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Sexual orientation, suicide ideation and suicide attempt: A population-based study

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ABSTRACT

The aim is to investigate associations between sexual orientation and experience of suicide thoughts and suicide attempts. The 2012 public health survey in Scania, southern Sweden, is a cross-sectional population-based study including 28,029 participants aged 18–80 with 51.7% participation. The associations between sexual orientation and experience of suicide thoughts and attempts were investigated in multiple logistic regressions. A 8.2% proportion of men and 11.3% of women reported suicide thoughts more than a year ago, and 4.0% of men 4.1% of women had experienced such thoughts during the past year. A 2.6% proportion of men and 4.6% of women reported suicide attempt more than a year ago, and 0.6% of men and 0.7% of women during the past year. In the age- and multiple adjusted models, bisexual and homosexual men and bisexual women had significantly higher odds ratios of suicide thoughts than heterosexual men and women. Bisexual and homosexual men and bisexual women had significantly higher odds ratios of suicide attempt than heterosexual men and women. After multiple adjustments these patterns largely remained. The results indicate that bisexual men and women and homosexual men have an increased risk of experience of suicide thoughts and suicide attempt.

1. Introduction

There has been substantial research in the past decade indicating that sexual minorities have poorer physical and psychological health than the general population. Sexual minorities have been found to be at greater risk for all-cause mortality (Cochran et al., 2016), poor self-rated health (Axelsson et al., 2013; Bränström et al., 2016a), high preventable morbidity (Bränström et al., 2016b) and more physical symptoms and conditions (Bränström et al., 2016a) than heterosexuals. In terms of psychological health, sexual minorities have been shown to be more likely to suffer from mental disorders (Plöder and Tremblay, 2015; Bränström and van der Star, 2016; Swannell et al., 2016) including anxiety and depression (Björkenstam et al., 2017). There is also growing evidence that sexual minorities are at greater risk of suicide ideation and attempts (King et al., 2008; Björkenstam et al., 2016a,2016b) as well as being disproportionately represented among deaths by suicide (Haas et al., 2011; Plöder et al., 2013; Cochran and Mays, 2015; Björkenstam et al., 2016b;) as compared to heterosexuals.

Suicide is an important public health challenge, and research has shown that previous suicide attempt is one of the best predictors of suicide (De Moore and Robertson, 1996; Jenkins et al., 2002; Owens et al., 2002; Runeson et al., 2010; Björkenstam et al., 2016b). Suicide is more common among sexual minority youth than among heterosexual youth (Seil et al., 2014; Clements-Nolle et al., 2018; Meader and Chan, 2017), and this pattern has also been observed in other age strata, although more empirical knowledge is needed (Haas et al., 2011). There are many variables that have been shown to be associated with suicide that are also associated with membership of a sexual minority such as mental disorders, which are strong predictors of suicide ideation and attempts (Björkenstam et al. 2016a, 2016b; Bränström and Pachankis, 2018).

Research has shown that sexual minorities have poorer health behaviours than heterosexuals, including higher odds ratios of smoking (Lindström et al., 2014), as well as alcohol and cannabis abuse (Bränström and Pachankis, 2018). None of these studies have investigated specifically physical activity though low physical activity has been found to be associated with increased likelihood of suicide ideation (Vancampfort et al., 2018), and sexual minorities have been found to be more likely to have high BMI (Björkenstam et al. 2016a, 2016b), which could be an indicator of lower levels of physical activity. In

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addition to poor health behaviours, sexual minorities have been found to be exposed to an unequal distribution of health protective resources including information, power, social capital (Björkenstam et al. 2016a, 2016b; Axelsson et al., al.,2013), as well as material resources, including financial resources and housing (Gustafsson et al., 2017; Lee et al., 2018). In fact, in the United States, sexual minorities have been found to have higher rates of poverty and unemployment (Fredriksen-Goldsen et al., 2017).

These findings are in line with the Minority Stress Hypothesis (Meyer, 1995). According to this hypothesis sexual minorities may have poorer health and increased risk for suicide as they are exposed to more stressors due to their membership of marginalised groups. Stress is the result of a situation in which requirements exceed resources available. These requirements can be psychological or material. In the case of sexual minorities, increased exposure to stress can be in the form of degrading treatment, such as stigma, discrimination and violence, but also in the form of inequalities in access to material resources (Gustafsson et al., 2017). The stress response triggers a psychobiological reaction involving the hypothalamic-pituitary-adrenal axis, which in turn can lead to poor health outcomes including suicide ideation and attempts.

The aim of this study is to investigate the association between sexual orientation and suicide ideation and attempt, and including socio-economic status, economic stress, physical activity and psychological health in the analysis.

2. Method

2.1. Study population

The study population is comprised of respondents to the cross-sectional Scania Public Health Survey 2012 which was used to investigate the distribution of ill-health and health risks in Skåne, the southernmost region of Sweden. It is based on a random sample of adults aged 18–80 years, stratified by age, sex and geographic location, extracted from the public population register of residents. A total of 28,029 respondents returned the questionnaire in August to October 2012, representing a 51.7% response rate. Ethical approval was sought and granted by the Ethics Committee in Lund, Sweden.

2.2. Dependent variable

Suicide ideation was assessed through the questions “Have you ever considered taking your own life, and may even have planned how you would do it?” with response alternatives: “No, never”, “Yes, more than a year ago”, “Yes, during the past year”, and “Yes, during the past week”. Responses were dichotomised into “No” for the first response and “yes” for the other three response alternatives.

Suicide attempt was assessed through the question “Have you ever tried to take your own life?” with response alternatives: “No, never”, “Yes, more than a year ago”, “Yes, during the past year”, and “Yes, during the past week”. Responses were dichotomised into “No” for the first response and “Yes” for the other three response alternatives.

The two items concerning suicide ideation and suicide attempts only measure the latest occurrence of ideation and attempt. There was thus only one optional answer on each of the two items.

2.3. Independent variables

Sexual orientation was assessed through the question “Do you regards yourself today as 1) heterosexual, 2) bisexual, 3) homosexual, 4) other?”.

Age was stratified into the age groups 18–24, 25–34, 35–44, 45–54, 55–64, and 65–80 years.

Born in Sweden/born in other country than Sweden, participants were dichotomised by whether they were born in Sweden or not.

Marital status was assessed by asking respondents if they were 1) married/cohabiting, 2) unmarried, 3) separated/divorced, 4) widowed.

Socioeconomic status (SES) was assessed through employment categories including: higher non-manual employees, medium level non-manual employees, low level non-manual employees, skilled manual workers, unskilled manual workers, self-employed/farmers, early retirees/sick leave (aged below 65 years), unemployed, students, old age pensioners (aged over 65 years), and unclassified/homeworker.

Leisure-time physical activity was assessed through the question: “How much physical activity have you undertaken during your leisure time over the past 12 months? (a) Regular exercise –at least 30 min, relatively strenuous exercise, at least 3 times a week; (b) Moderate regular exercise – you do relatively strenuous exercise at last 1–2 times per week for at least 30 min each time; (c) Moderate exercise –at least two hours light exercise per week, usually without sweating; d) Sedentary leisure time –you walk, cycle or otherwise move your body less than 2 h per week, usually without sweating.

Economic stress was assessed through the question “How often in the past 12 months have you had difficulties paying your bills?”. Response alternatives were: (a) every month; (b) approximately half of the moths of the year; (c) maybe once; and (d) never.

Psychological health was assessed through the GHQ12 questionnaire. Responses were dichotomised into 1–2 of 12 answers indicating poor psychological health during the past weeks as good psychological health and 3 or more indicating poor psychological health during the past weeks as poor psychological health. For more detail please see Goldberg et al. (1997) and Lindström and Rosvall (2016).

2.4. Statistical analysis

The prevalence of suicide ideation, suicide attempt, sexual orientation, age, born in Sweden, marital status, socioeconomic status, leisure time physical activity, economic stress and psychological health was calculated for the study population, stratified by sex (Table 1). Bivariate analysis, including prevalence (%) and odds ratios with 95% confidence interval, of suicide ideation according to sexual orientation, age, born in Sweden, socioeconomic status, civil status, physical activity, economic stress and psychological health were calculated, stratified by sex (Table 2). This was repeated for suicide attempt (Table 3). Multiple analysis (odds ratios with 95% confidence intervals) of the association between sexual orientation to suicide ideation (Table 4) were calculated stratified by sex adjusting stepwise for 1) age, 2) country of birth, socioeconomic status, civil status, 3) leisure time physical activity and economic stress, 4) psychological health, each model adjusted for the covariates included in the model preceding it. This analysis was repeated for the association of sexual orientation to suicide attempt (Table 5). Statistical analyses were carried out using SPSS programme 23.7.

3. Results

Table 1 shows that the prevalence of suicide ideation was 0.9% during the past week, 3.1% during the past year and 8.2% more than a year ago among men, and 0.7% during the past week, 3.4% during the past year and 11.3% more than a year ago among women. The prevalence of suicide attempt was 0.1% during the past week, 0.5% during the past year and 2.6% more than a year ago among men, and 0.1% during the past week, 0.6% during the past year and 4.6% more than a year ago among women. In terms of sexual orientation the vast majority of the sample were heterosexual at 96.2% with 1.7% identifying as bisexual, 1.1% identifying as homosexual and 1% identifying as other. The distributions of age, born in Sweden, socioeconomic status, civil status, leisure time physical activity, economic stress and psychological health are also depicted in Table 1.

Table 2 shows that the prevalence and odds ratios with 95% confidence intervals of bivariate analyses of suicide ideation were

Table 1
Prevalence (%) of ever having considered and ever having tried taking one's own life, sexual orientation, age, country of birth, socioeconomic status, civil status, leisure-time physical activity, economic stress during the past year and psychological health (GHQ12). The public health survey in Scania 2012. $N = 28,029$.

	Men ($n = 12,828$)	Women ($n = 15,201$)	Total ($n = 28,029$)
Ever having considered taking one's own life			
No	87.9	84.5	86.2
Yes, more than a year ago	8.2	11.3	9.7
Yes, during the last year	3.1	3.4	3.3
Yes, during the last week	0.9	0.7	0.8
Ever having tried taking one's own life			
No	96.8	94.7	95.8
Yes, more than a year ago	2.6	4.6	3.6
Yes, during the last year	0.5	0.6	0.5
Yes, during the last week	0.1	0.1	0.1
Sexual orientation			
Heterosexual	96.2	96.1	96.2
Bisexual	1.3	2.2	1.7
Homosexual	1.4	0.8	1.1
Other	1.1	0.9	1.0
Age			
18–24	11.2	13.7	12.5
25–34	17.1	18.0	17.5
35–44	17.5	17.9	17.7
45–54	17.7	16.9	17.3
55–64	16.2	15.3	15.7
65–80	20.3	18.1	19.2
Born in Sweden/born in other country than Sweden			
Sweden	79.1	77.8	78.4
Other country	20.9	22.2	21.6
Socioeconomic status			
High non-manual	11.7	9.6	10.6
Medium non-manual	9.8	12.9	11.3
Low non-manual	5.7	10.2	7.9
Skilled blue-collar	14.2	13.1	13.6
Unskilled blue-collar	14.1	12.8	13.3
Employer/farmer	9.8	4.8	7.3
Sick leave/ long-term	2.5	4.0	3.2
Unemployed	5.7	4.7	5.2
Student	6.2	8.4	7.3
Pensioner	20.4	18.8	19.6
SES not available/ homeworker	0.2	0.8	0.5
Civil status			
Married/ registered partnership/ co-habitant	65.6	62.5	64.0
Unmarried	25.6	22.7	24.1
Divorced	7.0	9.5	8.2
Widower/ widow	1.9	5.4	3.6
Leisure-time physical activity			
Regular exercise	23.5	20.9	22.2
Moderate regular	22.8	23.5	23.2
Moderate	38.9	42.1	40.5
Sedentary	14.8	13.5	14.2
Economic stress during the past year			
No			
Occasionally	75.9	73.4	74.6
Half the year	15.3	16.8	16.1
Every month	3.7	4.2	3.9
Psychological health (GHQ12)	5.1	5.6	5.4
Good	83.7	77.6	80.7
Poor	16.3	22.4	19.3

significantly higher among all sexual minorities, among the youngest (ages 18–24), among those not born in Sweden, among those who are unmarried or separated/divorced, and among those with sedentary lifestyles. Economic stress at all levels was associated with suicide ideation with higher odds ratios with the increased frequency of experiencing economic stress during the past year. In terms of employment, the pattern is slightly different for women than men. For women, higher odds ratios of suicide ideation were associated with being on sick leave or early retirement, unemployed, student, SES not available/ homeworker, and unskilled blue-collar worker. For men, almost all employment categories were associated with increased odds ratios of suicide ideation as compared to high non-manual workers, except low non-manual, self-employed/farmer and pensioners. Poor psychological health also showed higher odds ratios of suicide ideation for both men and women compared to the good psychological health reference category.

Table 3 follows a similar pattern to Table 2, showing that the prevalence and odds ratios of bivariate analyses of attempted suicide were significantly higher among all sexual minorities, with homosexual women as the exception, OR 1.84 (0.91–3.73), despite a comparatively strong effect measure. Experience of suicide attempt was also significantly more common among younger age groups (ages 18–24), among those born abroad, among unmarried and separated/divorced, among those with sedentary lifestyles, among those experiencing economic stress and among those with poor psychological health. In terms of employment, suicide attempt had much higher odds ratios among those in early retirement or sick leave for both men and women. In contrast to Table 2, increased odds ratios of suicide attempt were found for all SES categories for women (except pensioners), while for men it was only found among unskilled blue-collar workers, long-term sick leave, unemployed, students and those for which SES was not available or who were homeworkers.

Table 4 demonstrates the age-adjusted and multiple adjusted odds ratios of suicide ideation to sexual orientation. For men, the odds ratios of suicide ideation were significantly higher for both bisexuals, OR 2.51 (1.67–3.77), and homosexuals, OR 3.41 (2.37–4.91), after final multiple adjustments for age, country of birth, socioeconomic status, civils status, leisure time physical activity, economic stress and psychological health. Men in the other group did not significantly differ from heterosexual men in the final multiple model, OR 1.46 (0.90–2.36). For women, the odds ratios of suicide ideation remained significantly higher for both bisexuals, OR 3.20 (2.40–4.26), and other, OR 2.13 (1.30–3.49), after adjusting for all covariates. The association was non-significant for homosexual women, OR 1.24 (0.71–2.20) (in the final multiple model), in all models.

Table 5 displays the age-adjusted and multiple adjusted odds ratios of attempted suicide by sexual orientation. Both bisexual, OR 2.46 (1.36–4.44), and homosexual, OR 2.02 (1.05–3.89) men had significantly higher odds ratios of attempted suicide as compared to heterosexual men in the final model. Men in the other group did not significantly differ from heterosexual men in the final multiple model, OR 1.55 (0.76–3.13). For women, the odds ratios were significantly higher for bisexual women, OR 3.02 (2.13–4.30), and women identifying as other, OR 2.01 (1.03–3.92) in the final model, but not for homosexual women, OR 1.98 (0.93–4.22).

4. Discussion

Bisexual men and women and homosexual men have an increased risk of experience of suicide thoughts and suicide attempt, even after adjustment for a number of known confounders in the final multiple adjusted models. Within each sex, bisexuals have the highest odds ratios (effect measures) for suicide ideation and suicide attempt than any other sexual orientation. Men who classify themselves as 'other' have significantly higher odds ratios of suicide ideation until the last model which adjusts for age, country of birth, socioeconomic status, civil

Table 2
Prevalence (%) and odds ratios (OR, 95% CI) in bivariate analyses of ever having considered taking one's life according to sexual orientation, age, country of birth, socioeconomic status, civil status, leisure-time physical activity, economic stress during the past year and psychological health (GHQ12). The public health survey in Scania 2012. $N = 28,029$.

	Men ($n = 12,828$)		Women ($n = 15,201$)	
	%	OR(95%CI)	%	OR(95%CI)
Sexual orientation				
Heterosexual	11.6	1.00	14.7	1.00
Bisexual	33.8	3.90 (2.76–5.52)	48.7	5.50 (4.30–7.04)
Homosexual	29.9	3.26 (2.34–4.52)	22.0	1.66 (1.03–2.65)
Other	22.2	2.20 (1.46–3.31)	34.9	3.09 (2.06–4.62)
Age				
18–24	17.5	1.00	21.3	1.00
25–34	16.5	0.93 (0.78–1.12)	21.2	0.99 (0.85–1.16)
35–44	15.0	0.82 (0.68–0.98)	15.5	0.68 (0.58–0.80)
45–54	12.1	0.64 (0.53–0.78)	16.9	0.75 (0.64–0.88)
55–64	9.9	0.52 (0.42–0.63)	12.2	0.51 (0.43–0.61)
65–80	5.5	0.28 (0.22–0.34)	7.0	0.28 (0.23–0.34)
Born in Sweden/born in other country than Sweden				
Sweden	11.6	1.00	14.7	1.00
Other country	14.3	1.27 (1.12–1.44)	18.3	1.29 (1.16–1.45)
Socioeconomic status				
High non-manual	7.9	1.00	12.3	1.00
Medium non-manual	10.8	1.42 (1.09–1.84)	14.4	1.19 (0.96–1.48)
Low non-manual	9.7	1.24 (0.91–1.69)	13.1	1.07 (0.84–1.35)
Skilled blue-collar	11.3	1.48 (1.17–1.89)	14.6	1.22 (0.98–1.52)
Unskilled blue-collar	15.3	2.10 (1.67–2.65)	18.7	1.63 (1.32–2.02)
Employer/farmer	9.0	1.15 (0.88–1.51)	14.2	1.18 (0.89–1.56)
Sick leave/ long-term	37.3	6.95 (5.16–9.38)	38.0	4.38 (3.42–5.60)
Unemployed	27.4	4.41 (3.42–5.68)	23.3	2.17 (1.68–2.80)
Student	20.3	2.96 (2.28–3.83)	21.9	2.00 (1.60–2.50)
Pensioner	6.2	0.77 (0.61–0.99)	7.4	0.57 (0.45–0.72)
SES not available/ homeworker	25.0	3.91 (1.53–10.03)	20.8	1.86 (1.10–3.14)
Civil status				
Married/ registered partnership/ co-habitant	8.8	1.00	12.3	1.00
Unmarried	18.4	2.29 (2.04–2.58)	23.2	2.17 (1.94–2.42)
Divorced	19.0	2.39 (1.99–2.87)	22.0	2.02 (1.74–2.36)
Widower/ widow	11.5	1.31 (0.88—1.95)	7.5	0.58 (0.43–0.77)
Leisure-time physical activity				
Regular exercise	10.4	1.00	13.8	1.00
Moderate regular	9.5	0.90 (0.76–1.08)	14.2	1.04 (0.89–1.21)
Moderate	12.1	1.19 (1.03–1.38)	14.3	1.04 (0.91–1.20)
Sedentary	19.0	2.03 (1.72–2.40)	23.7	1.94 (1.65–2.28)
Economic stress during the past year				
Never	8.8	1.00	11.5	1.00
Occasionally	18.4	2.33 (2.04–2.68)	20.6	2.00 (1.77–2.27)
Half the year	25.8	3.62 (2.88–4.53)	32.9	3.78 (3.12–4.59)
Every month	35.9	5.80 (4.83–6.96)	40.7	5.29 (4.47–6.26)
Psychological health (GHQ12)				
Good	8.2	1.00	10.4	1.00
Poor	32.6	5.43 (4.83–6.12)	32.9 2.	4.21 (3.79–4.66)

status, leisure-time physical activity, economic stress and psychological health, at which point the association becomes statistically non-significant. In terms of suicide attempt, men who classify themselves as 'other' only have significantly increased odds ratios when adjusting for age alone.

The heightened vulnerability of bisexuals and in particular bisexual women is in line with previous research (Björkenstam et al., 2016b, 2017; Swannell et al., 2016). In fact, there is a growing body of evidence from the United States that bisexual persons may experience unique prejudice related to their bisexual orientation (Fredriksen-Goldsen et al., 2017; Katz-Wise et al., 2017). This has been termed anti-bisexual prejudice (Katz-Wise et al., 2017) or biphobia (Dodge et al., 2016). This concept posits that bisexual persons face stigmatisation both by heterosexual populations for not being heteronormative, as well as from homosexual populations for not being mono-sexual, or attracted to one sex (Dodge et al., 2016). Bisexuality is often perceived as a somewhat illegitimate sexual orientation or as a transitory phase while simultaneously being associated with promiscuity (Dodge et al., 2016). Hence, bisexuals could be exposed to additional stress compared to other sexual minorities, and as such would be exposed to higher odds ratios for negative health outcomes including suicide ideation and suicide attempt.

The increased odds ratios for women is also consistent with previous studies (e.g. Bränström et al., 2016a, 2016b), which is thought to be due to the intersection of gender-related discrimination with sexual minority discrimination. The one exception to this pattern is in the case of homosexuals where men have higher odds ratios of suicide ideation and attempt than women. This is in line with the study by Björkenstam et al. (2016a), which found an almost three times higher rate of suicide mortality among homosexual men as compared to heterosexual men with only a slightly higher rate among homosexual women compared to heterosexual women. In that particular study, however, the outcome, suicide mortality, may partially explain the strength of the association as men are in general more likely to die by suicide while women are more likely to attempt suicide (Haas et al., 2011).

In terms of suicide risk, the results of this study confirmed previous findings. Suicide ideation and attempt was strongly associated with youth, being born outside of Sweden, among those who are unmarried or separated/divorced, among those of lower socio-economic status,

Table 3
Prevalence (%) and odds ratios (OR, 95% CI) in bivariate analyses of ever having tried taking one's life according to sexual orientation, age, country of birth, socioeconomic status, civil status, leisure-time physical activity, economic stress during the past year and psychological health (GHQ12). The public health survey in Scania 2012. $N = 28,029$.

	Men ($n = 12,828$)		Women ($n = 15,201$)	
	%	OR(95%CI)	%	OR(95%CI)
Sexual orientation				
Heterosexual	2.9	1.00	4.8	1.00
Bisexual	10.8	4.21 (2.49–7.12)	21.3	5.34 (3.93–7.25)
Homosexual	6.7	2.44 (1.33–4.46)	8.9	1.84 (0.91–3.73)
Other	7.4	2.63 (1.36–5.10)	19.6	4.76 (2.92–7.76)
Age				
18–24	4.6	1.00	7.4	1.00
25–34	3.6	0.78 (0.56–1.10)	7.2	0.98 (0.77–1.24)
35–44	3.9	0.83 (0.60–1.16)	5.1	0.67 (0.52–0.87)
45–54	3.3	0.69 (0.49–0.98)	5.8	0.78 (0.60–1.00)
55–64	3.0	0.64 (0.45–0.92)	3.8	0.50 (0.37–0.67)
65–80	1.5	0.30 (0.20–0.46)	2.1	0.35 (0.26–0.47)
Born in Sweden/born in other country than Sweden				
Sweden	2.4	1.00	4.5	1.00
Other country	5.9	2.50 (2.03–3.08)	8.1	1.85 (1.56–2.19)
Socioeconomic status				
High non-manual	1.8	1.00	2.3	1.00
Medium non-manual	2.5	1.40 (0.83–2.35)	3.8	1.60 (1.02–2.50)
Low non-manual	1.1	0.61 (0.27–1.34)	4.5	1.94 (1.23–3.05)
Skilled blue-collar	1.7	0.94 (0.56–1.59)	4.3	1.84 (1.19–2.85)
Unskilled blue-collar	4.7	2.66 (1.71–4.14)	5.9	2.58 (1.69–3.95)
Employer/farmer	1.9	1.07 (0.61–1.87)	6.2	2.72 (1.67–4.43)
Sick leave/ long-term	17.6	11.62 (7.19–18.79)	17.3	8.58 (5.56–13.23)
Unemployed	7.9	4.59 (2.86–7.37)	10.1	4.59 (2.91–7.23)
Student	4.9	2.80 (1.69–4.64)	7.7	3.45 (2.24–5.31)
Pensioner	1.8	1.00 (0.62–1.62)	3.0	1.28 (0.83–1.97)
SES not available/ homeworker	8.3	5.73 (1.40–23.47)	8.3	3.89 (1.75–8.65)
Civil status				
Married/ registered partnership/ co-habitant	2.1	1.00	3.9	1.00
Unmarried	5.0	2.48 (1.99–3.09)	8.1	2.20 (1.84–2.62)
Divorced	6.3	3.18 (2.34–4.34)	9.6	2.62 (2.10–3.28)
Widower/ widow	2.0	1.02 (0.42–2.46)	1.8	0.44 (0.25–0.79)
Leisure-time physical activity				
Regular exercise	2.3	1.00	4.8	1.00
Moderate regular	2.5	1.11 (0.79–1.56)	4.4	0.92 (0.71–1.18)
Moderate	2.9	1.28 (0.95–1.72)	4.6	0.96 (0.77–1.20)
Sedentary	6.0	2.71 (1.98–3.71)	8.8	1.93 (1.50–2.48)
Economic stress during the past year				
Never	2.0	1.00	3.4	1.00
Occasionally	5.7	3.04 (2.38–3.87)	7.7	2.40 (1.97–2.93)
Half the year	5.7	2.95 (1.91–4.54)	13.5	4.45 (3.38–5.87)
Every month	10.8	6.06 (4.50–8.16)	16.9	5.87 (4.65–7.41)
Psychological health (GHQ12)				
Good	2.1	1.00	3.1	1.00
Poor	8.2	4.27 (3.46–5.28)	13.0	4.68 (3.99–5.50)

and among those who experience economic stress, among those who have more sedentary lifestyles and amongst those who report poor psychological health. However, despite the strong associations of many of these variables to increased odds ratios of suicide ideation and attempt, adjusting for them did little to diminish the strength of the association of sexual orientation to suicide ideation and attempt among homosexual and bisexual men (and other men in the case of suicide attempt), and among bisexual and other women.

4.1. Strengths and limitations

Though the participation rate of 51.7% reflects the internationally declining trends in participation in postal surveys, the 2012 public health survey was found to have only limited under-representation of the age interval 18–34 years, men and people with low education, but substantial under-representation of people born outside Europe compared to sociodemographic variables regarding the entire population of Skåne from official Swedish register data (Lindström and Rosvall, 2018), and as such the risk of selection bias due to non-response is judged to be acceptable. This includes the relatively low rates of sexual minority respondents which also corresponds well with Swedish national data, and the item used to measure sexual orientation has been used in many previous studies including by a Swedish Public Health Authority (Boström et al., 2006). We do not have ethical permission to follow up and investigate non-responders. Sexual orientation has three dimensions: self-identification, behaviour and attraction/ fantasy (Haas et al., 2011). Though self-identification is the measure most often used in public health research, it may under-represent sexual minorities in the population, and consequently underestimate the strength of the association between sexual orientation and health. The item regarding sexual orientation is often used in the international literature (Cochran et al., 2016; Bränström, 2017). There was no item with the phrasing “straight” or “not gay, lesbian or bisexual”. The “other alternative was followed by a question asking the respondent to specify exact sexual orientation as an open question. However, the diversity of answers makes the singling out of large enough specific groups to analyse statistically impossible. The use of single items to measure suicide ideation and suicide attempts has also been used in many previous studies (Sorenson and Rutter, 1991; Vilhjalmsson et al., 1998; Enns et al., 2006; Parks et al., 2006; Afifi et al., 2009; Fuller-

Table 4
Age-adjusted and multiple adjusted odds ratios (OR, 95% CI) of ever having considered taking one's life according to sexual orientation. The public health survey in Scania 2012. $N = 28,029$.

Men	OR (95% CI)[a]	OR (95% CI)[b]	OR (95% CI)[c]	OR (95% CI)[d]
Heterosexual	1.00	1.00	1.00	1.00
Bisexual	3.39 (2.39–4.83)	2.76 (1.92–3.99)	2.70 (1.85–3.95)	2.51 (1.67–3.77)
Homosexual	3.02 (2.17–4.22)	3.14 (2.23–4.41)	3.06 (2.15–4.36)	3.41 (2.37–4.91)
Other	2.33 (1.54–3.52)	2.05 (1.34–3.14)	1.71 (1.09–2.66)	1.46 (0.90–2.36)
Women				
	OR (95% CI)[a]	OR (95% CI)[b]	OR (95% CI)[c]	OR (95% CI)[d]
Heterosexual	1.00	1.00	1.00	1.00
Bisexual	4.36 (3.39–5.59)	4.16 (3.22–5.38)	3.44 (2.62–4.52)	3.20 (2.40–4.26)
Homosexual	1.52 (0.95–2.45)	1.46 (0.89–2.39)	1.28 (0.76–2.18)	1.24 (0.71–2.20)
Other	3.13 (2.08–4.70)	2.85 (1.86–4.38)	2.40 (1.50–3.83)	2.13 (1.30–3.49)

[a] Adjusted for age.
[b] Adjusted for age, country of birth, socioeconomic status (SES), and civil status.
[c] Adjusted for age, country of birth, socioeconomic status (SES), civil status, leisure-time physical activity and economic stress during the past year.
[d] Adjusted for age, country of birth, socioeconomic status (SES), civil status, leisure-time physical activity, economic stress during the past year and psychological health (GHQ12).

Table 5
Age-adjusted and multiple adjusted odds ratios (OR, 95% CI) of ever having tried taking one's life according to sexual orientation. The public health survey in Scania 2012. $N = 28,029$.

Men	OR (95% CI)[a]	OR (95% CI)[b]	OR (95% CI)[c]	OR (95% CI)[d]
Heterosexual	1.00	1.00	1.00	1.00
Bisexual	3.70 (2.17–6.28)	2.96 (1.71–5.14)	2.85 (1.62–5.01)	2.46 (1.36–4.44)
Homosexual	2.27 (1.24–4.16)	1.99 (1.05–3.80)	1.92 (1.00–3.67)	2.02 (1.05–3.89)
Other	2.72 (1.40–5.28)	1.85 (0.94–3.64)	1.56 (0.78–3.13)	1.55 (0.76–3.13)
Women				
	OR (95% CI)[a]	OR (95% CI)[b]	OR (95% CI)[c]	OR (95% CI)[d]
Heterosexual	1.00	1.00	1.00	1.00
Bisexual	4.36 (3.19–5.95)	4.26 (3.10–5.84)	3.38 (2.41–4.74)	3.02 (2.13–4.30)
Homosexual	1.72 (0.85–3.48)	1.76 (0.86–3.60)	1.66 (0.79–3.48)	1.98 (0.93–4.22)
Other	4.77 (2.92–7.80)	3.47 (2.03–5.90)	2.48 (1.32–4.66)	2.01 (1.03–3.92)

[a] Adjusted for age.
[b] Adjusted for age, country of birth, socioeconomic status (SES), and civil status.
[c] Adjusted for age, country of birth, socioeconomic status (SES), civil status, leisure-time physical activity and economic stress during the past year.
[d] Adjusted for age, country of birth, socioeconomic status (SES), civil status, leisure-time physical activity, economic stress during the past year and psychological health (GHQ12).

Thomson and Dalton et al., 2011; Lindström and Rosvall, 2015). The two items concerning suicide ideation and suicide attempts only measure the latest occurrence of ideation and attempt. They do not measure persistence.

This study adjusts for a number of confounders and covariates including age, country of birth, socioeconomic status, civil status, physical activity, economic stress and psychological health, and stratified by sex. Leisure-time physical activity in particular has not been included in previous studies on the association between sexual orientation and suicide risk, despite its strong association with risk for suicide (Vancampfort et al., 2018), and that sexual minorities are more likely to report higher BMI (Bränström et al., 2016a, 2016b).

Suicide ideation and suicide attempt had approximately 9% internally missing with the remaining variables having proportions of internally missing much lower than this.

As this study is cross-sectional, no causal inference can be made. However, the most plausible direction of causality would be from sexual orientation to suicide ideation and attempt and not vice versa.

5. Conclusions

Sexual minorities have higher odds ratios of suicide ideation and attempts with bisexuals being particularly vulnerable, and bisexual women have the highest odds ratios. Only homosexual men, and not homosexual women, have higher odds ratios for suicide ideation and suicide attempt. Women who classify themselves as other also have higher odds ratios for both suicide ideation and attempt, while other men do not have significantly higher odds ratios of suicide ideation and suicide attempt than the heterosexual reference group in the multiple adjusted final models.

Conflicts of interest

None.

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