

Suicide in married couples in Sweden: Is the risk greater in same-sex couples?

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Received: 9 March 2016 / Accepted: 27 April 2016 / Published online: 11 May 2016
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Abstract Minority sexual orientation is a predictor of suicide ideation and attempts, though its association with suicide mortality is less clear. We capitalize on Sweden's extensively linked databases, to investigate whether, among married individuals, same-sex marriage is associated with suicide. Using a population-based register design, we analyzed suicide risk among same-sex married women and men ($n = 6456$), as compared to different-sex married women and men ($n = 1181723$) in Sweden. We selected all newly partnered or married individuals in the intervening time between 1/1/1996 and 12/31/2009 and followed them with regard to suicide until 12/31/2011. Multivariate Poisson regression was used to calculate adjusted incidence risk ratios (IRR) with 95 % confidence intervals (CI). The risk of suicide was higher among same-sex married individuals as compared to different-sex married individuals (IRR 2.7, 95 % CI 1.5–4.8), after adjustment for time at risk and socioeconomic confounding. Sex-stratified analyses showed a tentatively elevated risk for same-sex married women (IRR 2.5, 95 % CI 0.8–7.7) as compared to different-sex married women. Among same-sex married men the suicide risk was nearly three-fold

greater as compared to different-sex married (IRR 2.895 % CI 1.5–5.5). This holds true also after adjustment for HIV status. Even in a country with a comparatively tolerant climate regarding homosexuality such as Sweden, same-sex married individuals evidence a higher risk for suicide than other married individuals.

Keywords Sexual minority · LGBT · Gay · Lesbian · Homosexual · Suicide · Marriage · Registered partnership

Introduction

There is broad consensus that sexual minority individuals (e.g., lesbians, gay men, and bisexuals) are at increased risk for suicide attempts during their lifetimes [1–5]. However, evidence linking minority sexual orientation to similar increased risk for mortality attributable to suicide is sparse and inconsistent [1, 6–9]. Nordic countries, many now entering their third decade of legalized same-sex partnerships, offer a unique opportunity to investigate this potential health hazard given their extensive, interlinked administrative databases. It is of importance to identify whether minority sexual orientation is a risk factor for suicide. These findings will have implications for future public health interventions, e.g. through targeted prevention programs.

Worldwide, the largest registry-based studies investigating sexual orientation as a risk indicator for suicide have emerged from Denmark [10, 11]. Using data from the early years of official same-sex partnerships (1990–2001), Mathy et al. found that deaths attributable to suicide among women in current or former same-sex registered domestic partnerships (RDP) was slightly greater than that seen among currently heterosexually married women (IRR 1.65,

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95 % CI 0.74–3.68). RDP men evidenced an eight-fold risk, as compared to heterosexually married men. Recently, a more extensive nationwide Danish study [11] compared suicide risk between individuals who had ever been same-sex married to currently different-sex married individuals using information from the 12 year period between 2000 and 2011. After adjusting for demographic and socioeconomic confounders, this study also observed higher suicide risk in those who had ever been same-sex married. Same-sex married women experienced more than a sixfold increased suicide risk when compared to different-sex married women. Similarly, same-sex married men evidenced more than a fourfold increase in risk when compared to different-sex married men.

Denmark and Sweden are similar in two regards. Denmark initially gave legal standing with an RDP structure to same-sex partnerships in 1989, a process that Sweden followed and allowed same-sex couples to legalize their unions beginning in 1995 with Registered Partnership (RP) designation [12]. In 2009, Sweden went even further and adopted a fully gender-neutral marriage legislation, granting same-sex couples the same rights as heterosexual couples. Further, both Denmark and Sweden have been experiencing secular trends of reductions in suicide mortality over time, though suicide levels were initially higher in Denmark than in Sweden until the late 1990s [13]. On the other hand, same-sex marriage is somewhat more common in Denmark than in Sweden [14], perhaps reflecting a higher prevalence of minority life-styles in Denmark as compared to Sweden. Whether same-sex married individuals in Sweden experience elevated risk for suicide as compared to different sex married individuals is unknown.

Materials and methods

We conducted a population-based study in Sweden to investigate whether individuals in same-sex marriages (or registered partnerships) who by proxy are likely to be lesbian, gay, or bisexual, have higher risk for suicide than different-sex married individuals, who by proxy are likely to be heterosexual. We also conducted sex-stratified analyses to identify possible sexual orientation related differences among women and men separately, as evidence from Denmark and the United States is suggestive that sexual minority women are particularly vulnerable to suicide when compared to other women.

To address these questions we took advantage of the extensive and high quality nationwide Swedish registers, covering the period just following legalization of RP (1996–1999) and also the more recent years (2000–2011).

Registers

Construction of the population-based cohort study was made possible by the large number of high quality nationwide Swedish registers. Each Swedish resident is assigned a unique personal identity number which we used to link information from the administrative registers below [15].

- The Longitudinal Integration Database for Health Insurance and Labor Market Studies (LISA) is a central database held by Statistics Sweden, LISA includes family and individual data on socioeconomic parameters, with complete national coverage since 1990.
- The Swedish National Patient Register (NPR) records all admissions to any psychiatric or general hospital since 1973 and has almost complete coverage [16]. From 2001 and onwards, NPR also records specialized out-patient care delivered in Sweden. In Sweden, health care is publicly funded and accessible to all residents for a low fee.
- The Causes of Death Register contains information on all deceased Swedish residents since 1952. In the event of a death, physicians are required to ascertain the cause of death and submit a death certificate to the National Board of Health and Welfare. There, all medical diagnoses and injuries reported on the death certificate are translated into international classification of disease (ICD) codes. A computerized process then selects the underlying cause of death. Information in the register has been shown to have high validity with cause of death absent in only 0.5 % of deaths [17].

Study population

Newly partnered or married residents of Sweden during the intervening period between January 1st, 1996 and December 31st 2009 were identified in LISA ($n = 1188,181$). Same-sex registered partners and same-sex married individuals were grouped together and are hereafter referred to as “same-sex married”.

Suicide

We defined suicide as having an underlying cause of death in the Causes of Death Register (1997–2011), coded according to the international classification of disease (ICD) as (ICD-10: X60-X84) or as death undetermined intent (ICD-10: Y10-Y34). The latter reduces spatial and secular trends in detecting and classifying cases of suicide where intent is indeterminable [18, 19]. As LISA records the civil status as of December 31st each year, our follow-up began in January 1997. The omission of observations

for the first year of observation is due to restrictions imposed on us by Statistics Sweden.

Covariates

Using information available in the LISA register, we also included the following covariates in our analyses: sex, age in years (categorized as: 18–29, 30–39, 40–49, 50+), country of birth (categorized as: Sweden, other Nordic countries, non-Nordic European countries, other non-European countries), type of place of residency (collapsed into the following three categories: larger cities including suburbs, medium sized municipalities including suburbs or smaller municipalities), highest educational attainment (9 years or less, 10–12 years, and 13 years or more), and any co-residence with children aged less than 18 years in the 3 year period between onset of partnership or marriage and the two subsequent years (coded as yes/no). Because HIV-infection may be a risk for early mortality [7] we also included as a covariate HIV-infection defined as any main or contributing diagnosis (ICD-10: B20-B24) in the NPR medical care records from 1997 and onwards.

Statistical analysis

We assessed person-years at risk, i.e. “exposed” to same-sex marriage or “exposed” to different-sex marriage, from year of marriage until year of suicide, other death, dissolution of the marriage due to divorce or widowhood, or until the end of follow-up (12/31/2011). In the case that an individual was both same-sex and different-sex married during the period under study (14 % of same-sex married individuals), we treated the individual as same-sex married and counted only the years same-sex married as time at risk.

Multivariate Poisson regression Analyses were conducted using SAS v. 9.1 (SAS Institute Inc. Cary, NC, USA) in order to calculate incidence rate ratios (IRR) and their estimated 95 % confidence intervals (CI). We conducted both total sample and sex-stratified analyses adjusting for potential confounders in two sequential models: (1) Model 1 adjusted for sex (where the analysis was not sex-stratified), age and country of birth; (2) Model 2 additionally adjusted for place of residence, educational attainment and living with children. In a third model limited only to men, we further adjusted for HIV-infection as it has been shown that sexual minority men have far higher HIV prevalence than what is observed among heterosexual men [7].

Results

The study population comprised 1,188,181 individuals whereof 6,458 were same-sex married (Table 1). Women and men were evenly distributed among same-sex married individuals.

Marital type was associated with several individual characteristics for both women and men. Same-sex married individuals, as opposed to different sex married individuals were more likely to be older at time of marriage ($p < .0001$), live in larger cities ($p < .0001$), and possess higher levels of educational attainment ($p < .0001$). The last was especially true among same-sex married women where 45 % evidenced a college education, as compared to 35 % of different-sex married women. Same-sex married women were also more likely to be born in Sweden than different-sex married women ($p < .0001$). In contrast, same-sex married men were more likely to be born abroad and especially in other Nordic countries as compared to different-sex married men ($p < .0001$).

A higher proportion of different-sex married individuals were living with children within the first 3 years of their marriage, 63 % of women and 58 % of men, compared to both same-sex married women (50 %), and same-sex married men (8 %) ($p < .0001$). HIV-infection was rare, though 3.5 % of same-sex married men received an HIV-related diagnosis during the period under study.

There were 865 individuals who committed suicide during follow-up; three were same-sex married women and 9 were same-sex married men (Table 2). While relatively rare in general, suicide evidenced a rate of 18.6 per 100,000 person-years among same-sex married women as compared to 6.4 among different-sex married women. Similar estimates for men were 44.1 for same-sex married men as compared to 14.5 for different-sex married men.

Overall, the risk of suicide was higher among same-sex married individuals as compared to different-sex married individuals (IRR 2.7, 95 % CI 1.5–4.8), after adjustment for time at risk and sociodemographic confounders (Table 2). In the sex-stratified analyses, we found somewhat elevated suicide risk among same-sex married women, as compared to different-sex married women (IRR 2.5; 95 % CI 0.8–7.7) though the confidence could not rule out chance differences. Same-sex married men revealed a highly elevated suicide risk as compared to different-sex married men (IRR 2.8; 95 % CI 1.5–5.5). Further, adjustment for HIV-infection (Model 3, Table 2) somewhat attenuated the IRR for suicide among same-sex married men (IRR 2.3; 95 % CI 1.2–4.8).

Table 1 Demographic characteristics at the time of marriage of individuals married in Sweden between 1996–2009, by sex and sexual orientation

Demographics	Women		Men		χ^2 <i>P</i> value
	Same-sex N (%)	Different-sex N (%)	Same-sex N (%)	Different-sex N (%)	
Total N (%)	3229 (50)	580,929 (49)	3229 (50)	600,794 (51)	
Age in years					<.0001
18–29	832 (26)	227,568 (39)	379 (12)	151,015 (25)	
30–39	1387 (43)	234,518 (40)	1071 (33)	277,191 (46)	
40–49	696 (22)	76,145 (13)	949 (29)	105,193 (18)	
50+	314 (10)	42,698 (7)	830 (26)	67,395 (11)	
Country of birth					<.0001
Sweden	2745 (85)	476,618 (82)	2463 (76)	491,318 (82)	
Other Nordic	166 (5)	18,259 (3)	239 (7)	16,479 (3)	
Other European	109 (3)	15,700 (3)	166 (5)	16,126 (3)	
Other world	209 (6)	70,352 (12)	361 (11)	76,871 (13)	
Place of residency ^a					<.0001
Large city	1934 (60)	252,803 (43)	2330 (72)	260,273 (43)	
Medium municipality	917 (28)	200,022 (35)	616 (19)	207,178 (35)	
Small municipality	378 (12)	127,383 (22)	281 (9)	132,469 (22)	
Missing	0 (0)	721 (0)	2 (0)	874 (0)	
Educational attainment					<.0001
9 years or less	323 (10)	67,126 (12)	409 (13)	85,238 (14)	
10–12 years	1408 (44)	294,949 (51)	1470 (45)	337,351 (56)	
13 years or more	1460 (45)	204,055 (35)	1268 (39)	164,276 (27)	
Missing	38 (1)	14799 (3)	82 (3)	13,929 (2)	
Living with children ^b					<.0001
No	1607 (50)	216,545 (37)	2972 (92)	252,328 (42)	
Yes	1622 (50)	364,384 (63)	257 (8)	348,466 (58)	
Prevalent HIV-infection					<.0001
No			3115 (96.5)	600,628	
Yes			114 (3.5)	166 (0.03)	

Statistical significance evaluated by χ^2 tests

^a At the time of marriage, based on the H-classification scheme(34)

^b Measured at the year of marriage and the two following years. Yes means living with a child at least 1 of these years

Discussion

In the current study, we capitalized on extensive, nationwide health care and administrative registers to investigate the question of whether sexual orientation is linked to suicide mortality in Sweden. Elsewhere, we have shown that sexual minority residents in Stockholm, Sweden, are more likely to have positive histories of both suicide attempts and treatment for suicide-related morbidity [20]. While we were unable here to measure sexual orientation directly, we were able to demonstrate that same-sex married, especially men, in Sweden, experience elevated risk for suicide when compared to their different-sex married peers.

This finding is consistent with results from two Danish register-based studies on suicide in sexual minorities. The first Danish study found no distinct difference for same-sex partnered women, but an eight-fold increased suicide risk among same-sex partnered men in Denmark between 1990 and 2001 [10]. The second nationwide Danish mortality study that used more recent data (2000–2011), found a highly elevated suicide risk in both same-sex married women (HR: 6.4) and same-sex married men (HR: 4.1), as opposed to their heterosexual peers [11]. Most of the risk estimates for suicide among same-sex married individuals in the Danish studies seem to be higher than the excess risks of suicide mortality found in our study. It might be that differences in the two settings, including differences in

Table 2 Number of suicides, suicide rates per 100,000 person-years, adjusted suicide incidence risk ratios (IRR) with 95 % confidence intervals (CI), by relationship status and sex in Sweden 1997–2011

Relationship status and sex	Number of suicides	Suicide rate/ 100,000	Number of person-years	Adjusted IRRs (95 % CI)		
				Model A ^a	Model B ^b	Model C ^{c,d}
<i>All</i>						
Same-sex married	12	32.8	36,547	2.3 (1.3–4.1)	2.7 (1.5–4.8)	–
Different-sex married	853	10.6	8,070,947	1 (REF)	1 (REF)	–
<i>Women</i>						
Same-sex married	3	18.6	16,138	2.4 (0.8–7.4)	2.5 (0.8–7.7)	–
Different-sex married	254	6.4	3,944,339	1 (REF)	1 (REF)	–
<i>Men</i>						
Same-sex married	9	44.1	20,409	2.3 (1.2–4.5)	2.8 (1.5–5.5)	2.3 (1.2–4.8)
Different-sex married	599	14.5	4,126,608	1 (REF)	1 (REF)	1 (REF)

Partial results of Poisson regression analyses are shown

^a Model A: Adjusted for age, sex (where not sex-stratified) and country of birth

^b Model B: With additional adjustment for: place of residency, educational attainment and living with children

^c Model C: With additional adjustment for HIV-infection (only men)

^d HIV only relevant for men

the health environment and the embracement of same-sex marriage among the general population in the two countries [14, 21], are related to this discrepancy.

Marriage has, in previous studies [22–24] been shown to be beneficial for health among different sex-married individuals, perhaps through positive personal changes in behavior and greater social inclusion, that improve mental and physical well-being. There is some evidence that this might be true also for sexual minority individuals. A recent study from the US found that being in a legally recognized same-sex relationship appeared to diminish mental health differentials between heterosexuals and lesbian, gay, and bisexual individuals [25].

Furthermore, the more recent Danish mortality study [11] found some evidence of declining overall mortality in same-sex married men, but not for women, during the first decade of the Twenty-first century. It could be that better-adjusted and healthier individuals are selected into marriage, which might explain the health differences with those not married—be they heterosexual or homosexual. In support of and adding to this notion, socioeconomically disadvantaged lesbian and gay individuals in the US, appear to be less likely to disclose their involvement in a same-sex cohabiting relationship than their socioeconomically advantaged peers [26].

Our study analyzed sexual minority individuals who legally register their relationships or get married and these are only a proportion of all sexual minority individuals in Sweden. Thus, the suicide risk among same-sex married individuals found in our study is likely an underestimation of the suicide risk among the general gay and lesbian population in Sweden, in the same way as the suicide risk among the

married are much lower than among the non-married in the general population. Further, the risk estimate for same-sex married women, did not reach statistical significance. This is likely due to the few cases and relatively short follow-up. A longer follow-up would most likely provide statistically significant estimates also for same-sex married women. This requires, however, further investigation.

Possible explanations of our findings include that sexual minority individuals experience anti-gay stigma and are at higher risk for depression than their heterosexual peers [27], which is the most prominent risk factor for suicide [28]. According to Meyer's minority stress model [29], the experience of prejudice events, expectations of rejection, hiding and concealing of one's sexual identity, internalized homophobia, and ameliorative coping processes are associated with the increased levels of mental ill health and suicidal behavior among sexual minorities [30].

Lastly, living with children is a protective factor for suicide [31] and a higher proportion of heterosexual women and men were living with children compared to same-sex married women and men in our study. This could therefore explain some of the difference in suicide risk between sexual minority and majority people in our study. However, due to the lack of suicides among same-sex married individuals living with children, we could not explore this issue further.

The strengths of this study include the use of prospective data in the manner of high quality nationwide registers and the large number of same-sex married individuals in the study population. Two study limitations warrant consideration in contextualizing the results reported here. First, as suicide is a rare event our estimates are still based on a small

number of event outcomes, which when related to a relatively small minority population make it hard to draw any conclusions for same-sex married women. Second, since we only capture suicides among officially partnered sexual minority individuals our results are not representable for all sexual minority individuals; just like suicide mortality in heterosexual married individuals is not comparable to the suicide rate in the general population [32, 33].

In conclusion, we found that sexual minority married individuals evidence a higher risk of suicide than other married individuals, after adjustment for confounders. This finding, call for targeted suicide prevention programs aimed at reducing suicide among sexual minority individuals.

Funding This work was supported by the Wenner-Gren Foundations and the Swedish Research Council (Vetenskapsrådet) via the Stockholm University SIMSAM Node for Demographic Research, Grant 340-2013-5164.

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