Mental health of sexual minorities. A systematic review

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ABSTRACT

Many studies, reviews, and meta-analyses have reported elevated mental health problems for sexual minority (SM) individuals. This systematic review provides an update by including numerous recent studies, and explores whether SM individuals are at increased risk across selected mental health problems as per dimensions of sexual orientation (SO), genders, life-stages, geographic regions, and in higher quality studies. A systematic search in PubMed produced 199 studies appropriate for review. A clear majority of studies reported elevated risks for depression, anxiety, suicide attempts or suicides, and substance-related problems for SM men and women, as adolescents or adults from many geographic regions, and with varied SO dimensions (behaviour, attraction, identity), especially in more recent and higher quality studies. One notable exception is alcohol-related problems, where many studies reported zero or reversed effects, especially for SM men. All SM subgroups were at increased risk, but bisexual individuals were at highest risk in the majority of studies. Other subgroup and gender differences are more complex and are discussed. The review supports the long-standing mental health risk proposition for SM individuals, overall and as subgroups.

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Introduction

Many studies have reported elevated mental health problems for sexual minority (SM) individuals, including lesbian, gay, bisexual (LGB), mostly heterosexual, or questioning individuals, compared to heterosexual counterparts. These findings have been replicated, but it is only since the 1990s that SM individuals have been sampled within the general population as opposed to LGB communities, the latter possibly producing biased results (Kuyper et al., 2015).

A few meta-analyses reported statistically significant disparities for SM compared to heterosexual individuals for most assessed mental health disorders, substance use problems, and suicidality (King et al., 2008; Marshal et al., 2008, 2011; Plöderl et al., 2006). However, these meta-analyses often collapsed SM into one group, possibly because older studies did not report results for SM subgroups, or to increase statistical power, nonetheless blurring the differences between subgroups (Savin-Williams, 2008). For example, bisexual individuals commonly have higher levels of mental health problems than homosexual individuals (Marshal et al., 2008, 2011) and this could distort estimations of other SM subgroups. Studies have often also used different dimensions of sexual orientation (SO) (identification, behaviour, attraction) that impacts the SO differences (Bostwick et al., 2010). Moreover, SO differences have varied with gender and type of mental health problem (Marshal et al., 2008; Plöderl et al., 2006).

Most importantly, a substantial number of studies have been published since the analyses mentioned, thus necessitating an update. Because of the studies’ methodological diversity we opted for a systematic review without meta-analytic aggregation. The review is organized according to these questions:

Is the often reported increased risk for mental health problems of SM individuals apparent

• in light of recent studies?
• within subgroups of SM (e.g. gay, lesbian, bisexual, questioning)?
• for men and women?
• for adolescents and adults?
• across dimensions of SO?
• for different types of mental health problems?
• in higher quality studies?

Method

PubMed was searched with two sets of keywords combined with the AND operator. The first set included
SO key words (gay, lesbian, homosexual, homosexuality, sexual orientation, same-sex sexual) and the second set had mental health key words (suicide, self-harm, mental health, mental disorders, depression, anxiety, drug use, alcohol use, drug abuse, alcohol abuse, drinking problems), all separated with OR. We used the results of an existing search (Plöderl et al., 2006) with publications to 31 August 2005, producing 2508 hits. We complemented this with a publication search from 1 September 2005, to 31 December 2014, producing 1942 hits, for a total of 4450 results.

The study titles and abstracts were screened using a dual selection criteria: First, only studies that did not selectively recruit SM individuals but used pre-specified, defined populations such as countries, states, counties, districts, cities, regions, schools, universities, birth-cohorts, large occupational groups (nurses, veterans), and registers of general practitioners. Studies from social networking sites (e.g. Facebook groups, online newspaper readers) were excluded because the sample was not pre-specified. Only studies with a comparison heterosexual group were included.

Second, we included studies reporting on depression or depressive mood, distress, anxiety and anxiety disorders, alcohol and substance use (and related disorders), suicide attempts and suicides. If other psychiatric disorders or indicators of mental distress were reported, results were only reported in the supplementary table. For the behaviour dimension of SO, we did not report the results for sexually inactive individuals.

In the text and table, ‘effects’ refer to SO differences, with heterosexuals always as the reference group. Similarly, for subgroups (e.g. men, older groups), the reference group is always the heterosexual counterpart within the subgroup (e.g. male heterosexual, older heterosexuals). For example, when we compare homosexual and bisexual SM subgroups, we compare the SO differences of homosexual versus heterosexual with the SO difference bisexual versus heterosexuals. Reported effect sizes (odds ratios, risk ratios, hazard ratios, Cohen’s d) were used when the control variables were not problematic (e.g. age, education). When variables were known to differ crucially by SO (e.g. partnership status, marriage, health-related variables), we either used the unadjusted effect sizes or, if possible, they were calculated (see the footnote to the table for details). We used the following interpretations of effect sizes for ORs and RR: zero/close to zero difference (1.0–1.2), small (1.3–2.0), medium (2.1–3.5), and large (> 3.5). These interpretations follow conventions (Breughe, 2003; Ferguson, 2009; Haddock et al., 1998), except that we categorized very small effects as ‘zero or close to zero’ difference (OR/RR ≤ 1.2, d ≤ 0.1). To formulate summarizing statements, we tabulated the effect sizes, avoiding using multiple studies on the same data set (as marked in the supplementary table). This way we could calculate the fraction of the study findings with certain effect sizes, allowing an approximation of the overall effect size. One study could produce several entries in the table, for example when results for different dimensions of SO or for SM subgroups were reported.

Results

A total of 199 studies fulfilled review criteria; 95% were published in the new millennium, 82% since 2006 and 53% since 2011. The tabulated study descriptions and outcomes are available as an online supplement. Two longitudinal studies from adolescence to young adulthood are reported separately. The results for different assessment methods (clinical interview, questionnaire, single items, diagnosis/treatment by doctor) are separated.

Description of the studies

In total, 26 studies (13%) are of higher quality, defined as representative national studies using clinical interviews; 27% of studies are of special importance because results were separated by sex and by homosexual/LG and bisexual status. Only one study provided separate analyses for transgender individuals (Rath et al., 2013), but small sample size precluded reliable results only reported in the online supplement. Most studies (76%) were from the USA or Canada, 15% from Europe, 6% from Australia or New Zealand, and 2% from Asia or Mexico.

Depression

Adults

A clear majority of study results (89%) indicated elevated levels/rates of depression in general or across SM subgroups in all dimensions of SO (behaviour, attraction, identity), for both genders, age groups, regions, and in more recent studies. These findings were replicated using varied assessment methods: structured clinical interviews or medical chart (Booth et al., 2012; Chakraborty et al., 2011; Cochran & Mays, 2000a, 2000b; Cochran et al., 2003; Fergusson et al., 1999, 2005; Frisell et al., 2010; Gattis et al., 2012; Gilman et al., 2001; Hatzbenuehler et al., 2009; Mattocks et al., 2013; Said et al., 2013; Sandfort et al., 2001), questionnaires (Bagley & Tremblay, 1997; Cochran & Mays, 2009; Frisell et al., 2010; Grant et al.,
Albright, 2014; Steele et al., 2009; Tjepkema, 2008). & Wyatt, 2011; Pakula & Shoveller, 2013; Pelts & 2014; Matthews & Lee, 2014; McNair et al., 2011; Oswalt 2014; Hughes, Szalacha, & McNair, 2010b; Lytle et al., 2014; Matthews & Lee, 2014; McNair et al., 2011; Oswalt & Wyatt, 2011; Pakula & Shoveller, 2013; Pelts & Albright, 2014; Steele et al., 2009; Tjepkema, 2008).

Few study results (11%) indicated close to zero differences or reversed effects in specific subgroups, with no clear-cut pattern (see supplementary table) (Bostwick et al., 2010; Cheng et al., 2014; Cochrans & Mays, 2009; Cochrans et al., 2007; Gattis et al., 2012; McNair et al., 2005, 2011; Sandfort et al., 2009; Schauer et al., 2013; Skegg et al., 2003). Overall, most of the effects were medium for men and small for women (39% and 50% of study results, respectively).

**Adolescents**

A clear majority of studies (97%) reported elevated levels of depression in general or across SM subgroups, and across dimensions of SO (identity, behaviour, attraction). These findings were replicated using questionnaires (Almeida et al., 2009; Bos et al., 2008; Denny et al., 2014; Hatzenbuehler et al., 2008b; Johnson et al., 2011; Lucassen et al., 2014; Marshal et al., 2013a, 2013b; Martin-Storey & Crosnoe, 2012; Pesola et al., 2014; Poteat et al., 2009), and single items (including items on core symptoms, i.e. sadness/hopelessness) (Birkett et al., 2009; Hatzenbuehler et al., 2012; Jiang et al., 2010; Kann et al., 2011; Lampinen et al., 2006; Mustanski et al., 2014; Seil et al., 2014; Shields et al., 2012; Zhao et al., 2010). Reversed or close to zero differences were reported only in specific subgroups in the Add Health/GUTS studies (see below) and for white LGB men in one study (Poteat et al., 2009). Most of the effects were small (37%) or medium (40%).

**Add health and guts study**

In the Add Health study, elevated depression among SM adolescents was reported in wave I (adolescence) across subgroups (Russell & Joyner, 2001; Ueno, 2010b; Williams & Chapman, 2011) and for all assessed subgroups (Marshal et al., 2013a). No or reversed effects were reported for LG, mostly LG, bisexual individuals, but not for mostly heterosexuals (Cardom et al., 2013). In wave II (adolescence), significant effects were reported overall (Teasdale & Bradley-Engen, 2010; Ueno, 2010b) and for all assessed subgroups (Marshal et al., 2013a). In wave III (young adulthood), elevated depression levels were reported overall (Ueno, 2010b), and for all assessed subgroups (Marshal et al., 2013a; McLaughlin et al., 2012; Needham & Austin, 2010). In two studies there were only significant effects or effects with substantial evidence for bisexual and mostly heterosexual individuals (Loosier & Dittus, 2010; Savin-Williams et al., 2010). In wave IV (young adulthood), elevated depression levels applied for all subgroups (Marshal et al., 2013a; Strutz et al., 2015). No or reversed effects for LG and mostly LG but effects for bisexuals and mostly heterosexuals were reported in one study (Cardom et al., 2013), and close to zero effect only for male youths with attraction and some other SO indicator (Strutz et al., 2015). More complex patterns were reported in one study where significant effects applied only for women identified as mostly heterosexual, bisexual, and mostly lesbian, but not lesbians; for bisexual but not same-sex attracted, only for mostly heterosexual behaviour and, among men, only for mostly heterosexual identity and behaviour (Lindley et al., 2012).

In the GUTS study, elevated levels of depression applied for all identity subgroups (LG/mostly LG, bisexual, mostly heterosexual) except questioning individuals (Rosario et al., 2014a, 2014b).

**Lifetime versus past year**

The results are mixed: some studies had comparable effects for lifetime and past year depression (Frisell et al., 2010; Gilman et al., 2001; Sandfort et al., 2001) while others reported larger lifetime effects (Barnes et al., 2010), with some having mixed results, depending on subgroups (Bostwick et al., 2010; Cochrans et al., 2007).

**Subgroup differences**

Bisexual individuals had larger effects than homosexual individuals in a slight majority of studies (Bagley & Tremblay, 1997; Bostwick et al., 2010; Cardom et al., 2013; Denny et al., 2014; Hughes et al. 2010b; Jorm et al., 2002; Kerr et al., 2013; Loosier & Dittus, 2010; Marshal et al., 2013a; McLaughlin et al., 2012; McNair et al., 2011; Roberts et al., 2013; Rosario et al., 2014b; Said et al., 2013; Savin-Williams et al., 2010; Schauer et al., 2013; Steele et al., 2009; Tjepkema, 2008). Larger effects for bisexuals than homosexuals were sometimes reported only among women but not men (Cochran & Mays, 2009; Ziyadeh et al., 2007), or reversed (Needham & Austin, 2010). Bisexuals had comparable or smaller
effects than homosexuals in several other studies (Brennan et al., 2010; Cochran & Mays, 2000b; Diamant & Wold, 2003; Lhomond et al., 2014; McNair et al., 2005; Mustanski et al., 2014; Rath et al., 2013; Rosario et al., 2014a; Sandfort et al., 2009; Skogg et al., 2003; Wang et al., 2014). In the adolescent Youth Risk Behavior Surveys (YRBS), bisexuals had larger effects than homosexuals for the behaviour dimension but not for the identity dimension (Kann et al., 2011), noting that the risk may vary by SO for sexually inactive individuals.

Mostly heterosexuals had larger effects than homosexuals in some studies (Cardon et al., 2013; Lindley et al., 2012; Loosier & Dittus, 2010; Marshal et al., 2013a), or only among women (Ziyadeh et al., 2007), or only among men (Cochran & Mays, 2009). In contrast, more studies reported that mostly heterosexuals had comparable or smaller effects than homosexuals (Bloomfield et al., 2011; Fergusson et al., 2005; Lhomond et al., 2014; McNair et al., 2005; McNair et al., 2011; Wang et al., 2014; Zhao et al., 2010).

Questioning individuals, compared to homosexuals, had larger SO differences in some studies (Birkett et al., 2009; Poteat et al., 2009; Rath et al., 2013), but the reverse was reported in other studies (Kann et al., 2011). Heterosexual-identified individuals with same-sex attraction or behaviour had somewhat smaller effects than gay/lesbian identified with concordant behaviour/attraction (Gattis et al., 2012).

**Gender**

A weak majority of studies reported larger effects for men than for women. Comparable effects for SM men and women were reported in some studies (Almeida et al., 2009; Cheng et al., 2014; Frissell et al., 2010; Grella et al., 2011; Lhomond et al., 2014; Lucassen et al., 2014; Matthews & Lee, 2014; Needham, 2012; Pearson & Wilkinson, 2013; Pesola et al., 2014). More studies reported larger effects among SM men (Bostwick et al., 2010; Cochran & Mays, 2000b, 2009; Cochran et al., 2003; Fergusson et al., 2005; Gruskin & Gordon, 2006; Pakula & Shoveller, 2013; Remafedi et al., 1998; Sandfort et al., 2001; Skegg et al., 2003), fewer reported larger effects among SM women (Cochran et al., 2007; Gilman et al., 2001; Lindley et al., 2012; Needham, 2012; Ueno, 2010b). There were occasional mixed findings, depending on age or SO subgroups (Bostwick et al., 2010; Gattis et al., 2012; Sandfort et al., 2009).

**Higher quality studies**

A clear majority of high quality studies reported elevated levels of depression (Chakraborty et al., 2011; Cochran & Mays, 2000a, 2000b; Cochran et al., 2003; Fergusson et al., 1999; Frissell et al., 2010; Gattis et al., 2012; Gilman et al., 2001; Hatzenbuehler et al., 2009; Sandfort et al., 2001), with only few exceptions among men (Cochran et al., 2007) or women for past year depression (but not lifetime) (Sandfort et al., 2001), or among heterosexual identified women with homosexual experience (Cochran & Mays, 2009).

**Other mood disorders**

The majority of studies reported elevated bipolar disorder incidences for SM individuals (Cochran & Mays, 2000a; Mattocks et al., 2013; Pelts & Albright, 2014; Sandfort et al., 2001) except bipolar I in one study with all other mood disorders elevated – thus perhaps a false positive result (Cochran & Mays, 2000a); dysthymia (Bostwick et al., 2010; Cochran & Mays, 2000a; Hatzenbuehler et al., 2009; Sandfort et al., 2001), or mania (Bostwick et al., 2010; Hatzenbuehler et al., 2009), and for any mood disorder (Barnes et al., 2014; Bolton & Sareen, 2011; Hatzenbuehler et al., 2009). However, a very complex pattern emerged where elevated levels were reported across SO dimensions among men and women except in women identifying as unsure, and women homosexually attracted or behaving so (Bostwick et al., 2010).

**Summary**

A great majority of studies reported elevated levels of depression for all SM subgroups in all dimensions of sexual orientation (behaviour, attraction, identity), for both genders, age groups, regions, and in more recent studies. Most effects were small or medium. Regarding subgroups, compared to homosexuals/LG individuals, the majority of studies reported the largest effects for bisexual individuals, whereas results for mostly heterosexual and questioning individuals are mixed. For SO identities, LG and bisexual individuals were comparable. More studies reported larger SO differences for men rather than the opposite, but several studies had comparable male and female effects. Studies of higher quality are in line with other studies. The few findings for other mood disorders (e.g. bipolar, dysthymia) are similar to depression.

**Attempting suicide and suicides**

**Adults**

Nearly all study results (98%) indicated elevated attempted suicide rates in general or across SM
subgroups, genders, dimensions of SO (identity, behaviour, attraction), regions, and in more recent studies. This outcome applied for lifetime suicide attempts (Bagley & Tremblay, 1997; Blosnich et al., 2014b; Chakraborty et al., 2011; Cochran & Mays, 2000a; Cochran et al., 2007; de Graaf et al., 2006; Ferguson et al., 1999; Gilman et al., 2001; Herrell et al., 1999; Husky et al., 2013; Lhomond & Saurel-Cubizolles, 2006; Oswalt & Wyatt, 2011; Pelts & Albright, 2014; Skegg et al., 2003; Wang et al., 2012; Wichstrom & Hegna, 2003), attempting suicide in the past 12 or 6 months (Blosnich & Bossarte, 2012; Cochran et al., 2007; Gilman et al., 2001; Hughes et al., 2010b; Kerr et al., 2013; Lhomond & Saurel-Cubizolles, 2006; Lian et al., 2015; Lytle et al., 2014; McNair et al., 2005; Oswalt & Wyatt, 2011; Reed et al., 2010; Wang et al., 2012, 2014), or in the past five years (Fergusson et al., 2005). Most of the effects were large (58%).

Adolescents

Similarly, nearly all study results (98%) indicated elevated attempted suicide rates for SM adolescents for lifetime suicide attempts (Button et al., 2012; Eisenberg & Resnick, 2006; McMahon et al., 2012; O’Connor et al., 2009b, 2014; Remafedi et al., 1998; Wang et al., 2012), past year attempts (Almeida et al., 2009; Bostwick et al., 2014; Denny et al., 2014; DuRant, Krowchuk, & Sinal, 1998; Faulkner & Cranston, 1998; Fleming et al., 2007; Garofalo et al., 1998; Hatzenbuehler, 2011; Hatzenbuehler et al., 2014; Jiang et al., 2010; Kann et al., 2011; Lucassen et al., 2014; Madge et al., 2011; Marshall et al., 2012b, 2013b; Mustanski et al., 2014; Olshen et al., 2007; Pinhey & Millman, 2004; Robin et al., 2002; Saewyc et al., 2007; Seil et al., 2014; Shields et al., 2012; Stone et al., 2014a, 2014b; Taliaferro & Muehlenkamp, 2014; Wang et al., 2012; Zhao et al., 2010), in a 6-month follow-up period (O’Connor et al., 2009a), and in one study without a given timeframe (Lampinen et al., 2006).

Reversed or close to zero differences were uncommon (2%) and only reported in specific subgroups (see supplementary table) (Olshen et al., 2007; Saewyc et al., 2007; Skegg et al., 2003; Zhao et al., 2010), and in the Add Health studies for certain waves and subgroups (see below). Overall, most of the effects were large (47%) or medium (33%).

Add health study

In the Add Health wave I study, SM young people had elevated rates of past year suicide attempts overall (Russell & Joyner, 2001; Williams & Chapman, 2011), for all subgroups (mostly heterosexual, bisexual, mostly LG), except for LG depressed youths in one study (Cardom et al., 2013). Similar effects applied (no subgroup analysis) in wave II (Fried et al., 2013) and wave III (Fried et al., 2013; Silenzio et al., 2007). In wave IV, elevated attempted suicide rates were reported for minority women but reversed effects existed for all dimensions among men (Almazan et al., 2014). In one study of men and women combined, a negative effect was reported only for mostly LG, not for all other SM subgroups (mostly heterosexuals, bisexuals, LG) (Cardom et al., 2013).

Lifetime versus past year

There are mixed findings: larger effects for lifetime compared to past year attempts were reported in some studies (Hidaka et al., 2008; Wang et al., 2012), but not in others (Cochran et al., 2007; Lhomond & Saurel-Cubizolles, 2006), with comparable effects sometimes reported (Gilman et al., 2001; Oswalt & Wyatt, 2011).

Subgroup differences

The majority of studies reported the largest effects for bisexual individuals, compared to homosexuals (Bagley & Tremblay, 1997; Blosnich & Bossarte, 2012; Denny et al., 2014; Hatzenbuehler, 2011; Hatzenbuehler et al., 2014; Hughes et al., 2010b; Kerr et al., 2013; Olshen et al., 2007; Robin et al., 2002; Wang et al., 2014), with only a few studies reporting comparable or smaller effects among bisexual compared to homosexual individuals, sometimes only in subgroups (Button et al., 2012; McNair et al., 2005; Saewyc et al., 2007) However, the dimension of SO is crucial, as bisexuals had elevated risk only for the behavioural dimension but not the identity dimensions in adolescents (Kann et al., 2011; Stone et al., 2014b), a detailed description being available elsewhere (Ramsay & Tremblay, 2015).

Many studies reported that mostly heterosexuals had comparable or smaller effects than homosexual individuals (Fergusson et al., 2005; McNair et al., 2005; Saewyc et al., 2007; Wang et al., 2014), and one study reported the opposite (Hughes et al., 2010b). Those questioning their identity had smaller effects than homosexuals (Hatzenbuehler et al., 2014; Kann et al., 2011; Stone et al., 2014b; Zhao et al., 2010).

Gender

A clear majority of studies reported larger effects among men, compared to women (Almeida et al., 2009; Cochran et al., 2007; de Graaf et al., 2006; Hidaka et
al., 2008; Husky et al., 2013; Lucassen et al., 2014; O’Connor et al., 2009b, 2014; Olshen et al., 2007; Pinhey & Millman, 2004; Remafedi et al., 1998; Saewyc et al., 2007; Skegg et al., 2003); only one study reported an opposite effect (Almazan et al., 2014). Comparable effects among men and women were reported in a few studies (Bostwick et al., 2014; Eisenberg & Resnick, 2006; Russell & Joyner, 2001; Stone et al., 2014a, 2014b).

**Higher quality studies**

All higher quality studies reported increased risks for attempting suicide among SM individuals, with exceptions for suicides.

**Suicides**

Only a few studies about death by suicide are available. In the Danish registry data, same-sex-registered partners had higher rates of suicide compared with heterosexual married individuals. This difference was of medium size in the first study (men and women combined) (Qin, Agerbo, & Mortensen, 2003). In a second study, the effect was large for men and small for women (Mathy et al., 2011) but medium for men and large for women in a third study (Frisch & Simonsen, 2013). The latter study also reported higher suicide rates for long-term same-sex cohabiting compared to opposite-sex cohabiting individuals (medium effect among men, small for women). No suicide occurred in the male NHANES study among the 85 men who had sex with men at least once in life (Cochran & Mays, 2011) but the study is underpowered and thus highly inconclusive (Plöderl et al., 2013). Furthermore, the study sample is likely compromised given that 98% of homosexually oriented suicide attempters (lifetime) were in the 17–29 age group, and essentially none in the 30 to 39 age group, whereas the heterosexual suicide attempter percentages were not significantly different in both age groups. Thus, a significant proportion of at-risk SM men may not have participated in the study (Tremblay, n.d.). In the General Social Survey, SM status was based on any lifetime sexual behaviour and SM men had non-significant lower suicide rates (medium effect), SM women had significantly higher rates (large effect) (Cochran & Mays, 2015). In two psychological autopsy studies with living control groups, SM young people were over-represented in deaths by suicide (Renaud et al., 2010; Shaffer et al., 1995). In the original study, a no-difference effect was reported, but this is incorrect, and the effect size is large (Plöderl et al., 2013)

**Summary**

Nearly all studies reported elevated rates of suicide attempts in general or across SM subgroups in all dimensions of sexual orientation (behaviour, attraction, identity), for both genders, age groups, regions, and in more recent studies. Most effects were large. Regarding subgroups, compared to homosexuals/LG individuals, the majority of studies produced larger effects for bisexuals, comparable or smaller effects for mostly heterosexuals and smaller effects for questioning individuals. With respect to SO identity, the differences between bisexual and LG individuals were less pronounced or absent. The majority of studies had larger SO differences for men than women. Studies of higher quality are in line with other studies. Only a few studies of SM suicide exist. The youth autopsy studies had an SM over-representation and the Danish data produced elevated rates of suicide for same-sex-registered partners or households with long-term cohabiting same-sex adults. Of two US follow-up studies, one is too underpowered and inconclusive, and the other reported an increase of suicide rates among same-sex active women but not men.

**Anxiety disorders**

**Adults**

A majority of study results (83%) indicated elevated levels of anxiety or rates of anxiety disorders (panic attacks (PD), generalized anxiety disorders (GAD), phobias) in general or across SM subgroups in all dimensions of SO (behaviour, attraction, identity), for both genders, age groups, regions, and in more recent studies.

These findings were replicated for varied assessment methods: structured clinical interviews or medical charts (Barnes et al., 2014; Bolton & Sareen, 2011; Bostwick et al., 2010; Chakraborty et al., 2011; Cochran & Mays, 2000b, 2009; Cochran et al., 2003, 2007; Fergusson et al., 1999, 2005; Frisell et al., 2010; Gattis et al., 2012; Gilman et al., 2001; Hatzenbuehler et al., 2009; Sandfort et al., 2001), questionnaires (Jorm et al., 2002; Rath et al., 2013; Said et al., 2013), single items (Kerr et al., 2013; McNair et al., 2005; Oswalt & Wyatt, 2011; Sandfort et al., 2009), and treatment/diagnosis by professionals, as reported by participants (Brennan et al., 2010; Burgess et al., 2007; Grant et al., 2014; Hughes et al. 2010b; McNair et al., 2005, 2011; Oswalt & Wyatt, 2011; Pelts & Albright, 2014; Tjepkema, 2008).

Some study results (17%) indicated close to zero differences or reversed effects among women (Cochran et al., 2007) or for more specific SM subgroups, anxiety
disorders, age groups, or period of assessment. However, no specific pattern emerged (see supplementary table) in these studies (Bolton & Sareen, 2011; Bostwick et al., 2010; Cochran & Mays, 2009; Gilman et al., 2001; McNair et al., 2005; Oswalt & Wyatt, 2011; Sandfort et al., 2001, 2009). Most of the effects were small (35%) or medium (39%) sized.

**Adolescents**

All of the few studies reported elevated levels of anxiety among SM youths, either assessed by questionnaires (Hatzenbuehler et al., 2008b; Marshal et al., 2012b, 2013b; Williams & Chapman, 2011) or via diagnosis by health professionals, as reported by the young people (Strutz et al., 2015). The effects were mostly medium sized.

**Lifetime versus past year**

The results were comparable for lifetime and past year assessments (Barnes et al., 2014; Bostwick et al., 2010; Cochran et al., 2007; Gilman et al., 2001; Sandfort et al., 2001, 2009).

**Subgroup differences**

For bisexuals, the findings are mixed. Bisexuals had larger effects than homosexual/LG in several studies (Hughes et al. 2010b; Jorm et al., 2002; Kerr et al., 2013; McNair et al., 2005, 2011; Said et al., 2013; Tjepkema, 2008), or only among women (but reversed for men) (Bolton & Sareen, 2011; Bostwick et al., 2010). In several other studies bisexuals had comparable or smaller effects than homosexual/LG individuals (Brennan et al., 2010; Fergusson et al., 2005; Oswalt & Wyatt, 2011; Rath et al., 2013; Sandfort et al., 2009) or only among the older women (McNair et al., 2005). Mostly heterosexuals had comparable or smaller effects than homosexuals (Hughes et al. 2010b; McNair et al., 2005, 2011) and there was a complex pattern in one study (Bostwick et al., 2010). Questioning individuals had smaller than or comparable effects to homosexuals (Bolton & Sareen, 2011; Bostwick et al., 2010; McNair et al., 2005; Oswalt & Wyatt, 2011; Rath et al., 2013).

A complex pattern occurred for panic attacks and generalized anxiety disorder for LG, bisexual, and mostly heterosexual men and women (Cochran & Mays, 2009). In one study, men and women identified as heterosexual, but with some homosexual behaviour or attraction, scored between behaviour concordant heterosexuals and homosexuals for GAD, except for heterosexual women with homosexual behaviour who had lower levels than concordant heterosexual women (Gattis et al., 2012).

**Gender**

Most studies reported larger effects among men than women (Cochran & Mays, 2000b; Cochran et al., 2007; Frisell et al., 2010; Sandfort et al., 2001), but this was only for homosexual and not bisexual men in one study (Bolton & Sareen, 2011). One study had comparable effects for men and women (Strutz et al., 2015) and some reported mixed findings, depending on the SO subgroup (Bostwick et al., 2010; Tjepkema, 2008) or type of anxiety disorder (Cochran et al., 2003).

**Higher quality studies**

The results of high quality studies are in line with other studies. The majority reported elevated anxiety problems/disorders for SM men and women (Barnes et al., 2014; Bolton & Sareen, 2011; Chakraborty et al., 2011; Cochran & Mays, 2000a; Cochran et al., 2003; Fergusson et al., 1999, 2005; Frisell et al., 2010; Hatzenbuehler et al., 2009), and many studies reported negative findings for women (Bostwick et al., 2010; Cochran & Mays, 2009; Cochran et al., 2007; Gattis et al., 2012; Gilman et al., 2001, 2009) or men (Gilman et al., 2001).

**Summary**

A clear majority of studies on adults and all adolescent studies reported elevated SM anxiety levels, rates in general or across different dimensions of SO (identity, behaviour, attraction), genders, age groups, regions, and in more recent studies. Zero or reversed effects were reported in some studies, mostly for female adults, and for some subgroups of SM. Most effects were small or medium. Regarding subgroups, compared to homosexuals and LG individuals, bisexuals had elevated levels or rates in several studies but comparable in others. Mostly heterosexual and questioning individuals had comparable or smaller differences than homosexuals. The majority of studies reported larger effects for men than women. Studies of higher quality are in line with other studies.

**Alcohol and drug use**

To reduce complexity, only recent binge or risky drinking, alcohol dependency (AD), drug dependency (DD) and recent use of illicit drugs (including marijuana) are summarized. For drug use/disorder, the majority of study results (93% for adults and 94% for
adolescents) indicated an increased risk among SM individuals in general or across SM subgroups in all dimensions of SO (behaviour, attraction, identity), for both genders, age groups, regions, and in more recent studies. For alcohol abuse/dependence, the results were mixed, and the majority of study findings for adults indicated no or reversed effects (31%) or small effects (32%) especially for men and certain SM subgroups (for adolescents, 35% of effects were zero or reversed and 52% were small, respectively).

**Adults**

SM adults had higher levels or rates in studies with structured clinical interviews or medical chart: alcohol (Barnes et al., 2014; Booth et al., 2012; Chakraborty et al., 2011; Cochran & Mays, 2009; Cochran et al., 2003; Drabble et al., 2005; Farmer et al., 2013b; Fergusson et al., 2005; Frisell et al., 2010; Gilman et al., 2001; Grella et al., 2011; Hatzenbuehler et al., 2009; Hughes et al. 2010b; McCabe et al., 2009; Midanik et al., 2007; Sandfort et al., 2001); drugs (Bolton & Sareen, 2011; Chakraborty et al., 2011; Cochran & Mays, 2009; Cochran et al., 2003; Fergusson et al., 1999, 2005; Gilman et al., 2001; Grella et al., 2011; Hatzenbuehler et al., 2009; Hughes et al. 2010b; McCabe et al., 2009; Rath et al., 2013; Sandfort et al., 2001); with questionnaires for alcohol (Ericksen & Trocki, 1994; King & Nazareth, 2006; Lhomond et al., 2014; Mattocks et al., 2013; Said et al., 2013), with single items for alcohol (Balsam et al., 2012; Blosnich, Bossarte et al., 2013; Blosnich et al., 2014a; Boehmer et al., 2012; Bowring et al., 2015; Burgard et al., 2005; Burgess et al., 2007; Case et al., 2004; Cochran et al., 2012; Diamant et al., 2000; Dilley et al., 2010; Drabble et al., 2005; Ford & Jasinski, 2006; Fredriksen-Goldsen et al., 2013; Gruskin & Gordon, 2006; Hughes et al. 2010b; Julien et al., 2008; Lhomond & Saurel-Cubizolles, 2006; Mercer et al., 2007; Pope et al., 2001; Przedworski et al., 2014; Reczek et al., 2014; Reed et al., 2010; Rhodes et al., 2009; Rothman et al., 2012; Sandfort et al., 2001; Schauer et al., 2013; Steele et al., 2009; Talley et al., 2014) and drugs (Bowring et al., 2015; Cochran et al., 2012; Conron et al., 2010; Hughes et al. 2010b; Julien et al., 2008; Kerr et al., 2015; Lhomond et al., 2014; McCabe et al., 2003, 2005, 2012; Mercer et al., 2007; Pope et al., 2001; Reed et al., 2010; Rhodes et al., 2009; Ridner et al., 2006; Rothman et al., 2012; Skegg et al., 2003; Ueno, 2010a) and with treatment/diagnosis by professionals, as reported by participants for drugs (Pelts & Albright, 2014).

For alcohol, close to zero differences or reversed effects were reported overall (Bloomfield, 1993; Blosnich & Silenzio, 2013; McCabe et al., 2003, 2012; Reed et al., 2010; Rhodes et al., 2009) or for specific subgroups, but without a clear-cut pattern (see supplementary table) (Bloomfield et al., 2011; Boehmer et al., 2012; Brennan et al., 2010; Cochran & Mays, 2000a; Cochran et al., 2007; Conron et al., 2010; Dilley et al., 2010; Eisenberg & Wechsler, 2003; Ericksen & Trocki, 1994; Farmer et al., 2013a, 2013b; Gilman et al., 2001; Jorm et al., 2002; Kerr et al., 2014, 2015; King & Nazareth, 2006; Lhomond et al., 2014; Matthews & Lee, 2014; McCabe et al., 2005, 2009; Midanik et al., 2007; Ridner et al., 2006; Sandfort et al., 2001; Schauer et al., 2013; Talley et al., 2014).

Zero/negative effects for drugs were reported in certain subgroups, and again, no specific pattern emerged (see supplementary table) (Cochran & Mays, 2000b; Eisenberg & Wechsler, 2003; Ford & Jasinski, 2006; Gattis et al., 2012; Hughes et al. 2010b; Kerr et al., 2014, 2015; McCabe et al., 2005, 2009, 2012; Rath et al., 2013; Sandfort et al., 2001; Schauer et al., 2013).

The effect sizes for alcohol were mostly near zero or reversed for men (53%) and small (30%) or medium (33%) for women. For drugs, most effects were small (39%) or medium (39%) for men and medium (31%) or large (45%) for women. Generally, it seemed that the effects sizes for marijuana were smaller than for other illicit drugs and especially harder drugs.

**Adolescents**

A number of studies reported elevated levels/rates using questionnaires: alcohol (Marsh et al., 2012b, 2013b; Pesola et al., 2014; Russell & Joyner, 2001), drugs (Birkett et al., 2009; Marshall et al., 2012b, 2013b), and single items: alcohol (Butler et al., 2012; Faulkner & Cranston, 1998; Garofalo et al., 1998; Hagger-Johnson et al., 2013; Konishi et al., 2013; Ortiz-Hernandez et al., 2009), drugs (Butler et al., 2012; Duncan & Hatzenbuehler, 2014; DunRant et al., 1998; Faulkner & Cranston, 1998; Garofalo et al., 1998; Kann et al., 2011; Konishi et al., 2013; Lampinen et al., 2006; Newcomb et al., 2014; Orenstein, 2001; Poteat et al., 2009; Seil et al., 2014; Shields et al., 2012; Tucker et al., 2008; Zhao et al., 2010).

For alcohol, zero or reversed effects were reported overall (Hatzenbuehler et al., 2012; Lucassen et al., 2014), or for certain subgroups: gay/homosexuals but not bisexuals (Mustanski et al., 2014; Robin et al., 2002); bisexual men but not gay men and lesbian or bisexual women (Hagger-Johnson et al., 2013), questioning individuals (Butler et al., 2012), or for less severe alcohol problems (Faulkner & Cranston, 1998; Tucker et al., 2008). Some studies reported complex patterns depending on gender/SM subgroup and SO dimension, with lacking or reversed effects especially for the behavioural dimension (Hatzenbuehler et al., 2008a; Kann et al., 2011; Matthews et al., 2014; Ortiz-
Hernandez et al., 2009; Talley et al., 2014), and, prospectively, for older youths (Pesola et al., 2014).

For drug use disorders, only a few studies reported negative or reversed effects, and only in certain subgroups: gay/homosexual but not bisexual individuals (Robin et al., 2002), questioning individuals (Button et al., 2012), or for marijuana (at least for certain subgroups) but not for harder drugs (Faulkner & Cranston, 1998; Kann et al., 2011; Mustanski et al., 2014; Orenstein, 2001).

The effect sizes for alcohol were mostly near zero or reversed for men (50%) and mostly small for women (55%), whereas for drug-related problems most effects were small (29%) to medium (43%) for men and medium (50%) for women.

Add-Health and GUTS studies

Similar patterns appeared in the two longitudinal studies. Add Health study wave I studies reported elevated levels of alcohol use/abuse among girls (Marshal et al., 2012a) and overall (Russell & Joyner, 2001). Wave II studies reported no or reversed effect for binge drinking for both SM men and women (Hahm et al., 2008). For wave I and II combined, binge drinking was elevated among SM girls but not SM boys, illicit drug use was significantly elevated for SM girls and boys but with near-zero magnitude for boys (Pearson & Wilkinson, 2013). In studies on wave III, binge drinking was elevated among LG but not bisexual participants, but drug use was elevated in all groups (McLaughlin et al., 2012). Another study using identity reported elevated binge drinking rates for lesbian and bisexual women but not among their male counterparts, whereas hard drug use was elevated among all subgroups (Needham & Austin, 2010). In wave IV, close to zero effects were reported for binge drinking among gay men but not for bisexual men and women and lesbian women, whereas for drug use, there were elevated levels in all subgroups (Almazan et al., 2014; Marshal et al., 2008).

In the GUTS wave I study, binge drinking effects were reported for LGB adolescents, but there were reversed effects for questioning adolescents (Ziyadeh et al., 2007). In waves I–III, complex alcohol abuse patterns appeared, depending on variables, gender, and SM subgroups, and some close to zero effects were reported for gay and lesbian adolescents (Corliss et al., 2008). Binge drinking was elevated in lesbian/gay and mostly heterosexual but not in bisexual participants (Rosario et al., 2014a). In contrast, for marijuana and other illicit drugs there were SO differences in all subgroups (Corliss et al., 2010; Rosario et al., 2014a).

**Lifetime versus past year**

Studies reporting lifetime versus current problems had comparable effects (Gilman et al., 2001; Kerr et al., 2014; Sandfort et al., 2001).

**Subgroup differences**

In contrast to other mental health problems there was no clear majority of studies reporting elevated levels of alcohol/drug abuse/dependency for bisexuals compared to homosexuals (Balsam et al., 2012; Brennan et al., 2010; Burgard et al., 2005; Button et al., 2012; Dilley et al., 2010; Ford & Jasinski, 2006; Jorm et al., 2002; Kerr et al., 2014, 2015; Loosier & Dittus, 2010; Mercer et al., 2007; Mustanski et al., 2014; Newcomb et al., 2014; Robin et al., 2002). Sometimes this was only among women but not men (Conron et al., 2010; McCabe et al., 2009). Several studies reported that bisexuals had comparable or smaller risk than homosexual individuals (Blosnich et al., 2014a; Boehmer et al., 2012; Bolton & Sareen, 2011; Cochrans & Mays, 2009; Diamant et al., 2000; Drabble et al., 2005; Hughes et al. 2010b; McLaughlin et al., 2012; Przedworski et al., 2014; Rosario et al., 2014a; Said et al., 2013; Schauer et al., 2013; Steele et al., 2009), and there were mixed findings depending on the substance (Corliss et al., 2010; Hughes et al. 2010b) or on SM subgroups (Hagger-Johnson et al., 2013; Kann et al., 2011; Matthews et al., 2014; McCabe et al., 2012; Midanik et al., 2007; Needham & Austin, 2010).

Mostly heterosexuals had comparable or smaller effects compared to homosexuals in the majority of studies (Corliss et al., 2010; Hughes et al. 2010b; Rosario et al., 2014a; Ziyadeh et al., 2007) and larger effects in one study (Cochran & Mays, 2009). Questioning individuals were, compared to homosexuals, at lower risk in the majority of studies (Bolton & Sareen, 2011; Button et al., 2012; Hughes et al. 2010b; Kann et al., 2011; McCabe et al., 2009; Zhao et al., 2010; Ziyadeh et al., 2007). They had comparable risk (Newcomb et al., 2014), higher risk (Birkett et al., 2009), or comparable risk only among women but higher risk among men (Poteat et al., 2009) always, compared to homosexual individuals.

**Gender**

Larger effects among women than men were reported in the majority of studies (Bloomfield et al., 2011; Boehmer et al., 2012; Bolton & Sareen, 2011; Cochrans et al., 2003, 2007; Corliss et al., 2010; Dilley et al., 2010; Drabble et al., 2005; Eisenberg & Wechsler, 2003; Farmer et al., 2013a, 2013b; Frisell et al., 2010; Grella et al., 2011; Gruskin & Gordon, 2006; Hughes et al. 2010b; Kerr et al.,...
differences for alcohol-related problems. For drugs, the effect sizes were small or medium for men and medium or large for women, and they were larger for other illicit drugs than marijuana, especially hard drugs. Regarding subgroups, compared to homosexual/LG individuals, bisexuals did not have larger effects in the majority of studies, but mostly heterosexual and questioning individuals had comparable or smaller effects. The majority of studies reported larger effects among women than men. In contrast to lower quality studies, studies with higher quality reported elevated levels of alcohol and drug problems among all SM subgroups.

**Other disorders**

For other mental disorders, increased levels or rates also applied for SM individuals: for bulimia and anorexia higher for gay and bisexual men, less so for bisexual women, and not for lesbian women (Matthews-Ewald et al., 2014; Pelts & Albright, 2014), eating disorders for women but not men (Cochran et al., 2007), OCD for SM veterans (Pelts & Albright, 2014), PTSD, with some subgroup exceptions (Gattis et al., 2012; Gilman et al., 2001; Grella et al., 2011; Hatzenbuehler et al., 2009), ADHD (Frisell et al., 2010; Pelts & Albright, 2014; Strutz et al., 2015; Wang et al., 2014), schizophrenia or psychotic symptoms (Bolton & Sareen, 2011; Chakraborty et al., 2011; Pelts & Albright, 2014), personality disorders, with scattered zero or reversed effects in some subgroups (Bolton & Sareen, 2011), oppositional defiant disorder and borderline personality in LB identified girls (Marshal et al., 2012b). Antisocial personality disorder was not elevated among young mostly gay or bisexual men in Switzerland, but elevated levels (small effect) existed for mostly heterosexuals and mostly gay individuals (Wang et al., 2014).

**Older versus newer studies**

Recently published studies are in line with older studies. Of importance are the YRBS, which have been replicated often and continue reporting elevated mental health risks among SM adolescents. A related replication study from New Zealand had comparable or even increasing effects from 2001 to 2012 for adolescent suicide attempters (Lucassen et al., 2014), and a replication study from the Netherlands (not in this review) reported results similar to those studied in 1996 (Sandfort et al., 2014).

**Discussion**

The majority of reviewed studies reported elevated levels or rates of mental health problems for SM individuals, including depression, anxiety, suicide attempts or
suicides, and drug-related mental health problems, compared to heterosexuals. The only exception was alcohol-related mental health problems, where the majority of studies reported negative or near zero effect for men. However, in the majority of higher quality studies that used clinical diagnoses of alcohol dependency, SM individuals again had increased rates. SO differences were largest for attempting suicides and suicides, where most of the effect sizes were large, and they were smallest for alcohol-related mental health problems. The increase of risk varied in magnitude and existed across SM subgroups in all dimensions of sexual orientation (behaviour, attraction, identity), for both genders, age groups, regions, and in more recent studies. Thus, the main results of this review that included more recent studies are in line with older meta-analytic reports and reviews. However, given that most studies appeared only recently, there is now much more weight of evidence supporting the conclusions. Older studies and reviews have been criticized because they ignored result differences for gender or SO subgroups and dimensions, which could lead to distorted views about mental health problems for subgroups, for example overestimations among gay-identified individuals (Savin-Williams, 2008). Our review included several recent studies that used different dimensions of SO and with separate SO subgroup analysis. Indeed, there are differences such that in the majority of studies effects are larger for bisexuals and comparable or smaller for mostly heterosexuals and questioning individuals compared to homosexual individuals for most mental health problems. However, our review concludes that elevated risk, with varying degree, exists within all SM subgroups in the majority of studies. For example, among gay identified or homosexual attracted or behaving men, most studies nonetheless reported elevated rates or levels of depression and anxiety (mostly medium effects), suicide attempts (mostly large effects), and drug abuse or disorder (mostly small effects). Only for alcohol abuse were there many studies reporting lower levels of alcohol abuse disorder, but not in the majority of higher quality studies. Thus, the assumption that certain SM subgroups are not at increased risk for mental health problems is not supported by the available data.

The review also supports the previously reported larger effects for men than women for all disorders except substance-related disorders, where the majority of studies reported larger effects for women.

**Methodological considerations**

Only studies that did not recruit SM individuals from gay/lesbian organizations were chosen for this review, based on the common assumption that this avoids biases inherent in convenience samples. Only one meta-analysis reported that SO differences are comparable or even smaller in random samples than in convenience samples (Meyer, 2003), but a recent single study found small opposite effects (Kuyper et al., 2015). Both sampling approaches have their strengths and weaknesses (Meyer & Wilson, 2009), and an updated meta-analytical comparison would be fruitful. Until then, results from convenience samples – not included in our analysis – should be taken seriously.

Another critical issue in several studies is adjustment and weighting procedures. It is standard practice to adjust for sociodemographic variables to increase the validity of group differences. However, in several studies, this included variables such as marriage status, which is known to be associated with better mental health, but only a few SM individuals are married. Adjustment for such a variable may thus be inappropriate. In the same line, several studies used sampling weights to achieve representativeness. However, it remains an open issue whether it is appropriate to use similar sampling weights for SM and heterosexual individuals given different population distributions. Furthermore, the number of SM individuals in the studies is rather small and weighting may lead to grossly different percentages of SM individuals (Grella et al., 2011) or SO differences (Husky et al., 2013). The Cochran et al. (2000) NHANES study results were likely compromised given that the homosexually oriented small subsample of 108 men became 78 men (weighted, a 28% reduction), while the large sample of 3208 heterosexual men became 3212 (little change). For this reason, the Centers for Disease Control and Prevention (CDC) warned against using weighting procedures for small samples (CDC, 2015).

There is an ongoing debate about the validity of studies, especially for suicides and suicide attempts as outcomes (Plöderl et al., 2013). Some SM individuals may refuse to participate, as in one study where three times (16.8 versus 5.1%) more SM men were among those who initially refused to participate in a household survey (CDC, 1991). The associated bias remains unknown. A gold standard to assess mental health disorders are clinical interviews. However, fewer SM members disclose their homosexual behaviour to interviewers compared with computer-based methods (Villaroel et al., 2006). It is possible that non-disclosed SM individuals or those who refuse study participation may be at increased risk for mental health problems, a reasonable hypothesis given the negative psychological impact of a concealed stigma (Pachankis, 2007). On the other hand, those who report their SM status may also be more willing to report mental health problems than...
those not disclosing their SM status, leading to inflated estimation of SO differences. Furthermore, for suicidality, one study reported that gays and lesbians over-report mental health problems due to a suffering script (Savin-Williams, 2001), but other studies did not replicate these findings (Plöderl et al., 2010, 2013). Similarly, SO differences may be inflated by mischievous responses. However, as demonstrated in a study on adolescents SO disparities remained significant after controlling for biases (Robinson-Cimpian, 2014) and it seems unlikely that such biases are influential in the studies on adults or when using clinical interviews.

These methodological caveats could lead to overestimations or underestimations of the actual SO differences and more research on biases would be helpful. However, by nature, research on hidden populations will never achieve top quality level. Unfortunately, this will leave room for those wanting to downplay or overstate the problem for other than scientific reasons. Following the principle of Ockham’s razor, we recommend not including additional unproven assumptions but to let the data speak for itself.

Despite the increase of mental health risk for SM people, it is important to acknowledge that the majority of SM individuals do not have a mental health problem. Furthermore, SO differences may be explained, in great part, by increased minority stressors (Hatzenbuehler, 2009; Meyer, 2003; Stall et al., 2008).

**Limitations**

As with all restricted search strategies, some studies are missed, for example, probability samples without a control group (Catania et al., 2001), unpublished data, studies in other databases, or those whose SO results are given as aside results. Given that PubMed covers a wide range of studies, similar conclusions would apply. For attempting suicide, we are certain about it, because the most exhaustive collection of international studies (Ramsay & Tremblay, 2015) is in line with our findings. In addition, the weight of the evidence in our review is strong, and it would take many studies with opposite findings to undermine the conclusions.

We tried to summarize subgroup and gender differences. However, only a meta-analysis could precisely quantify the differences but, as most studies vary in methodology, it will take more studies to accomplish this. In addition, there are certainly some more or less strong effects of race, education, or age that may have gone unnoticed in our review.

**Conclusion**

Our review includes more recent studies and supports the proposition that SM individuals are at increased risk for mental health problems. The risks vary within SM subgroups and gender and they are, as a rule, elevated in all subgroups.

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