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Original Article

Poor mental health among Taiwanese people experiencing the public debates on and referendums for same-sex marriage: A Facebook online survey

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Background/Purpose: Public debates on legalization of same-sex marriage occurred in Taiwan since the latter half of 2016. Taiwanese people voted on same-sex marriage referendums on November 24, 2018. The aim of this Facebook online study was to examine the changes in rates of poor mental health status among Taiwanese people during the 23-month period of public debates on and referendums for legalizing same-sex marriage.

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Homosexual

Methods: A two-wave internet survey was conducted using Facebook to gather information regarding mental health and attitudes toward same-sex marriage among 3286 participants (1456 heterosexual and 1830 nonheterosexul) in Wave 1 (one week after the first reading of the Marriage Equality Bill) and 1370 participants (540 heterosexual and 830 nonheterosexul) in Wave 2 survey (one week after the referendum of same-sex marriage). The five-item Brief Symptom Rating Scale was used for assessing mental health status.
Results: The rate of poor mental health status significantly increased from the Wave 1 to Wave 2 surveys in heterosexual, lesbian, gay and bisexual (LGB) participants. In nonherterosexual groups, the rates of poor mental health status increased in LGB and female and male nonheterosexual participants of all age. The rates of poor mental health status also increased in heterosexual participants who were female, were young, and supported same-sex marriage.
Conclusion: The rates of poor mental health status increased in both heterosexual and nonheterosexual people during the period of public debates on and the referendums for same-sex marriage. Heterosexual people who were female, were young, and supported same-sex marriage had also increased rates of poor mental health state during the same period.
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Introduction

Increasing evidence suggests that social climates and environments that are hostile to lesbians, gay men, and bisexual (LGB) individuals negatively affect the mental health of sexual minority people.[1–7] For example, McDermott et al. reported the social prejudices of homophobia, biphobia, and transphobia were related to the suicide risk among the LGB population.[6] Hatzenbuehler et al. revealed that among LGB youth, the risk of attempting suicide was 20% greater in unsupportive environments relative to supportive environments.[7] Anti-stigma programs are essential to building friendly social climates and environments for improving mental health in sexual minority population.

Research has indicated that the legislation of same-sex marriage improved the general mental health and well-being of sexual minority people.[3,8–10] Kail et al. examined the association between the health of people in same-sex relationships and state-level marriage equality and demonstrated that LGB persons living in states during years with an antigay amendment exhibited poorer self-assessed health than those living in a state with legally sanctioned same-sex marriage.[3] On the contrary, The California Health Interview Survey reported that same-sex married LGB people were substantially less distressed than LGB people not in a legally recognized relationship.[8] LGB people had a considerable reduction in medical care visits, mental health care visits, and mental health care costs in the 12 months after the legislation of same-sex marriage in Massachusetts in 2003.[9] A United States nationwide study evaluated the relationship of state same-sex marriage policies with youth suicide attempts and found that same-sex marriage policies were associated with a 7% relative reduction in the proportion of high school students attempting suicide, which was attributed to same-sex marriage implementation.[10]

Campaigners for sexual minority rights in Taiwan have strived for the legalization of same-sex relationships since the 1980s. Article 972 of Taiwan's Civil Code poses a problem for same-sex marriages by stipulating that "An agreement to marry shall be reached between a male and a female party of their own accord." Sexual minority right campaigners appealed for recognizing same-sex marriages, but the Court turned down the petition on the grounds that "homosexuality corrupts social values." In October 2016, a group of legislators proposed a Marriage Equality Bill to change the Civil Code for legally recognizing same-sex marriages and passed its first court reading in Taiwan. Although the Marriage Equality Bill failed to be further considered by the Judiciary and Organic Laws and Statutes Committee, it initiated public debates between supporters and opposers of the legalization of same-sex relationships in Taiwan. In May 2017, the Council of Grand Justices of Taiwan ruled that the current Civil Code barring same-sex marriage was a violation of the human right to equality and was unconstitutional. Consequently, the Council of Grand Justices directed that same-sex marriage should be legislated within 2 years. In response to the decision, the groups against same-sex marriage drafted two referendums ("Do you agree that marriage defined in the Civil Code should be restricted to the union between one man and one woman?" and "Do you agree to the protection of the rights of same-sex couples in cohabitation on a permanent basis in ways other than changing of the Civil Code?") to argue that legal reform should be made outside of changes to the Civil Code. The first referendum drafted by the groups against same-sex marriage advocated that marriage defined in the Civil Code should be restricted to the union between one man and one woman; the second referendum advocated that same-sex couples may have right to cohabitation but not get married according to the Civil Code. Therefore, these two referendums were against same-sex marriage. Likewise, those lobbying for marriage equality drafted another referendum ("Do you agree to the protection of same-sex marital rights with marriage as defined in the Civil Code?") to argue that separate legislation amounts to a form of discrimination. The Taiwanese people voted on the three same-sex marriage referendums on November 24,

2018. The results of the vote determined that up to 70% of Taiwanese citizens voted against same-sex marriage and that only approximately 30% supported same-sex marriage. However, a 2015 national survey showed that up to 50% of Taiwanese people have a positive view toward same-sex marriage.[11] The difference may imply an increase in anti-LGB attitudes in Taiwanese society during the period between the announcement in favor of same-sex marriage by Council of Grand Justices and the referendum against same-sex marriage initiated by anti-LGB groups.

Not only the results of the vote on the referendums of same-sex marriage but also the anti-LGB messages spread in public and social media discouraged sexual minority people. Research indicates that increased exposure to same-sex marriage campaigns is associated with high stress among sexual minority individuals in the United States, and negative advertisements evoke the feeling of sadness among them.[12] However, whether the negative impacts of public debates and the results of referendums for same-sex marriage on mental health also occurred among non-heterosexual people in Taiwan warrants study. Moreover, although legalization of same-sex marriage is not directly to the welfare of heterosexual people, whether public debates and the results of referendums also have an impact on the mental health of heterosexual people, especially those who supported same-sex marriage warrants study.

This two-wave Facebook online survey aimed to compare the rates of poor mental health status and related factors in Taiwanese people between two time points closely related to the milestones of legalizing same-sex marriage. The first wave (Wave 1) was conducted from January 1 to 31, 2017, that is, 1 week after the first reading of the Marriage Equality Bill. The second wave (Wave 2) was conducted from December 1 to 31, 2018, that is, 1 week after the referendums. We hypothesized that the rate of poor mental health status in nonheterosexual people increased from the Wave 1 to the Wave 2 surveys. Moreover, we hypothesized that the rate of poor mental health status in heterosexual people with a supportive attitude toward same-sex marriage also increased from the Wave 1 to the Wave 2 surveys.

Methods

Participants

The method of participant recruitment was comprehensively described in our previous study.[13] In brief, a Facebook advertisement was launched between January 1 and 31, 2017 (Wave 1) and between December 1 and 31, 2018 (Wave 2). Facebook users aged $\geq$20 years who resided in Taiwan and spoke Mandarin Chinese were eligible for this study. Participants reached the research questionnaire website through the Facebook advertisement, which was composed of a headline, main text, pop-up banner, and weblink. The advertisement of our research appeared in the "News Feed" of Facebook, which is a streaming list of updates from the user's connections (i.e., friends) and advertisers.[14] Facebook users can join our study at Wave 1 or/and at Wave 2 if they saw the advertisement and signed the online informed consent form. To avoid duplicate submissions, a deduplication protocol, including the cross-validation of the eligibility criteria of key variables and discrepancies in key data and checking for unusually fast completion time ($<$10 min), was applied to preserve data integrity.[15] Moreover, each Internet Protocol address could register only once to complete the online questionnaire. Our study participants were not given any incentives for participation. This study used the design of online response to the recruitment and questionnaire anonymously that freely allowed the respondents to decide whether to join and kept personal information secure. This study was approved by the Institutional Review Board (IRB) of Kaohsiung Medical University Hospital (KMUHIRB-EXEMPT(II)-20160065). Written informed consent was waived based on the approval of IRB.

Measures

Brief Symptom Rating Scale

General mental health was assessed by the Brief Symptom Rating Scale (BSRS-5) containing the following five items related to psychopathology: (1) feeling tense or keyed up (anxiety), (2) feeling low in mood (depression), (3) feeling easily annoyed or irritated (hostility), (4) feeling inferior to others (interpersonal hypersensitivity: inferiority), and (5) having trouble falling asleep (insomnia). The participants were asked to rate symptoms on a five-point scale: 0, not at all; 1, a little bit; 2, moderately; 3, quite a bit; and 4, extremely. The BSRS-5 has been reported to have satisfactory psychometric properties as a measure of detecting psychiatric morbidity in a medical setting or in the community. The five items and total score on the BSRS-5 were used in the present study as the indicators of mental health. Participants who rated 2 or more on the item were classified as having an appreciable symptom. Participants whose total BSRS-5 score was 10 or more were classified as having poor mental status.[16]

Attitude toward same-sex marriage

We asked the following question to determine participants' personal attitude toward same-sex marriage: "To what degree do you support same-sex marriage?" The level of support for same-sex marriage was assessed based on a five-point Likert scale (0 = very low, 1 = low, 2 = moderate, 3 = high, and 4 = very high). Participants who scored 0 to 2 and who scored 3 or 4 were classified into those who opposed and supported same-sex marriage, respectively.

Demographic characteristic and sexual orientation

Data on participants' gender (female, male, and transgender), age, and sexual orientation (heterosexual, bisexual, homosexual, pansexual, asexual, and questioning) were collected. According to sexual orientation, the participants were classified into heterosexual and nonheterosexual (including bisexual, homosexual, and others) groups.

Statistical analysis

The proportions of participants with poor mental health status were compared between Wave 1 and Wave 2 surveys

in heterosexual and nonheterosexual groups. The proportions of heterosexual participants and nonheterosexual with poor mental health status were further compared between Wave 1 and Wave 2 surveys based on gender, age, and attitude toward same-sex marriage, separately using Chi-square test and univariate logistic regression with odds ratio (OR) and its 95% confidence interval (CI). Because of multiple comparisons of six mental health indicators on the BSRS-5, a p-value of $<.008$ (.05/6) was considered statistically significant for all tests.

Results

A total of 3423 and 1395 Facebook users completed the online questionnaire in Wave 1 and Wave 2, respectively. Among these users, 137 and 25 were excluded from the analysis due to an unqualified age (<20 years) or an erroneous value (>100 years) in Wave 1 and Wave 2, respectively. The final data of 3286 participants (1456 heterosexual and 1830 nonheterosexual) in Wave 1 and 1370 participants (540 heterosexual and 830 nonheterosexul) in Wave 2 were analyzed. The distributions of gender and attitude toward same-sex marriage did not differ between participants in Wave 1 and Wave 2 surveys, in both heterosexual and nonheterosexual groups. There were more heterosexual participants aged 20—29 and fewer aged 40 or older in the Wave 1 survey compared with those in the Wave 2 survey. There were more nonheterosexual participants who opposed same-sex marriage in the Wave 2 survey compared with those in the Wave 1 survey (Table 1).

Table 2 demonstrates the comparisons of mental health on the BSRS-5 between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants. Heterosexual participants in the Wave 2 survey had higher rates of significant insomnia, anxiety, hostility, depression, and poor mental health status ($\chi^2 = 11.898—41.437$, $p < .008$) but not inferiority ($\chi^2 = 1.850$, $p = .174$) compared with heterosexual participants in the Wave 1 survey. Nonheterosexual participants in the Wave 2 survey had higher rates of significant insomnia, anxiety, hostility, depression, inferiority, and poor mental health status ($\chi^2 = 34.935—98.495$, $p < .001$) compared with non-heterosexual participants in the Wave 1 survey. All χ^2 values of comparisons between Wave 1 and Wave 2 surveys in nonheterosexual participants were higher than those in heterosexual participants.

Table 3 demonstrates the comparisons of mental health between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants among various genders. Both heterosexual and nonheterosexual females had increased rates of significant insomnia, anxiety, hostility, depression, and poor mental health status between Wave 1 and Wave 2 surveys, whereas the rate of feelings of inferiority did not increase in heterosexual females (Table 3). Nonheterosexual but not heterosexual males had increased rates of all poor mental health indicators between Wave 1 and Wave 2 surveys. No difference in mental health problems between Wave 1 and Wave 2 surveys was found in transgender participants.

Table 4 demonstrates the comparisons of mental health between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants among various age groups. Younger (age 20—29 and age 30—39) but not older (age 40 or older) heterosexual had increased rates of significant mental health problems between Wave 1 and Wave 2 surveys, whereas nonheterosexual participants had increased rates of significant mental health problems in almost all indicators between Wave 1 and Wave 2 surveys.

Table 5 demonstrates the comparisons of mental health between Wave 1 and Wave 2 surveys between heterosexual participants with opposing and supporting same-sex marriage and among nonheterosexual participants of various sexual orientations. Heteroseuxals who supported but not those who opposes same-sex marriage had increased rates of poor mental health status between Wave 1 and Wave 2 surveys.

Gay and lesbian participants had increased rates of all significant mental health problem indicators between Wave 1 and Wave 2 surveys. Bisexual participants had increased

Table 1 Comparisons of demographic characteristics and attitude toward same sex marriage between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants.

	Heterosexual			Nonheterosexual		
	Wave 1 ($n = 1456$) n (%)	Wave 2 ($n = 540$) n (%)	χ^2 (p)	Wave 1 ($n = 1830$) n (%)	Wave 2 ($n = 830$) n (%)	χ^2 (p)
Gender						
Female	1132 (77.8)	416 (77.0)	3.202 (.202)	917 (50.1)	412 (49.6)	9.488 (.009)
Male	311 (21.4)	123 (22.8)		879 (48.0)	386 (46.5)	
Transgender	13 (.9)	1 (.2)		34 (1.9)	32 (3.9)	
Age (years)						
20—29	640 (44.0)	157 (29.1)	64.554 (<.001)	1075 (58.7)	472 (56.9)	2.207 (.332)
30—39	536 (36.8)	193 (35.7)		611 (33.4)	279 (33.6)	
40 or older	280 (19.2)	190 (35.2)		144 (7.9)	79 (9.5)	
Attitude toward same-sex marriage						
Oppose	222 (15.2)	84 (15.6)	.029 (.865)	29 (1.6)	27 (3.3)	7.711 (.005)
Support	1234 (84.8)	456 (84.4)		1801 (98.4)	803 (96.7)	

BSRS-5: five-item Brief Symptom Rating Scale. A p value of .008 was considered statistically significant based on multiple comparisons.

Table 2 Comparisons of mental health on the BSRS-5 between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants.

	Heterosexual[a]			Nonheterosexual[b]		
	n (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)
Insomnia						
Wave 1	185 (12.7)	1.859 (1.437−2.405)	22.760 (<.001)	480 (26.2)	2.329 (1.926−2.766)	95.165 (<.001)
Wave 2	115 (21.3)			376 (45.3)		
Anxiety						
Wave 1	280 (19.2)	1.527 (1.212−1.924)	13.019 (<.001)	733 (40.1)	1.861 (1.576−2.196)	54.516 (<.001)
Wave 2	144 (26.7)			460 (55.4)		
Hostility						
Wave 1	381 (26.2)		13.269 (<.001)	874 (47.8)	1.649 (1.396−1.948)	34.935 (<.001)
Wave 2	186 (34.4)	1.482 (1.199−1.834)		499 (60.1)		
Depression						
Wave 1	268 (18.4)	2.072 (1.655−2.593)	41.437 (<.001)	754 (41.2)	2.251 (1.904−2.663)	91.626 (<.001)
Wave 2	172 (31.9)			508 (61.2)		
Inferiority						
Wave 1	172 (11.8)	1.223 (.915−1.634)	1.850 (.174)	535 (29.2)	1.985 (1.675−2.353)	63.572 (<.001)
Wave 2	76 (14.1)			374 (45.1)		
Poor mental health status						
Wave 1	168 (11.5)	1.616 (1.228−2.126)	11.898 (.001)	484 (26.4)	2.360 (1.988−2.801)	98.495 (<.001)
Wave 2	94 (17.4)			381 (45.9)		

BSRS-5: five-item Brief Symptom Rating Scale; CI: Confidence interval; OR: Odds ratio. A *p* value of .008 was considered statistically significant based on multiple comparisons.

[a] Wave 1: n = 1456, Wave 2: n = 540.

[b] Wave 1: n = 1830, Wave 2: n = 830.

rates of all mental health problems except for anxiety and hostility between Wave 1 and Wave 2 surveys. All χ^2 values of comaprisons in gay and lesbian participants were higher than those in bisexual participants. The group that included other sexual orientations (pansexual, asexual, and questioning) did not have increased rates of poor mental health indicators between Wave 1 to Wave 2.

Fig. 1 shows the gender and age effects on poor mental health status in Wave 1 and Wave 2 surveys among heterosexual and nonheterosexual participants, as well as the effects of attitude toward same-sex marriage in heterosexual participants and effects of sexual orientation in nonheterosexual participants.

Discussion

The results of the present study found that the rate of poor mental health status significantly increased in heterosexual and LGB participants during the 23-month period of public debates on and referendums for legalizing same-sex marriage. In nonherterosexual groups, the rates of poor mental health status increased in LGB and female and male nonheterosexual participants of all age. The rates of poor mental health status also increased in heterosexual participants who were female, were young, and supported same-sex marriage.

As previously mentioned, anti-LGB social climates and environments, including those produced by referendums against same-sex marriage, substantially impairs the mental health of nonheterosexual people.[3–7] Before the legislation of same-sex marriage in the US state of North Carolina in October, 2014, a 2011 North Carolina Behavioral Risk Factor Surveillance Survey reported that LGB people in North Carolina generally had poorer health, including both mental (e.g., depression) and physical (e.g., metabolic syndrome) health, as well as smoking status.[17] The detrimental effect of anti-LGB policy was immediate, prominent, and lasting. The study of Schwartz et al. examining the impacts of the Same-Sex Marriage Prohibition Act on LGB people in Nigeria found that fear of seeking health care, avoidance of health care, perceived discrimination and stigma were considerably higher in postlaw visits than in prelaw visits; reported fear of seeking health care services even dramatically increased from approximately 20% in the prelaw period to approximately 40% in the postlaw period.[18] Compatible with previous findings,[17,18] our study found that during the period of public debates on and the referendum for same-sex marriage, the mental health deteriorated considerably in LGB people. According to minority stress theory,[4] socially-stigmatized individuals may experience chronic stress due to their minority statuses and consequently develop mental health problems. Anti-LGB statements in public debates and the results of referendums further reminded nonheterosexual people their minority identity and thus might exacerbate their mental health. There were malicious libels on sexual minority people during the public debates on same-sex marriage in Taiwan, which might directly induce the feeling of fear and compromise mental health status of nonheterosexual people.

Few studies have assessed the effect of anti-LGB social climate on the mental health of heterosexual people. Our previous study demonstrated that heterosexuals who

Table 3 Comparisons of mental health based on the BSRS-5 between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants: gender effect.

	Heterosexual[a]								Nonheterosexual[b]								
	Female			Male			Transgender		Female			Male			Transgender		
	n (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	*p* of Fisher's exact test	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*N* (%)	OR (95% CI)	χ^2 (*p*)
Insomnia																	
Wave 1	145 (12.9)	1.987 (1.489–2.651)	22.319 (<.001)	35 (11.3)	1.531 (.845–2.774)	1.996 (.158)	5 (38.5)	.429	252 (27.5)	2.371 (1.862–3.020)	50.177 (<.001)	216 (24.6)	2.316 (1.798–2.984)	43.229 (<.001)	12 (35.3)	1.618 (.602–4.346)	.915 (.339)
Wave 2	94 (22.6)			20 (16.3)			1 (100)		195 (47.3)			166 (43.0)			15 (46.9)		
Anxiety																	
Wave 1	222 (19.6)	1.662 (1.284–2.151)	15.073 (<.001)	52 (16.7)	1.146 (.666–1.970)	.241 (.623)	6 (46.2)	1.000	372 (40.6)	1.926 (1.522–2.437)	30.183 (<.001)	347 (39.5)	1.829 (1.437–2.329)	24.252 (<.001)	14 (41.2)	1.429 (.540–3.780)	.518 (.472)
Wave 2	120 (28.8)			23 (18.7)			1 (100)		234 (56.8)			210 (54.4)			16 (50)		
Hostility																	
Wave 1	306 (27.0)	1.570 (1.237–1.993)	13.855 (<.001)	68 (21.9)	1.257 (.774–2.040)	.857 (.355)	7 (53.8)	1.000	430 (46.9)	1.878 (1.480–2.382)	27.303 (<.001)	430 (48.9)	1.475 (1.158–1.878)	9.963 (.002)	14 (41.2)	1.429 (.540–3.780)	.518 (.472)
Wave 2	153 (36.8)			32 (26.0)			1 (100)		257 (62.4)			226 (58.5)			16 (50)		
Depression																	
Wave 1	208 (18.4)	2.327 (1.808–2.994)	44.419 (<.001)	54 (17.4)	1.403 (.839–2.344)	1.678 (.195)	6 (46.2)	1.000	394 (43.0)	2.247 (1.770–2.853)	45.035 (<.001)	343 (39.0)	2.354 (1.843–3.007)	48.081 (<.001)	17 (50)	1.133 (.431–2.979)	.064 (.800)
Wave 2	143 (34.4)			28 (22.8)			1 (100)		259 (62.9)			232 (60.1)			17 (53.1)		
Inferiority																	
Wave 1	130 (11.5)	1.350 (.975–1.870)	3.274 (.070)	36 (11.6)	.903 (.461–1.767)	.089 (.765)	6 (46.2)	1.000	243 (26.5)	2.028 (1.588–2.589)	32.682 (<.001)	282 (32.1)	1.989 (1.557–2.541)	30.785 (<.001)	10 (29.4)	1.642 (.592–4.557)	.913 (.339)
Wave 2	62 (14.9)			13 (10.6)			1 (100)		174 (42.2)			187 (48.4)			13 (40.6)		
Poor mental health status																	
Wave 1	132 (11.7)	1.832 (1.353–2.480)	15.638 (<.001)	31 (10.0)	.976 (.484–1.970)	.004 (.947)	5 (38.5)	.429	249 (27.2)	2.364 (1.856–3.012)	49.657 (<.001)	224 (25.5)	2.400 (1.866–3.086)	47.755 (<.001)	11 (32.4)	1.626 (.597–4.430)	.910 (.340)
Wave 2	81 (19.5)			12 (9.8)			1 (100)		193 (46.8)			174 (45.1)			14 (43.8)		

BSRS-5: five-item Brief Symptom Rating Scale; CI: Confidence interval; OR: Odds ratio.

[a] Female: Wave 1: n = 1132, Wave 2: n = 416; male: Wave 1: n = 311; Wave 2: n = 123; transgender: Wave 1: n = 13, Wave 2: n = 1.

[b] Female: Wave 1: n = 917, Wave 2: n = 412; male: Wave 1: n = 879; Wave 2: n = 386; transgender: Wave 1: n = 34, Wave 2: n = 32.

Table 4 Comparisons of mental health based on the BSRS-5 between Wave 1 and Wave 2 surveys in heterosexual and nonheterosexual participants: age effect.

	Heterosexual[a]									Nonheterosexual[b]								
	Age 20–29			Age 30–39			Age 40 or older			Age 20–29			Age 30–39			Age 40 or older		
	n (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)
Insomnia																		
Wave 1	90 (14.1)	2.611 (1.737–3.926)	22.317 (<.001)	54 (10.1)	2.714 (1.754–4.199)	21.200 (<.001)	41 (14.6)	.803 (.464–1.388)	.620 (.431)	280 (26.0)	2.315 (1.845–2.905)	53.841 (<.001)	160 (26.2)	2.321 (1.725–3.124)	31.622 (<.001)	40 (27.8)	2.410 (1.359–4.272)	9.265 (.002)
Wave 2	47 (29.9)			45 (23.3)			23 (12.1)			212 (44.9)			126 (45.2)			38 (48.1)		
Anxiety																		
Wave 1	148 (23.1)	2.170 (1.500–3.318)	17.399 (<.001)	84 (15.7)	1.881 (1.264–2.799)	9.909 (.002)	48 (17.1)	.979 (.599–1.599)	.007 (.932)	448 (41.7)	2.006 (1.610–2.499)	39.068 (<.001)	235 (38.5)	1.635 (1.228–2.175)	11.448 (.001)	50 (34.7)	2.028 (1.160–3.548)	6.231 (.013)
Wave 2	62 (38.9)			50 (25.9)			32 (16.8)			278 (58.9)			141 (50.5)			41 (51.9)		
Hostility																		
Wave 1	176 (27.5)	2.350 (1.643–3.363)	22.574 (<.001)	141 (26.3)	1.594 (1.123–2.264)	6.849 (.009)	64 (22.9)	.958 (.616–1.490)	.037 (.848)	519 (48.3)	1.835 (1.469–2.291)	29.049 (<.001)	302 (49.4)	1.317 (.990–1.751)	3.594 (.058)	53 (36.8)	2.158 (1.235–3.773)	7.407 (.006)
Wave 2	74 (47.1)			70 (36.3)			42 (22.1)			298 (63.1)			157 (56.3)			44 (55.7)		
Depression																		
Wave 1	135 (21.1)	2.858 (1.977–4.131)	32.785 (<.001)	91 (17.0)	2.660 (1.835–3.857)	27.731 (<.001)	42 (15)	1.325 (.812–2.160)	1.274 (.259)	445 (41.4)	2.492 (1.993–3.116)	66.770 (<.001)	260 (42.6)	1.925 (1.444–2.566)	20.222 (<.001)	49 (34.0)	2.316 (1.321–4.059)	8.762 (.003)
Wave 2	68 (43.3)			68 (35.2)			36 (18.9)			301 (63.8)			164 (58.8)			43 (54.4)		
Inferiority																		
Wave 1	103 (16.1)	1.723 (1.133–2.620)	6.588 (.010)	51 (9.5)	1.481 (.894–2.451)	2.352 (.125)	18 (6.4)	.894 (.413–1.939)	.080 (.777)	334 (31.1)	1.888 (1.512–2.358)	31.775 (<.001)	167 (27.3)	2.353 (1.752–3.160)	33.109 (<.001)	34 (23.6)	1.587 (.865–2.911)	2.244 (.134)
Wave 2	39 (24.8)			26 (13.5)			11 (5.8)			217 (46.0)			131 (47.0)			26 (32.9)		
Poor mental health status																		
Wave 1	91 (14.2)	2.276 (1.503–3.446)	15.634 (<.001)	50 (9.3)	2.078 (1.298–3.329)	9.562 (.002)	27 (9.6)	.921 (.487–1.741)	.065 (.799)	289 (26.9)	2.520 (2.011–3.157)	66.373 (<.001)	164 (26.8)	2.118 (1.574–2.849)	25.044 (<.001)	31 (21.5)	2.482 (1.362–4.521)	9.065 (.003)
Wave 2	43 (27.4)			34 (17.6)			17 (8.9)			227 (48.1)			122 (43.7)			32 (40.5)		

BSRS-5: five-item Brief Symptom Rating Scale; CI: Confidence interval; OR: Odds ratio.

[a] Age 20–29: Wave 1: n = 640, Wave 2: n = 157; Age 30–39: Wave 1: n = 536; Wave 2: n = 193; Age 40 or older: Wave 1: n = 280, Wave 2: n = 190.

[b] Age 20–29: Wave 1: n = 1075, Wave 2: n = 472; Age 30–39: Wave 1: n = 611; Wave 2: n = 279; Age 40 or older: Wave 1: n = 144, Wave 2: n = 79.

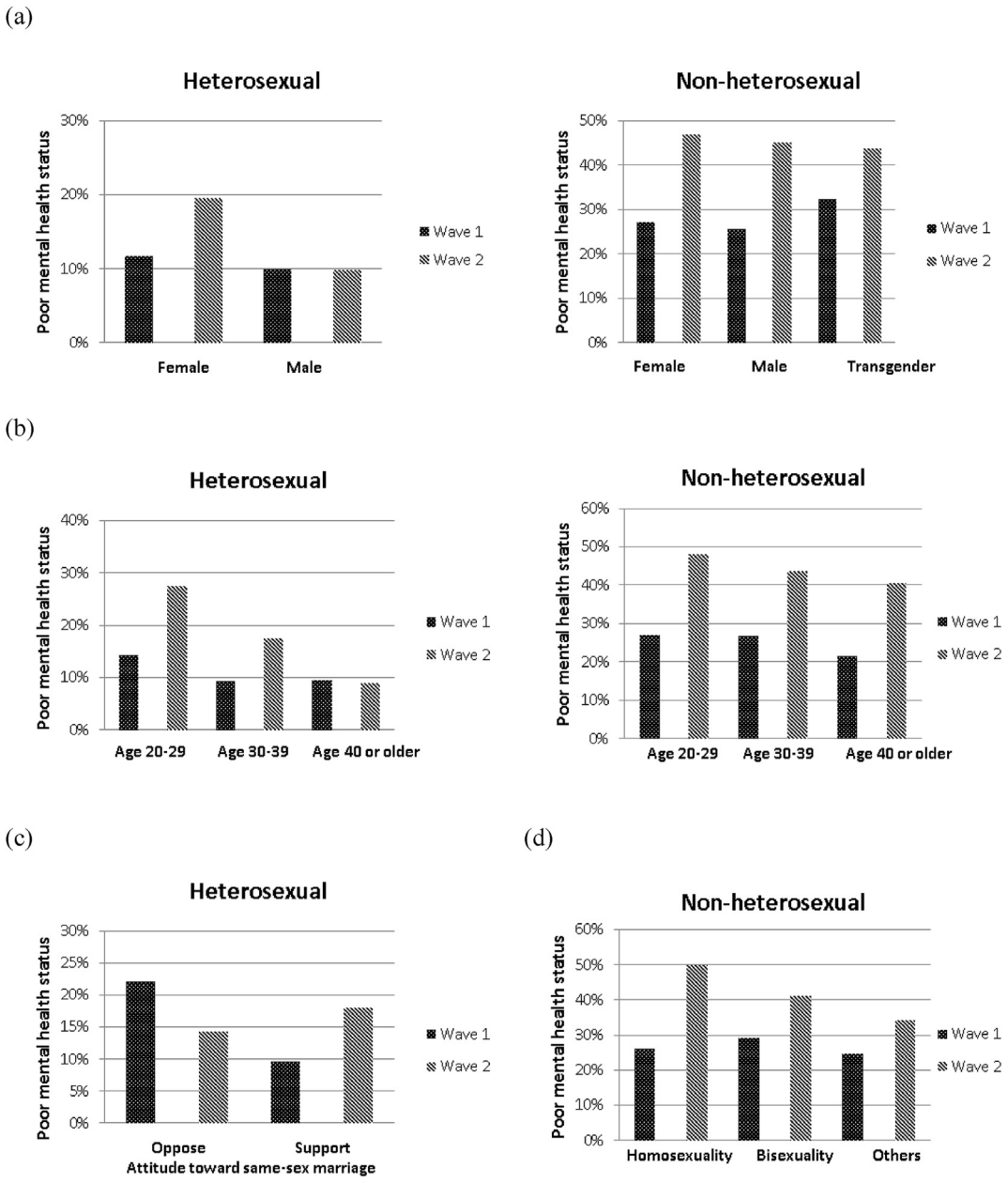

Figure 1 Poor mental health status in Wave 1 and Wave 2 surveys among heterosexual and nonheterosexual participants: (a) gender effect; (b) age effect; (c) effects of attitude toward same-sex marriage; and (d) effects of sexual orientation.

supported same-sex marriage were more likely to have better mental health compared with those who opposed.[13] However, the current study found that the rates of poor mental health status increased in heterosexual participants who supported same-sex marriage but not in those who opposed. According to the ecological systems theory,[19] mental health may result from complex interactions between individuals and their environments. Heterosexual people who supported same-sex marriage might be vulnerable to the statements that stigmatized sexual minority people and same-sex marriage during the period of public debates. They might be also discouraged by the results of referendums. Therefore, the rate of poor mental health status significantly increased in heterosexual people who supported same-sex marriage. The result indicated that the prevention and intervention programs for mental health problems related to anti-LGB policies should include heterosexual people who have a friendly attitude toward LGB people as the target.

Age and sex were the factors related to the changes in the rates of poor mental health during the period of public debates on and referendums for same-sex marriage. The rates of poor mental health increased considerably among both heterosexual people aged <40 years but not among those aged 40 or older, whereas nonheterosexual participants had increased rates of significant mental health problems in almost all indicators between Wave 1 and Wave 2 surveys. Moreover, the rates of poor mental health

Table 5 Comparisons of mental health based on the BSRS-5 between Wave 1 and Wave 2 surveys: effect of attitude toward same-sex marriage in heterosexual participants and effect of sexual orientation in nonheterosexual participants.

	Heterosexual[a]						Nonheterosexual[b]								
	Oppose same-sex marriage			Support same-sex marriage			Homosexuality			Bisexuality			Others		
	n (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)	*n* (%)	OR (95% CI)	χ^2 (*p*)
Insomnia															
Wave 1	61 (27.5)	.574 (.305−1.079)	3.021 (.082)	124 (10.0)	2.514 (1.883−3.358)	40.879 (<.001)	301 (25.8)	2.736 (2.207−3.392)	86.999 (<.001)	126 (29.7)	1.695 (1.191−2.414)	8.655 (.003)	53 (22.1)	1.841 (1.111−3.051)	5.682 (.017)
Wave 2	15 (17.9)			100 (21.9)			259 (48.8)			81 (41.8)			36 (34.3)		
Anxiety															
Wave 1	75 (33.8)	.497 (.273−.907)	5.318 (.021)	205 (16.6)	1.938 (1.503−2.497)	26.639 (<.001)	472 (40.5)	2.128 (1.727−2.622)	51.057 (<.001)	175 (41.3)	1.394 (.991−1.961)	3.645 (.056)	86 (35.8)	1.628 (1.022−2.592)	4.249 (.039)
Wave 2	17 (20.2)			127 (27.9)			314 (59.1)			96 (49.5)			50 (47.6)		
Hostility															
Wave 1	78 (35.1)	.969 (.400−1.210)	1.657 (.198)	303 (24.6)	1.709 (1.356−2.154)	20.882 (<.001)	557 (47.8)	1.854 (1.502−2.287)	33.492 (<.001)	209 (49.3)	1.367 (.977−1.937)	3.347 (.067)	108 (45)	1.294 (.817−2.049)	1.212 (.271)
Wave 2	23 (27.4)			163 (35.7)			334 (62.9)			111 (57.2)			54 (51.4)		
Depression															
Wave 1	65 (29.3)	.525 (.280−.985)	4.118 (.042)	203 (16.5)	2.667 (2.088−3.407)	64.203 (<.001)	483 (41.4)	2.497 (2.020−3.086)	73.417 (<.001)	174 (41.0)	1.962 (1.391−2.769)	14.921 (<.001)	97 (40.4)	1.751 (1.102−2.780)	5.685 (.017)
Wave 2	15 (17.9)			157 (34.4)			339 (63.8)			112 (57.8)			57 (54.3)		
Inferiority															
Wave 1	38 (17.2)	.510 (.227−1.143)	2.751 (.097)	134 (10.9)	1.439 (1.051−1.969)	5.198 (.023)	368 (31.6)	2.080 (1.686−2.567)	47.403 (<.001)	98 (23.1)	2.334 (1.622−3.360)	21.320 (<.001)	69 (28.8)	1.187 (.723−1.947)	.460 (.498)
Wave 2	8 (9.5)			68 (14.9)			260 (49.0)			80 (41.2)			34 (32.4)		
Poor mental health status															
Wave 1	49 (22.1)	.588 (.296−1.171)	2.315 (.128)	119 (9.6)	2.054 (1.515−2.786)	22.096 (<.001)	302 (25.9)	2.850 (2.299−3.533)	94.499 (<.001)	123 (29.0)	1.717 (1.205−2.448)	9.022 (.003)	59 (24.6)	1.601 (.972−2.636)	3.446 (.063)
Wave 2	12 (14.3)			82 (18.0)			265 (50.0)			80 (41.2)			36 (34.3)		

BSRS-5: five-item Brief Symptom Rating Scale; CI: Confidence interval; OR: Odds ratio.

[a] Oppose same-sex marriage: Wave 1: n = 222, Wave 2: n = 84; Support same-sex marriage: Wave 1: n = 1234; Wave 2: n = 456.

[b] Homosexuality: Wave 1: n = 1166, Wave 2: n = 531; Bisexuality: Wave 1: n = 424; Wave 2: n = 194; other: Wave 1: n = 240, Wave 2: n = 105.

increased among female but not among male heterosexuals, whereas both female and male nonheterosexual participants had increased rates of significant mental health problems. In Taiwan, the rate of acceptance toward the LGB population decreased with the increase of age and were higher in females than in males.[11] Based on the analysis of results of Taiwanese referendum, the majority of people who opposed same-sex marriage were >40 years old and the majority of people who supported same-sex marriage were less than 40 years.[20] Females voted on the referendum supporting same-sex marriage more than males.[20] Because that the two referendums drafted by the group against same-sex marriage received considerably stronger support than the one by the group supporting marriage equality, younger people and female heterosexuals might receive strong impacts and have difficulties in psychological adjustment.

Based on the results of the two referendums against same-sex marriage, the Taiwanese government enacted the Act for Implementation of Judicial Yuan Interpretation No. 748 outside the Civil Code in May 2019. This law guaranteed most but not all of the same rights entailed in a heterosexual marriage for same-sex couples.[21] For example, the Act for Implementation of Judicial Yuan Interpretation No. 748 neither legally recognize the ability of a same-sex spouse to adopt his or her partner's non-biological children nor the ability to register transnational same-sex marriages in cases where a partner is from a country where same-sex marriage is not legalized, showing that there is still discrimination in how same-sex marriage is treated.[21]

This study had several limitations. First, the second wave of survey was conducted shortly after the referendum and likely to draw attention from and recruit particularly Facebook users who were supportive of same-sex marriage and markedly and emotionally impacted by the referendum results. This selection effect may substantially contribute to the finding of poor mental health post-referendum. Second, we recruited the participants by Facebook advertisement; therefore, they were not a national representative sample. Facebook is the most popular social media in Taiwan. The 2019 Taiwan Internet Report revealed that 98.9% of Taiwanese people are Facebook users, followed by Instagram (38.8%) and Twitter (5.6%).[22] However, there are gender and age differences in the users of various social media. More males than females are Facebook and Twitter users, whereas more females than males are Instagram users.[22] More Taiwanese people aged 12–14, 35–39, 45–54 and 65 or older are Facebook user, whereas Taiwanese people aged 15–24 and 29–29 are Instagram and Twitter users, respectively.[22] Most participants in our study were <40 years old and the majority of heterosexual participants were female. Whether the results may be generalized to older populations and male heterosexuals requires further investigation. Moreover, only 44.3% and 39.4% of participants were heterosexual in Wave 1 and Wave 2, respectively, in the current study. The 2011–2013 National Survey of Family Growth reported that 17.4% of women and 6.2% of men aged 15–44 years reported any same-sex contact in their lifetimes.[20] Furthermore, 1.3% of women and 1.9% of men said they were "homosexual, gay, or lesbian," whereas 5.5% of women and 2.0% of men said they were bisexual.[23] According to the Taiwan Social Change Survey 2012, Phase 6, Wave 3 published by Taiwan's Academia Sinica in April 2013, 4.4% of Taiwan's population is non-heterosexual.[24] The overrepresentation of sexual minorities in our sample may confine generalizability of the study findings. As other online surveys, the present study could not screen out those who were not qualified for the inclusion or exclusion criteria. Also, fabrication of the answers could not be avoided.

Third, most of the participants in the present study had a high or very high level of supporting same-sex marriage. The prevalence of supportive attitude toward same-sex marriage in heterosexuals was as high as 84–85% in both survey waves. Compared with the result of the Taiwan Social Change Survey 2012, Phase 6, Wave 3 that 52.5% of the populace believes that homosexuals should be entitled to marriage rights,[24] the participants of the present study is obviously not representative. Whether the results can be generalized to people who have a low level of supporting same-sex marriage requires further investigation.

Fourth, we generally enrolled two different samples at Wave 1 and Wave 2 because anyone who saw Facebook advertisement could join our study. Based on our method, we only assessed the changes of psychiatric symptoms in the population level, but not in the personal level, between Wave 1 and Wave 2. It limited the possibility to determine the causal effects of referendums for same-sex marriage on mental health. Fifth, the mechanisms accounting for the change in the rate of poor mental health during the period of public debates on and referendums for same-sex marriage warrant further investigation. Sixth, there might be other events that impacted participants' mental health simultaneously. For example, the referendums for same-sex marriage was held with the nine-in-one elections that elected all municipality, city, and township mayors, county magistrates, councilmen, and chiefs of village in Taiwan. The results of elections might also influence participants' mental health.

Conclusions

The rate of poor mental health status significantly increased in nonheterosexual participants, especially in young and lesbian and gay ones, during the period of public debates on and referendums for legalizing same-sex marriage. Heterosexual participants who were female, were young, and supported same-sex marriage also had increased rates of poor mental health status. The result indicated that both nonheterosexual people and a subgroup of heterosexual people may suffer from the experiences during the period of public debates on and referendums for legalizing same-sex marriage. The results also indicated the importance of considering gender, age, and sexual orientation differences in psychological reactions to major events related to sexual minorities. Whether civil rights of sexual minority individuals can be determined through referendums warrants inspection.

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The authors have no conflicts of interest relevant to this article.

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