Variables hypothesized to potentially confound the relationship between sexual orientation and anxiety and depression were initially assessed via a backward stepwise selection process using a more than 5% ‘change-in-estimate’ strategy (Maldonado & Greenland, 1993). Though not all met the statistical criteria for confounding in each model, all potential confounders were retained for all models based on an *a priori* conceptual model. Adjusted odds ratios (aOR) and 95% confidence intervals ($p < 0.05$) were calculated. Based on best practices in the literature regarding potential bias toward poorer health outcomes for bisexual groups with use of a behavior measure (Bauer & Brennan, 2013), a sensitivity analysis was conducted by re-analyzing the behavioural multivariable models for anxiety and depression with inclusion of number of sexual partners in the past six months for additional adjustment. This study received ethical approval from the research ethics boards of the University of British Columbia, the University of Victoria, and Simon Fraser University.

Results

Table 1 summarizes characteristics of the overall study sample ($n=774$). The median HADS anxiety score was 8 (Quartile 1, Quartile 3: 5, 11), meeting the criteria for anxiety caseness. Median HADS depression score was 3 (Quartile 1, Quartile 3: 2, 6), not meeting the criteria

for depression caseness. Sample median age was 34 (Quartile 1, Quartile 3: 26, 47), and participants reported a median of 6 sexual partners in the past 6 months (Quartile 1, Quartile 3: 3, 14). After RDS adjustment, 84.5% of the sample identified as gay and 15.5% identified as bisexual. In terms of attraction, 66.6% reported attraction to men exclusively and 33.4% to men and women. Three-quarters of participants (77.3%) reported sexual activity with men only and 22.7% reported any sexual activity with men and women, in the past two years. The majority of the sample reported an annual income of less than \$30,000 (72.9%), identified as White (68.5%) and had attained greater than high school education (67.4%). Approximately one-third of respondents (37.6%) had a regular partner or were married at the time of study visit and 27.4% were HIV-positive by self-report.

Table 2a presents anxiety scores by sexual orientation measure. Overall, over half the sample (56.0%) met the criterion for anxiety (HADS-A score ≥ 8). By sexual orientation measure, 69.6% of bisexually identified men, 63.3% of bisexually attracted men, and 62.9% of bisexually behaving men met the anxiety cut-off. Table 2b displays depression scores by sexual orientation measure. 17.4% of the overall sample, 32.4% of bisexually identified men, 21.5% of bisexually attracted men, and 20.6% of bisexually behaving men met the criterion for depression (HADS-D score ≥ 8).

Spearman rank correlations between sexual orientation measures for bisexual men are included in Table 3, all correlations were statistically significant at the $p < 0.0001$ level. The correlation was largest for behavior and identity (0.58) and smallest for attraction and identity (0.46). Chi-squared tests also explored associations between sexual orientation measures, all with significant results at the $p < 0.0001$ level (results not shown). Figure 1 illustrates the overlap between the sexual orientation measures for bisexuality, for those who endorsed at least one bisexuality measure. Sexual orientation dimension overlap is presented for bisexuality overall and by those who met the case definitions for anxiety and depression. Of the 218 men who endorsed at least one measure of bisexuality, 54 of 218 men endorsed all three, 46 endorsed only two measures, and 118 endorsed only one measure (3 identity, 8 behavior, 107 attraction only).

Table 4a displays the multivariable model of the relationship between sexual orientation and anxiety, adjusted for confounders (i.e. age, income, ethnicity, educational attainment, regular partner status, and HIV status). In multivariable analyses, bisexual men had greater odds of anxiety compared with gay men in the identity (aOR: 1.87, 95% CI: 1.14, 3.07) and attraction (aOR: 1.47, 95% CI: 1.06, 2.04) models. Results were statistically non-significant for anxiety in the behavior model. The odds of anxiety for bisexual men in the behavioral model remained non-significant and essentially unchanged in the sensitivity analysis with the addition of number of sexual partners (behavioral model aOR: 1.34, 95% CI: 0.89, 2.01; sensitivity model aOR: 1.33, 95% CI: 0.89, 2.00).

Multivariable logistic regression modeled the relationship between sexual orientation and depression (Table 4b). Bisexual men had greater odds of depression than gay men in the identity model (aOR: 2.14, 95% CI: 1.27, 3.61). Results were not statistically significant for the attraction and behavior models for depression. The odds of depression for bisexual men was slightly attenuated with the addition of number of sex partners to the behavior model in

a sensitivity analysis (behavior model aOR: 1.11, 95% CI: 0.67, 1.83, sensitivity model aOR: 1.08, 95% CI: 0.65, 1.78), and remained statistically non-significant.

Discussion

This study adds to the evidence of elevated anxiety and depression for bisexual men compared with gay men, overall and varying by sexual orientation dimensions. Descriptively more bisexual than gay men met the case definition for both anxiety and depression across all sexual orientation measures, highest for the identity measure and lowest by the behavior measure. In multivariable analysis, bisexual compared with gay men had greater odds of anxiety by identity and attraction and greater odds of depression by identity. While not all multivariable models were statistically significant, the odds of both anxiety and depression across all multivariable models were highest by the identity measure and lowest when bisexuality was measured by behavior.

This study also provides evidence of correlation across all three major sexual orientation dimensions for bisexual men. While there is limited sexual orientation concordance literature that has statistically compared sexual orientation dimensions, results of concordance in the current study are consistent with significant concordance found in an Austrian mixed sexual orientation study of men and women (Plöderl et al., 2010). In the Austrian study, concordance effects for men were greatest for the identity and attraction relationship and smallest for the past 12-month behavior and attraction relationship. This differs from the current study in which concordance effects were largest for the correlation between behavior and identity and smallest for the correlation between attraction and identity. Importantly, while there was overall concordance between sexual orientation measures, there was not complete overlap. Furthermore, the overlap was inconsistent for the overall bisexual sample and for those who met the case definition for anxiety or depression. Considering the preponderance of identity or behavioral single item sexual orientation measures in epidemiological research among sexual minority men, it is worth noting that in this study the least overlap was found for the overall sample, wherein 25% of bisexual-identified men would have been missed if only a behavioral measure had been used, and 41% of bisexually-behaving men would have been excluded if a single identity measure had been used. These patterns may have a number of explanations including that some bisexually-identifying men may be monogamous or sexually active with only one gender for a period, and thus misclassified with use of a single behavior measure. Some bisexually-behaving men may identify more strongly with gay or heterosexual self-labels, as a result of social stigma, 'double discrimination', primary partner gender, or other reasons. Consequently, this strongly recommends the inclusion of multiple sexual orientation measures in population health and survey research, as others have called for (Bauer & Brennan, 2013; Rainbow Health Ontario, 2012).

Compared to previous research on mental health outcomes among bisexual men, the anxiety and depression prevalences in this sample are for the most part high. A 2010 Canadian study using national health survey data, self-reported mental health measures and an identity based sexual orientation measure found a 13.8% prevalence of mood or anxiety disorder among bisexual men (Brennan, Ross, Dobinson, Veldhuizen, & Steele, 2010). Using 2004-5 data

from a U.S. national substance use and mental health survey, mental health outcomes based on validated scales, and all three major sexual orientation dimensions, Bostwick et al. (2010) found a 35.8% lifetime prevalence of major depression among bisexually-identified men, between 21.8-33.0% among categories of bisexually-attracted men, and 36.9% among bisexually-behaving men (Bostwick et al., 2010). The same study found a lifetime prevalence of any anxiety disorder of 38.7% among bisexually-identified men, 24.2-43.0% among categories of bisexually-attracted men, and 38.9% among bisexually-behaving men. These differences could be due to a number of factors including use of different sexual orientation (e.g., lifetime vs. past two-year behavior, etc.) and mental health (e.g. self-report, validated scales, etc.) measures and differences in study population (i.e., general population, recently sexually active sexual minority sample, etc.) (Galupo, n.d.; Ross et al., 2017).

Demonstrated anxiety and depression disparity for bisexual men may be explained by a number of underlying mechanisms. Previous research has found biphobia among both heterosexual and sexual minority groups, contributing to ‘double discrimination’, or negative attitudes toward bisexuality that bisexual people experience from both heterosexual and sexual minority communities (Dodge, Schnarrs, Goncalves, et al., 2012a; Friedman et al., 2014). Such sexual orientation based stigma and discrimination has been linked to poor mental health outcomes among bisexual people (Bostwick, Boyd, Hughes, West, & McCabe, 2014). Bisexual men experience a lack of visibility and absent sense of belonging to both heterosexual and gay communities (Dodge, Schnarrs, Reece, et al., 2012b), which may impact their mental health and general well-being. Bisexual men have also been shown to be more likely to conceal their identity or behavior than gay men, and concealment has been linked to poorer mental health (Schrimshaw, Siegel, Downing, & Parsons, 2013). These mechanisms, and in particular ‘double discrimination’ may be more pronounced for bisexually-identified men rather than those that are bisexually-attracted or -behaving. Bisexually-identified people, especially those who are publicly ‘out’ about their sexual identity, may be more exposed to social discrimination. This may explain why only the identity based models in this study consistently showed statistically significant poorer mental health outcomes for bisexual compared with gay men, as well as greatest effect size.

Strengths and limitations

This study has a number of important limitations. First, the study is limited by selection bias in that study eligibility criteria required participants to have been sexually active with another man in the 6 months prior to study enrollment. This may have biased the sample toward poorer health outcomes, particularly for behaviorally bisexual men (Bauer & Brennan, 2013). As such, results may not be generalizable to sexual minority men who are not recently sexually active with men. Results may also have been biased toward poorer health outcomes as data for this study came from a larger HIV study that oversampled for HIV-positive MSM. As such, findings may not be comparable to single HIV serostatus samples or, in particular, generalizable to HIV-negative only groups. Additionally, HADS relies on self-report for anxiety and depression ascertainment, which may not be as reliable as objective clinical measures, or a combination of both objective and subjective mental health measures (Trauer, 2010). As RDS allows for measurement of and adjustment for recruitment-related biases, this sampling method was chosen in order to maximize external

validity. However, there were challenges to producing long recruitment chains in this study, necessary to reach diverse participant networks and gain independence from the purposively selected initial study recruits or ‘seeds’ (Heckathorn, 2002). This may limit the representativeness and generalizability of findings from this study. As this study focused on comparing gay with bisexual men, we were not able to specifically examine the impact of identification as other than bisexual or gay on mental health outcomes or disentangle the effect of plurisexual from bisexual attraction. This is important as plurisexual people may experience poorer community connection and mental health outcomes than bisexual people (Mitchell, Davis, & Galupo, 2014). Finally, absence of a gold-standard for measuring sexual orientation dimensions limits the comparability to the available research in this area, as a variety of measures of different constructs (e.g. identity, behavior, partner gender, affect, etc.) with diverse timeframes (e.g., lifetime, past year, current, etc.) and language are used across the literature.

Despite these limitations, this study makes a unique contribution in a number of important ways. While there have been a growing number of studies looking at mental health outcomes using multiple sexual orientation dimensions, this is one of the first studies with a Canadian sample. Additionally, study data were obtained via respondent-driven sampling, a probability based sampling strategy designed to produce more representative samples than other methods such as venue or bar based sampling (Kendall et al., 2008; Lansky et al., 2007). While most previous research on mental health morbidity and sexual orientation dynamics for bisexual men has been conducted among bisexual-only or general population samples, this study provides evidence specific to anxiety and depression from within a sample of sexual minority men. This allowed for the disaggregation of gay and bisexual men for comparison, and for a single gender sample. Study participants were ethnically diverse and included cisgender and transgender men ($n=14$). Inclusion of all three major sexual orientation dimensions as well as use of widely-used validated scale for anxiety and depression outcome ascertainment also strengthened this analysis.

Results confirm findings from previous research that bisexual men experience greater anxiety and depression compared with gay men, and that this trend holds across all major sexual orientation dimensions in descriptive statistics, and consistently for the identity measure in adjusted multivariable analysis of anxiety and depression. Building on previous literature, findings provide novel evidence from a probability-based, ethnically-diverse, and transgender-inclusive sexual minority sample, using a robust anxiety and depression measure and highly-comparable sexual orientation dimension measures. This study also provides confirmatory evidence of sexual orientation dimension concordance for bisexual and gay men from among a sexual minority sample. Findings point to the value of inclusion of multiple sexual orientation measures in surveys and routinely collected data; if using only one, it is important to ensure the selected dimension corresponds to the intended data collection purpose (e.g., behavior measures may be most appropriate for studies of HIV transmission). Findings highlight the need to consider the unique realities and vulnerabilities of bisexual men and ensure sexual minority groups and sexual orientation dimensions are not considered commensurate in clinical and public health settings for mental health prevention and treatment. Future research is needed to better understand the mechanisms

underlying heightened levels of anxiety and depression among bisexual men, and distinctions by sexual orientation dimension.

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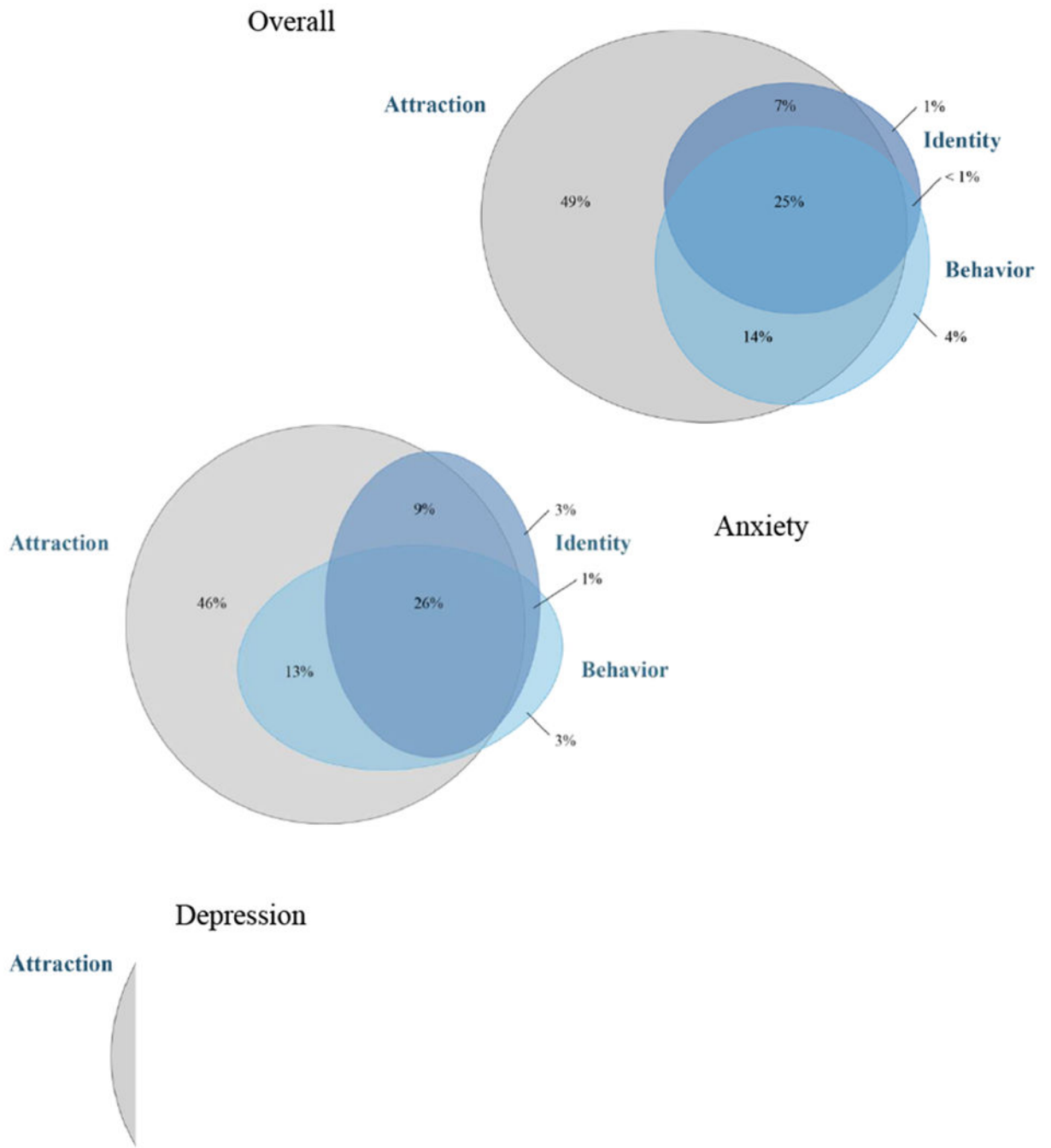


Figure 1. Bisexuality by sexual orientation dimension: overall, by anxiety, and by depression

Table 1.

Overall study sample characteristics (n=774)

	N or median	% or Q1,Q3	RDS%	95% CI
HADS Anxiety ($\alpha=0.84$)*	8	5, 11		
HADS Depression ($\alpha=0.79$)*	3	2, 6		
Age	34	26, 47		
Past 6 month partner number	6	3, 14		
Sexual Identity[‡]				
Gay	655	90.0	84.5	79.7 89.1
Bisexual	73	10.0	15.5	10.9 20.3
Attraction				
Men only	541	69.9	66.6	60.8 72.1
Men and women	233	30.1	33.4	27.9 39.2
Behavior				
Men only	660	85.3	77.3	71.9 82.9
Men and women	114	14.7	22.7	17.1 28.1
Annual income				
<\$30,000	485	62.7	72.9	67.4 78.5
\$30,000 - \$59,999	200	25.8	18.6	14.4 22.4
\$60,000	89	11.5	8.6	5.4 12.0
Ethnicity				
White	585	75.6	68.5	61.5 74.4
Asian	74	9.6	9.2	5.7 13.7
Indigenous	50	6.5	9.7	5.2 14.9
Latino/Other	65	8.4	12.7	8.1 18.1
Educational attainment				
High school	179	23.1	32.6	26.9 39.8
>High school	595	76.9	67.4	60.2 73.1

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	N or median	% or Q1,Q3	RDS%	95% CI
Regular partner status				
Yes/Married	297	38.4	37.6	31.4 - 43.6
HIV status				
Negative/Unknown	554	71.6	72.6	68.1 - 77.2
Positive	220	28.4	27.4	22.8 - 31.9

Q1, Q3: Quartile 1 and Quartile 3 (25th and 75th percentiles)

RDS: Respondent driven sampling

CI: Confidence interval

* 9 missing

± 27 Queer and 19 Other excluded

Table 2a.

Sexual orientation by HADS anxiety scores (n=765)

	Non-cases (< 8)				Anxiety cases (8)			
	N	%	RDS%	95% CI	N	%	RDS%	95% CI
Total	373	48.8	44.0	38.6 49.9	392	51.2	56.0	50.1 61.4
Identity [‡]								
Gay	330	50.8	45.3	39.8 50.8	319	49.2	54.7	49.2 60.2
Bisexual	25	35.2	30.4	16.8 44.1	46	64.8	69.6	55.9 83.2
Attraction								
Men only	271	50.6	47.0	40.8 53.1	265	49.4	53.0	46.9 59.2
Men and women	102	44.5	36.7	28.3 45.1	127	55.5	63.3	54.9 71.7
Behavior								
Men only	325	49.7	45.3	39.8 50.7	329	50.3	54.7	49.3 60.2
Men and women	48	43.2	37.1	24.7 49.5	63	56.8	62.9	50.5 75.3

[‡]27 Queer and 19 Other excluded

RDS: Respondent driven sampling

CI: Confidence interval

Table 2b.

Sexual orientation by HADS depression scores (n=765)

	Non-cases (< 8)				Depression cases (≥ 8)			
	N	%	RDS%	95% CI	N	%	RDS%	95% CI
Total	649	84.8	82.6	77.5 87.3	116	15.2	17.4	12.7 22.5
Identity [‡]								
Gay	558	86.0	84.2	80.1 88.4	91	14.0	15.8	11.6 19.9
Bisexual	51	71.8	67.6	50.1 85.0	20	28.2	32.4	15.0 49.9
Attraction								
Men only	458	85.4	84.4	80.0 88.9	78	14.6	15.6	11.1 20.0
Men and women	191	83.4	78.5	69.6 87.5	38	16.6	21.5	12.5 30.4
Behavior								
Men only	561	85.8	83.3	79.0 87.7	93	14.2	16.7	12.3 21.0
Men and women	88	79.3	79.4	67.3 91.4	23	20.7	20.6	8.6 32.7

[‡]27 Queer and 19 Other excluded

RDS: Respondent driven sampling

CI: Confidence interval

Table 3.

Correlations of sexual orientation measures, for bisexuality

	Identity[±]	Attraction
Attraction	0.46	
Behavior	0.58	0.54

[±]27 Queer and 19 Other excluded

Note: All correlations significant at the p<0.0001 level

Multivariable models of the relationship between sexual orientation measures and anxiety (HADS-A 8)

Table 4a.

	Identity*		Attraction*		Behavior*		Sensitivity analysis [†]	
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI
Identity								
Gay	Ref							
Bisexual	1.87	1.14 3.07						
Attraction								
Men only			Ref					
Men and women			1.47	1.06 2.04				
Behavior								
Men only					Ref			
Men and women					1.34	0.89 2.01	1.33	0.89 2.00

CI: Confidence interval

aOR: Adjusted odds ratio

Ref: Reference group

* Adjusted for age, annual income, race/ethnicity, educational attainment, current partner status, and HIV serostatus

[†] Adjusted for past 6 month sexual partner number, in addition to age, annual income, race/ethnicity, educational attainment, current partner status, and HIV serostatus

Multivariable models of the relationship between sexual orientation measures and depression (HADS-D) 8)

Table 4b.

	Identity*		Attraction*		Behavior		Sensitivity analysis [†]	
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI
Identity								
Gay	Ref							
Bisexual	2.14	1.27 3.61						
Attraction								
Men only			Ref					
Men and women			1.38	0.92 2.08				
Behavior								
Men only					Ref			
Men and women					1.11	0.67 1.83	1.08	0.65 1.78

CI: Confidence interval

aOR: Adjusted odds ratio

Ref: Reference group

* Adjusted for age, annual income, race/ethnicity, educational attainment, current partner status, and HIV serostatus

[†] Adjusted for past 6 month sexual partner number, in addition to age, annual income, race/ethnicity, educational attainment, current partner status, and HIV serostatus