Influence of Online Dating Apps on Sexual Risk Behaviors among Homosexual and Bisexual Adolescents and Youths in Thailand: An Online Cross-sectional Survey

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ABSTRACT

Objective: The internet and social media enhance communication, education, and social connection among users; however, some adverse effects on health are notable, particularly sexual risk engagement and mood problems. Mobile dating applications (apps)/websites facilitate high sexual-risk access, particularly among lesbian, gay, bisexual, transgender, and queer (LGBTQ) individuals. Recognition of the characteristics of using these platforms and identifying factors related to high sexual risk among LGBTQ youths will facilitate both targeting of those at risk and subsequent intervention.

Materials and Methods: Adolescents and youths were invited to voluntarily join this study, scan the QR code, and anonymously complete the questionnaires. These validated questionnaires were launched online via a popular platform among LGBTQs during 2017-2018. Multiple logistic regression was employed to identify factors independently associated with high sexual risk among study subjects.

Results: Of 360 participants (mean age: 21±2.8 years, range: 11-25), 60.8% self-reported as homosexual, and the rest were bisexual. Median dating app/website usage was 2 (range 1-10). Two-thirds (62.8%) met partners from those e-platforms, and most (79.6%) developed a sexual relationship. Over half (52.2%) did not use a condom, and one-third (30.6%) abused substances during sex. Poor condom compliance, multiple partners, and substance use were strongly associated with individuals who used >2 apps for longer than 3 years. Depression susceptibility was 32.2%, and was related to condom-use failure (p=0.01).

Conclusion: Among LGBTQs, the greater the number and longer time exposed to dating apps/websites, the higher the number of sexual risk behaviors. Moreover, unsafe sex increased among individuals at risk for depression.

Keywords: Bisexual; dating apps; homosexual; men who have sex with men (MSM); social media (Siriraj Med J 2023; 75: 612-621)

INTRODUCTION

Social media offers numerous benefits and perceived advantages for adolescents, including improved health literacy and communication skills. However, its excessive use can lead to undeniable social and medical problems,[1] such as cyberbullying, internet addiction, sleep problems, depression,[2] and increasing exposure to pornography and sexual risk behaviors.[1] In particular, social network dating in which individuals met online resulted in increased possibility of random, impromptu sexual encounters,

which, in turn, led to unplanned, unprotected, and undiscerned sexual intercourse and sexual behaviors. Among men who have sex with men (MSM), high-risk sexual activity is frequently linked to substance abuse. Notably, misuse of prescription analgesic pills and muscle relaxants was significantly associated with engaging in receptive unprotected anal intercourse.[3] Other substances were used to enhance sexual stamina while performing anal sex, such as phosphodiesterase type 5 inhibitor.[4] Extensive social media use correlated with high-risk sexual activities. Smith LW et al. found a growing association between exposure to sexually explicit websites or "sexting" by young people and condomless sexual intercourse (SI), recent sexual activity, alcohol and drug use prior to SI, and having multiple recent sexual partners.[5] Furthermore, adolescents who shared sexual photos were more likely to have low self-esteem than their demographically similar peers.[6]

Sexting posed a specific risk to the MSM and bisexual population, as they extensively used geo-social mobile dating apps, granting greater access to potential sexual partners who lived nearby or were currently in close proximity. Previous research found that men who used online dating apps were more likely to seek sexual encounters rather than romantic relationships.[7] Moreover, the length of use of these dating apps was associated with increased likelihood of high-risk condomless anal intercourse.[8] Therefore, individuals who used geo-social apps for finding sexual partners were at greater risk for sexually transmitted infections, such as gonorrhea and chlamydia infection, when compared to individuals who met their partners in person.[9]

Sexual risk behaviors were also associated with patterns of geo-social dating app usage. Men who reported using 3 or more websites or apps to meet sex partners were significantly more likely to report anal intercourse and condomless anal sex within the past 3 months.[10] Finally, the use of such technology was also associated with increased likelihood of having sex exchanged for food, drugs, or a place to stay within the past 3 months.[11]

In Thailand, the use of online social networking has become increasingly popular over the past decade. The use of social media apps also increased from 33.2% to 86.8% in 2013 and 2016, respectively.[12,13] At the same time, increased sexual health risks were well-reported, especially among sexual minorities. It was estimated that there are 185,000 MSMs living in metropolitan Bangkok, and more than 75,600 transgenders living in Thailand. The median HIV prevalence among these two groups was estimated at 9.15% and 12.7%, respectively. A 2015 study by UNICEF found that 39% of young transgender people had commercial sex. Moreover, although condom use among MSMs and transgenders remained high at 82-84%, new infections had not declined[14], and the rate of HIV transmission in young MSMs aged less than 25-years-old remained 12.1%.[4] As such, the impact of mobile dating apps on this particular phenomenon remain unknown.

The study aimed to assess the association between mobile dating app usage and sexual risk behaviors among Thai homosexual and bisexual adolescents and youths. It also evaluated the links between sexual risk behaviors, self-esteem, and depression in the participants.

MATERIALS AND METHODS
Participants

We conducted a cross-sectional survey among adolescents and youths aged 11 – 25 years who identified themselves as homosexual, bisexual, or queer. Survey data was obtained during 17 May 2017 to 16 May 2018. Research posters were placed in large medical care centers in Bangkok, including the Adolescent Clinics at Siriraj Hospital and Ramathibodi Hospital, the Gender Variation Clinic at Ramathibodi Hospital, the Silom clinic at the Hospital for Tropical Diseases, the MSM Clinic at Bangrak Hospital, the Tangerine Clinic at the Thai Red Cross AIDS Research Center, and at the Rainbow Sky Association of Thailand Health Center. Study participants were also recruited via an advertisement in a popular online forum (www.pantip.com), and in an online chat room (www.lovecarestation.com). Those who were interested could voluntarily access the survey via a conspicuously visible QR code. Once logged in, the study information was visible, and participants were asked to complete a 62-item electronic questionnaire (provided in Thai), which took about 15-20 minutes to complete. Participants could decide whether they wanted to continue or not. Study consent was automatically obtained by way of a participant's voluntary decision to response the survey. Due to the anonymous log-in process, parental consent for participants aged less than 18 years was not required. Upon completion of the survey, a gift of 100 Thai baht in the form of a LINE pre-paid card (US$ 3.2) was sent to the email address provided by each participant. For sample size calculation, no previous study had reported the correlation coefficient value for this population. Considering other similar studies with 90-350 participants, the sample size for this study was set to at least 350.

The research methodology for this study was approved by the Ethical Review Board of the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand [COA no. Si 264/2017] prior to initiation of the study.

Measurement

Survey questions were designed to collect demographic and lifestyle data, apps or website usage patterns, and sexual risk behaviors. Collected data included age, sexual orientation, marital status, education, occupation, and household income. Dating apps or website usage patterns within the previous 12 months were obtained using the number of apps or websites (multiple selectable choices with spaces for naming all dating apps or websites used), onset and duration of knowing apps, purpose of use, online day(s), online time(s), duration of use on weekdays, and duration of use on weekends. Sexual risk behaviors included inconsistent condom use, number of partners within the previous one and twelve months, number of previous partners, history of sexual transmitted infections (STIs), and history of substance use during sexual intercourse (SI). The developed questions were then tested for content validity by three experts (a child and adolescent psychiatrist, a gynecologist, and an adolescent medicine physician). The questions were then put to 33 unidentified participants to check for reliability and internal validity. The Cronbach's alpha coefficient was 0.95. Rosenberg Self-Esteem Scale, Thai version[15] with 10 items was used to assess the self-esteem of all participants (Cronbach's alpha: 0.86), with a higher score indicating higher self-esteem. Groups with low, moderate, and high self-esteem were classified by mean score. For depression screening, the 20-item self-report Center for Epidemiologic Studies-Depression Scale (CES-D), Thai version[16] was used. A score higher than 22 indicated a person at risk for depression (Cronbach's alpha: 0.86). The completed questionnaires were analyzed.

Statistical analysis

The descriptive data were shown as mean plus/minus standard deviation, median and range, or number and percentage. Chi-square and independent *t*-tests were used to test differences between two groups, and statistical significance was defined as *p*-value less than or equal to 0.05. To identify association between mobile dating apps or website usage patterns and sexual risk behaviors, we used Spearman's correlation coefficient (*r*). The factors associated with sexual risk behaviors were reported as crude and adjusted odds ratio with their respective 95% confidence interval (CI). Multiple logistic regression models were constructed for each exposure of interest, including age, biological sex, sexual orientation, education, occupation, and income, which were all previously found to be associated with sexual risk behaviors. The statistical analyses were conducted using SPSS version 18™ (licensed to Mahidol University).

RESULTS

Targeted recruitment

Out of 401 respondents, 360 completed the survey, resulting in an 89.7% response rate. Of those, 219 (60.8%) self-identified as homosexuals, 110 (30.6%) as bisexuals, and the remaining 31 (8.6%) as queer or not sure about their sexual orientation. Table 1 showed the demographic and lifestyle characteristics of study participants. The mean age was 21 years. The homosexual group was significantly older than the bisexual group (21.3±2.6 vs. 20.6±2.9, respectively; *p*=0.03). Most participants (75%) were in a relationship prior to the initiation of this study. Over half were studying (55.3%), and 62.8% had low income (<15,000 Thai baht/month).

Dating app or website usage patterns

The median number of dating-apps/websites used by study participants was 2 (range: 1-10). The most popular website for finding sex-partners was Google. The dating apps and websites reported by participants were shown in Fig 1. Weekends were the most common online days, and during 5 to 10 pm was the most popular time period for searching out dating partners (Fig 2). The majority of participants (78.1%) used dating apps to find friends, whereas one-third used them to find sexual partners. Subgroup analysis revealed homosexual males to be significantly more likely than homosexual females to use dating apps to find sex partners (*p*<0.001). In addition, bisexual males were significantly more likely to use dating apps to find sex partners than homosexual males (*p*=0.037), while homosexual females were significantly more likely to use these apps to find a partner for a long-term relationship than bisexual females (X² 5.42, *p*=0.02).

Sexual risk behavior

In our study population, the mean age at first SI was 17.6±2.8 years. About two-thirds (62.8%) of subjects met with persons they found via dating apps, and most of those (79.6%) had SI with their apps partner. Among the homosexual group, males were significantly more likely to meet (*p*<0.001) and have SI (*p*<0.001) with an app partners than females. About half (52.2%) reported no condom use during SI with apps partners. About one-third (30.6%) of participants used substances during SI. The most common substance used was alcohol (83.6%). The median number of previous apps partners within 12 months was 4, and the median number of concomitant apps partners (within the previous 30 days) was 1 with a range of 0 to 22. Duration of familiarity with the dating apps was strongly associated with duration of dating

TABLE 1. Demographic and lifestyle characteristics of adolescents and youths aged 11-25 years grouped by sexual orientation.

| Characteristics		All (n=360)	Sexual orientation		
			Homosexual (n=219)	Bisexual (n=110)	Queer (n=31)
Age (years old)	Mean ± sd	21.0 ± 2.8	21.3 ± 2.6	20.6 ± 2.9	19.8 ± 3.5
Previously in a relationship	n (%)	270 (75.0)	163 (74.4)	84 (76.4)	23 (74.2)
Educational status	n (%)				
High school		81 (22.5)	40 (18.2)	27 (24.5)	14 (45.2)
Vocational school		24 (6.7)	12 (5.5)	6 (5.5)	6 (19.4)
Bachelor degree		231 (64.2)	147 (67.1)	74 (67.3)	10 (32.3)
Master degree or higher		20 (5.6)	18 (8.2)	1 (0.9)	1 (3.1)
Others		4 (1.0)	2 (1.0)	2 (1.8)	0 (0.0)
Occupation	n (%)				
Student		199 (55.3)	116 (53.0)	66 (60.0)	17 (54.8)
Employed		142 (39.4)	91 (41.5)	39 (35.5)	12 (38.7)
Unemployed		19 (5.3)	12 (5.5)	5 (4.5)	2 (6.5)
Marital status	n (%)				
Single		249 (69.2)	143 (65.3)	81 (73.6)	25 (80.6)
In a relationship		103 (28.6)	72 (32.9)	25 (22.7)	6 (19.4)
Married/stay together/divorced		8 (2.2)	4 (1.8)	4 (3.6)	0 (0.0)
Income per month*	n (%)				
< 15,000 Baht		226 (62.8)	127 (58.0)	77 (70.0)	22 (71.0)
15,001-30,000 Baht		101 (28.1)	68 (31.1)	27 (24.5)	6 (19.4)
30,001-50,000 Baht		24 (6.7)	19 (8.7)	4 (3.6)	1 (3.2)
> 50,000 Baht		9 (2.5)	5 (2.3)	2 (1.8)	2 (6.5)
Dating apps/ websites usage pattern					
Number of dating apps/websites used	Median (range)	2.0 (1-10)	3.0 (1-10)	2.0 (1-10)	2.0 (1-7)
Duration of using dating app/ website (years)	Median (range)	3.0 (0.5-12.0)	3.0 (0.5-12.0)	3.0 (0.5-10.0)	2.0 (1.0-11.0)
Duration of use on weekdays (hours)	Median (range)	2.0 (0-16.0)	1.0 (0-14.0)	2.0 (0-16.0)	2.0 (1.0-10.0)
Duration of use on the weekend	Median (range)	2.0 (0-24.0)	2.0 (0.1-24.0	3.0 (0-24.0)	4.0 (1.0-15.0)
Purpose of using apps/websites	n (%)				
Find friends		281 (78.1)	167 (76.3)	87 (79.1)	27 (87.1)
Find long-term relationship		232 (64.4)	146 (66.7)	67 (60.9)	19 (61.3)
Find sex partner		117 (32.5)	75 (34.2)	33 (30.0)	9 (29.0)
Sex workers		17 (4.7)	7 (3.2)	8 (7.3)	2 (6.5)

TABLE 1. Demographic and lifestyle characteristics of adolescents and youths aged 11-25 years grouped by sexual orientation. (Continue)

| Characteristics		All (n=360)	Sexual orientation		
			Homosexual (n=219)	Bisexual (n=110)	Queer (n=31)
Sexual practice					
Age at sexual debut (years) (n=233)	Mean ± sd	17.6 ± 2.8	17.5 ± 2.8	17.6 ± 2.8	17.8 ± 2.8
Met partner from a dating app/website,	n (%)	226 (62.8)	145 (66.2)	63 (57.3)	18 (58.1)
Having SI with apps-partner, n (%)	(n=226)	180 (79.6)	122 (84.1)	48 (76.2)	10 (55.6)
Previous apps sex-partners within 12 months (n=179)	Median (range)	4.0 (0-100)	3.0 (0-100)	5.0 (0-48)	10.0 (1-20)
Previous apps sex-partners in a month, (n=179)	Median (range)	1 (0-22)	1 (0-22)	1 (0-7)	1 (0-5)
Number of times having group sex (n=56)	Median (range)	3 (1-10)	3 (1-10)	3 (1-6)	3 (2-10)
No condom used with app-partners (n=180)	n (%)	94 (52.2)	61 (50.0)	25 (52.1)	8 (80.0)
Always ask the number of sex-partners from current apps-partner (n = 180)	n (%)	50 (27.8)	34 (27.9)	15 (31.2)	1 (10.0)
Always ask history of previous STD (n=180)	n (%)	46 (25.6)	27 (22.1)	16 (33.3)	3 (30.0)
Type of substances used while having sex					
Substance use during SI	n (%)	55 (30.6)	30 (24.6)	22 (45.8)	3 (30.0)
Alcohol		46 (83.6)	22 (73.3)	21 (95.5)	3 (100)
Vasodilator (sildenafil)		21 (38.2)	13 (43.3)	6 (27.3)	2 (66.7)
Methamphetamine & its derivatives		9 (16.4)	7 (23.3)	1 (4.5)	1 (33.3)
Cannabis		7 (12.7)	3 (10.0)	3 (13.6)	1 (33.3)
Mental health issues					
Rosenberg's self-esteem score	Mean ± sd	28.9 ± 4.8	28.7 ± 4.9	29.3 ± 4.4	29.0 ± 4.9
Level of self-esteem					
Low	n (%)	65 (18.1)	46 (21.0)	16 (14.5)	3 (9.7)
Moderate to high	n (%)	295 (81.9)	173 (79.0)	94 (85.5)	28 (90.3)
CES-D score,	Median (range)	17.4 ± 9.6	17.5 ± 9.2	16.9 ± 10.0	18.4 ± 11.3
Positive depression screening	n (%)	116 (32.2)	72 (32.9)	35 (31.8)	9 (29.0)

* 1 USD = 32.507 Thai baht (2017)

Abbreviations: SD, standard deviation; USD, United States dollars; App(s), application(s); SI, sexual intercourse; STD, sexually transmitted disease; CES-D, Center for Epidemiologic Studies Depression Scale
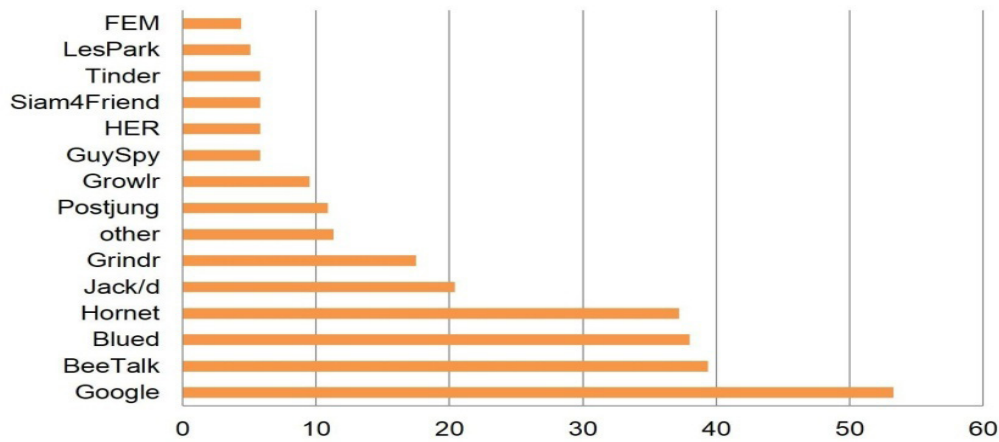
Fig 1. Dating apps/websites accessed among study adolescents and youths.
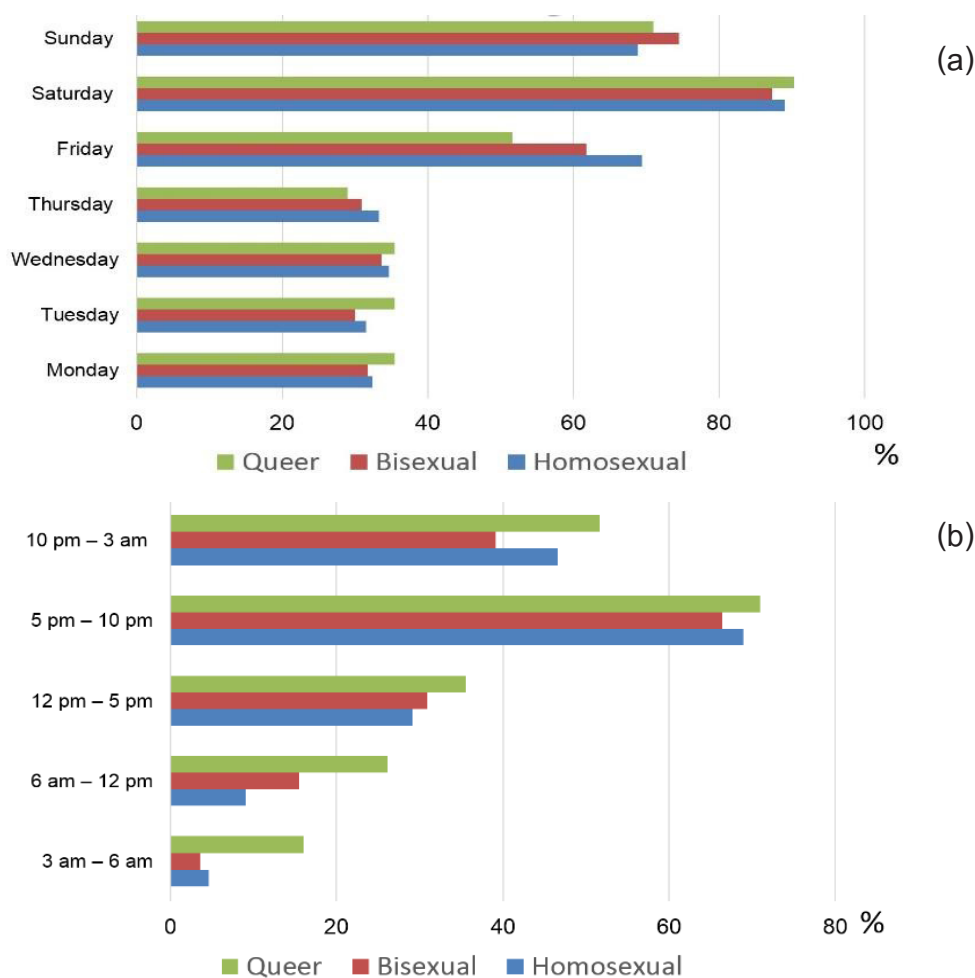
Fig 2. Days (a) and times (b) online among subgroup participants.

platform use during the weekdays and weekend ($p<0.001$). Moreover, those who used dating apps during the weekday were also more likely to use them during the weekend ($r=0.80$, $p<0.05$) (Table 2). In addition, if a study subject currently had sex partners that they became acquainted with via dating apps, they were significantly more likely to have had app-partners before within that year ($r=0.67$, $p<0.001$).

Table 3 showed the factors significantly associated with specific sexual risk behaviors (inconsistent condom use, recent multiple apps sex-partners, and substance use during SI). After adjusting for age, biological sex, sexual orientation, education, occupation, and income, participants who used ≥2 apps/websites were twice as likely to have inconsistent condom use [OR: 2.131, 95% CI: 1.047-4.334], and 2.8 times more likely to use drug

TABLE 2. Spearman's correlation coefficient of dating app/website usage patterns.

Dating app usage patterns	Age	Number of dating apps being used	Duration of knowing dating apps	Duration of dating app use on weekdays	Duration of dating app use on weekends	Previous app partner within 12 months
Number of dating apps being used	*0.18***					
Duration of knowing dating apps	*0.56***	-0.03				
Duration using dating app use on weekdays	*0.10**	*0.29**	*0.26***			
Duration of dating app use on weekends	*0.10**	*0.13**	*0.24***	*0.80**		
Previous app partner within 12 months	0.015	*0.28***	-0.04	0.10	0.14	
Recent app partner	-0.002	0.06	-0.14	0.136	0.13	*0.67***

A p-value<0.05 indicates statistical significance* and p<0.01 indicated strongly statistical significance**

TABLE 3. Factors associated with various sexual risk behaviors.

Factors	Unadjusted OR (95% CI)	P	Adjusted OR (95% CI)*	P	B	SE
Inconsistent condom use						
Duration of knowing apps >3 years	1.984 (1.086 - 3.623)	0.026	1.975 (0.998 - 3.907)	0.051	0.680	0.348
Number of apps/websites used >2 apps	1.466 (0.792 - 2.711)	0.223	2.131 (1.047 - 4.334)	*0.037*	0.756	0.362
Previous history of no condom use	74.408 (24.155 - 229.210)	<0.001	90.348 (26.373 - 309.509)	<0.001	4.504	0.628
Recent sex partners from apps ≥2 partners	2.212 (1.198 - 4.081)	*0.011*	2.212 (1.159 - 4.219)	*0.016*	0.794	0.330
Positive depression screening	2.612 (1.359 - 5.020)	*0.004*	2.436 (1.231 - 4.821)	*0.011*	0.890	0.348
Recent multiple sex partners from apps						
Duration of knowing apps >3 years	2.381 (1.263 - 4.489)	*0.007*	2.633 (1.248 - 5.552)	*0.011*	0.968	0.381
No condom use with apps sex partner	2.212 (1.198 - 4.081)	*0.011*	2.267 (1.149 - 4.475)	*0.018*	0.818	0.347
Substance use during SI	2.646 (1.381 - 5.073)	*0.003*	3.080 (1.467 - 6.464)	*0.003*	1.125	0.378
Substance use during SI						
Number of apps/websites used >2 apps	2.154 (1.051 - 4.415)	*0.036*	2.807 (1.172 - 6.725)	*0.021*	1.032	0.446
Recent sex partners from apps ≥2 partners	2.646 (1.381 - 5.073)	*0.003*	3.144 (1.487 - 6.646)	*0.003*	1.145	0.382

*Adjusted for age, biological sex, gender orientation, education, occupation, and income
A p-value<0.05 indicates statistical significance* and p<0.01 indicated strongly statistical significance**
Abbreviations: OR, odds ratio; CI, confidence interval; SE, standard error; App(s), application(s); SI, sexual intercourse

during SI [OR: 2.807, 95% CI: 1.172-6.725]. History of no-condom use [OR: 90.348, 95% CI: 26.373-309.509] and having positive depression screening [OR: 2.436, 95% CI: 1.231-4.821] were factors that had higher odds that a study subject would have sex without barrier method. Moreover, those who used dating apps for a long time and those who practiced unsafe sex (no condom use or use of substances while having sex) also had a higher chance of having multiple sex partners. Lastly, participants who regularly had a minimum of 2 sex partners had a greater probability of taking any substance while having SI [OR: 3.144, 95% CI: 1.487-6.646]. These results strongly confirm that duration of use these kinds of dating apps/ websites, and the number of dating apps used strongly significantly associated with high sexual risk behaviors among homosexual and bisexual adolescents and youths.

Self-esteem and depression

The mean score of the Rosenberg self-esteem scale was 28.9±4.8. Sixty-eight participants (18.1%) showed low self-esteem (scores less than 25) with no statistical difference among the homosexual, bisexual, and queer groups. No association between low self-esteem and sexual risk behaviors was found. Around one-third of each group had positive depression screening. Those at risk for depression were associated with inconsistent condom use (X^2 9.05, p<0.01), and were twice as likely to use no condom when compared to the group without depression (OR: 2.61, 95% CI: 1.36-5.02; p<0.01) (Table 3).

DISCUSSION

This paper described the patterns and relationships specific to geo-social mobile dating apps among the homosexual, bisexual, and queer adolescents and youths in Thailand. Our findings demonstrated that these populations have used several dating apps/websites for a few years, that they spent twice as much time during the weekend compared to during the week, and that they accessed these platforms mostly at night. Interestingly, most of the dating apps/websites used were originally created in English, which suggests that these populations were well-educated or that at least they understood English. This hypothesis was supported by the fact that over 80% of our participants completed at least high school. Extensively use of geo-social mobile dating apps provided greater access to nearby potential sexual partners, which was found to pose a special sexual risk to the MSM, lesbian and bisexual populations. More than three-fourths of our target populations already had a sexual relationship and had their sexual debut by the end of middle adolescence

(at age 17.5-17.8 years). Most participants used mobile dating apps to search for sexual partners, which is similar to previous research. People used online dating apps to seek sexual relationships, and men were more likely to seek out a sexual encounter rather than a romantic relationship.[7] However, the Thai youths in this study tended to seek friends and romantic relationships from dating apps more than finding sexual partners when compared to previous study.[6] The data from our study showed that the more study participants used these dating apps, the more likely they were to engage in sexual risk behaviors. In addition to inconsistent condom use and unawareness of their partner's sexual risk, our study identified other high-risk sexual behaviors, such as group sex or 'sex party or swinging sex', substance use when having sex, and a large number of sex partners (22 partners in a month or a hundred in a year). Consistent with previous study, we found condomless anal intercourse to be more common among low-education people who spent more time using dating apps.[8] In addition, a small number of bisexual and homosexual females reported no condom use during sex, which may be due to a lack of education, unawareness of sexual transmitted disease, or misunderstanding that condom is only for males.[17]

Compatible with another report[18], one-third of our study participants reported using substances while having sex, and alcohol was the most common substance used followed by vasodilator medication (sildenafil), methamphetamine, and cannabis, sequentially. It's worth noting that cannabis was not legally declared "free" during the study. Access to alcohol was not difficult, but sildenafil required a physician specialist's prescription, and amphetamine and cannabis were illegal in Thailand, which suggested illegitimate sourcing for all (including under age for alcohol) or most substances. Those using substances were more likely to be employed, bisexual, using many dating apps for a long time, spending more time online, and currently having multiple partners from dating apps. Generally similar to other previous reports[19,20], individuals who had positive screening for depression were more likely to demonstrate condom noncompliance. Depression was also shown to increase sexual risk and diminish self-efficacy towards condom use among MSM population.[21] In addition to having sex to cope with sadness, when feeling depressed, people had less concentration, which could reduce sexual risk perception that could lead to forgetting to use a condom.[22,23]

Our study demonstrated association between the use of dating apps/websites and sexual risk behaviors among bisexual and homosexual adolescents and youths population. The more exposure they had to these dating

platforms, the more sexual risk they experienced. Therefore, sexual risk prevention that specifically focuses on dating apps/ websites is suggested. First, exposure to dating apps or sexually explicit websites should be delayed in children and adolescent population. Second, educate children and adolescents to postpone their sexual debut until the appropriate age or relationship, and emphasize the important of a 'no condom, no sex' approach to SI decision-making. In addition to family, school was shown to be another effective environment for helping students develop the confidence to say "No" to sex, to understand the consequences of unplanned sex, and how to minimize sexual risk, including substance use.[24] Legal mandating of pop-up messages, such as a warning to engage in safe sex, should be considered for dating apps/websites. Finally, early detection of depression and treatment may help to reduce possible future sexual risk.

Limitations

This study has some mentionable limitations. Firstly, since this was a self-report questionnaire-based study, certain recall bias among study participants was possible. Secondly, the authors provided a LINE pre-paid card to participants who provided their email addresses as a token of gratitude for their cooperation. However, this could be seen as a biased incentive favoring a specific group. Thirdly, the authors acknowledged the delayed timing of publication but emphasized that the study's uniqueness and relevance persist for Thailand and neighboring countries with similar social and cultural norms, contrasting to developed countries where "sexual health/sexuality or gender minorities" issues are more advanced. Lastly, recruiting participants from specific locations serving sexual-minority adolescents and youths may introduce bias towards mental health and substance use issues, potentially inflating their prevalence in the study. In addition to the valuable findings from this study, an additional strength of this study is proof of the effectiveness of the study design. For researchers who set forth to study these same or similar objectives in their respective country (especially in the developing world), we recommend an anonymous online approach that is user-friendly, and the use of an attractive premium that can be rapidly and easily redeemed as a thank you gift to the respondent.

CONCLUSION

The patterns of use of online dating apps/websites was found to be significantly related to high sexual risk behaviors among homosexual and bisexual adolescents and youths. The longer they used and the more they were exposed to these kinds of apps/websites, the higher the likelihood that they would present sexual risk behaviors, particularly having recent multiple partners, inconsistent condom use, and using substance while having sex. In addition, almost one-fifth of this population had low self-esteem, and around one-third were at-risk for depression, and depression would increase the risk of unsafe sex practices.

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