研究成果の刊行に関する一覧表

(以下、研究代表者は二重下線、分担研究者は単純下線、原文添付は○)

【原著論文等】

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RESEARCH ARTICLE

Socio-behavioral risk factors among older adults living with HIV in Thailand

Patou Masika Musumari[1], Arunrat Tangmunkongvorakul[2]*, Kriengkrai Srithanaviboonchai[2,3], Mitchell D. Feldman[4], Wathee Sitthi[2], Kittipan Rerkasem[2,3], Teeranee Techasrivichien[1], S. Pilar Suguimoto[1,5], Masako Ono-Kihara[1], Masahiro Kihara[1]

1 Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan, **2** Research Institute for Health Sciences, Chiang Mai University, Chiang Mai, Thailand, **3** Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, **4** Division of General Internal Medicine, University of California San Francisco, San Francisco, California, United States of America, **5** Center for Medical Education, Graduate School of Medicine, Kyoto University, Kyoto, Japan

* arunrat@rihes.org

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Abstract

Background

There has been a global increase in HIV infection in persons 50 years of age and older. This group is at risk for development of chronic illness that may be exacerbated by socio-behavioral risk factors such as smoking, unhealthy alcohol use, and sedentary lifestyle. However, socio-behavioral risk factors in this older HIV infected population are not well described. The current study aims to describe and document factors related to alcohol use, tobacco smoking, and physical exercise in older adults living with HIV (OALHIV).

Methods

This cross-sectional quantitative study was conducted between August and September 2015, and enrolled HIV-infected participants aged 50 years and older from 12 community hospitals in Chiang Mai Province, Northern Thailand.

Results

Of the 364 participants recruited in the study, 57.1% were female, and 67.3% were between 50–59 years of age. Respectively, 15.1%, 59.1%, and 18.7% were current smokers, currently engaged in physical exercises, and reported ever drank alcohol in the past year. 22.1% of those who drank alcohol reported experience of heavy episodic drinking. Male gender was one of the strongest predictors of ever drank alcohol in the past year (AOR, 4.66; CI, 2.28–9.49; $P<0.001$) and of being a current smoker (AOR, 13.41; CI, 7.23–24.87; $P<0.001$). Lower household income was associated with increased odds of ever drank alcohol in the past year (household income (1 USD = 35 THB) of $\leq$ 5,000 Baht versus > 20,000 Baht: AOR, 5.34; CI, 1.28–22.25; $P = 0.021$). Lower educational level was associated with decreased odds of physical exercises (no education versus secondary and higher: AOR, 0.22; CI, 0.08–0.55; $P = 0.001$).

Conclusion

Smoking and alcohol use is common among OALHIV, with a substantial proportion not engaging in physical exercises. Interventions for OALHIV should particularly target males and those of lower socio-economic status to deter smoking and alcohol use and to promote physical exercises.

Introduction

Antiretroviral (ARV) medications are extending the lifespan of HIV-infected persons and this longevity means these older adults with HIV are developing chronic diseases. Health care delivery for older adults with HIV has shifted from acute to chronic care, making it more important to focus on health behavior of the patients [1–3]. Socio-behavioral risk factors, including smoking, alcohol use, and physical inactivity are associated with many chronic non-communicable diseases, and have become significant causes of morbidity and mortality among HIV-infected individuals in areas with large access to antiretroviral medication [4–17].

Older adults living with HIV (OALHIV), defined as HIV-infected individuals aged 50 years and older, account for approximately 10% of adults living with HIV in low- and middle-income countries (LMIC) [18]. However, to date, very little is known about the extent of, and factors associated with alcohol use, smoking and physical activity among OALHIV in LMIC. Most knowledge in this area is derived from literature in high-income countries [18–24].

The prevalence of HIV in individuals aged 50 years and older is not routinely reported in the national statistics in Thailand, the setting of the current study. The literature however suggests that HIV-infected individuals in Thailand will approach older age at a pace faster and at a size larger than other developing countries. This is because of both the severity of the HIV/AIDS epidemic in the past [25–27] and the early initiation of an antiretroviral treatment (ART) program, which covered a large number of HIV-infected people with a high rate of retention rate in care [28, 29].

No study in Thailand has investigated alcohol use and tobacco smoking, and physical activity among OALHIVs. These socio-behavioral risk factors are however reported for the elderly Thai in the general population. In Northern Thailand, 25.2% of adults aged 50 years and older were daily alcohol users and 64% were lifetime alcohol users [30]. Results from the Thailand National Health Examination Survey IV (NHES IV), a nationally representative cross-sectional survey conducted from 2008–2009, showed that the prevalence of Thai population, aged 45 and older, that had consumed alcohol in the past 12 months, were current smokers, and had at least moderate physical activity during leisure time was respectively 29.4%, 19.5%, and 23.7% [31].

In the current study, we describe and provide factors associated with alcohol use, smoking, and physical exercise among HIV-infected older adults in Chiang Mai, Thailand.

Methods

Study design, participants, & setting

This study draws on data from our cross-sectional survey on HIV-infected and non-infected older adults. The study was conducted between August and September 2015 in Chiang Mai province, Thailand. Chiang Mai is located in Northern Thailand, and is administratively divided into 25 districts. The province is home to a total of 24 community hospitals, offering

general health services and services related to HIV/AIDS prevention, care and treatment. The present report specifically focuses on HIV-infected individuals, aged 50 years or older, receiving ambulatory care in selected facilities. The study was conducted in the 12 district hospitals that serviced the largest population of HIV-infected patients. The number of HIV/AIDS patients in the selected hospitals ranged from 300 to 1,128 at the time prior to the study. The 30 oldest HIV patients registered at each hospital were invited to participate in the study by their care givers (usually a nurse from the ART clinic). The patients who were interested in participating were given an appointment to meet with study staff.

Data collection instruments and variables

Data were collected through face-to-face interviews, medical records (HIV diagnosis, history of opportunistic infections, plasma viral loads, and information related to ARV medication), and onsite clinical examination (e.g. body mass index (BMI) and waist circumference). The interviews were conducted in Thai using a structured questionnaire which included items on socio-economic and demographic characteristics (gender, age, educational level, occupation, marital status, household monthly income, perceived sufficiency of household monthly income), religion, living conditions, and health behavior information (frequency and intensity of physical exercise, tobacco smoking, and alcohol use).

Description of behavioral variables. The behavioral variables were comprised of "alcohol use", "smoking", and "physical exercise".

Alcohol use: The outcome variable "alcohol use" was measured with the item "Have you ever drunk alcohol in the past year?" with "yes and no" as response options. We also used the Alcohol Use Disorders Identification Test (AUDIT) to identify harmful patterns of drinking behavior among the participants who reported having drunk alcohol in the past year. Based on the AUDIT, participants with a history of drinking alcohol were classified into: 1) low risk drinkers, 2) hazardous drinkers, 3) harmful alcohol use), and 4) alcohol dependence [32, 33]. For ease of analysis, we dichotomized the categories in 1) low-risk drinker and 2) high-risk drinkers (which combined the three AUDIT categories: hazardous drinkers, harmful drinkers, and harmful alcohol use). Furthermore, we assessed heavy episodic drinking using the third item of the AUDIT. This item measures heavy episodic drinking or having six or more drinks on one occasion on a scale ranging from never to daily or almost daily. Participants were classified as "ever" heavy episodic drinkers (those who selected "less than monthly or more frequently) or "never" heavy episodic drinkers [34].

Cigarette smoking: Participants were categorized as: 1) non-smokers, 2) previous smokers, and 3) current smokers based on their questionnaire responses. Participants who reported currently smoking were asked to estimate the average number of cigarettes they consume on daily basis.

Physical exercise: In this study, physical exercise was defined as moderate-intensity activities (sport, fitness, or recreational activities that require moderate physical effort and cause small increases in breathing or heart rate) or vigorous-intensity activities (sport, fitness, or recreational activities that require hard physical effort and cause large increases in breathing or heart rate) for at least 10 continuous minutes during free time. Participants were specifically asked whether or not they were currently engaged in: 1) any moderate-intensity and 2) vigorous-intensity activities (response options included yes or no). Participants who responded "yes" were asked to provide their weekly frequency of physical exercise. We created the variable "currently engaged in physical exercise", to distinguish participants who reported physical exercise (moderate-intensity or vigorous-intensity) from those who did not. This was used as the outcome variable for physical exercise.

Ethics statement

The study was approved by the Chiang Mai University Research Institute for Health Sciences Human Experimentation Committee (Certificate of Ethical Clearance No.39/2015). Prior to study enrollment, participants were educated about the study's objectives; the role of participants; and their rights, which included answering or not answering any question during the interview. All participants provided written informed consent, and were paid 200 Baht (~6 USD) for the cost of transportation and time.

Statistical analysis

The analysis was performed using SPSS 17 (PASW) for Windows (SPSS Inc., Chicago, Illinois, USA). Univariate analysis was conducted to obtain descriptive statistics of all the variables. Univariate and multivariate logistic regressions were performed to obtain both unadjusted (OR) and adjusted odds ratios (AOR), and 95% confidence intervals (CI) of factors associated with the main outcomes. For alcohol use, we predicted the odds of "drunk any alcohol in the past 12 months" versus "no". For tobacco smoking, we modeled the odds of being a "current smoker" versus "not current smoker (which combined non-smokers and previous smokers). Lastly, for physical exercise, we predicted the odds of "currently engaged in physical exercise of moderate and/or vigorous-intensity" versus "no". The multivariate logistic regression models included variables that had $p \leq 0.10$ at the bivariate analysis and variables we considered epidemiologically important. We did not include "waist circumference" and "living with spouse" in the same model because of their multicollinearity respectively with "BMI" and "marital status".

Results

Demographics

We recruited a total of 364 HIV-infected participants. More than half were female (57.1%), and between 50–59 years old (67.3%). Most participants had at least completed primary school education (87.6%), were employed (79.4%), were Buddhist (96.7%), and lived with at least 2 family members (82.4%). A sizeable proportion of the participants lived in households with a monthly income less than 5,001 baht (1 USD = 35 THB) (44.2%), and perceived their household income as insufficient (45.3%). Nearly half of the participants (49.7%) had a BMI within the normal range.

Most of the participants reported being HIV positive (85.1%) and were on ART (79.0%) for more than 5 years. The majority were diagnosed with HIV before they were 50 years old (64.2%), and had a plasma viral load of 50 copies/mL or less (98.3%) (Table 1).

Behavioral characteristics of participants

A total of 68 participants reported drinking alcohol in the past year, among whom, 15 (22.1%) and 16 (23.5%) participants respectively reported a history of high-risk drinking and heavy episodic drinking. A significantly higher proportion of participants reported having ever drunk alcohol were male than female (73.5% versus 26.5%, $p< 0.001$).

Fifteen percent of our participants were current smokers and 22% were previous smokers. A significantly higher proportion of current smokers were male than female (72.7% versus 27.3%, $p< 0.001$).

A substantial proportion (59.1%) of participants reported being currently engaged in physical activities in their free time. Moderate-intensity physical exercise was the most reported type of exercise (54.4%), followed by vigorous-intensity physical exercise (9.6%). There was no

Table 1. Socio-demographic and clinical characteristics of HIV-infected and non-infected older adults in Chiang Mai, Thailand.

	N (364)	%
Gender		
Male	156	42.9
Female	208	57.1
Age		
50–54 years	121	33.2
55–59 years	124	34.1
60–64 years	76	20.9
≥ 65 years	43	11.8
Mean (SD)	57.8 (5.6)	
Education		
Never attended school	45	12.4
Primary school	264	72.5
Secondary school or higher	55	15.1
Occupation		
Unemployed	75	20.6
Employed	289	79.4
Marital Status		
Married	164	45.1
Single/Widowed/Divorced	200	54.9
Religion		
Buddhism	352	96.7
Christianity	10	2.7
Islam	2	0.5
Current number of family members		
≥ 2 persons	300	82.4
Alone	64	17.6
Live with spouse		
No	189	51.9
Yes	175	48.1
Live with children		
No	208	57.1
Yes	156	42.9
Household income (Baht/month)		
≤ 5,000	161	44.2
5,001–20,000	157	43.1
>20,000	46	12.6
Perceived sufficiency of household income		
Sufficient /savings	71	19.5
Sufficient /no savings	128)	35.2
Insufficient	165	45.3
Waist circumference[#]		
Below standard	253	69.5
Above standard	111	30.5
BMI		
< 18.5	77	21.2
18.5–22.9	181	49.7

(*Continued*)

Table 1. (*Continued*)

	N (364)	%
≥ 23	106	29.1
Age at HIV positive diagnosis		
Before 50 years old	233	64.0
After 50 years old	130	35.7
Missing	1	0.3
Ever had an opportunistic infection		
Yes	107	29.4
No	257	70.6
ARV treatment		
Yes	362	99.5
No	2	0.5
Plasma viral load		
0–50 copies/mL	352	98.3
> 50 copies/mL	6	0.8
Missing	6	0.8
Years taking ARV		
0–5 years	76	21.0
6–10 years	168	46.4
> 11 years	118	32.6

BMI: Body Mass Index; ARV: antiretroviral drug; SD: Standard Deviation

Waist circumference: below standard (Male < 90 cm; female < 80 cm); above standard (Male ≥ 90 cm; female ≥ 80 cm)

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statistically significant difference between male and female participants in terms of physical exercise (44.2% versus 55.8%; $p = 0.538$) (Table 2).

Factors associated with socio-behavioral characteristics of participants among HIV-infected participants

The current report includes results from the multivariate analysis (Table 3). Bivariate associations with behavioral characteristics are provided in a supplemental file (S1 Table). The analysis revealed that more male participants than females reported drinking alcohol in the past year (AOR, 4.66; CI, 2.28–9.49; $P<0.001$) and were current smokers (AOR, 13.41; CI, 7.23–24.87; $p<0.001$). However, there was no difference between males and females in terms of physical activity.

There was a relation between alcohol use and household income. Participants with a monthly household income ≤ 5,000 Baht and those with incomes ranging from > 5,000 to 20,000 baht were more likely to report having drunk alcohol in the past year (household income of ≤ 5,000 baht versus > 20,000 baht: AOR, 5.34; CI, 1.28–22.25; $p = 0.021$; household income of > 5,000–20, 000 baht versus >20,000 baht: AOR, 4.66; CI, 1.21–17.88; $p = 0.025$).

We also found that participants who never attended school were less likely to engage in physical exercises compared to those who had secondary or higher education levels (AOR, 0.22; CI, 0.08–0.55; $p = 0.001$). In addition, participants with a waist circumference above the normal standards were more likely to report being currently engaged in physical exercises (AOR, 1.96; CI, 1.15–3.34; $p = 0.013$).

Table 2. Behavioral characteristics of HIV-infected older adults in Chiang Mai, Thailand.

	N	%
Drunk any alcohol in the past year		
No	296 (81.3)	81.3
Yes	68 (18.7)	18.7
AUDIT (N = 170)		
Low risk drinker	53 (77.9)	77.9
High risk drinker	15 (22.1)	22.1
Heavy episodic drinking		
Never	52 (76.5)	76.5
Ever	16 (23.5)	23.5
Smoking behavior		
Non smoker	229 (62.9)	62.9
Previous smoker (quit > 3 months)	80 (22.0)	22.0
Current smoker	55 (15.1)	15.1
Number of cigarettes smoked average per day (N = 116)		
Less than 1–1 smoke occasionally	2 (3.8)	3.8
2–5 cigarettes per day	41 (78.8)	78.8
>5 cigarettes per day	9 (17.3)	17.3
Engage in physical exercise #		
No	149 (40.9)	40.9
Yes	215 (59.1)	59.1
Currently doing vigorous-intensity exercises		
No	329 (90.4)	90.4
Yes	35 (9.6)	9.6
If you do vigorous-intensity exercises, how often do you do them? (N = 35)		
1–2 days a week	11 (31.4)	31.4
3–5 days a week	11 (31.4)	31.4
>5 days a week	13 (37.4)	37.4
Currently doing moderate-intensity exercises		
No	166 (45.6)	45.6
Yes	198 (54.4)	54.4
If you do moderate-intensity exercises, how often do you do them? (N = 198)		
1–2 days a week	42 (21.2)	21.2
3–5 days a week	65 (32.8)	32.8
>5 days a week	91 (46.0)	46.0

AUDIT: The Alcohol Use Disorders Identification Test

#: includes participants who reported being engaged in at least one of type of physical exercise (moderate-intensity or vigorous-intensity, or both)

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Discussion

This study describes and reports correlates of major health behaviors including alcohol use, smoking, and physical exercise among OALHIVs in Thailand. These socio-behavioral risk factors are increasingly associated with poor health outcomes in HIV-infected individuals in high-income countries, but have remained understudied in LMICs [13, 14, 35, 36]. We are not aware of previous studies in LMICs that have specifically focused on OALHIVs to explore alcohol use, smoking and physical activity. The fact that the health impacts of alcohol use, smoking and physical inactivity might be even more pronounced for OALHIVs, and that this

Table 3. Correlates of alcohol use, tobacco smoking, and physical exercise among OALHIV participants.

	Adjusted Odds Ratio (95%CI)		
	Alcohol drinking in the past year	**Currently smoking**	**Currently doing physical exercises**
Gender			
Female	1.00	1.00	1.00
Male	4.66 (2.28–9.49)†	13.41 (7.23–24.87)†	1.20 (0.71–2.02)
Age			
50–54 years	1.00	1.00	1.00
55–59 years	0.53 (0.26–1.07)φ	0.96 (0.49–1.87)	1. 76 (1.00–3.08)*
60–64 years	0.40 (0.14–1.14)φ	0.75 (0.30–1.89)	1.46 (0.69–3.08)
≥ 65 years	0.34 (0.08–1.42)	0.78 (0.24–2.54)	1.09 (0.41–2.94)
Education			
Never attended school	0.53 (0.13–2.05)	2.15 (0.74–6.20)	0.22 (0.08–0.55)*
Primary school	0.67 (0.28–1.58)	0.82 (0.36–1.85)	0.53 (0.26–1.08) φ
Secondary school or higher	1.00	1.00	1.00
Occupation			
Unemployed	1.00	1.00	1.00
Employed	2.56 (0.90–7.30) φ	0.73 (0.36–1.49)	1.41 (0.78–2.53)
Marital Status			
Married	1.00	1.00	1.00
Single/Widowed/Divorced	1.57 (0.83–2.95)	1.62 (0.92–2.86) φ	0.74 (0.46–1.21)
Household income (Baht/month)			
≤ 5,000	5.34 (1.28–22.25)*	2.07 (0.73–5.89)	1.19 (0.52–2.71)
5,001–20,000	4.66 (1.21–17.88)*	1.91 (0.73–5.03)	1.09 (0.51–2.34)
>20,000	1.00	1.00	1.00
Family financial status			
Sufficient /savings	1.05 (0.44–2.51)	0.36 (0.15–0.84)*	1.04 (0.53–2.02)
Sufficient /no savings	0.81 (0.41–1.61)	0.98 (0.53–1.81)	1.33 (0.80–2.21)
Insufficient	1.00	1.00	1.00
Waist circumference			
Below standard	1.00		1.00
Above standard	0.96 (0.44–2.11)		1.96 (1.15–3.34) *
BMI			
< 18.5		1.93 (0.90–4.14) φ	
18.5–22.9		0.97 (0.51–1.85)	
≥ 23		1.00	
Years on ARV treatment			
0–5 years	1.00	1.00	1.00
6-10 years	0.86 (0.35–2.11)	0.96 (0.46–2.00)	0.99 (0.53–1.84)
>11 years	1.50 (0.56–4.03)	0.58 (0.25–1.35)	0.90 (0.45–1.80)
Timing of HIV status			
Before 50 years old	1.00	1.00	1.00
After 50 years old	0.96 (0.35–2.65)	0.82 (0.35–1.91)	1.00 (0.49–2.03)
Ever had an opportunistic infection			
Yes	1.00	1.00	1.00
No	1.21 (0.64–2.29)	1.06 (0.59–1.92)	1.04 (0.64–1.70)

* *P* value < 0.05.

** *P* value < 0.01.

† *P* value <0.001.

φ *P* value <0.10.

Waist circumference: below standard (Male < 90 cm; female < 80 cm); above standard (Male ≥ 90 cm; female ≥ 80 cm).

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population is expected to increase, highlights the relevance of focusing attention on socio-behavioral risk factors.

In our study, nearly one-fifth of the participants reported having drunk alcohol in the past 12 months, of which 23.5% experienced heavy episodic drinking and 22.1% were classified as high-risk drinkers. In a large survey conducted in three provinces in Northern Thailand including Chiang Mai, 25% of adults aged 50 years old were daily alcohol users [30]. The prevalence of "drank any alcohol in the past 12 months" in the Thailand NHES IV was 24.5% for people aged 60 years and older and 29.4% for those aged at least 45 years. However, the prevalence of heavy episodic drinking in the NHES IV, which was a national representative probability sampled survey, was much lower than that documented in our study, 2% and 4.9% for people aged at least 60 years and for those aged at least 45 years respectively [31].

Smoking is associated with increased risk of non-AIDS related mortality among HIV-infected individuals [13, 14], and its prevalence in people living with HIV infection was shown to be generally higher than that of the general population in the settings where the studies were conducted [9, 13, 37, 38]. The proportion of participants who were current smokers in our study was similar to the one reported in the Thai NHES IV in the general population [31]. A recent study found that HIV infection was not only an independent risk factor for smoking but = also decreased the likelihood of quitting smoking [39]. Several tobacco cessation programs have been shown to be effective with HIV-infected individuals, but most were limited by short follow-up, a non-randomized design, and the use cognitive behavioral strategies, which are hard to implement and scale-up within the care models in many LMICs [40–43]. HIV-infected individuals remain a high-risk group in need of targeted HIV smoking cessation interventions, deliverable within the routine care models [39, 44]. We also found that a significant proportion of our participants engaged in physical activity. Approximately 59% reported having physical activity of moderate or vigorous intensity at least 1–2 days a week. This proportion is much larger than that reported in the general population in Thailand, 21.4% and 23.7%, respectively for people aged at least 60 years and for those aged at least 45 years [31].

This study has also brought to light some of the risk factors associated with alcohol use, smoking, and physical activity among OALHIVs in Thailand. We found that male OALHIVs were more likely to report alcohol use and to be current smokers than their female counterparts. The difference in drinking and smoking behaviors in males and females is extensively documented [45–50]. In the context of our study, the gender difference likely reflects social and cultural norms that condone men's smoking and drinking but disapprove of these behaviors in women. Such traditional norms tend to prevail among the older generation such as the participants in our study [49, 51, 52]. On the other hand, there was no statistically significant difference between male and female OALHIVs in terms of physical exercise. There is a remarkable scarcity of literature examining gender differentials in physical activity among HIV-infected individuals, particularly in OALHIVs. The only study we are aware of is a recently published study that found that HIV-infected men and women aged 51 years and older were similar in terms of frequency, average intensity and average hours of exercise. However, the study was limited by its small sample size of 27 men and 18 women aged 51 years and older [53].

We also found that the likelihood engaging in exercise decreased with the level of education among HIV-infected participants. Physical activity should be encouraged among OALHIVs with particular emphasis given to those with lower educational attainment.

Previous studies conducted among HIV-infected individuals [54–57], and in the general population [58–60] have documented higher prevalence of alcohol use/disorders and smoking in disadvantaged groups. In this study, lower household income was associated with increased odds of alcohol use in the past year. A previous review and critique of the literature highlighted

the limited evidence of interventions to reduce alcohol use among HIV-infected individuals [61]. Effective interventions targeting socially disadvantaged groups in the general population are equally scarce. An ongoing trial is testing the effectiveness of mobile phone text messages to reduce binge drinking among disadvantaged men in Scotland [62]. Similar trials should be conducted in HIV-infected individuals given the ubiquitous nature of mobile phones even in disadvantaged groups. The fact that OALHIVs with higher waist circumference were more likely to be currently engaged in physical exercises suggests that overweight/obese individuals might be more health-conscious and aware of the adverse outcomes associated with overweight and/or obesity.

The interpretation of our findings should be examined in the light of study limitations. The cross-sectional design does not allow for drawing causal inferences from the documented associations. Caution is warranted in generalizing the findings of this study. Our participants were recruited from districts hospitals serving a large population of HIV-infected individuals in Chiang Mai province. Because we did not apply random sampling, our results may not be representative of population of OALHIVs in Chiang Mai.

Conclusions

A substantial proportion of OALHIVs in our study were current smokers and reported alcohol drinking, with a particularly higher proportion of heavy episodic drinking than that documented in similar age groups in the general population. Male gender was a strong predictor of having drunk alcohol in the past 12 months and being a current smoker, while low socio-economic status (income and education) was a predictor of lack of physical exercise and alcohol use. Hence, we recommend that safe and effective interventions should be developed to deter smoking and alcohol use, and to promote physical exercises in OALHIVs, with a special focus on males and those of lower socio-economic status.

Supporting information

S1 Table. Bivariate factors associated with socio-behavioral risk factors.
(DOCX)

S1 File. Questionnaire Thai version.
(DOC)

S2 File. Questionnaire English version.
(DOCX)

S3 File. Medical record and clinical examination information.
(PDF)

S1 Dataset. Dataset of the study.
(SAV)

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Author Contributions

Conceptualization: Patou Masika Musumari, Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа, Wathee Sitthi, Kittipan Rerkasem.

Data curation: Patou Masika Musumari, Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа.

Formal analysis: Patou Masika Musumari, Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа, Mitchell D. Feldman, Wathee Sitthi, Kittipan Rerkasem, Teeranee Techasrivichien, S. Pilar Suguimoto, Masako Ono-Kihara, Masahiro Kihara.

Funding acquisition: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа.

Investigation: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа, Wathee Sitthi, Kittipan Rerkasem.

Methodology: Patou Masika Musumari, Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа.

Project administration: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа, Wathee Sitthi, Kittipan Rerkasem.

Supervision: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа, Mitchell D. Feldman, Kittipan Rerkasem, Masako Ono-Kihara, Masahiro Kihara.

Validation: Patou Masika Musumari, Mitchell D. Feldman.

Visualization: Mitchell D. Feldman.

Writing – original draft: Patou Masika Musumari.

Writing – review & editing: Patou Masika Musumari, Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchа, Mitchell D. Feldman, Wathee Sitthi, Kittipan Rerkasem, Teeranee Techasrivichien, S. Pilar Suguimoto, Masako Ono-Kihara, Masahiro Kihara.

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RESEARCH ARTICLE

"When I first saw a condom, I was frightened": A qualitative study of sexual behavior, love and life of young cross-border migrants in urban Chiang Mai, Thailand

Arunrat Tangmunkongvorakul[1], Patou Masika Musumari[2,3]*, Kriengkrai Srithanaviboonchai[1,4], Veruree Manoyos[1], Teeranee Techasrivichien[2], S. Pilar Suguimoto[2,5], Masako Ono-Kihara[2], Masahiro Kihara[2], Suwat Chariyalertsak[1,4]

1 Research Institute for Health Sciences, Chiang Mai University, Chiang Mai, Thailand, **2** Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan, **3** Japan Foundation for AIDS Prevention, Tokyo, Japan, **4** Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, **5** Center of Medical Education, Graduate School of Medicine, Kyoto University, Kyoto, Japan

* patoumus@yahoo.fr

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Abstract

Background

Many young migrant workers move across the border to Chiang Mai, a major city in Northern Thailand, in search of work opportunities. This study describes their sexual behavior, life-styles, relationships and experiences with youth-friendly sexual and reproductive health (SRH) services.

Methods

This is the qualitative arm of a mixed methods study using focus group discussions (FGDs) among young MWs aged 15–24 years in urban Chiang Mai. We conducted 6 FGDs with 84 participants (43 males, 41 females) organized in groups of 10–15 people, including 3 groups of males, 2 groups of females, and 1 group of both males and females.

Results

We found that the lack of parental control, pressure to assimilate into Thai society, access to social media and modern communication technologies, and limited knowledge and access to sexual and reproductive health (SRH) services interplayed to shape lifestyle and sexual behaviors, including low condom use among young migrants.

Conclusion

The present study helped discern the vulnerability of young migrants to adverse SRH outcomes. This particular group of youth needs urgent intervention to improve their knowledge on SRH and access to a youth-friendly clinic to help them personalize risk of HIV and other adverse SRH outcomes.

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Introduction

Labor migration has become one issue of particular salience for public health in Thailand. The country is home to approximately 3.25 million migrant workers (MWs); 2.7 million of whom are documented and undocumented MWs from Myanmar, Cambodia, and Laos [1]. This number is expected to increase given Thailand's relatively higher economic status, which acts as a pull factor for MWs from neighboring countries.

Many studies in Thailand indicate that MWs are a particularly high-risk group for adverse sexual and reproductive health (SRH) outcomes such as HIV/STIs and unintended pregnancies. For example, studies have documented that this population has a high prevalence of HIV infection [2], low prevalence of condom use [3–5], high frequency of visits to sex workers [3, 4], and low prevalence of HIV testing [6]. The vulnerability of MWs to adverse SRH outcomes has been attributed to a range of factors, including poor social integration into the host country [7–9] and legal and financial barriers to services [7–11]. MWs without legal status may be reluctant to use available public health services due to fear of deportation. Similarly, income can be a barrier to accessing health services for MWs unaware of low or no cost health programs [7, 8]. There are a number of other factors, such as poor educational level and limited Thai language ability, that interplay to shape the vulnerability of MWs [12, 13].

In response to this, the Thai government, through the Ministry of Public Health, has taken a series of measures to improve access and quality of health care services for migrants. The main 4 activities include health examinations; necessary treatments; health promotion and disease prevention; and surveillance [14]. Other services outlined in the guidelines include health screening for high-risk groups (men who have sex with men (MSM), female sex workers, people who inject drugs, and cross-border MWs), family planning, disease control and prevention, and counseling for MWs [15]. Unfortunately, the implementation of these policies has not yet reached a national scale, and their effect on the health of migrants are yet to be seen. Moreover, these policies are not consistently reinforced and implemented, and do not cover undocumented MWs [16, 17].

Young MWs are a particular group whose sexual behavior patterns and lifestyle remain generally understudied. In 2012, the prevalence of HIV among MWs in Thailand was low, estimated at 0.8%, with young MWs carrying the highest burden. However, MWs displayed high levels of risk behaviors including multiple sexual partnerships and inconsistent use of condoms [18, 19]. In Thailand, young MWs accounted for approximately 20% of the documented 1,443,474 legal MWs in 2015. This proportion is similar for young MWs in Chiang Mai City, the setting of the current study, which hosts a total of 102,456 documented MWs [20]. Chiang Mai province is the economic epicenter of Northern Thailand; it is rapidly urbanizing, borders Myanmar and Lao PDR, and attracts a growing number of young MWs from these countries. These young people may have special SRH needs, which are yet to be thoroughly explored. Understanding their needs is therefore crucial for policy and program development.

The current study is the qualitative arm of a mixed-method study conducted to document HIV infection sexual risk behaviors among young cross-border MWs in Chiang Mai City. In our quantitative study [21], which included 442 participants aged 15–24 years, more than half (57%) of participants were sexually active, but the majority had never used condom, and a significantly low proportion of young MWs reported using condoms consistently. The majority of our participants were from the Shan ethnic group, [21] a group primarily from Shan State in Myanmar and constitutes one of the largest groups of cross-border MWs in Chiang Mai province [1, 22, 23]. The Shan in Thailand include two major groups. First are those who migrated to escape violence and human rights abuses due to political unrest and the armed conflict with Myanmar's military junta. They are refugee migrants; many of whom are not officially

recognized by the Thai Government. These workers are considered illegal undocumented workers. The second group includes both documented and undocumented Shan MWs who have migrated in search of economic opportunities in Thailand. Many Shan work in low-paid jobs including domestic work, construction, agricultural labor, and sex work [1, 22, 23]. Changes in social and traditional norms of the Shan living in Thailand have been reported anecdotally. These include high rates of divorce for groups in Northern Thailand [24]. However, little has been reported on the changes of lifestyle and sexual behavior of the Shan in Thailand. The few existing HIV-related studies that have included the Shan population have shown that this group of migrants was disproportionately affected with HIV, with prevalence rates much higher than in the general Thai population and other ethnic migrants from Myanmar [25–27].

This qualitative study specifically aimed to describe young migrants' sexual and reproductive health behaviors, lifestyle, and awareness and use of youth-friendly services in urban Chiang Mai.

Methodology

This qualitative study was conducted between March 2014 and February 2015. The target group was young cross-border MWs aged 15 to 24 years who lived in urban Chiang Mai. Participants in the qualitative study were recruited from among those who participated in the quantitative survey. A full description of the quantitative survey is described elsewhere [21]. The quantitative surveys were administered in areas where young migrants gathered, such as outdoor areas of residential camps, Buddhist temple, non-formal education centers for migrant workers, and various construction sites. Upon completing the quantitative survey, participants were informed of the focus group discussions (FGDs), and invited to participate. Recruitment for the qualitative study continued until a total sample size of 84 participants was reached. Participants interested in participating in the FGDs were provided with information regarding the objectives of the FGDs, and then were contacted by phone regarding the date of the FGD.

The focus group guide included open-ended questions specifically designed to probe young MWs' about their daily lifestyle, intimate relationships and perceptions of SRH services in Chiang Mai (See S1 and S2 Files). The FGDs were conducted in rooms that ensured participants' safety and privacy and participants were referred to using pseudonyms to conceal their identities. Participants were encouraged to freely answer the questions and share their opinions and experiences during the discussion. The FGDs were mainly conducted in Thai given that all the participants were relatively fluent. However, participants had the option of responding in their own languages (Shan and Burmese) if this was more comfortable for them. Our field research team consisted of 7 members, of whom three were fluent in Shan and Burmese and facilitated translation during the FGDs. Three research team members were present at each FGD, including one FGD moderator, two note takers (one fluent in Shan and Burmese). The FGDs lasted around 60–90 minutes.

Ethics statement

The study received ethical approval from the Human Experimentation Committee, Research Institute for Health Sciences, Chiang Mai University (Certificate of Ethical Clearance No. 52/2514). All participants gave verbal informed consent or assent, and written consent (signature or fingerprint) from a guardian was received for participants aged 15–17 years old. The locations for focus group discussions were selected to maximize participants' sense of safety and comfort. The FGDs were conducted at the places where participants felt safe and comfortable to provide information, such as the quiet places in non-formal education centers for MWs, young migrant Learning Center Building, and outdoor areas at play grounds or living camps

where participants used for meeting friends, playing sports, etc. We used pseudonyms to preserve confidentiality of participants during the FGDs.

Data analysis

The FGDs were digitally audio recorded, transcribed verbatim, and translated into Thai (for responses that were in Shan or Burmese). The transcripts were annotated with field notes taken during the interviews. The transcripts were coded and analyzed using content analysis. The process included identification of repeated normative themes, which emerged either spontaneously from the discussion or directly from the responses to the open-ended questions designed for the study. Passages most relevant to the study were later translated into English for presentation in manuscripts.

Results

A total of 84 participants, including 43 males and 41females, were recruited. We conducted 6 FGDs of 10–15 participants, specifically including 3 groups of males, 2 groups of females, and 1 group of both males and females. All the participants were Shan by ethnicity.

The themes that emerged from the FGDs are presented below, and are supported by quotes from participants. In some instances, the quotes were lightly edited to facilitate reading and understanding, but without altering the original meaning.

Contemporary lifestyles and sexual relationships

Lack of parental control and sense of freedom. Most participants reported that the lifestyle they currently lead in terms of love, relationships, and sexual behavior in Thailand do not reflect how they would behave in their home country. The traditional values of Shan culture, and by extension of their families, discourage premarital sex, teenage romantic relationships, and cohabitation of unmarried couples. Participants reported, for example, that it was considered immoral for an unmarried female to go on a date with a man or to be touched by a man. They explained that their parents closely monitored them with regards to relationships and dating while still in Myanmar before they migrated to Thailand.

Young migrants felt that being away from their parents offered them an opportunity to express their sexuality and to love more openly without having to deal with the consequences of disobeying and disappointing their parents. They found it easier to associate with other young migrants with whom they shared common new living conditions.

> "*I think they [young migrants] are at risk because they are staying with friends. If they have friends encouraging them to drink, to go out at night or to visit boys, it is very easy for them to do so because there are no adults to stop them.*"
>
> (Young female migrant, female focus group)

Many participants had a sense a freedom living in Thailand as they could get together with friends more freely than they did when they were in Myanmar. Festivals and other important local and public holidays in Thailand were an opportunity for young migrants to meet with peers and to seek out potential sexual encounters.

> "*It is different here than at home [in Myanmar], because at home, I didn't have the chance to go out that much. But here it is like I live in a hotel, I have everything in my place [in Thailand] that my house [in Myanmar] doesn't have. I can go out anywhere I want.*"

(Young female migrant, female focus group discussion)

Parental monitoring from home countries. Other participants reported that their parents worried about their promiscuity and repeatedly warned them to be careful in their relationships. Their parents encouraged them to follow the traditional rules for love and marriage if they were in a relationship, and warned them not to engage in inappropriate behaviors such as premarital sex.

"*Sometimes my parents are worried about me and when they are worried, they call me more often. Some people back home told my parents that being in Thailand puts one at risk of getting AIDS or having an unintended pregnancy, and that Shan girls in Thailand wore short skirts that were not appropriate. This makes my parents worry a lot.*"

(Young female migrant, female focus group discussion)

"*When I go out with a boy, I worry because my parents would tell me to marry that boy. They would tell me not to go out with him if I didn't really love him because [casual dating] is not proper behavior for good girls.*"

(Young female migrant, female focus group discussion)

Adoption of the local lifestyle. Many young MWs reported that their lifestyle in Thailand is different than their lifestyle in Myanmar. This included how they dressed and spoke, or their approach to dating and sexual relationships.

"*Here there are so many beautiful Shan women and they are tempting. When I was back home, young women dressed modestly and wore traditional skirts, but they don't do that here in Thailand.*"

(Young male migrant, male focus group discussion)

"*Right now my friends more closely resemble Thai people, unlike my friends in Myanmar. Their outfits, thoughts, and even their vocabulary is more like Thai people. They don't speak Shan anymore. When they meet at a Shan temple fair [in Chiang Mai], they speak Shan and wear Shan outfits, but when they leave [the fair] and go to work, they don't really speak Shan.*"

(Young male migrant, male focus group discussion)

Access to social media and modern communication technologies. Access to the Internet, mobile phone technologies and social networking sites emerged as an important factor that impacted young MWs' lifestyle, dating, and relationships. Many reported having greater access to modern forms of communication (e.g. mobile phones, smartphones and tablet computers) in Thailand. This made it easy for them to reach out and communicate with one another, and to initiate new romantic relationships through social media.

"*Nowadays, it is easier to have a relationship because of social media—the Internet allows us to chat, to see each other and go out together. It is much more convenient compared to the past back home.*"

(Young male migrant, male focus group discussion)

"*Back home [Myanmar] it is not easy to have a relationship with a woman. But in Thailand, if we can get her phone number, we can chat via Line which means that we can have a relationship.*"

(Young male migrant, male focus group discussion)

Knowledge, attitudes, and experience using condoms and contraception

Poor knowledge of and use of condom. Although some participants, particularly males, had positive attitudes that young people should carry condoms, and reported using condoms for preventing both STIs and unintended pregnancies, many of the participants in this study still had limited knowledge regarding how to appropriately use a condom. Most participants who stated not knowing how to use a condom had never seen one before. Additionally, male participants felt that young female migrants, compared to them, had even worse knowledge about condoms.

"*I think many Shan women don't know about condoms. Some women may even ask what it is. Even if they see it, they don't know how to use it. Actually, some men are worried that women will see the condom if they carry one around. But back home [in Myanmar] they don't need to worry about this because no one knows what it is.*"

(Young male migrant, male and female group discussion)

On the other hand, female participants were shy about talking about issues regarding condoms. They acted embarrassed when shown a condom, and were scared to touch the package (when it was presented at the end of the FGD).

There was also a lot of stigma and taboo around issues related to condoms.

"*When I first saw it [condom], I was frightened, I had never seen it before.. I brought it [given by a non-government organization (NGOs)] to my boss and asked him what it was. I didn't know. He told me that it was something for males to use.*"

(Young female migrant, female group discussion)

"*One day, while I was in class, a teacher told us about condom., I then visited my relatives showed them the condom. My relatives thought that it was something dirty to talk about. That day, I was scolded badly (laughs). . . . For the Shan, this is an unacceptable issue to talk about. If we talk about condoms, no one dares to express their opinions.*"

(Young female migrant, male and female focus group discussion)

Relationship trust and condom use. We found that condom use during sexual intercourse depended on the type of relationship and trust. Some male participants said that they would prefer using contraceptive pills over condoms, especially if they trusted their female partner. They based their trust of their female partner through observation of their behavior and by asking friends.

"*I rarely use condoms even though I see her [regular partner] once in a while. I prefer my girlfriend to take birth control pills. I don't like to wear condoms.*"

(Young male migrant, male focus group discussion)

"*I will tell you frankly I have never used a condom once in my life and I have sex only with my girlfriend. I don't know how to use it. I just learned about it today [from a focus group discussion] (sound of laughing from male participants). She uses the pill.*"

(Young male migrants, male focus group discussion)

Poor knowledge and use of contraception. We found that there were gender differences regarding knowledge of contraception. Male participants knew many more contraceptive methods than their female counterparts whose knowledge of contraception was mostly limited to contraceptive pills. Some young female MWs expressed worries about the side effects of other methods of contraception such as contraceptive implants and were reluctant to use them. They feared that some methods could potentially affect their ability to get pregnant.

"*I have never seen injection birth control. The inserting medicine one [contraceptive implant] seems dangerous. It scares me.*"

(Young female migrant, female focus group discussion)

"*I know a person back home [in Myanmar]–who after receiving a birth control shot, things were no longer normal. She didn't know when her period would come. But with birth control pills, we know that the period will come right after we finish the pills, and after the period is finished, we can start to take the pills again. It is easy like that.*"

(Young female migrant, female focus group discussion)

Use of youth friendly health services

Access to service: Unawareness of the eligibility right. Most participants were neither aware of the existence of youth-friendly clinics nor of their eligibility to access the services under the MW health insurance system.

"*I wake up in the morning, go to work and go back to my place. I don't go out that much, so I don't know. None of my friends talk about this clinic. I don't have any information about that kind of service for the young.*"

(Young male migrant, male focus group discussion)

"*I have never heard of a service like that for young people. Is there really one?*"

(Young female migrant, female focus group discussion)

Need for tailored sexual and reproductive health services for young migrants. The need for tailored SRH services did not spontaneously emerge from the FGDs. We did however ask participants what kind of services they would want to receive if youth-friendly clinics were available. Most indicated that youth-friendly services should ideally be provided in their native language and should include programs to improve knowledge about SRH. They expected such programs to provide them with the right knowledge and skills, including condom use, contraception, STIs and HIV/AIDS, so that they can make informed decisions and adopt appropriate behavior in times of need.

"*If it is possible, I want Shan people who have knowledge on this thing [sexual and reproductive health issue] to be the health providers or trainers. Because most people here [young migrants] are Shan, we will communicate well in our own language.*"

(Young male migrant, male and female focus group discussion)

Discussion

The findings from our qualitative study corroborate results from our quantitative survey [21], and expand our understanding of the factors that shape sexual and reproductive health behaviors among young MWs in Chiang Mai. What was alarming from the results of our quantitative survey was that a high proportion of sexually active MWs never used condoms, and very few used condoms in a systematic fashion [21]. In our qualitative study, we found that there is an interplay of factors that can be useful in discerning the vulnerability of MWs to HIV and adverse SRH outcomes. For example, many participants in our study reported not knowing how to use a condom, and some, particularly females, had never seen a condom prior to the FGDs. There was a lot of social stigma and taboo around issues related to condoms, predominantly among females. Additionally, the type of relationship and trust influenced condom use. Quite a few male participants found that the use of condoms was not justified in a committed romantic relationship where trust prevails, and they preferred the use of contraceptive pills to condoms. These factors can partly explain the low prevalence of condom use in our quantitative survey since most (91.7%) had initiated sexual activity with their girlfriend or boyfriend, rather than with a casual or a commercial sex worker [21]. The evaluation of the PHAMIT-2 project (Prevention of HIV among Migrant Workers in Thailand), which compared baseline (2010) [11] and end line (2014) [28] surveys, found that the prevalence of "ever used a condom with a regular partner or spouse" remained very low despite the modest changes observed over the two rounds of surveys, from 11% to 19%, while the proportion of MWs reporting "never used a condom with a non-regular partner in the past 12 months" declined from 42% to 21% [28]. There is an urgent need to develop strategies to help MWs personalize the risk of HIV/STIs and unintended pregnancies regardless of the type of sexual partner.

Anecdotal reports suggest that the migration of Shans to Thailand has led to a change in social norms and to the traditional Shan community; citing for example the extremely high rates of divorce, averaging 90% in some areas of Northern Thailand [24]. However, very little is known about how these changes in social and traditional norms impact the sexual behavior of young MWs. The results of our quantitative survey indicated that most MWs had initiated sexual activity at an early age and had resided in Thailand for less than 5 years, suggesting that they might have been already sexually active before migrating to Thailand [21]. In our study, young MWs attributed the changes in their life style and sexual behavior to the lack of parental monitoring. They also linked access to social networking and modern communication technologies to their ability to initiate new romantic and/or sexual relationships. There has been an unprecedented growth in social network technologies over the past decade. A number of studies from both developed and developing settings have associated the use of these technologies with increased risky sexual behaviors [29–31]. In a recent study from Swaziland [29], participants who found it easier to initiate a romantic conversation on Facebook were more likely to report multiple sexual partnerships. The explosion of social networking sites, particularly among the young –including young migrants-, makes it an attractive channel to reach out to this vulnerable group. Future research should thoroughly explore the patterns of use of social media and other communication technologies among young MWs, and the feasibility to use them as potential channels for health interventions.

It is very concerning to find that young MWs were neither aware of the availability of youth friendly health services, nor of their eligibility to access the services under the MW health insurance scheme. The participants expressed a need for such services, and indicated that it should ideally be provided in their native languages and be tailored to their needs. It is worth noting that the participants' need for youth-friendly SRH services did not emerge spontaneously; rather, it was expressed in response to a specific question asking them what kind of services they would want to receive if youth-friendly SRH services were available. In view of our quantitative survey which showed that a low proportion (41.2%) had health insurance [21], interventions to improve access to youth-friendly health services in Thailand should, at the individual level, aim to increase young MWs' awareness of the availability of youth-friendly services as well as their eligibility for these services, and at the structural level, to increase health insurance coverage for the migrant population.

Thailand has been successful in mounting programs and policies that have rapidly led to the improvement SRH services in the country. Most programs and policies however had targeted married women, leaving other groups, such as adolescents and youths and MWs, with unmet needs for SRH services [32]. The nationwide establishment of youth-friendly SRH services is one of the initiatives the Thai Ministry of Public Health spearheaded to address the gap in SRH services among young people [33]. However, there are still many challenges to making the services acceptable by young people [33, 34].

It is anticipated that the provision youth-friendly SRH services to young migrants may present even more challenges than to the Thai population. For example, undocumented migrants and those without work permits, respectively 14.7% and 26.2% in our survey [21], may be reluctant to engage with the health or legal system for fear of being deported back their home countries. Another challenge is the government's regulation to control the inflow, living, and spatial mobility of MWs in Thailand, which affects migrants' access to health services [35]. Lastly, the unfamiliarity of young migrants with the Thai law, regulations, and health systems may create fear and impede access to SRH services even when they are entitled to receive such services.

This study has many limitations worth being mentioned. Firstly, we did not address issues of sexual orientation, including the types of sexual intercourse (male-to-male vs. male-to-female, anal vs. vaginal, etc.). The prevalence and incidence of HIV infection is very high in young MSM in Thailand, with orders of magnitude reaching eight-fold greater than in heterosexual men [36–38]. Similarly, we did not collect information regarding involvement in sex work. Migrant male sex workers (MSWs) are an extremely vulnerable population. In Chiang Mai, the majority of migrants MSWs are Shan from Myanmar. Many have unstable employment; have experienced sexual abuse, and often use recreational drugs [39, 40]. The lack of information on sexual orientation and involvement in sex work limits the interpretation of risk in our sample of participants. Future research will do well by exploring condom use and other sexual behaviors of MWs in light of their sexual orientation as well as involvement in sex work. Secondly, there is the possibility of social desirability bias in our study given the vulnerability of the young MWs and the use of a group format to discuss sensitive sexual issues. Our participants may have felt uncomfortable about describing their sexual practices and relationships. This can possibly explain why issues such as the sexual orientation of participants did not spontaneously emerge from the discussions. Social desirability bias can to a certain extent explain the apparent lack of knowledge about condoms among Shan female participants. In settings where gender double standards in sexual norms still prevails, such as in many Southeast Asian countries including Thailand and Myanmar [41, 42], females may prefer to be silent regarding their knowledge of sexual issues including condoms in an open forum due to fear of being regarded as sexually experienced; hence, being labeled as a "bad girl". Lastly, our study

did not explore in-depth the issue of contraception in light of the sexual culture of young migrants. We sought to understand the level of knowledge about existing contraceptive methods; however, delving deeper in the sexual culture of young MWs could have provided a deeper understanding of the use of contraception in this population.

Despite these limitations, this study provides a useful qualitative assessment of young MWs' sexual behavior, lifestyles and relationships, and issues related to access to youth friendly health services in Chiang Mai, Thailand. Based on the findings from our study, as well as results from previous research [21, 28, 43–45], we suggest that health interventions for young MWs should be holistic, designed based on relevant contextual factors (e.g. emphasizing condom use regardless of the type of partner), using relevant channels of communication (social network sites, and other ICT technologies, etc.), address a range of outcomes (risky sexual behaviors, HIV testing, etc.), and target different levels of influence (individual, community, and structural: policy and regulations). This will require tight collaboration between all the interested stakeholders particularly the Ministry of Public Health, Provincial Health Office, Provincial Employment Office, hospitals and non-government organizations.

Conclusion

The present study helped discern the vulnerability of young migrants to adverse SRH outcomes. We have highlighted a set of factors namely poor knowledge and lack of awareness of condoms, contraception, and SRH services that interplayed to shape the SRH behavior such as low condom use. The use of youth-friendly SRH services was limited by the lack of awareness of the existence of such services. Ideally, interventions to address SRH needs should not only improve knowledge and raise awareness on SRH issues, but also address upstream structural barriers to accessing health services such as lack of health insurance.

Supporting information

S1 File. Focus group discussion guide, Thai version.
(DOCX)

S2 File. Focus group discussion guide, English version.
(DOCX)

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Author Contributions

Conceptualization: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchai, Veruree Manoyos.

Data curation: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchai, Veruree Manoyos.

Formal analysis: Arunrat Tangmunkongvorakul, Patou Masika Musumari, Kriengkrai Srithanaviboonchai, Veruree Manoyos.

Funding acquisition: Arunrat Tangmunkongvorakul.

Investigation: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchai, Veruree Manoyos.

Methodology: Arunrat Tangmunkongvorakul, Patou Masika Musumari, Kriengkrai Srithanaviboonchai, Veruree Manoyos.

Project administration: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchai, Veruree Manoyos, Suwat Chariyalertsak.

Supervision: Arunrat Tangmunkongvorakul, Kriengkrai Srithanaviboonchai, Masako Ono-Kihara, Masahiro Kihara, Suwat Chariyalertsak.

Visualization: Arunrat Tangmunkongvorakul, Patou Masika Musumari, Kriengkrai Srithanaviboonchai, Teeranee Techasrivichien, S. Pilar Suguimoto, Masako Ono-Kihara, Masahiro Kihara, Suwat Chariyalertsak.

Writing – original draft: Arunrat Tangmunkongvorakul, Patou Masika Musumari, Kriengkrai Srithanaviboonchai, Veruree Manoyos, Teeranee Techasrivichien, S. Pilar Suguimoto.

Writing – review & editing: Arunrat Tangmunkongvorakul, Patou Masika Musumari, Kriengkrai Srithanaviboonchai, Teeranee Techasrivichien, S. Pilar Suguimoto, Masako Ono-Kihara, Masahiro Kihara, Suwat Chariyalertsak.

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Research Paper

"Now drugs in Libya are much cheaper than food": A qualitative study on substance use among young Libyans in post-revolution Tripoli, Libya

Fauzi Muftah Elamouri[a,*], Patou Masika Musumari[a], Teeranee Techasrivichien[a], Anwer Farjallah[b], Sufian Elfandi[b], Osama Fathi Alsharif[b], Hussein Benothman[c], S. Pilar Suguimoto[a], Masako Ono-Kihara[a], Masahiro Kihara[a]

[a] Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Yoshida-Konoe-cho, Sakyo-ku, Kyoto 606-8501, Japan
[b] Ministry of Health – Libya, Alfornaj Street, Libya
[c] National Center of Disease Control, National AIDS Program, Ain Zara District, Tripoli 71171, Libya

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ABSTRACT

Background: Libya is facing a rapidly growing epidemic of illicit drug use and HIV. This situation is fueled by a complex array of factors, mainly the consequences of the political and military turmoil of the Arab Spring. Although it is extensively documented in other settings that young people are one of the most vulnerable groups to both HIV and illicit drug use, no study has explored this issue among young people in Libya. The current study addresses this research gap.

Methods: This study is a qualitative study using in-depth interviews guided by a semi-structured questionnaire. We used a maximum variation, purposive sampling strategy to recruit male and female participants, aged 14–18 years, from schools, prisons, and community-based informal re-education and rehabilitation centers in Tripoli, Libya.

Results: In total, 31 participants were recruited: 6 females and 25 males. Sixteen participants were prisoners and residents of community-based informal re-education and rehabilitation centers, and 15 were recruited in schools. Risk factors for drug use included peer influence, the increased availability and affordability of drugs, disruption of social life and healthy recreational activities, and the distress and casualties of the war. Protective factors were religious beliefs and practices, good parent-child connectedness, and high self-esteem and future aspiration. Risk factors for HIV were insufficient knowledge related to HIV transmission and unsafe injection practices, such as sharing needles and syringes.

Conclusion: We found individual, interpersonal, family, and structural-level factors that interplayed to shape the vulnerability of young people to drug use and HIV infection in Tripoli, Libya. Structural factors, including the increased availability and affordability of drugs, provided the frame within which other factors, such as peer influence, insufficient knowledge of substance use, and HIV, operated to increase the vulnerability of young people to drugs and HIV, while religious beliefs and parent-child connectedness acted as protective factors. Multisectoral efforts and studies to quantitatively evaluate the magnitude and distribution of these problems are urgently needed.

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Introduction

Libya is facing a rapidly growing epidemic of illicit drug use and HIV (The National AIDS Control Program-Libya, 2015). The country is located in North Africa, and is one of the largest in the region, with a population of around 6.5 million (Index Mundi, 2016). Libya is also situated in the heart of the trans-Saharan drug-trafficking routes. It is an established market and a transit zone for hashish, and a transit spot for heroin and cocaine. There is an emerging market for both heroin and cocaine in Lybia's large cities, including Tripoli, Misurata, and Benghazi. Cocaine and heroin are trafficked

* Corresponding author.
E-mail addresses: fuzi_yasmin@yahoo.com, publichealthkyoto2015@gmail.com (F.M. Elamouri), patoumus@yahoo.fr (P.M. Musumari), techasrivichien.teeranee.2a@kyoto-u.ac.jp (T. Techasrivichien), anwarfrgalla@yahoo.com (A. Farjallah), selfandi@yahoo.com (S. Elfandi), osamaf.alsharif@yahoo.com (O.F. Alsharif), hussein_benothman@hotmail.com (H. Benothman), suguimoto.pilar.2w@kyoto-u.ac.jp (S. P. Suguimoto), kihara.masako.2u@kyoto-u.ac.jp (M. Ono-Kihara), kihara.masahiro.4n@kyoto-u.ac.jp (M. Kihara).

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from southwestern Libya, either directly northward through Sebha or along the southern border toward Egypt, where these substances move onward. Hashish is transported either from West Africa along the same route as heroin and cocaine or eastward from Morocco along the Libyan coast to Egypt. In addition, Libya is now considered a major hub for methamphetamine trafficking from West Africa; suggesting the country is diversifying into new drug markets. There are also pharmaceutical psychotropic products smuggled from neighboring countries (Shaw & Mangan, 2014).

The political unrest and military turmoil of the Arab Spring has led to a dramatic deterioration of the State's control, further aggravated by the recent political turmoil between two rival governments, causing outbreaks of violence across the country (The National AIDS Control Program-Libya, 2015). Libya's political instability and armed conflicts have exacerbated drug trafficking and access to illicit drug use, hampered national response efforts to the country's HIV epidemic, led to discontinuation of projects to address HIV and illicit drug problem, and deterioration of basic services including rehabilitation services for people who inject drugs (PWID).

Sound evidence on the status and dynamics of the HIV epidemic in Libya has begun to burgeon (Daw et al., 2014). Recent studies suggest that the epidemic in Libya is concentrated, with injection drug use as the main mode of transmission, and there is a relatively low prevalence in the general population (Mirzoyan et al., 2013). The latest bio-behavioral surveys, conducted in 2010 among 328 PWID in Tripoli, found an HIV prevalence of 87%. This is, so far, the highest reported prevalence of HIV among PWID worldwide, and was much larger than in other risk groups in Libya, such as men who have sex with men (3.1%) and female sex workers (15.7%) In the same study, there was an alarmingly high prevalence of hepatitis C virus (HCV) (94%), with a relatively low prevalence of hepatitis B virus (HBV) (5%) (Mirzoyan et al., 2013). The National Center of Disease Control indicated that PWID account for 90% of reported cases of HIV in Libya (Ministry of Health, 2014). There are however strong indications that sexual transmission is becoming an increasingly important contributor to the national HIV incidence rate (The National AIDS Control Program-Libya, 2015). In another study, conducted in 2011 among the Tripoli's general population, the prevalence of HIV, HCV, and HBV was respectively 0.15%, 0.9%, and 3.7% (Daw et al., 2014).

Despite the lack of data on drug addiction in Libya, there is a joint consent that drug addiction is an increasingly salient issue in the country (Shaw & Mangan, 2014). This, however, contrasts with the very limited availability of quality services for drug treatment, rehabilitation, and harm reduction. The only two Libyan rehabilitation centers, located in Tripoli and Benghazi, are now closed due to the political and military instability (The National AIDS Control Program-Libya, 2015). This institutional void has led to the establishment, by different a militia faction in the country, of many community-based, informal, re-education and rehabilitation centers. Residents of these centers include individuals who have been arrested for using and/or selling drugs, having sex out of marriage, theft, and other misdemeanors; in few instances, their family may have brought them in. The service is often limited to the institutionalization of the residents, with no clearly defined rules that govern the length of stay and no provision for specific drug treatment and rehabilitation services (e.g., counseling) for drug users (Finucci, 2014; Sifaw & Plaza, 2017).

There is a dearth of information related to HIV and drug substance use among young people in Libya, even though they are a priority group for HIV prevention and harm reduction strategies, due to their vulnerability to both conditions (Degenhardt, Stockings, Patton, Hall, & Lynskey, 2016). At the global level, young people aged 15–24 years accounted for approximately 40% of new HIV infection among adults (WHO, 2015). In young men aged 20–24 years, substance use, including illicit drug use, is responsible for 14% of the total health burden (Degenhardt et al., 2016). In Libya, young people aged 15–24 years account for approximately 17% of the population, and over half of the population is under 30 years of age (Index Mundi, 2016). Young people in Libya face an exacerbated risk of substance use and HIV due to the country's socio-economic and political situation. In a previous study, although the majority of PWID were at least 35 years old, around 43% of the participants were less than 25 years old when they first injected drugs (Mirzoyan et al., 2013).

There is a salient lack of qualitative and epidemiological data on substance use and HIV among Libya's young people. We found no previous studies in peer-reviewed publications on this specific topic. The current study provides a qualitative assessment of the vulnerability of young people to substance use and HIV infection. We first explore the factors that shape young people's vulnerability to drug use, and then examine how these factors enhance the risk of HIV infection. Although the overall research examined substance use in general (drugs, alcohol, and tobacco), the current report specifically focuses on drug use.

Methods

Research design, sampling and target population

This is a qualitative study exploring factors that shape the vulnerability of young people to drug use and HIV infection in Tripoli, Libya. We used maximum variation, purposive sampling strategy to recruit participants. We chose this specific purposive sampling technique because it ensures that the sampled participants collectively represent as wide a range as possible of variation in the factors considered relevant to the object of the study (Bowers, House, & Owens, 2011). In this study, we purposively recruited two groups of young male and female Libyans aged 14–18 years: 3community-based informal re-education and rehabilitation centers, and (2) secondary and high schools in Tripoli. The rational of this selection was that the two groups might have different experiences, risks, or behaviors related to drug use and HIV. At the time of the study Tripoli had 5 official prisons, of which we selected 2 because they incarcerated adolescents as well as adults. By convenience, we selected 2 informal re-education and rehabilitation centers. The currently existing centers operate as informal structures under the control of the armed militia and lack capacities for the provision of adequate rehabilitation services. The student participants, with or without experience of drug use, were selected from 5 schools (2 secondary schools and 3 high schools), conveniently chosen based on the demonstrated cooperation from the schools' administrative authorities. In total, we recruited 16 participants from the prisons and community-based informal re-education centers, and 15 participants from the schools.

Data collection

We conducted in-depth interviews with gender-matched interviewers between September and October 2015. The semi-structured questionnaire was developed based on the literature review of drug use and HIV among young people, and our previous informal outreach to key informants working with youth in Libya. The interviews covered topics related to drug use and HIV-related risky behaviors; particularly, (1) knowledge of the risk of injection and non-injection drug use, (2) experience with injection and non-injection drug use, (3) perception of factors that lead to substance use, (4) knowledge related to HIV prevention, and (5) perception of

factors that prevent the use of injection and non-injection drugs among young Libyans.

All interviews were conducted in Arabic and in private rooms (at the schools, prisons, and informal rehabilitation centers) to ensure strict confidentiality. Although most of the interviews were audio-recorded with prior consent, interviews with female participants were instead recorded by hand, since these participants were concerned about their voices being audio-recorded, fearing that they could be recognized if the recording devices were lost. Notes were taken on non-verbal data (e.g., facial expression) during the interviews. Each interview was followed by a debriefing session (which lasted between 15 and 20 min) to map the main emerging themes, and ultimately, to determine whether saturation had been reached. We conducted a total of 31 interviews, which lasted 60 min on average.

Data analysis

Transcripts of audio and hand-written records were translated into English for data analysis. Data analysis was carried out using a thematic analysis procedure with analysts' triangulation (Braun & Clarke, 2006). We started with repeated and careful readings of the data (verbal or non-verbal) to generate codes, categories, and (finally) the thematic diagram (analytical framework) to depict the relationship between the codes and categories, and how they relate to the overall research question.

Next, three investigators (FME, TT, PMM) independently coded the data transcripts and generated the initial codes, which were then grouped into larger categories. The team met on a regular basis to discuss the labels assigned to the transcripts. Discrepancies in coding and categorizations of the data were resolved through revisiting the transcripts. In the second phase, codes and categories were revised and refined through regular meetings with another group of investigators (MOK & MK) to ensure data quality and credibility.

The entire process was iterative and led to the development of the working analytical framework based on the first few transcripts. Subsequent codes that emerged from the remaining transcripts were fed into the analytical framework. Codes that fit into the framework were placed under the appropriate category. The framework was flexible and expanded with emerging codes that did not fit into the initial analytical framework. Fig. 1 displays the final analytical framework. It displays the codes and categories that emerged from the data, and their relationships in terms of how they affect vulnerability to drug use and HIV infection. We elaborate on the codes and categories in the results section, and contextualize them in the discussion section.

Psychological support and counselling for participants

During the interviews, a female psychiatrist and a male psychologist carefully observed the participants and intervened when deemed necessary, taking into consideration the gender-match preference of each participant. Our psychological support team also provided post-interview follow-ups at the request of participants.

Ethical considerations

The study received ethical clearance from the Kyoto University Graduate School and Faculty of Medicine, Ethics Committee and the Ethical Regulatory Authority of the Department of Health,

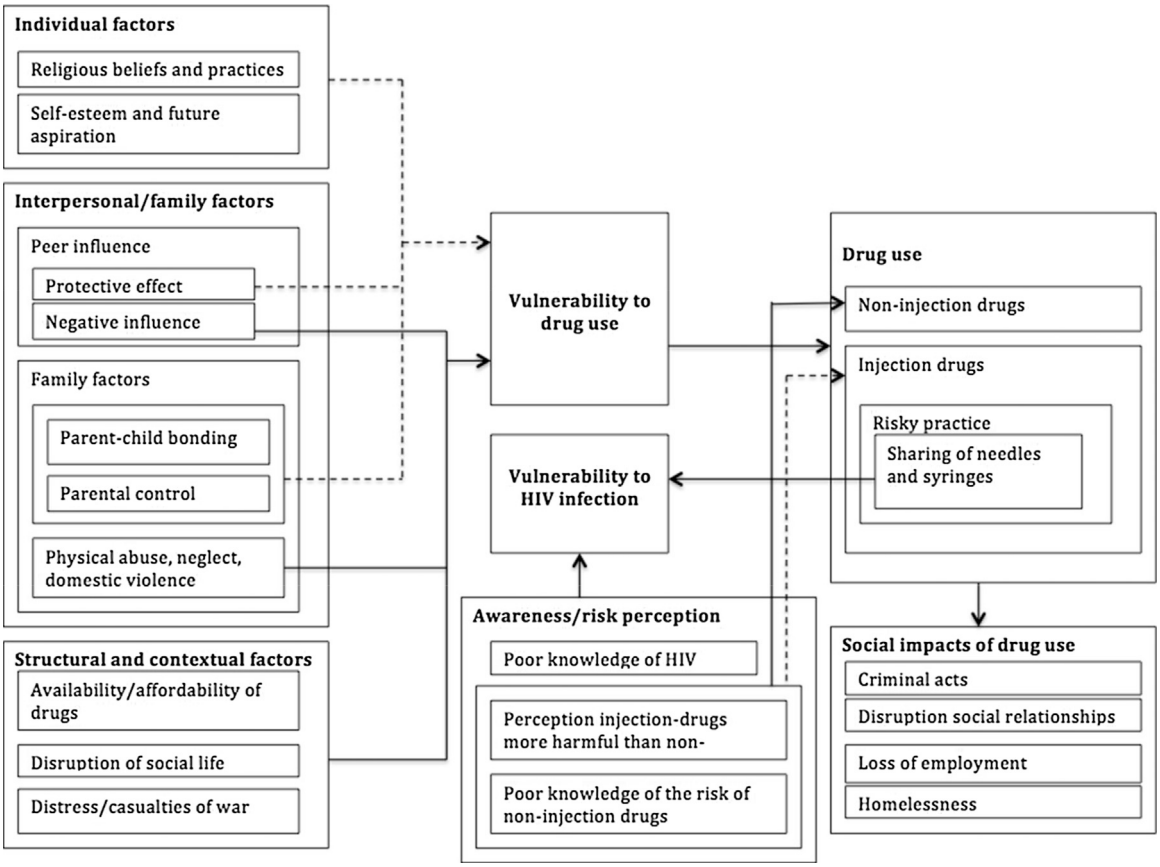

Fig. 1. Analytical framework showing the codes and categories, and their relationships with vulnerability to drug use and HIV. Solid lines refer to the risk factors; the dotted lines refer to protective factors.

Libya. Potential participants were informed about the nature and purpose of the study when they were invited to participate. We obtained consents from both the participant him/herself and that of parental/legal guardian. As a show of gratitude, participants were provided with a brochure from the National AIDS Program. Appropriate measures were taken to ensure confidentiality and anonymity of participants. No names or any other individual identifiers were recorded in any part of the study.

Results

Characteristics of participants

We interviewed a total of 31 participants. Previous research has shown that thematic saturation could be reached with sample size ranging from 5 to 25 participants (Creswell, 2007). In our study, we assessed that we reached saturation through debriefing sessions conducted at the end of each interview.

Sixteen participants were recruited in prisons (9 participants) and community-based informal re-education centers (7 participants). Fifteen participants were students recruited from 2 secondary schools (7 participants) and from 3 high schools (8 participants) in Tripoli. The total sample consisted of 6 females and 25 males. The median age of participants was 16 years. Non-injection drugs were the most commonly reported and used in a combination of many substances among the participants who were drug users (Table 1).

Prisoners and residents of community-based informal re-education and rehabilitation centers

Over half of the participants were not living with family. The majority (87%) had some form of employment before imprisonment and some reported having worked in the armed forces or admitted to selling illegal drugs or illegally selling prescription drugs. All the participants had used or were currently using drugs. Almost 90% reported having had friends who were used illegal drugs. The majority of participants (75%) used non-injection drugs. Nine reported ever used injection-drug; of which 4 participants were still using injection-drugs by the time they were institutionalized. Most participants reported having used more than one kind of drug and were also alcohol consumers. The four types of the most commonly used drugs were hashish, hallucinogens (ecstasy), and Tramadol and Trihexyphenidyl (Artan) tablets. Six participants reported the use of heroin by inhalation and/or injection by the time they were institutionalized. Three of them had faced murder charges under drug influence (Table 2). Among the 9 participants who ever used injection drugs, 6 (66.6%) reported having shared needles or syringes.

Table 1
Demographic characteristics and history of drug use.

Characteristic	Prisoners and Residents of Community-Based Informal Re-education and Rehabilitation Centers (n = 16) n (%)	Students (n = 15) n (%)
Sex		
Male	14 (87)	11 (73)
Female	2 (13)	4 (27
Age		
14–16	7 (44)	11 (73)
17–18	9 (56)	4 (27
Living with family		
Yes	7 (44)	15 (100)
No	9 (56)	0 (0)
Having (had) a job		
Yes	14 (87)	2 (13)
No	2 (13)	13 (87)
Have (had) friends using drugs		
Yes	14 (87)	3 (20)
No	2 (13)	12 (80)
Ever had alcohol consumption		
Yes	13 (81)	2 (13)
No	3 (19)	13 (87)
Ever used drugs		
Yes	16 (100)	1 (7)
No	0 (0)	14 (93)
Ever injected drug		
Yes	4 (25)	0 (0)
No	12 (75)	15 (0)

Students in secondary and high school

All student participants were living with family: 2 had part-time jobs. While the majority (93%) were not using drugs, 1 student reported taking Tramadol tablets and 2 reported drinking alcohol. Three participants had friends who were using drugs. Additional demographic characteristics are shown in Table 1.

Codes and categories

The codes and categories that emerged from the data transcripts are illustrated in Fig. 1. Three thematic categories (individual factors; interpersonal/family factors; structural and contextual factors) included codes related to factors protecting and promoting drug use among young people in Libya: 1 category was related to the social impacts of drug use on young people, and 1 category included codes related to HIV and drug use (awareness, risk perception, and risky sexual behavior) among young people. (See Fig. 1) Quotes from the participants are lightly edited for ease of reading, without substantially altering the contents.

Factors that influence drug use

Individual-level factors

Religious beliefs and practices. Religious beliefs emerged as a salient protective factor against drug use among the participants who had no previous substance use experience. All participants were Muslim, and the protective effects of religion manifested in multiple ways. Some of them evoked the notion that their religion demands respect and sanctity of mind and life. Therefore, most had less tolerance for behaviors such as drug use, which they regarded as offensive to the Islamic religion. One participant said:

> "I'm Muslim and the philosophy of Islam includes preserving the person's life, mind, and wealth. Any substance that threatens any of these factors is considered prohibitive." (M, age 15, high school)

Religious beliefs also provided strong resilience and resistance against drugs for participants who were going through hardships as a result of the war. One participant mentioned:

> "All the people have a difficult time and when I have problems I just pray to god and trust he (God) will be with us in this difficult time. Even though I don't get a response to my prayers now, I believe he (God) will protect us. But I don't to turn to drugs to solve these problems because it will make my situation worse. Using drugs and alcohol are '*Haraam*' (forbidden by Allah)" (F, age 17, High School).

Among the participants who were using drugs, few attributed their behavior to the fact that they had distanced themselves from God and their religious practices. One participant said:

> "If I were closer to god and prayed regularly I think I wouldn't be here (in re-education and rehabilitation center). Since I stopped

Table 2
Characteristics of the Prisoners and Residents of Community-Based Informal Re-education and Rehabilitation Centers.

	Gender	Age	Types of drugs used by participants	Ever used Injection drugs	Ever shared syringe	Ever used injection drugs by the time of one was arrested	Charge	Institution
1.	Female	18	Ecstasy – Artan (Trihexyphenidyl) – Diazepam pills, Heroin, Hashish	Yes	Yes	Yes	Using and selling drugs	Prison
2.	Female	17	Ecstasy – Diazepam, Tramadol pills, heroin	Yes	Yes	Yes	Using drugs	Rehabilitation center
3.	Male	16	Tramadol – Ecstasy – Artan pills, Hashish, Heroin	Yes	Yes	Yes	Using drugs and Theft	Rehabilitation center
4.	Male	18	Tramadol – Ecstasy pills and snort Heroin and smoke Hashish	Yes	No	Yes	Theft	Rehabilitation center
5.	Male	15	Tramadol pills and Hashish	No	–	–	Using drugs	Prison
6.	Male	18	Tramadol, ecstasy, pill, smoking hashish and snort heroin	No	–	–	Kidnap and Using drugs	Prison
7.	Male	17	Ecstasy, Artan, Tramadol pills, smoking hashish and heroin	Yes	Yes	No	Murder	Prison
8.	Male	16	Ecstasy pills	No	–	–	Using and selling drugs	Rehabilitation center
9.	Male	18	Hashish, Tramadol, Diazepam pills	No	–	–	Using drugs	Prison
10.	Male	15	Hashish, Artan, ecstasy, snort heroin	Yes	Yes	No	Having sex out of marriage with girl	Prison
11.	Male	16	Hashish, Ecstasy, Artan pills	No	–	–	Using and selling drugs	Rehabilitation center
12.	Male	17	Hashish, Tramadol, Artan, smoking Heroin	Yes	No	No	Kill his father	Prison
13.	Male	18	Artan, Hashish	No	–	–	Using drugs	Rehabilitation center
14.	Male	17	Ecstasy, Hashish, smoking Heroin	Yes	No	No	Murder	Prison
15.	Male	17	Ecstasy, Tramadol, Hashish	No	–	–	Selling drugs	Rehabilitation center
16.	Male	15	Hashish, Artan, Ecstasy, Tramadol pills, smoking Heroin	Yes	Yes	No	Using drugs	Prison

praying and going to Mosque every Friday I lost my life and I lost the way to become good person; but since I am here, I start praying regularly and try to go back to god" (M, age 16, re-education and rehabilitation center)

Self-esteem and future aspiration. Most of the participants mentioned that the way young people view themselves has a direct impact on how they make choices in their lives. Those who have high self-esteem with strong future aspirations will not turn to drugs.

"Drugs are not for me! I have no time to waste on drugs and I have all the willpower to stay away from them. I have family, friends, and my future." (M, age 14, secondary school)

Interpersonal and family factors

The influence of peers. Peer pressure was one of the largest facilitating factors that led to drug use, particularly among participants who were incarcerated. The influence from peers was mainly exerted in the form of active pressure including implicit encouragement or the threat of social isolation in case of refusal to adopt the drug use behavior of the group.

"All my friends are using drugs. Eventually they influenced me. It was when my friend gave me a drug for free that I first used drugs." (M, age 16, re-education and rehabilitation center)

"When they (referring to his friends) started using drugs, I tried not to use but they told me: if you don't do what we do you are not part of us and you will not be our friend anymore. I was scared to lose them, then I started to using drugs with them." (M, Age 15, prison)

On the one hand, most participants who did not experience drug use recognized the positive role of peers in their behavior. More than half of the participants in this group concurred that forming positive relationships with their peers led to a productive use of free time and created a strong shield against drug use.

'We encourage each other, we study together, and during our free time we play together and we support, criticize, and give advice whenever needed.' (M, age 17, high school)

Family factors. Family factors, including parent-child attachment and parental control, emerged as protective factors against drug use. Most participants who did not experience drug use agreed that a positive and strong parent-child relationship, a supportive family environment, guardian monitoring and caregiving facilitated a healthy relationship with young people. Continuous supervision, paying attention to their children's friends, and giving advice when needed are protective factors that keep them from choosing to use drugs.

"My family always keeps an eye on me and supports me; my father is like a friend to me. We share our problems and we solve them together." (F, age 16, high school)

"My family takes care of me, and every time they visit me in the school to know who I hang out with. I left the bad friends when they wanted to pull me to drugs" (M, age 15, high school)

When the family became aware of the participants' drug use, they often responded through physical punishment and abuse or through room confinement that could last for weeks. Some families threw these young adults onto the streets.

"After my family found out that I was on drugs, they locked me in a dark room for three weeks and my father and brothers beat me every day." (F, age 17, re-education and rehabilitation center)

Participants also pointed to physical abuse, neglect, and domestic violence, particularly from the parents or close relatives during early childhood as one of the factors that led them to drug use. They felt their family did not provide enough support, did not understand their role in helping young people cope with drug use,

and that the further physical punishment they received from family members only made the situation worse.

Structural and contextual factors

Availability and affordability of drugs. A large number of participants felt availability of illicit drugs had increased due to the political and security instability since 2011—post revolution. Drugs have become easily accessible through the an increased number of drugs dealers and are on offer at an affordable price. Easy access to drugs in prison also emerged during the interviews. Some participants reported the following:

"Post revolution, food prices increased. When you ask why, they say it is because of the war and limited importation; meanwhile, the price of illegal drugs was dropping and their purity was increasing and they became very easy to obtain. Now drugs in Libya are much cheaper than food." (M, age 16, prison)

"On every street in Tripoli you can find drug dealers; almost every family has a person using or selling drugs" (M, age 17 prison)

"In post-revolution, the drugs are available everywhere. I am now about 4 months here (in prison) do you think I stopped using drugs? No . . . No, I can get the drugs even here. I can't tell you how I get the drugs but some people they get from their friends from outside when they visit them or from other prisoners here" (M, age 17, prison)

Disruption of social life and healthy recreational activities. Most participants explained that the war has created an environment of violence, unemployment, and disruptions in access to school or traditional recreational resources for social activities, such as facilities for sport activities. As a result, many young people had much free time, which they could not use in a constructive way. One participant explained:

"When the war started, all the entertainment places closed and the open ones are very expensive, like sport clubs, football stadium, and fitness studios. There is no place to have relaxed time or enjoy. So, I felt so bored and I would like to do anything to kill my time. I started to go to the summer house [a countryside shelter or house for relaxation] of my friends and its one of reasons I used drugs" (M, Age 18, Prison)

Drug use as a way to cope with distress and casualties of war. The use of drugs also emerged as a form of coping with the loss incurred during the war. Many participants had lost their families, relatives, and friends. Some of them had to flee their homes, while others lost their jobs and had to join the armed militia. One participant said:

"I was a nice person, ambitious and hard-working also in my studies, but the war killed a lot of my friends and relatives. My school was destroyed and we lost our house and everything we had. Can't you imagine that all of this would push me into drugs in order to forget?" (M, age 16, re-education and rehabilitation center)

Social impacts of drug use on young people

We found that drug use led to a range of detrimental social consequences. Accounts of violence and criminal acts were very common among incarcerated participants. Some of them were charged with murder, theft, gender-based violence, and weapons ownership under the influence of drugs and alcohol. Substance use was considered as the main factor leading young people to incarceration, especially during the post-revolution period.

"Usually I come home late under the influence of drugs. One night my father got very angry with me; he picked up a rubber pipe and beat me repeatedly. I tried to defend myself. I got angry and pulled a gun out of my pocket and shot him." (M, age 17, prison)

Drug and alcohol use disrupted social relationships with family, friends, and neighbors, and in some cases, led to loss of employment and homelessness. A few participants' quotes are presented below:

"I was a very good person, I had a lot of friends, but the drugs make you not human and change everything in your life, I had my nice family and friends but after drugs nobody likes me as before" (M, Age 18, Prison)

"I had good job in a very famous restaurant in Tripoli but after I started using drugs, I didn't go to job regularly and I made some problems with the clients so I lost the job" (M, age 17, prison)

"When my family learned that I was using drugs they kicked me out of the house and never accepted me anymore. I became homeless and was living on the beach until the army caught me." (M, age 16, re-education and rehabilitation center)

Awareness, risk perception, and risky behavior related to drug use and HIV

There was a high level of awareness among all the participants regarding the types of drugs available in the community, as well as their street names. However, most participants perceived that non-injection drugs were less harmful than injecting drugs. Some had personally witnessed or heard accounts of adverse health effects of injection drugs on people. Mostly, participants associated injection drug use with the risk of acquiring HIV and/or HCV. Some participants mentioned:

"I have never injected drugs in my life, I used only pills even though I know it's not good but I feel I forget all my difficulties and problems and Libyan situation now; but I never used or I will never use the injection drugs because all our old neighbors and old generation who used injection drugs died one by one by AIDS, and I consider the injection is old fashioned" (M, age 17, prison)

"My uncle is my idol in the life; he always advised me not to use injection drugs use; I injected heroin two or three time then I stopped it after he (meaning his uncle) died from AIDS " (M, age 16, prison)

Despite the injection drug users awareness of the risks associated with injection drug use, most of them reported using old syringes or having shared needles or syringes due, for example, to supply shortages.

"I shared my syringe with my friends and ex-boyfriend. We didn't have enough syringes for everyone. I thought, I'm sure he doesn't have any diseases." (F, age 17, re-education and rehabilitation center)

On the other hand, the link between the use of non-injection drug and HIV or the transmission of HIV through sexual activity did not appear to dominate the discourse of the participants, although few reported increased libido when they were under the influence of drugs.

"I don't know where I got HIV. I never used drugs by injection. But maybe I got it from some girl. When I am under the influence of drugs, my sexual desire increases and I don't know what I'm doing!!" (M, age 15, prison)

Overall, participants had a limited understanding of HIV, with a lot of misconceptions of its modes of transmission. The main

source of HIV-related knowledge was from peers or casual chats, and many felt that there was inadequate health education in schools, at home, and in the media.

> "HIV is transmitted via razors, shaking hands, wearing the same clothes that HIV-infected people had worn and sharing food with them; I know some people who got HIV because they were using the same toothbrush." (F, age 17, high school)
>
> "We don't have specific classes in school for health education but some organizations visit us from time to time and give us basic information related to drug use and HIV. Generally, we do not receive enough information." (M, age 16, high school)

Discussion

This is, to our knowledge, the first qualitative study to explore the factors that increase the vulnerability of young people to use drugs in Tripoli, Libya. We found that individual-level factors, namely religious beliefs, good self-esteem, and future aspirations, had a protective effect against drug use, while structural and contextual factors (availability and affordability of drugs; disruption of social life; distress and casualties due to war) enhanced their vulnerability to drug use. Factors at the interpersonal and family level were either risk factors or protective factors against drug use. The current study also helped discern HIV-related risk factors among participants who engaged in drug use; notably the sharing of needles and syringes, poor HIV-related knowledge, and low risk perception for non-injection drugs.

The results of this study add to the existing body of literature that depicts the vulnerability to social and mental health problems of the youth and adolescents living in conflict-affected or post-conflict zones. Young people and adolescents are disproportionately affected by armed conflicts and war (UNICEF, 2009). Beside reports of forceful recruitment of young people and adolescents into armed groups (Quénivet & Shah-Davis, 2013; Theresa Stichick et al., 2010), there exists extensive literature linking armed conflicts to mental health disorders (distress, anxiety, depression) (Dimitry, 2011), increased exposure to negative peer influence (Karakos, 2014), increased access to illicit drugs (Harris, Levey, Borba, & Deborah, 2011), disruption of social and family structure (Peltzer & Ramlagan, 2009), deprivation of education (ICRC, 2009), and violence, including sexual violence (GTZ, 2009; Slegh, Barker, Ruratotoye, & Shand, 2012).

In our study, the context of post-revolution social conflict in Libya appeared to be one of the most significant factors enhancing the vulnerability to drugs among our participants. Many participants, including non-drug users, felt that the availability of drugs had escalated greatly in post-revolution Libya, as a result of both political instability and the loss of control over the extensive national borders. The volatile political situation and social chaos have created a perfect environment for the influx of large amounts of drugs, which are sold at low prices on every corner of the city (Burke, 2014; Micallef, 2017; Shaw & Mangan, 2014). Drug trafficking is common in (post-) conflict zones. However, the relationship between armed conflict and illicit drug trade and use is complex, and bears multiple facets. Drug trafficking is likely to thrive in conflict- and post-conflict-affected regions as a result of the weakened capability to enforce counterdrug laws and policies, weakened control of borders, and the emergence of new and/or strengthening of existing organized criminal groups operating in the illicit drug market (Durnagöl, 2009; UNODC, 2017). In addition, illicit drug trafficking can serve as a source of financing for politico-military groups involved in armed confrontation. Presently, most of the world production of opium and coca is taking place in conflict or post-conflict-affected zones, including Myanmar, Afghanistan, Colombia, and Peru (Cornell, 2007; LaVerle, Curtis, Hudson, & Kollars, 2002; Stepanova, 2009). In Colombia, although drug trafficking is not recognized as the cause of the armed conflicts, it has however been the main source of income for the armed groups involved in the conflict (Garay, 2013; Le Billon, 2015; Otis, 2014). In Libya, the drug market has become a dynamic source of resources for the militias (Felbab-Brown, 2017; Valssenroot, 2008; Wennmann, 2011).

The increased availability and affordability of drugs was further compounded by other factors, direct or indirect consequences of the warfare. For example, the harsh experience of the war (that had led some to lose their employment, home, educational opportunities, family, friends, relatives, and assets) has created hopelessness and distress among young people, thereby pushing them toward drugs and alcohol as a coping strategy to obtain temporary relief. A qualitative study on risk factors and consequences of substance use among youth in post-conflict Liberia indicated that some young people engaged in drug use as a way to cope with the negative and traumatic experience of the war (Lippitt, 2013). In addition, unemployment and the disruption of schools and recreational resources for social activities resulted in young people having too much free and unsupervised time, further exposing them to drug use.

Also noteworthy was the finding that participants who were incarcerated felt that access to drugs in prison was relatively easy, through visitors, other inmates, or prison officers. The traffic of drugs in prison is a widespread concern in many settings, even in developed and developing countries (UNODC, 2015).

We found peer influence is a common contributing factor to drug use. In our study, the influence of peers not only led to the initiation of drugs but also helped sustained the behavior, particularly among participants incarcerated in prisons or in rehabilitation centers. This is in agreement with many studies showing that prisons have become effective environment for drug use due to peer pressure and easy access to drugs (Alhyas et al., 2015; Jürgens, Nowak, & Marcus, 2011; Penal Reform International, 2015). We found that young people facing the hardship of war with easy access to drugs and a lot of free time on hands are prone to be influenced by their peers. Peer pressure is extensively documented as a contributing factor to substance use among young people (Brook, Morojele, Pahl, & Brook, 2006; Lippitt, 2013; Peltzer & Ramlagan, 2009). The influence of peers is all the more relevant in the context of conflict and post-conflict. The breakdown of families and traditional social networks may drive young people to rely more on their peers. In Liberia, the influence of peers emerged as an important contributing factors to initiating substance use. Particularly, the social isolation of substance users reinforced bonds and reliance on peers and contributed to sustain the drug use behavior (Lippitt, 2013). Interestingly, only a few of the participants who were using drugs linked their behavior to their failure to abide by the prescription of the Islamic religion. The protective role of religion on substance use has been documented in many studies (Alhyas et al., 2015; Marsiglia et al., 2005), and the postulated mechanisms are multiple. For example, some religions explicitly prohibit substance use (Benda, 1997), while others prescribe norms that can discourage substance use (McBride, Mutch, & Chitwood, 1996). Young people and adolescents involved in religion are less likely to be influenced by deviant peers as they tend to form peer groups with youth who are involved in similar activities (Oetting, Donnermeyer, & Deffenbacher, 1998). In addition, religious involvement can provide protection against substance use through promotion of pro-social activities, which in turn, may promote antidrug conduct norms. Religious involvement can enhance the ability to recover from adverse life events (Sattari, Mashayekhi, & Mashayekhi, 2013); thus, faith-based strategies are regarded as useful a tool for interventions aiming to address substance use (Epstein, Glezen, Clark, & Preston, 2010).

We identified family-related risk and protective factors for drug use. For example, lack of family support, physical abuse, violence, and neglect in early childhood were reported as factors that pushed some participants into drug use, or that worsened the drug use behavior. This concurs with the findings of previous studies showing that maltreated children later participate in some sort of substance use and become drug addicts (Whitesell, Bachand, Peel, & Brown, 2013). On the other hand, family support and strong family ties, such as parental monitoring and care giving were all mentioned as factors that kept young people away from drugs (Meghdadpour, Curtis, Pettifor, & MacPhail, 2012). This highlights the importance of family-level factors in modeling adolescents' behavior, such as in the case of substance use.

The use of drugs had tremendously adverse social and economic consequences in our study. Participants who were using drugs reported accounts of criminal acts, disruption of social relationships, loss of employment, and homelessness. In our study, both non-injection and injection drug users knew about the health risks associated with injection drug use; mostly associating the latter with HIV and/or HCV. However, the link between non-injection drug use and sexual transmission of HIV was much less salient in the participants' discourse.

The perception among our participants that injection drug use was more harmful echoes previous studies in other settings (Rio & Alvarez, 1995). In the context of our study, this perception might have been formed based on observed harm and/or accounts of harm to others, as some participants reported. It is also possible that the community in the setting of this study is more sensitized (through media portrayal, hearsay) to the effects of injection drug use, given that it is the predominant route of HIV transmission in the country.

The prevention of HIV transmission among drug users has overwhelmingly focused on injection drug users, and there is a dearth of evidence-informed strategies to guide HIV prevention among non-injection drug users (Shoptaw, Montgomery, Williams, & Strathdee, 2013). In our study, because the majority of participants had limited knowledge of the mechanisms of HIV infection, they were very likely at risk of HIV infection through risky sexual behavior. Unfortunately, we were not able to explore risky sexual behaviors among our sampled participants in any depth.

Additionally, most of the injection drug users in our sample reported sharing needles and syringes or using old syringes, despite being aware of associated risks of HIV and HCV transmission. This corroborates results from a previous study in Libya, where a significantly high proportion shared needles and other injection equipment (Mirzoyan et al., 2013). This situation is very likely due to structural barriers impeding access to clean needles and syringes. Libya does not currently provide a comprehensive national needle and syringe exchange program or opioid substitution therapy. The Drugs and HIV Project that the United Nations Office on Drugs and Crime established with financing from the Libyan government was suspended in 2011 due to the civil war; however, it is slowly being restarted according to the latest Libyan HIV/AIDS country progress report (The National AIDS Control Program-Libya, 2015).

This study has a number of limitations that are worth mentioning: First, the nature of the qualitative design in our study, the convenience sampling method, and the limited geographic location within Tripoli, limit the generalization of this study to all of Libya. Second, it was not possible to investigate the current status of sexual practice because sex is a taboo subject in Libyan culture; therefore, a more culturally appropriate approach would be needed to explore this issue. Lastly, our sample included only a limited number of participants who were injecting drugs; which restricted the in-depth exploration of this group. Despite these limitations, this study remains particularly important. This is the first study to qualitatively assess the vulnerability of young people in Libya in the context of the post-revolution period.

Conclusion

We have identified factors at the individual, interpersonal, family, and structural levels that interplayed to shape the vulnerability of young people to drug use and HIV infection in Tripoli, Libya. Structural factors including the increased availability and affordability of drugs, engendered by the social political turmoil, provided the frame within which other factors such as peer influence and limited knowledge of substance use and HIV, operated to increase the vulnerability of young people to drugs and HIV, while religious beliefs and parent-child connectedness act as protective factors.

Our results suggest the urgent need to develop effective strategies for the prevention of drug use among young people in Tripoli (in particular) and Libya (in general). At the structural level, strategies should include controlling national borders to curtail drug trafficking, developing policies that discourage drug trafficking in prisons, and establishing professional drug treatment and rehabilitation centers with harm-reduction services. Educational programs to raise drug awareness and harm reduction programs are most needed in the schools and prisons. At the individual, interpersonal and family levels, interventions should include behavioral, educational, and religious-based strategies. The target should be young people and their families, helping them to build skills and foster bonds to protect against substance use and to help prevent HIV infection.

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Conflict of interest

The author declares no conflict of interests.

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Disparities in Mental Well-being between Non-Minority and Sexual Minority Male Youth in Bangkok, Thailand: Quantitative Findings from a Mixed Method Study

Sakol Sopitarchasak[1], Masahiro Kihara[2], Kyaw Min Soe[3] & Masako Ono-Kihara[2]

This paper investigates whether there are differences in mental well-being between non-minority and sexual minority adolescents. We also explore the experiences of victimization among sexual minority adolescents, compared to their non-minority peers. While the study used mixed methods, with an initial qualitative phase and a subsequent quantitative phase, this paper focuses on the quantitative findings. Male students from five secondary schools (n=1,250) in Bangkok were asked to answer an online questionnaire. Among all participants, 81.8% identified themselves as non-minority and 12.5% as sexual minority with 5.7% missing or unidentifiable responses. The results indicated a higher risk of depression for sexual minority participants than for non-minority participants (odds ratio: 1.85). Sexual minority participants were also more likely than their non-minority peers to have considered (23.2% vs. 9.8%) or attempted (10.3% vs. 2.9%) suicide, and to have been victimized and/or experienced sexual coercion during the past semester. The findings conform to results from previous studies worldwide. Although a causal relationship cannot be inferred from this study, the disparity in mental well-being can be due to the victimization that sexual minority adolescents experience more frequently than their non-minority counterparts.

Keywords: *Adolescents; Depression; Suicide; Victimization; Sexuality*

Globally, many studies have reported higher rates of psychological distress, self-harm, suicide, suicide attempts and suicidal ideation among sexual minority populations (Clements-Nolle, Marx & Katz, 2006; Diamant & Wold, 2003; DiStefano, 2008; Fergusson, Horwood, Ridder & Beautrais, 2005; Fitzpatrick, Euton, Jones & Schmidt, 2005; King et al., 2013; Warner et al., 2004). This association is further linked with social discrimination and oppression targeted towards these groups (Diaz, Ayala & Bein, 2001; Warner et al., 2004).

Higher rates of suicidality and compromised mental well-being were also reported among sexual minority adolescents (Consolacion, Russell & Sue, 2004; Galliher, Rostosky & Hughes, 2004; Garofalo, Wolf, Wissow, Woods & Goodman, 1999; Gary Remafedi, Farrow & Deisher, 1991; Russell & Joyner, 2001). According to a meta-analytic study by Marshal et al. (2001), significantly higher rates of suicidality (odds ratio = 2.92) and a higher tendency for depression (standardized mean difference = 0.33) among sexual minority youths than non-minority youths were reported (Marshal et al., 2011).

Meyer (2003) has proposed the minority stress model, where minority status is linked to mental outcomes through distal minority stressors (e.g. discrimination and violence) and proximal minority stressors (e.g. expectations of rejection and concealment). Empirically, compromises in mental health and higher rates of suicidality among sexual minority groups were found to be associated with discrimination and harassment related to their sexual orientation (Birkett, Espelage & Koenig, 2009). It also has been shown by mediation analyses

[1] Thai Health Promotion Foundation, Bangkok, Thailand. Email: sakol@thaihealth.or.th
[2] Kyoto University, Kyoto, Japan.
[3] Mahidol University, Bangkok, Thailand.

that discrimination and victimization account for the association between sexual orientation and depressive symptomatology (Almeida, Johnson, Corliss, Molnar & Azrael, 2009; Burton, Marshal, Chisolm, Sucato & Friedman, 2013; Williams, Connolly, Pepler & Craig, 2005). The situation highlights the concern for sexual minority adolescents' well-being, especially given that adolescence is a critical period; mental disorders experienced during this phase can continue to have an impact in adulthood (Kessler et al., 2005; McEwan, Waddell, Barker & Kirby, 2007).

In Thailand, van Griensven et al. (2004) investigated adolescents' well-being in relation to their sexual orientation, although their study focused heavily on adolescents' sexual health. Another study conducted among secondary school students in Thailand found that students who were bullied tended to do worse in school, were more likely to be depressed and to have attempted suicide (Mahidol University, Plan International & UNESCO, 2014). The study also found that the compromised well-being worsened when bullying occurred because perpetrators thought victims were LGBT as compared to being bullied for other reasons (Mahidol University et al., 2014). Other studies in recent years have also affirmed the worsened mental well-being among sexual minorities in Thailand (Boonkerd & Rungreangkulkij, 2014; Yadegarfard, Meinhold-Bergmann & Ho, 2014).

This study investigates the issue of disparity in mental well-being status between non-minority and sexual minority adolescents in Thailand. It also examines experiences of victimization among sexual minority adolescents, not only by peers but by parents and school staff. In this way the study provides a more holistic picture of the situation that sexual minority adolescents encounter.

Methods

The study used mixed methods, with an initial qualitative phase and a subsequent quantitative phase. The initial qualitative study was conducted to obtain insights for constructing the questionnaire to be used in the following quantitative study. A detailed description of the methodology used in the qualitative phase can be found in a separate published article by Sopitarchasak et al. (2015).

Target population and inclusion criteria. The target population for the study is male adolescents attending secondary schools in Bangkok, Thailand. According to the Ministry of Education, there were 152,439 secondary school students (grades 10 to 12) in Bangkok in 2015. Among those, 64,594 were male students, comprising approximately 11.8% of male secondary school students in the whole country (Ministry of Education, 2016). The inclusion criteria for participants in the quantitative phase included (1) having male sex at birth; (2) currently attending secondary school in Bangkok; and (3) able to read and write Thai fluently.

Sample size and sampling method. A sample size of 1,000 participants was estimated to be adequate for this study, calculated as follows. We hypothesized that sexual minority adolescents' mean score on the Center for Epidemiologic Studies-Depression scale (CES-D) would be higher than that of non-minority adolescents. From a study utilizing a Thai version of the CES-D, the mean CES-D score for the general population can be approximated at 15.4, with a standard deviation of 6.7 (Trangkasombat, Larpboonsarp & Havanond, 1997). According to a meta-analysis of ten studies in the USA and one study in Thailand that

examined depression among heterosexual and sexual minority youth, the estimate for the overall standardized difference of the mean of the CES-D score between non-minority and sexual minority adolescents was 0.33 (Marshal et al., 2011). Assuming the same results, we predict the CES-D mean score for the sexual minority adolescents to be approximately 17.6. With a significance level set at 5% (two-sided), power at 80%, and assuming the approximate proportion of sexual minority students to be around 10% among the student population[4], the calculated sample size for the non-minority minority group and the sexual group is 728 and 81 respectively. Thus total minimum sample size obtained by combining the two groups is 809. Considering the possibility of non-responses and invalid answers, it was deemed that a sample size of at least 1,000 participants was required for this study (Chow, Wang & Shao, 2007).

Considering the time limits for the study, participating schools were chosen partly by convenience sampling and partly by purposive sampling. The first three schools (Schools a, b and c) were chosen following convenience considerations because they had previously participated in another research project conducted by project staff. The other two schools (Schools d and e) were selected purposively, by sorting a list of schools in Bangkok according to the number of male secondary school students. The two schools with the highest number of male secondary school students among boys-only and among co-educational schools were then contacted to ask for their permission to participate in the study (four schools in total). Among those, both co-educational schools refused to participate. Teachers responsible for coordinating this project in the two (boys-only) participating schools were then asked to inform all male students (10th-12th grade) about the study and ask for their assent to participate. The number of participants and response rate is shown in Table 1. Only students in the 10th grade in school c and 12th grade in school e were allowed by the schools to participate, due to limitations in their class schedules. This is considered to not influence the results of this study since all students in the entire allowed grades were allowed to participate in the study.

Table 1: Number of Participants and Response Rates

School	Male secondary school students	Allowed target	Participants	Response rate
a	110	110	84	76.4%
b	111	111	72	64.9%
c*	512	157	131	83.4%
d	1,629	1,629	828	50.8%
e**	1,849	305	135	44.3%
total	**4,211**	**2,312**	**1,250**	**54.1%**

Notes: * Allowed Target: Only for the students in 10th grade; ** Only for half of the classes in 12th grade

Ethical considerations. Written consent was obtained from one of each participants' parents or guardians via Participation Consent Forms which were distributed to students along with the Research Information Sheet by teachers at each school in advance of data collection. Written consent from the students themselves was considered unnecessary, since it was made clear that participation in the study was voluntary and participants gave their verbal assent. The survey was administered in each school's computer rooms during computer classes. Seating arrangements were made so that no participants sat next to one another in order to assure their privacy while taking the survey. This protocol was approved

[4] A study by Mahidol University et al. (2014) found the proportion of LGBT students to be 11.9%.

by both the Committee for Research on Human Subjects at Kyoto University (E1896) and the IPSR-Institutional Review Board at Mahidol University (No. 2013/1-1-23). In order to protect anonymity, no names or other specific personal information that could be used to identify the participants' identities were asked or recorded.

Data collection and measures. An online computer-assisted self-administered questionnaire was created as a tool for data collection, using Survey Monkey® (http://www.surveymonkey.com/), a provider of web-based surveys. The questionnaire was designed based on findings from the qualitative study and was pretested with 25 secondary school students who participated in the qualitative phase before the initiation of data collection. Measures used in this study included:

1) *Demographics* (9 items): Measures of age, religion, current grade, Grade Point Average (GPA), whether they are originally from Bangkok, whether they live with their parents, parents' marital status, whether they are working any part time job, and their daily allowance.

2) *Sexuality* (2 items): Participants were asked to choose their own sexual orientation and self-identified sexual identity from the following choices: gay, *thud*, *katoey*, bisexual, straight, questioning, or other. The Thai terms *thud* and *katoey* are discussed below.

3) *Center for Epidemiologic Studies-Depression(CES-D) scale: Thai version* (20 items): The CES-D scale was translated into Thai and tested by Worapongsathorn, Pundee, and Triamchaisri (1990). The cut-off point of the CES-D score in this study was set at 22 as suggested by a previous study of Thai CES-D scale by Trangkasombat et al. (1997) (sensitivity=72%, specificity=85%, Cronbach's coefficient alpha = 0.86).

4) *Self-Harm and Suicidality* (3 items): Participants were asked if they have ever committed self-harm, considered suicide, or attempted suicide in the past semester (Yes or No).

5) *Victimization* (14 items): Experiences of victimization during the past semester by teachers, peers, parents, and strangers were asked, as well as sexual coercion, using 5 point scale response options (0:Never, 1:Less than once a week, 2:1-2 days a week, 3:3-4 days a week, 4:5-7 days a week). The question items were:

(1) Teachers or school staff said something or mocked how I act or talk to disdain or ridicule me.
(2) Teachers or school staff treated me differently, with prejudice.
(3) Teachers or school staff physically assaulted me, e.g. kicked, punched, hit me etc.
(4) Other students called me "fag", "gay", "gold-digger[5]", or other similar names.
(5) Other students said something or mocked how I act or talk to disdain or ridicule me.
(6) Other students treated me differently, with prejudice.
(7) Other students physically assaulted me, e.g. kicked, punched, hit, stomped me etc.
(8) Other students bullied me by forcibly taking my clothes off.
(9) My parents disdained or scolded me.
(10) My parents treated me differently, with prejudice.

[5] The word "gold" in "gold-digger" is a euphemism for excrement. "Gold-digger" in the Thai context thus is a word used to ridicule sexual minority males, as it refers to sexual intercourse between men.

(11) My parents physically assaulted me, e.g. slapped, kicked, punched, hit me etc.
(12) I felt that people were gossiping about me when I was out in public.
(13) Strangers yelled or made hurtful remarks towards me when I was out in public.
(14) Somebody forced, or tried to force me sexually.

Scores in each category of victimization (victimization by teachers, peers, parents, in public, and sexual coercion) were summed up, and categorized to four levels (Never/ Low/ Moderate/ High). Responses about sexual coercion were classified into "Never" or "At least once" in the past semester.

Data analysis. Statistical analyses were performed using IBM® SPSS® Statistics Desktop Version 21.0. Descriptive analysis was performed with all variables in order to identify distributions of the data. Consequently, bivariate associations between sexuality and other variables were identified. For depressive symptomatology, a previous study suggested a cut-off point for the Thai version at 22 (sensitivity=72%, specificity=85%), with a Cronbach's coefficient alpha of 0.86 (Trangkasombat et al., 1997). In the current study, Cronbach's coefficient alpha was 0.88. Participants who scored 22 or over on the CES-D scale were grouped as "High CES-D," suggesting a higher risk for depressive symptoms than those grouped as "Low CES-D", whose scores were below the cut-off point. It is important to note that, although CES-D scale can discriminate well between patients of clinical depression and general population, it is not a diagnostic tool and should not be used as one (Radloff, 1977). The group of participants who score above the cut-off point, hence, should be interpreted merely as a group with higher risk for depression, and the prevalence should *not* be interpreted as the prevalence of illness.

Adolescents who self-identified as gay (n = 27), young transgender[6] (*thud*) (n = 24), transgender (*katoey*) (n = 18), or bisexual (n = 27), were classified as being in the "sexual minority" group. "Questioning" participants (n=53) were also included in the sexual minority group since there was no difference in their experiences of victimization, depressive symptomatology and other outcomes from other sexual minority students; this is consistent with findings from a previous study (Williams et al., 2005). Among participants who chose "Others" (n = 35) without further specification, only those who answered that they are sexually attracted "only to men", "mostly to men, but have also felt sexually attracted to women at least once", "to both men and women", or "mostly to women, but have also felt sexually attracted to men at least once" in the sexual orientation question item were classified as being in the "sexual minority" group. Those who did not answer both

[6] Participants of the qualitative phase did differentiate between young transgender and transgender. For details, please refer to an article on the qualitative phase of this study by Sopitarchasak et al. (2015).

questions or whose sexuality could not be identified through the method explained in this paragraph (n = 71) were excluded from this study.

Results

Detailed results of the qualitative study can be found in our earlier article (Sopitarchasak et al., 2015). The qualitative study was used to investigate the male adolescents' understanding of sexual identity and the types of victimization they experienced. Participants were aware of five male sexual identities, which were gay, young transgender (*thud*), transgender (*katoey*), bisexual, and straight. Although sexual orientation was an important part of how they differentiated straight and bisexual from the others, gender expression was also heavily drawn on in distinguishing between gay, young transgender, and transgender. Sexual minority adolescents reported experiencing victimization based on their gender/sexuality in three major environments: at home, at school and in public. At home, they experienced different levels of rejection from parents, ranging from verbal insults to physical assaults such as punching or slapping. At school, they encountered occasional bullying and name-calling by intolerant peers. They also reported some teachers insulting their same-sex attraction and treating them differently in a prejudiced manner. In public, insulting, name-calling, and gossiping from strangers were common. However, they also felt tolerance towards their gender/sexuality had been increasing in school and in public settings in recent years. On the other hand, they perceived more pressure against their gender/sexuality at home. As mentioned above, these qualitative findings were used to develop the quantitative questionnaire.

Overall 1,250 participants completed the quantitative survey. As seen in Table 2, nearly all (96.1%) were 15 to 18 years old. Most (91.5%) regarded themselves as Buddhists. About three quarters of the participants (72.7%) were living with both of their parents, and 18.7% were living with only one of their parents. Among all participants, 81.8% could be identified as sexual non-minority and 12.5% as sexual minority, with 5.7% having missing or unidentifiable responses. There were no significant differences among socio-demographic variables between the non-minority and sexual minority groups, except for the means of Grade Point Average (GPA), where the mean GPA of sexual minority participants (3.38, SD was higher than that of the non-minority participants (Table 2).

Table 2: Percentage distribution of participants' socio-demographic characteristics among non-minority and sexual minority youth

Characteristics		Non-minority (%) (n=1,023)	Sexual minority (%) (n=156)	Total (%) (n=1,179)	*p* value*
Age	15 or under	16.4	09.6	15.5	
	16	30.2	28.2	29.9	
	17	32.1	37.2	32.7	
	18 or over	21.3	25.0	21.8	0.105
School	a	7.3	5.1	7.0	
	b	6.0	5.8	5.9	
	c	9.6	10.9	9.8	
	d	67.0	60.9	66.2	
	e	10.2	17.3	11.1	0.086
Religion	Buddhism	91.2	93.5	91.5	
	Others	8.8	6.5	8.5	0.327
Current grade	10th	33.0	27.6	32.3	
	11th	28.9	25.6	28.5	
	12th	38.0	46.8	39.2	0.109
Grade Point Average (S.D.)		3.05	3.31	3.08	**0.000**
		(0.70)	(0.72)	(0.73)	
Born in Bangkok	Yes	78.5	80.1	78.7	
	No	21.5	19.9	21.3	0.642
Currently living with	Both parents	72.2	75.6	72.7	
	Only mother	14.6	11.5	14.2	
	Only father	4.2	6.4	4.5	
	None of the parents	9.0	6.4	8.7	0.308
Parents' marital status	Married	75.8	75.0	75.7	
	Separated	9.1	12.8	9.6	
	Divorced	9.6	6.4	9.2	
	Either or both are deceased	5.6	5.8	5.6	0.325
Part-time job	Never	67.6	65.4	67.3	
	Not anymore	9.5	13.5	10.0	
	From time to time	10.4	9.0	10.2	
	Only during school break	7.6	5.1	7.3	
	Always	4.9	7.1	5.2	0.300

* For categorical variables, Chi-Square test was used to assess the differences among categories. For Grade Point Average, the only interval variable, t-test was conducted to compare the difference of means.

Overall 235 participants (19.9%) scored 22 or higher (high CES-D) on the CES-D scale (indicating that they were more likely to be clinically depressed). Comparing the two sexuality/gender groups, the prevalence rate of having a high CES-D score was significantly higher in the sexual minority participants (29.5%) than in the non-minority (18.5%). The mean CES-D score among sexual minority adolescents was 17.6, whereas among non-minority participants the mean score was 15.1 (effect size = 0.32). Overall, the Cronbach's coefficient alpha was 0.88.

About 20% of the participants had engaged in self-harm in the past semester. However, there was no significant difference in the prevalence of self-harm between the two groups.

Suicidality was significantly more common in the sexual minority group (Table 3). Nearly one in four (23.2%) sexual minority participants reported having considered suicide while only 9.8% of non-minority participants had done so. Moreover, 10.3% of sexual minority participants had attempted suicide in the past semester, while only 2.9% among the non-minority group had done so.

Table 3: Bivariate analyses of depressive symptomatology, suicidality, and victimization among non-minority and sexual minority groups

		Non-minority (%) (n=1,023)	Sexual minority (%) (n=156)	Total (%) (n=1,179)	*p* value ǂ	OR (95% CI)
Depression	Low CES -D	81.5	70.5	80.1		
	High CES -D	18.5	29.5	19.9	**0.001**	**1.85 (1.24 -2.70)**
Self -harm	No	79.6	80.6	79.8		
	Yes	20.4	19.4	20.2	0.769	0.94 (0.61 -1.44)
Suicide thought	No	90.2	76.8	188.4		
	Yes	9.8	23.2	11.6	**0.000**	**2.79 (1.82 - 4.27)**
Suicide attempt	No	97.1	89.7	96.1		
	Yes	2.9	10.3	3.9	**0.000**	**3.80 (2.02 - 7.16)**
Victimization by teachers	Never (0)	47.2	38.5	46.1		
	Low (1 -3)	41.3	44.9	41.7		1.34 (0.92 - 1.93)
	Moderate (4 -6)	10.2	11.5	10.3		1.39 (0.79 - 2.46)
	High (7 -12)	1.4	5.1	1.9	**0.004**	**4.60 (1.85 -11.42)**
Victimization by peers	Never (0)	46.9	23.1	43.8		
	Low (1 -5)	43.6	54.5	45.0		**2.54 (1.69 - 3.83)**
	Moderate (6 -10)	8.2	14.1	9.0		**3.49 (1.96 - 6.23)**
	High (11 -20)	1.3	8.3	2.2	**0.000**	**13.33 (5.76 -30.89)**
Victimization by parents	Never (0)	46.2	47.4	46.4		
	Low (1 -3)	43.3	37.2	42.5		0.84 (0.58 - 1.21)
	Moderate (4 -6)	8.4	11.5	8.8		1.34 (0.76 - 2.35)
	High (7 -12)	2.1	3.8	2.3	0.200	1.83 (0.71 - 4.67)
Victimization in public	Never (0)	48.8	26.9	45.9		
	Low (1 -2)	40.7	44.2	41.1		**1.97 (1.31 - 2.96)**
	Moderate (3 -4)	8.2	18.6	9.6		**4.10 (2.42 - 6.95)**
	High (5 -8)	2.3	10.3	3.4	**0.000**	**7.92 (3.91 -16.06)**
Sexual coercion	Never (0)	93.6	80.1	91.9		
	At least once (1-4)	6.4	19.9	8.1	**0.000**	**3.66 (2.29 - 5.82)**

ǂ Chi-Square test

Regardless of victimization category (victimization by peers, teachers, parents, or in public), approximately 10% of participants reported being victimized at a moderate or high level. For victimization by teachers, peers, or strangers, sexual minority participants were more likely to be victimized at a moderate or high level than their non-minority peers (Table 3). In addition, odds ratios of victimization by peers and by strangers increase as the level of victimization escalates (Table 3). The Mantel-Haenszel test for trend also suggested the trends were significant with *p* value less than 0.001. Although no significant difference was found between the two groups in their levels of victimization by parents, when the analyses were conducted for each item within the "victimization by parents" scale items, sexual

minority participants were more likely to have been physically abused by their parents, with 3.2% reporting having been physically assaulted by parents 3-7 days per week in the past semester, compared to 0.6% among the non-minority participants (results not shown). Sexual coercion was relatively common; overall 8.1% of all participants indicated they had experienced this. Sexual minority participants were three times more likely to have been sexually abused at least once in the past semester, compared to the non-minority group (19.9% *vs.* 6.4%). Furthermore, higher levels of victimization in every category and sexual coercion were significantly associated with tendencies of depression, self-harm, suicide thoughts, and suicide attempts (results not shown).

Discussion

This study investigates the issue of disparity in mental well-being status and experiences of victimization between non-minority and sexual minority adolescents in Thailand. We decided to adopt a mixed methods design for this study, which allowed us to utilize findings from the qualitative study to develop the questionnaire used in the quantitative study. The prevalence of higher risk for depression, self-harm, suicidality, and experiences of victimization among the two sexuality groups were explored to investigate the differences among them. The results revealed that sexual minority adolescents were at higher risk for depression and suicidality, and had experienced victimization more heavily than their non-minority counterparts.

The total prevalence of High CES-D was 19.9% in this study, consistent with the result (19%) of a previous study regarding depressive symptoms among male secondary school students in Thailand (Trangkasombat & Rujiradarporn, 2012). When comparing the two sexuality/gender groups, sexual minority participants were almost two times more likely to score over the cut-off point, suggesting a higher risk for clinical depression. This finding is also consistent with results from previous studies outside Thailand, indicating that sexual minority adolescents' mental well-being status in Thailand is also being compromised.

Previous research, including a meta-analytic study, have suggested a strong association between suicidality and being in a sexual minority (Fergusson et al., 2005; Garofalo et al., 1999; Marshal et al., 2011; Remafedi, French, Story, Resnick & Blum, 1998; Russell & Joyner, 2001). This was found to be consistent in our current study as well. Sexual minority participants in this study were almost four times more likely to have attempted, and almost three times more likely to have considered suicide than non-minority youth. Thus we suggest that interventions to prevent suicides among adolescents be focused especially on sexual minority adolescents. However, despite the substantial difference in suicidality

between the two groups, it is of interest that there was no significant differences in the two groups regarding self-harm. Further studies, especially qualitative inquiries, are needed to investigate the reasons behind this phenomenon.

As proposed by Meyer (2003), such compromised mental health outcomes (depression and suicidality) among sexual minority groups may be caused by distal (prejudice events) and proximal (expectation of rejection, concealment, internalized homophobia) minority stress processes. Evidently, sexual minority participants were more likely to be victimized especially by their peers and strangers in public, with significantly higher odds ratios at every level (low, moderate, and high). They were also more likely to be victimized by teachers and physically abused by their parents. These findings are against the common perception that sexual minorities in Thailand are well and widely accepted. Other studies by international agencies also confirm that sexual minorities in Thailand still encounters prejudice, which are rooted from a lack of understanding about diverse sexualities (Suriyasarn, 2014; UNDP & USAID, 2014). The report by the UNDP and USAID (2014) also argued that striving for family acceptance is the biggest issue for sexual minorities in Thailand.

The prevalence of sexual coercion found in this study (8.1%) was slightly higher than that of 6.5% in northern Thailand as reported by Manopaiboon et al. (2003). Sexual minority participants were over three times more likely to have been sexually coerced. The finding was consistent with the previous study by Manopaiboon et al. (2003), which reported the odds ratio of 7.3 (95% CI= 4.0-13.3) for homosexual/bisexual self-identification as a factor associated with sexual coercion. The higher tendency of sexual minority adolescents being sexually coerced raises concern over the higher risks for HIV and other STDs, as condoms are reportedly used less than half the time when sexual coercion occurs (Guadamuz et al., 2011; Manopaiboon et al., 2003). In addition, as many studies have shown, sexual coercion during adolescence is significantly associated with subsequent HIV risk-taking behaviors (Bensley, Van Eenwyk & Simmons, 2000; Brennan, Hellerstedt, Ross & Welles, 2007; Holmes & Slap, 1998; Mimiaga et al., 2009; O'Leary, Purcell, Remien & Gomez, 2003; Senn, Carey, Vanable, Coury-Doniger & Urban, 2006)

According to Meyer (2003), such experiences of victimization and sexual coercion are distal minority stressors which can negatively impact mental well-being. In this study, we found a significant association between victimizations/sexual coercion and adverse mental well-being measures. Arguably, it is likely that the greater frequency of victimization and sexual coercion results in worsened mental well-being among the sexual minority participants. Although the results support Meyer's minority stress model, the cross-sectional

nature of the current study limits the ability to infer causal relationships among the variables. Nonetheless, a previous longitudinal study has suggested that higher depressive symptoms and suicidality among sexual minorities are significantly mediated through victimization specific to the sexual minority (Burton et al., 2013).

Although the results from the quantitative study indicated no significant difference in victimization by parents, findings from the qualitative study showed that sexual minority participants felt more pressure at home. Many sexual minority participants during the qualitative study had not yet come out to their parents at the time. Some of those who had not come out to parents mentioned having to be highly careful with their actions and personalities any time they were with parents, in order to hide their sexual identity. Even some of the participants who were already open about their sexual identity to their families mentioned feeling guilty for having disappointed their parents because of their sexual identity. In another study, de Lind van Wijngaarden & Ojanen (2016) have found that gay identity was considered a defect by gay participants themselves who also believed that they needed to make up for such defect by being good persons for their families. According to Meyer's minority stress process, these kinds of stigma concerns, where sexual minority adolescents feel that their sexuality is a defect, are proximal minority stresses which can possibly have adverse effects on mental well-being (Meyer, 2003).

Another issue of interest is the significant difference in the mean GPA between the two sexuality groups. Overall, sexual minority participants' GPA was higher than that of the non-minority. This finding was inconsistent with previous studies abroad which suggested the opposite (Pearson, Muller & Wilkinson, 2007; Rostosky, Owens, Zimmerman & Riggle, 2003). This may possibly be explained by findings from the qualitative phase, where some of the sexual minority participants regarded they had to study hard and do better in order to compensate for their sexuality and not be disrespected. This phenomenon also goes in line with the results of studies by Suriyasarn (2014) and de Lind van Wijngaarden & Ojanen (2016) which found that LGBT and especially transgender persons in Thailand believed that they must work harder than the non-minority persons to earn respect from people around them.

According to Meyer (2003), coping and social support can possibly help alleviate the compromised mental well-being caused by minority stresses. Schools seem to be the most suitable place for supporting programs since adolescents spend most of their time at school. Gay-straight alliances or similar organizations, an inclusive curriculum that includes positive representations of LGBT people, supportive educators, and comprehensive bullying/harassment policies or laws, are recommended by *Gay, Lesbian & Straight Education*

Network (GLSEN) as solutions to provide safe environments for sexual minority students (Kosciw, Greytak, Bartkiewicz, Boesen & Palmer, 2012).

In Thailand, although the Child Protection Act was enacted in 2003, it does not explicitly address bullying. The law's vision is limited to "torture" which it defines as:

> *…any commission or omission of acts which cause the deprivation of freedom of, or mental or physical harm to, a child; sexual abuses committed against a child; inducement of a child to act or behave in a manner which is likely to be mentally or physically harmful to the child, unlawful or immoral, regardless of the child's consent.* (*Child Protection Act, B.E. 2546*, 2003)

Overall, the law seems to be written with torture as an act conducted by adults to children. As a result, further interpretation is needed if one wants to apply the law to cases of bullying by peers, which is deemed difficult since verbal or emotional abuse especially by peers is not usually perceived as torture and often overlooked. And although the Ministry of Education has established student protection centers in 2012 to holistically assist and help students (Ministry of Education, 2012), currently there is no evidence regarding the mechanism's efficiency in addressing bullying. Furthermore, until now there has not been a formal action taken by professional associations of Thai mental health professions to tackle the issue of mental well-being for sexual minorities (Ojanen, Ratanashevorn & Boonkerd, 2016).

As for developing an inclusive curriculum, comprehensive sexuality education is required to be taught at school by the *Prevention and Remedial Measures for Adolescent Pregnancy Act, B.E. 2559* (Royal Thai Government, 2016). Although the curriculum does include topics regarding sexual minorities, such topics are covered less than they should (UNDP & USAID, 2014).

On the community level, especially within school communities, gay-straight alliances or similar structures do not exist in Thailand. Nor do secondary schools in Thailand have concrete policies to address bullying problems, especially when a bullying event is based on perceived sexual minority status. When measures against bullying exist, they tend to be ad hoc to solve certain bullying cases that emerged, while lacking systematic procedures (Mahidol University et al., 2014).

In fact, many participants from the qualitative phase reported being discriminated against due to their sexuality by teachers, and some also mentioned being prohibited from applying for a scholarship due to their sexuality. Since we found from the qualitative study that sexual minority participants felt more pressure at home, we suggest supporting programs also involve parents or guardians into interventions as well.

There are several limitations to the current study. Since the participants in this study were male secondary school students in Bangkok, Thailand, generalization to other populations in other contexts is not recommended. The cross-sectional nature of the study also limits the ability to make causal inferences between the variables of interest. However, although participating schools were not recruited randomly, and there were schools which refused to participate, the refusals were due to limitation in their class schedules and were considered not to systematically bias the results. Despite several limitations, the nature of this study, which included male secondary school students in the general population regardless of their gender expression and sexuality, allowed us to identify the proportion of male sexual minority adolescents. However, because of the low numbers of participants with specific identities, subgroup analyses within the sexual minority group could not be properly conducted. Future studies that recruit more sexual minority adolescents is needed in order to further investigate risk factors related to adverse metal well-being within the sexual minority population.

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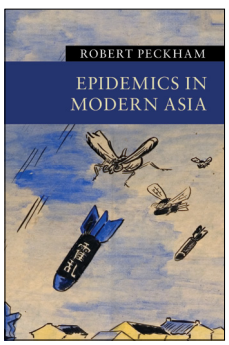
History and epidemics in modern Asia



Epidemics in Modern Asia
Robert Peckham
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Suddenly the corner of the world map occupied by Asia, formerly painted monochrome, is transformed into a multidimensional colour display with society, culture, economy, and politics as its axes. This display vividly shows how epidemics of infectious diseases, such as plague, malaria, and cholera, as well as the more recent severe acute respiratory syndrome, Nipah virus, and Zika virus outbreaks, contributed—or continue to contribute—to shaping the process of modernisation in Asia, especially east Asia. This is the image that swiftly emerges upon reading *Epidemics in Modern Asia* by Hong Kong-based historian Robert Peckham. Peckham discusses epidemics within the complex and dynamic interplay of social, cultural, economic, and political factors, examining their effects and causes with respect to important aspects of modern Asian history, such as migration, urbanisation, environmental change, war, and globalisation, connecting setting-specific aspects of each country with the broader interregional context. Readers will undoubtedly be absorbed in the changing and vividly described spectacles offered by this book.

Opposing the west-centric historical portrayals of Asia as simply a source of epidemics and the modernisation of Asia as the result of a simple diffusion of knowledge and technologies from west to east, Robert Peckham attempts to describe how disease epidemics have affected or were affected by the process of modernisation, as seen from within Asia. Concurrently, he rejects the trend towards describing the history of disease epidemics in terms of the continental or planetary level, with no borders or local contexts. He avoids the trap of describing Asia as monotone by instead highlighting the specific contexts of each area, recognising well the way that Asian countries have maintained their social and cultural identities during the process of modernisation, even under colonial rule.

Peckham argues against the traditional view of disease epidemics as episodes or events external to mainstream history; instead he tries to place them at the heart of the story. By doing so, his discussion of disease epidemics integrates the social, cultural, economic and political contexts, creating a multidimensional platform. He succeeds by using not only traditional archived materials, but also press reports, written testimonies, documentary films, and movies, including professional and personal accounts, giving a human touch to the stories. By using popular films such as *Contagion* to represent the discourse of the western view of disease epidemics, Peckham gives a sharper image to the discussion.

Epidemics in Modern Asia includes chapters on topics such as mobility, cities, the environment, war, and globalisation, structured around cases studies and selected to reflect key aspects in the process of modernisation in Asia. Rather than standalone blocks, the chapters are tightly interrelated, reinforcing each other while delving deeper into the specific issues that they are intended to address. The book should be credited for its successful presentation of epidemics such as plague, cholera, and others through their multiple facets. For example, while the chapter on mobility describes how the movement of people and goods through expanding commercial trade paths was crucial for the spread of epidemics such the 1894 plague epidemic in China, it was interesting to learn in the chapter on cities that anxieties over epidemics, particularly the plague epidemic in neighbouring China, were part of the impetus for the urban planning and modernisation of Hanoi, then the capital of Indochina. The discussion of the outbreak of plague in Manchuria in 1910 and 1911 in the chapter on war is an insightful illustration of how epidemics can be entangled in the centre of both medical and geopolitical and military influences, in this case featuring China, Russia, and Japan.

To our knowledge, this is the first book to describe the history of disease epidemics in Asia while integrating the complex social, cultural, economic, and political contexts. This task is prohibitively difficult for epidemiologists who are not specialised in human history, as well as challenging to historians who are generally unfamiliar with the fields of microbiology or epidemiology.

However, there is—as pointed out by Peckham—a danger of overrepresenting the role of epidemics in shaping history by placing them at the heart of the story. Nevertheless, this book is a milestone work that significantly enriches the history of disease epidemics.

This work provides a new model for historians who have an interest in disease epidemics and gives the epidemiologists, who are currently highly medicalised, the opportunity to appreciate the foresight of Rudolf Virchow, a giant in the field of bioscience in Germany in the 19th century and the father of modern pathology, as well as one of the founders of modern public health, who stressed the importance of understanding social, cultural, economic, and political context of epidemics and the social actions needed to tackle them.

Patou Masika Musumari, Teeranee Techasrivichien, S Pilar Suguimoto, Masako Ono-Kihara, Masahiro Kihara

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RESEARCH ARTICLE

Structural and Behavioral Correlates of HIV Infection among Pregnant Women in a Country with a Highly Generalized HIV Epidemic: A Cross-Sectional Study with a Probability Sample of Antenatal Care Facilities in Swaziland

Bhekumusa Wellington Lukhele[1]*, Teeranee Techasrivichien[1], S. Pilar Suguimoto[1,2], Patou Masika Musumari[1], Christina El-saaidi[1], Samson Haumba[3], Oslinah Buru Tagutanazvo[4], Masako Ono-Kihara[1], Masahiro Kihara[1]

1 Department of Global Health and Socio-epidemiology, School of Public Health, Graduate School of Medicine, Kyoto University, Kyoto, Japan, **2** Center for Medical Education, Graduate School of Medicine, Kyoto University, Kyoto, Japan, **3** Center for Human Services, University Research Co., LLC, Mbabane, Swaziland, **4** Department of Midwifery Science, Faculty of Health Sciences, University of Swaziland, Mbabane, Swaziland

* bhekie.l@gmail.com

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Abstract

Introduction

HIV disproportionately affects women in Sub-Saharan Africa. Swaziland bears the highest HIV prevalence of 41% among pregnant women in this region. This heightened HIV-epidemic reflects the importance of context-specific interventions. Apart from routine HIV surveillance, studies that examine structural and behavioral factors associated with HIV infection among women may facilitate the revitalization of existing programs and provide insights to inform context-specific HIV prevention interventions.

Methods and Findings

This cross-sectional study employed a two-stage random cluster sampling in ten antenatal health care facilities in the Hhohho region of Swaziland in August and September 2015. Participants were eligible for the study if they were 18 years or older and had tested for HIV. Self-administered tablet-based questionnaires were used to assess HIV risk factors. Of all eligible pregnant women, 827 (92.4%) participated, out of which 297 (35.9%) were self-reportedly HIV positive. Among structural factors, family function was not significantly associated with self-reported HIV positive status, while lower than high school educational attainment (AOR, 1.65; CI, 1.14–3.38; $P = 0.008$), and income below minimum wage (AOR, 1.81; CI, 1.09–3.01; $P = 0.021$) were significantly associated with self-reported HIV positive status. Behavioral factors significantly associated with reporting a positive HIV status included; ≥2 lifetime sexual partners (AOR, 3.16; CI, 2.00–5.00; $P<0.001$), and ever cohabited (AOR,

2.39; CI, 1.66–3.43; P = 0.00). The most cited reason for having multiple sexual partners was financial gain. HIV/AIDS-related knowledge level was high but not associated to self-reported HIV status (P = 0.319).

Conclusions

Structural and behavioral factors showed significant association with self-reported HIV infection among pregnant women in Swaziland while HIV/AIDS-related knowledge and family function did not. This suggests that HIV interventions should be reinforced taking into consideration these findings. The findings also suggest the importance of future research sensitive to the Swazi and African sociocultural contexts, especially research for family function.

Introduction

According to the World Health Organization, HIV/AIDS-related death is the worldwide leading cause of death among women of reproductive age [1]. Globally, 15% of women living with HIV in 2013 were of age 15–24 years, of whom 80% lived in Sub-Saharan Africa (SSA) [2]. Within the SSA region, the burden of HIV among women of age 15–49 years varies considerably; 7.6% in Kenya (2014) [3], 16.9% in Namibia (2014) [4], 19.0% in South Africa (2015) [5] and Swaziland bears the highest HIV prevalence of 38.8% (2011) [6]. The majority (62%) of all new infections in Swaziland occur among women[7]. HIV prevalence in Swaziland is higher among women aged 18–49 years (38.8%) compared to their male counterparts of the same age group (23.1%), and particularly high among women aged 30–34 years old, 54% compared to 37% in men of the similar age group [6]. Although there have been reports of a decline in HIV prevalence among women in southern Africa [8,9], at best, the epidemic in Swaziland seems to have only stabilized [6,10].

Young women's vulnerability to HIV

Young women's vulnerability to HIV could be attributed to several factors. First, families have great influence among young women. Studies show that lack of parental monitoring, poor parent-child communication, and low cohesion among family members are associated with increased HIV risky sexual behavior [11–16]. Second, research has shown a strong link between HIV/AIDS and poverty. Frequently, poverty drives girls and women to exchange sex for food or basic amenities and cause a day-to-day existence dominated by immediate survival needs and indifference to high HIV risk sexual behaviors [17–21]. Furthermore, most young women growing up in economically deprived families have little access to schooling and few future prospects, therefore, find themselves coerced into sexual activity with older working men for survival [22,23]. Third, behavioral factors such as; early sexual debut [24–27], inconsistent condom use [28–30], multiple sexual partnerships (concurrent and serial) [31–33], poor sexual-decision making under the influence of alcohol [34–36] and others, have shown to increase HIV vulnerability among young women. Lastly, there is extensive literature identifying biological factors putting women at particularly higher risk of HIV compared to men. As pointed out by Ramjee and colleague "women have a greater vaginal mucosal surface area exposed to pathogens and infectious fluid for longer periods during sexual intercourse, and that young women are particularly at higher risk due to cervical ectopy which facilitates greater exposure of target cells to trauma and pathogenesis in the vagina [9]".

Review of previous studies in Swaziland

In Swaziland, there are limited studies specifically focusing on HIV vulnerability among young women. Existing research has focused on men who have sex with men [37], sex workers [38], in-school youth [39] and the general population [40,41]. Studies on young women have either been qualitative [42–44] -which are suited to exploring risks at in-depth levels, but, fall short in quantifying risk- or sentinel surveillance studies using face-to-face interviews [45] which afford less privacy and anonymity and thus likely increase motivational bias [46,47]. This study aims to investigate HIV risk factors between HIV negative and HIV positive young women to provide empirical evidence specific to Swaziland. To achieve this goal, we studied pregnant women attending antenatal care since the median age at first birth is 19.8 years [48] and the majority (98.5%) of pregnant women access antenatal care services in Swaziland [49]. We used simple two-stage cluster sampling and self-administered computer-assisted data collection technique to overcome shortcomings of prior research.

Methods

Ethical considerations

This study was conducted according to the ethical principles outlined in the Declaration of Helsinki. The research protocol was approved by the Kyoto University Faculty of Medicine and Graduate School of Medicine, Ethics Committee, Japan (R0073) and the Swaziland Scientific and Ethics Committee, Swaziland (MH/599C/FWA00015267/IRB0009688). All participants signed a written informed consent. One USD (1$) was offered to each participant as compensation for taking part in our study.

Study setting

Swaziland, is a small land-locked country situated in Southern Africa. Its area is approximately 17 364 km^2 with an estimated population of 1 287 050 (2015), of which about 76% reside in rural areas [50]. Swaziland is divided into four administrative regions: Hhohho, Manzini, Lubombo, and Shiselweni region. The number of health facilities that provide antenatal care services to pregnant women per region is as follows: 52 in Hhohho, 63 in Manzini, 38 in Lubombo and 30 in Shiselweni [50]. In the Hhohho region, of all the facilities which offer antenatal health services, 78.8% are public and the rest (21.2%) are private facilities. The Hhohho region was selected as our study setting since it has the highest generalized HIV prevalence in the country; 27.8% in Hhohho, 21.9% in Shiselweni, 20.7% in Manzini, and 20.5% in Lubombo [40].

Participants

Our study targeted pregnant women who were ≥18 years old, had tested for HIV and were attending antenatal care services at facilities in the Hhohho region for the first time during the study period. We calculated the sample size following the approach proposed by Kohn et al and Hulley at al [51,52]. We based the calculation on results from the sentinel surveillance report which showed that 41% were HIV positive and 59% were HIV negative [45], to detect the difference in parental monitoring proportion of 28% and 52% [53] among HIV positive and negative participants respectively at $\alpha = 0.05$, $\beta = 0.2$. Based on these, a total sample size of 149 (for both groups) was sufficient to detect this difference. Taking into consideration the complex sample design effect of 2.0 [54], we inflated the sample size by a factor of two, resulting in a sample size of 298.

We further increased the sample size to 596 by multiplying by a factor of two to ensure the statistical power is enough for multivariate analysis. Finally, the sample size was adjusted to 894, assuming a response rate of two-thirds due to the sensitive nature of our questionnaire.

Survey instrument

A self-administered structured questionnaire was developed in English based on the review of Swazi and international literature [47]. To improve the initial draft [47], we conducted a preliminary qualitative study during February—March 2015 using semi-structured in-depth interviews among 37 pregnant women recruited through purposive sampling. We recruited pregnant women in their 3rd trimester to ensure that they would not be re-sampled for the current subsequent quantitative study. This initial step served several aims [55]. First, it allowed us to explore in-depth the sexual histories and ease of recalling those histories. Second, it enabled us to resolve language discrepancies to improve the translated draft. Lastly, it provided insights into recruitment issues. As described in our previous work, "the modified draft was then converted into an electronic format compatible with internet-enabled tablets, designed to be user-friendly and intuitive even for those participants not familiar with electronic devices" [47]. Using the tablet-based questionnaire, we piloted the instrument among 14 pregnant women (from a health facility not included in our survey sites) to test for face validity, skip logic, user interface, time to complete the survey and the upload-download functionality of the software.

The final survey instrument (S1 Questionnaire) consisted of a question on HIV status and seven domains: sociodemographic characteristics (6 items), schooling characteristics (2 items), HIV/AIDS-related knowledge (8 items), childhood household ownership of durable assets (19 items), obstetric characteristic (1 item), family characteristics (33 items) and sexual history characteristics (13 items). The family characteristics domain contained three items about parental characteristics and three subscales about family function: a) family cohesion subscale (8 items, Cronbach's alpha = 0.63), b) parental monitoring subscale (6 items, Cronbach's alpha = 0.67), and c) parent-child communication subscale (16 items, Cronbach's alpha = 0.83). The domain of sexual history characteristics explored the current and past sexual behavior. Items on HIV/AIDS-related knowledge and sexual histories were in part taken from the Swaziland Demographic Health Survey [40]. In the absence of a locally validated family function scale, we adapted items from Family Adaptability and Cohesion Evaluation Scales IV (FACES IV) [56] as well as the Parent Monitoring Scale [53]. The instrument was translated into the local language (siSwati) by the bilingual researcher BWL and back-translated by another independent researcher to minimize translation dissonance.

Study design and sampling

The survey was a cross-sectional study using a simple two-stage cluster sampling strategy following Levy and Lemeshow [57]. The National Monitoring and Evaluation Office at the Ministry of Health in Swaziland facilitated us with the list of all 52 health facilities providing antenatal care services in the Hhohho region. Each facility was considered as a cluster in our study. In the first stage, we selected 10 clusters using simple random sampling without replacement. In the second stage, we enumerated 41 working days during August and September 2015, excluding Swazi Holidays and weekends, to serve as listing units. Then, we selected one working day to serve as a start date for the survey using simple random sampling. We estimated that twenty working days were sufficient to cover our desired sample size and prevent bias due to variations in weekly cycles. All pregnant women presenting at the 10 health facilities (10 clusters) from the random start date (17 August 2015) were consecutively screened for

eligibility and invited to participate in the study. Recruitment took place throughout working hours in all facilities.

Data collection

To ensure high-quality data collection, we recruited nurses as field staff and provided them with a two-day intensive training; one day at a central location and another day at the data collection site. The field staff was trained on ethical considerations, aims and objectives of the study, the tablet use, and how to integrate the survey within patient flow. We followed a similar protocol for our previous research [47], having our field staff carry the print outs of screenshots of the electronic questionnaire to be able to read out loud and guide participants who had proficiency challenges without the field staff having to see their responses. BWL supervised data collection.

Statistical analysis

Sample weights and design effect. All statistical analyses were carried out using Complex Sample module of SPSS version 21 to account for the two-stage cluster sampling. We considered our sample self-weighted because, even though the selection of antenatal care clusters was done through simple random sampling at the first stage, at the second stage, pregnant women were consecutively sampled from all walk-in eligible potential participants, ensuring the sample size was potentially proportional to the total number of pregnant women attending each facility [54]. We calculated point estimates (proportions), their standard errors (SEs), and 95% confidence intervals (CIs) accounting for cluster sample design [57,58]. The magnitude of the inflation in variance was measured as the design effect, defined as "the ratio of the actual variance of a sample to the variance of a simple random sample of the same number of elements" [59].

Childhood household wealth index. Childhood household wealth index was developed according to the procedure described by Vyas and Kumaranayake [60]. Briefly, participants were asked if their childhood household had any of the 19 durable assets listed in the questionnaire (refer to S1 Questionnaire). Having the asset was coded as "1" and not having the asset as "0". The data was then analyzed using principal component analysis (PCA) which revealed that the first component included 10 items and accounted for 25.5% of all variance. Childhood household wealth index was defined as the total score of these 10 items weighted with the factor load of each item. After that, we ranked the participants into quintiles from poorest to the wealthiest according to their total score [61].

Family function. Family function consisted of three subscales (refer to S1 Questionnaire), to measure family cohesion, parental monitoring and parent-child communication, as previously stated. All responses of these subscales were 5-point Likert scale from "strongly disagree" to "strongly agree". In the analysis, responses were coded in the same direction such that higher scores represented "better family function" on all responses. For each subscale, we calculated the composite score, which was further divided into quintiles ranging from the lowest to the highest.

HIV/AIDS-related knowledge. HIV/AIDS-related knowledge included eight questions (refer to S1 Questionnaire). The total score was summed (min 0—max 8) (S1 Table) and later categorized as either 'high" (correct response $\geq$7) or "low" (correct response $\leq$6).

Bivariate and multiple logistic regressions. Bivariate analysis was performed using Chi-square tests for categorical variables to determine associations between HIV status and other variables. Factors that were significantly associated with being HIV positive at P value ≤ 0.10 were considered candidates to be included in the multiple logistic regression analysis. To

provide a better fit for our multiple logistic regression model, we polychotomized continuous variables since their distributions were nonlinear. Out of 21 factors associated with HIV status at *P* value ≤ 0.10 in the bivariate analysis, 7 were excluded based on epidemiological importance or because they were subset questions of upstream questions like "currently in a polygamous marriage" a subset question for those who reported being married. There was no evidence of multicollinearity and singularity among the remaining factors. All 14 factors were compulsorily entered into the multivariate model to calculate the adjusted odds ratios (AORs) to assess the magnitude of independent association of these predictors with a self-reported HIV positive status.

Results

Of 894 eligible pregnant women invited to participate, 827 participants completed the study (response rate of 92.5%). The median age was 25 years; the youngest respondent was 18 years old and the oldest 43 years old. Table 1 displays the characteristics of respondents. About half of the respondents had completed at least secondary school (51.3%) and had ever dropped out of school (54.7%). Only 14.6% had ever stayed at a boarding school. The majority (84.9%) lived below Swaziland's monthly minimum wage (approximately $110 USD), did not have formal employment (58.2%), and were never married (58.5%). Most participants identified correct responses to HIV/AIDS- related knowledge questions, correct responses ranged from 83.1% to 96.0% (S1 Table).

Prevalence of self-reported HIV status by characteristics of participants

Overall, self-reported HIV prevalence was 35.9%. As displayed in Table 1, those who reported an HIV positive status were more likely to be older ($P<0.001$), have lower than high school educational attainment ($P = 0.001$), have ever dropped out of school ($P<0.001$), be self-employed ($P = 0.052$), lived below Swaziland's monthly minimum wage ($P = 0.039$), never stayed at a boarding school ($P = 0.005$), have had a lower childhood household wealth index ($P<0.001$), in a polygamous union ($P = 0.041$), had two or more lifetime number of sexual partners ($P<0.001$), had multiple sexual partners (MSP) in the past 12 months ($P = 0.001$), used condom at last ($P = 0.001$) and first sex($P = 0.004$), had sexual debut at 17 years or younger, experienced intergenerational sex at sexual debut ($P = 0.025$), had ever cohabited ($P<0.001$), did not know their first or current partner's HIV status ($P = 0.005$ or 0.042), and had ever experienced forced sex ($P = 0.006$). Marital status, religious services attendance, planned pregnancy, parental cohesion, parental monitoring parent-child communication, father with polygamous union or partners having MSP, ever had sex under the influence of alcohol and high HIV/AIDS-related knowledge were not significantly associated with a reported positive HIV status ($P > 0.05$)

Bivariate associations between independent variables and self-reported HIV status

As shown in Table 2, factors significantly associated with self-reported HIV status included older age 25–34 years [Crude Odds Ratio (COR), 2.88; CI, 1.85–4.48; $P<0.001$] and 35–43 years (COR, 1.97; CI, 1.39–2.79; $P<0.001$) compared to 18–24 years, lower than high school educational attainment (COR, 2.00; CI, 1.47–2.71; $P<0.001$), level of income less than Swaziland's monthly minimum wage (COR, 1.76; CI,1.03–3.02; $P = 0.040$), lower childhood household wealth index (COR, 1.92; CI,1.45–2.54; $P<0.001$), ≥2 lifetime number of sexual partners (COR, 4.30; CI, 2.97–6.24; $P<0.001$), condom use during last sex (COR, 2.40; CI,1.56–3.70; $P<0.001$), no condom use at first sexual debut (COR, 2.03; CI,1.32–3.10; $P<0.001$), ≤ 17 years

Table 1. Descriptive and bivariate factors associated with HIV infection.

		Total N = 827	% of total	HIV positive	% HIV positive	Complex SE	DEFF	P value
Demographic Variables								
Age groups								
	18–24	391	47.3	95	24.3	2.5	1.59	<0.001
	25–34	356	43.0	171	43.0	3.6	2.31	
	35–43	80	9.7	31	38.8	3.9	0.64	
Marital status								
	Single	416	50.3	147	35.3	2.7	1.62	0.794
	Married	325	39.3	116	35.7	3.2	1.80	
	Cohabiting	68	8.2	26	38.2	8.5	2.60	
	Ever been married(Divorced and separated)	18	2.2	8	44.4	11.4	0.76	
Level of education								
	Low (<High School)	422	51.0	184	43.6	2.1	0.94	0.001
	High (≥High School)	405	49.0	113	27.9	2.4	1.34	
Employment status								
	Employed	198	23.9	72	36.4	4.3	1.93	0.052
	Not employed	481	58.2	173	36.0	2.1	1.18	
	Student	63	7.6	13	20.6	5.3	1.36	
	Self employed	85	10.3	39	45.9	5.4	1.26	
Level of income								
	≤Minimum wage	702	84.9	265	37.8	1.9	1.35	0.039
	>Minimum wage	125	15.1	32	25.6	4.7	1.76	
Religious services attendance								
	At least once a week	724	87.5	271	37.4	2.3	2.07	0.165
	At least once a month	48	5.8	12	25.0	7.5	1.79	
	At least once a year	17	2.1	6	35.3	9.4	0.81	
	Less than once a year	13	1.6	3	23.1	9.7	0.85	
	Never	25	3.0	5	20.0	6.6	0.84	
Schooling characteristics								
Boarding school[a]								
	Yes	61	7.4	9	14.8	4.4	1.18	0.005
	No	740	89.5	275	37.2	1.9	1.36	
Ever dropped out of school								
	Yes	452	54.7	199	44.0	1.9	0.82	<0.001
	No	375	45.3	98	26.1	2.0	0.96	
Childhood household wealth index								
Childhood household wealth index								
	Lower wealth (≤Medium)	496	60.0	207	41.7	2.4	1.41	<0.001
	Higher wealth (>Medium)	331	40.0	90	27.2	2.5	1.27	
Obstetric characteristic								
Planned pregnancy								
	Yes	312	37.7	110	35.3	3.5	2.12	0.817
	No	515	62.3	187	36.3	2.6	1.93	
Family characteristics								
Family function								
Family Cohesion								

(*Continued*)

Table 1. (*Continued*)

		Total N = 827	% of total	HIV positive	% HIV positive	Complex SE	DEFF	P value
	Lowest	178	21.5	70	39.4	6.1	3.39	0.750
	Low	149	18.0	53	35.6	2.8	0.61	
	Medium	160	19.3	55	34.4	1.7	0.25	
	High	164	19.8	56	34.2	3.6	1.17	
	Highest	176	21.3	63	35.8	4.8	2.21	
Parental Monitoring								
	Lowest	150	18.1	55	36.7	4.0	1.26	0.532
	Low	212	25.6	83	39.2	2.4	0.64	
	Medium	144	17.4	52	36.1	2.8	0.61	
	High	182	22.0	64	35.2	4.0	1.59	
	Highest	139	16.8	43	30.9	5.3	2.22	
Parent-Child Communication								
	Lowest	165	20.0	58	35.2	5.7	2.86	0.759
	Low	171	20.7	62	36.3	3.1	0.87	
	Medium	177	21.4	58	32.8	4.1	1.67	
	High	158	19.1	61	38.6	3.4	0.98	
	Highest	156	18.9	58	37.2	5.0	2.03	
Parental Characteristics								
Father had polygamy								
	Yes	272	32.9	108	39.7	3.9	2.15	0.281
	No/ don't know	555	67.1	189	34.1	2.7	2.18	
Parents had multiple sexual partners								
	Yes	301	36.4	113	37.5	3.3	1.76	0.434
	No/ don't know	526	63.6	184	35.0	2.1	1.22	
HIV related death of a family member								
	Yes	430	52.0	171	40.0	2.2	1.062	0.001
	No	397	48.0	126	31.7	2.4	1.269	
Sexual History								
Currently in a polygamous union[b]								
	Yes	27	3.3	14	51.9	9.8	1.28	0.041
	No	298	36.0	102	34.2	2.7	1.19	
Lifetime number of sexual partners								
	1	208	25.2	31	14.9	1.8	0.68	<0.001
	≥2	619	74.8	266	43.0	2.6	2.05	
Multiple sexual partners in the past 12 months								
	1	709	85.7	239	33.7	1.9	1.36	0.001
	≥2	118	14.3	58	49.2	4.2	1.03	
Perceived reason for multiple sexual partnerships								
	Lust	130	15.7	46	35.4	4.7	1.55	0.007
	Financial benefit	394	47.6	143	36.3	2.3	1.10	
	Fear of disappointment from current partner	95	11.5	45	47.4	5.4	1.34	
	Sexually unsatisfied with current partner	40	4.8	13	32.5	3.5	0.27	

(*Continued*)

Table 1. (*Continued*)

		Total N = 827	% of total	HIV positive	% HIV positive	Complex SE	DEFF	P value
	Looking for adventure	30	3.6	8	26.7	7.2	0.98	
	Peer Pressure	25	3.0	3	12.0	3.3	0.33	
	Lack of knowledge of risks of HIV	78	9.4	30	38.5	3.4	0.48	
	Get tempted to have sex	27	3.3	4	14.8	4.1	0.45	
	Other	8	1.0	5	62.5	9.6	0.39	
Condom use at last sex								
	Yes	336	40.6	161	47.9	3.7	2.25	0.001
	No	491	59.4	136	27.7	2.4	1.70	
Condom use at first sex								
	Yes	401	48.5	111	27.7	2.1	1.13	0.004
	No	426	51.5	186	43.7	3.6	2.74	
Age at sexual debut								
	≤17	327	39.5	132	40.4	3.4	1.91	0.025
	>17	500	60.5	165	33.0	1.6	0.71	
Intergenerational sex at sexual debut								
	>10 years older	120	14.5	54	45.0	3.4	0.69	0.026
	<10 years older	707	85.5	243	34.4	2.3	2.05	
Ever cohabited								
	Yes	228	27.6	121	53.1	3.2	1.20	<0.001
	No	599	72.4	176	29.4	2.0	1.44	
Knew first sexual partner's HIV status								
	Yes	211	25.5	43	20.4	4.2	2.55	0.005
	No	616	74.5	254	41.2	2.5	1.77	
Know current sexual partner's HIV status								
	Yes	598	72.3	195	32.6	2.3	1.77	0.042
	No	229	27.7	102	44.5	4.6	2.45	
Ever experienced forced sex								
	Yes	251	30.4	106	42.2	2.5	0.81	0.006
	No	576	69.6	191	33.2	2.4	1.91	
Ever had sex under the influence of alcohol								
	Yes	110	13.3	47	42.7	5.4	1.63	0.107
	No	717	86.7	250	34.9	1.9	1.45	
HIV/AIDS related knowledge level								
	High (≥7)	650	78.6	238	36.6	2.6	2.28	0.319
	Low (≤6)	177	21.4	59	33.3	2.1	0.48	

Complex SE = Standard error of estimate under complex sampling analysis.

DEFF = Design effect.

[b] = "currently in a polygamous union" was asked only among those who were married (n = 325).

[a] = "boarding school" excluded those who did not complete primary education (n = 801).

P value was calculated using the second-order Rao-Scott adjusted chi-square statistic.

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Table 2. Factors associated with reported HIV positive status by binary logistic and multiple logistic regression among 827 respondents.

		COR	95% CI[a]	P value	AOR	95%CI	P value
Age groups							
	18–24	Ref			Ref		
	25–34	2.88	1.85–4.48	<0.001	2.38	1.65–3.43	<0.001
	35–43	1.97	1.39–2.79	<0.001	1.31	0.72–2.37	0.380
Level of education							
	Low (<High School)	2.00	1.47–2.71	<0.001	1.65	1.14–3.38	0.008
	High (≥High School)	Ref			Ref		
Level of income							
	< Minimum wage	1.76	1.03–3.02	0.040	1.81	1.09–3.01	0.021
	≥Minimum wage	Ref			Ref		
Childhood household wealth index							
	Lower wealth (≤Medium)	1.92	1.45–2.54	<0.001	1.28	0.88–1.84	0.194
	High wealth (>Medium)	Ref			Ref		
Lifetime number of sexual partners							
	1	Ref			Ref		
	≥2	4.30	2.97–6.24	<0.001	3.16	2.00–5.00	<0.001
Condom use at last sex							
	Yes	2.40	1.56–3.70	<0.001	2.92	2.08–4.10	<0.001
	No	Ref			Ref		
Condom use at first sex							
	Yes	Ref			Ref		
	No	2.03	1.32–3.10	<0.001	1.56	1.10–2.22	0.012
Age at sexual debut							
	≤17	1.37	1.11–1.80	0.034	1.07	0.75–1.53	0.708
	>17	Ref			Ref		
Intergenerational sex at sexual debut							
	>10 years older	1.56	1.10–2.29	0.030	1.43	0.91–2.26	0.126
	<10 Years older	Ref			Ref		
Ever cohabited							
	Yes	2.72	2.00–3.69	<0.001	2.39	1.66–3.43	<0.001
	No	Ref			Ref		
Knew first sexual partner's HIV status							
	Yes	Ref			Ref		
	No	2.74	1.46–5.16	0.005	1.57	1.02–2.42	0.039
Know current sexual partner's HIV status							
	Yes	Ref			Ref		
	No	1.66	1.21–2.27	0.042	1.47	1.02–2.12	0.038
Ever experienced forced sex							
	Yes	1.47	1.15–1.89	0.006	1.10	0.77–1.58	0.601
	No	Ref			Ref		
HIV related death of a family member							
	Yes	1.42	1.20–1.68	<0.001	1.10	0.78–1.52	0.632
	No	Ref			Ref		

95% CI[a] = 95% confidence intervals adjusted for cluster sampling in SPSS complex sampling module.

COR = Crude Odds Ratio.

AOR = Adjusted Odds Ratio.

Ref = Reference category.

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old at sexual debut (COR, 1.37; CI,1.11–1.80; $P = 0.034$), intergenerational sex at first sexual debut (COR, 1.56; CI, 1.10–2.29; $P = 0.030$), ever cohabited (lived with a man as if married) (COR, 2.72; CI, 2.00–3.69; $P<0.001$), knew first sexual partner's HIV status (COR, 2.74; CI,1.46–5.16; $P = 0.005$), know current sexual partner's HIV status (COR, 1.66; CI, 1.21–2.27; $P = 0.042$), ever experienced forced sex (COR, 1.47;1.15–1.89; $P = 0.006$) and HIV related death of a family member (COR, 1.42; CI,1.20–1.68; $P = 0.001$).

Multivariate analysis

As shown in Table 2, factors strongly associated with HIV in the multiple logistic regression analysis included; 25–34 age group [Adjusted Odds Ratio (AOR), 2.38; CI, 1.65–3.43; $P<0.001$], lower than high school educational attainment (AOR, 1.65; CI, 1.14–3.38; $P = 0.008$], and level of income less than Swaziland's monthly minimum wage (AOR, 1.81; CI, 1.09–3.01, $P = 0.021$). Those who had $\geq$2 lifetime number of sexual partners were over 3 times more likely to report being HIV positive (AOR, 3.16; CI, 2.00–5.00; $P<0.001$) followed by those who reported condom use during the last sex (AOR, 2.92; CI, 2.08–4.10; $P<0.001$) and no condom use at first sex (AOR, 1.56; CI, 1.10–2.22; $P = 0.012$). Ever cohabited (AOR, 2.39; CI, 1.66–3.43; $P<0.001$), did not know first partner's HIV status (AOR, 1.57; CI, 1.02–2.42; $P = 0.039$) and does not know current partner's HIV status (AOR, 1.47; CI, 1.02–2.12; $P = 0.038$) were significantly associated with self-reported HIV infection. We found that childhood household wealth index, sexual debut at $\leq$ 17 years of age, intergenerational sex (first sexual partner $\geq$ 10 years older) and HIV-related death of a family member were not significantly associated with HIV infection.

Discussion

In this study, we explored the association of structural and behavioral factors with self-reported HIV status among pregnant women in Swaziland, a country having the highest generalized HIV epidemic in the world. The high access rate to antenatal care services in Swaziland (98.5%) and high acceptance of HIV testing during antenatal care visits (95.3%) enabled us to assess HIV status without burdening participants with an additional HIV test [49]. Our study revealed that 36% of pregnant women were self-reportedly HIV positive with a peak rate of 52.3% in the age group of 30–34 years. Our findings are corroborated by recent national household survey data which showed that 39% women were HIV positive with a peak of 54% among the age group of 30–34 years, suggesting that our sample is unlikely biased in this respect [6]. We found that family function and HIV/AIDS-related knowledge had no significant statistical association with self-reported HIV infection whereas lower educational attainment, lower income, and certain sexual behaviors were significantly associated with self-reported HIV infection.

Familial factors

One of our study's most important findings was that family function (family cohesion, parental monitoring and parent-child communication) was not significantly associated with self-reported HIV status, even after controlling for other factors such as economic status. Though evidence from most published literature shows a significant association between constructs of family function with sexual reproductive outcomes such as sexually transmitted infections [11,12,62–66], we did not find such an association in our study.

There may be several reasons for this. First, family cohesion, parental monitoring, and parent-child communication may not have major influence on HIV infection risk in Swazi's context where the living arrangement and family structure are mainly of the extended family type [67] with generally higher family function compared to western societies. Western societies

predominantly consist of nuclear family types and individualistic life styles [68], and many of the current studies were conducted in these contexts. The second reason may be that our participants were too homogenous in terms of family characteristics to detect such an association. In this case, future studies assessing family characteristics using cluster sampling should consider maximizing heterogeneity among participants by reducing samples within clusters and increasing the number of clusters as suggested by Kish [59]. Third, pregnant women may recall their personal childhood family circumstances and relationship differently, mediated by emotional and psychological changes induced by the current pregnancy. Forth, it is possible that existing family function scales are not sensitive enough to detect Swazi or African specific family function. If this is the case, there is a need for the development of more culturally specific assessment scales to assess family function in future research.

The only familial factor associated with HIV infection was the HIV-related death of a family member. Since participants having a family member who was infected with HIV appeared less likely to have multiple lifetime sexual partners (r = -0.135, $P<0.001$), it is possible that such association is not due to residual effect of statistically unadjusted sexual behavior but may be due to a more frequent HIV testing among participants with such family history.

Education and financial status

There was a clear inverse dose-response relationship between educational attainment and HIV infection; the higher the education attainment, the lower the reported HIV positive rate (40–50% rate among those with only up to primary or secondary education and 16.8% among those who had tertiary education). The association between education and HIV infection remained significant in the multivariate analysis. Educational attainment has long been recognized as a protective factor by the World Bank and since 2004 by the Global Coalition On Women and AIDS (UNAIDS Initiative) which have advocated for the exemption of school fees and the encouragement of HIV prevention education in schools [69,70]. As a result, every Swazi child is entitled to free primary school education in public schools. This policy has obvious positive outcomes as 95.3% of girls of schooling age are now able to read and write [71]. However, our results suggested that keeping girls in school only until primary education may still be insufficient to reduce the risk of HIV infection and further suggesting the amendment of national policy to safeguard girls' school enrollment until high school. Moreover, though enrolled in the education system, as much as 55% of participants reported to have dropped out due to lack of financial support (30%, S2 Table). As reviewed by Hardee and colleagues, girls face numerous barriers to stay in school such as lack of money to buy uniforms and textbooks. In addition, inadequate sanitary facilities also discourage girls to attend school especially during menstruation [19]. Such poor attendance may lead to low academic performance resulting in dropouts later on. Efforts should ensure not only to encourage higher educational attainment but also the uninterrupted school attendance among Swazi population, particular the girls, as such interventions have shown effectiveness in HIV risk reduction in the neighboring South Africa [28].

Regarding economic factors, ecological indices such as the Gross National Income has been shown to be inversely related to national HIV prevalence in SSA [72]. Similarly, at the individual level, a higher HIV prevalence is well documented in women with lower economic status [21,73,74]. In addition, it is evident that economic empowerment and cash transfer interventions targeting women have resulted in lower risky sexual behaviors [19,20,75]. Furthermore, a recent analysis in South Africa showed that cash or cash-in-kind reduced HIV risk among girls by mitigating pathways of poverty that increased their vulnerability [76]. While there is plenty of anecdotal evidence suggesting a link between poverty and HIV in Swaziland,

empirical evidence from studies with methodological rigor are limited [10,77] prior to our study. Though Miller and colleagues identified models of transactional sex in Swaziland indicating possible mechanisms through which low income might lead to HIV risk, the research is not an epidemiological study [78]. In our study, we found a clear dose-dependent relationship between lower economic status and HIV infection with both current cash income and childhood household wealth index. While the latter index lost statistical significance in the multivariate analysis probably because of the relatively strong association it had with level of education (r = 0.39), childhood household wealth index may contribute to HIV vulnerability through poor educational attainment. In other words, while current low income may directly put women in socially vulnerable situation to HIV infection, childhood household wealth status may also affect HIV infection through limited education opportunities. However, further research should seek to identify these mechanisms to design appropriate interventions relevant to the Swazi context. We hope that this evidence will allow for better prioritization of HIV prevention interventions that focus on economic empowerment of women.

Sexual behavior-related factors

Many of the sexual-related factors identified to increase the risk of HIV infection in this study have been well documented in previous studies in many countries including those in SSA. In our study, $\geq$2 lifetime number of sexual partners was the most prevalent (75%) and a powerful predictor of HIV infection (AOR $>$ 3). It is important to note that half of the women who had MSP cited financial benefit as a reason; strongly suggesting that poverty perpetuates the practice of MSP in Swaziland. Ever cohabiting was also found to be a strong predictor of HIV infection (AOR $>$ 2) and associated with the highest HIV prevalence (53%). In recent years, cohabiting is on the rise in Swaziland due to the inability of men to pay bridal payment (dowry) as a pre-requisite of marriage (a practice prominent in Swaziland) leading men to cohabit with multiple women for longer period of time, thus increasing unprotected coital frequency which results in an increased risk of HIV infection [9,79]. An alarming finding in the Swazi context, is the fact that 75% and 30% of women had first sex and last sex respectively without knowing their partner's HIV status and had an elevated risk for HIV infection (AOR = 1.6 and AOR = 1.5). As a country with a highly generalized HIV epidemic, as high as 30–40% on average in both men and women [6], revitalization of campaigns to promote safe sex with a partner of unknown HIV status, as well as support programs to encourage couple testing and HIV status disclosure should be prioritized.

HIV/AIDS-related knowledge

Finally, HIV/AIDS-related knowledge level was generally high: 80–90% of respondents correctly identified that a healthy looking person can be HIV positive, the risk of HIV infection can be reduced by avoiding MSP and using condoms. This suggests that young women in Swaziland are engaging in HIV risky behaviors not because of lack of knowledge. Due to the cross-sectional nature of our study, it could be argued that respondents may have recently gained HIV/AIDS-related knowledge during recent antenatal care visits and thus, their past risky sexual behaviors were primarily due to lower knowledge levels prior to antenatal checkups. Nonetheless, our data does not support this view since only 9.4% of respondents reported "lack of knowledge of HIV risks" as a reason for MSP. Furthermore, high HIV/AIDS-related knowledge has been previously reported in national surveys; e.g. 80–90% of women in the Swaziland Demographic Health Survey (2007) correctly identified ways to reduce HIV infection[40]. This is also consistently true among all age ranges, counter-arguing the concern that young people may not have had adequate information before their sexual debut, hence, thrusting

them into risky behaviors. Data from the Multiple Indicator Cluster Survey (2010) is in concordance, demonstrating that the general public is well-equipped with adequate knowledge [41]. For these reasons, risky behaviors are unlikely due to lack of knowledge but most likely because of low income and low educational attainment as discussed above. As demonstrated by our findings, the gap between knowledge and practice is yet of great concern. The Extended National Multisectoral HIV and AIDS Framework has pointed this out by stating that "HIV and AIDS awareness and knowledge has not translated into the desired levels of behavior change due to inadequate personal risk perception that focus on translating knowledge into action" [10] noted in 2012. As the gap is still largely predominant in our findings, therefore the country urgently needs more innovative strategies and revitalization of existing ones because interventions centered on HIV/AIDS-related knowledge alone may not be sufficient to deter women from engaging in HIV risky sexual behavior.

Strengths and limitations

This study was designed to maximize internal and external validity. First, the study was conducted in the region where HIV prevalence among pregnant women is highest. Second, simple two-stage cluster sampling was adopted to ensure the representativeness of pregnant women with a systematic effort to maximize response rate (92%). Third, appropriate statistical procedures were adopted to adjust for clustering effect on the variances of point estimates. Fourth, the study was conducted using self-administered questionnaire with internet-enabled tablet devices to minimize interviewer bias and socially desirable responses on the sensitive issues of HIV status, income and sexual behavior. In spite of these efforts, this study has some limitations. First, recall bias could have been introduced since our questionnaire asked retrospective factors such as first sex and childhood household belongings. Second, contamination of socially desirable answer is still possible to sensitive questions. Third, cause-effect relationship cannot be inferred due to its cross-sectional nature. Lastly, this study may not fully represent all women of reproductive age in Swaziland since women using contraceptives were not included therefore, the generalization of these findings should be done with caution.

Conclusion

Family function did not appear to increase the risk for self-reported HIV status among pregnant women attending antenatal care in our study. However, given the scarcity of studies exploring the role of family function in the specific context of the Swazi HIV epidemic, we recommend further studies. Taken altogether, our study showed that risky sexual behavior was unlikely due to the lack of HIV/AIDS-related knowledge but due to structural factors such as education and economic situation. Therefore, besides programs that promote HIV knowledge and safer sexual practice, interventions that address structural factors by ensuring opportunities for higher education and by providing sustainable financial support to young women should be promoted.

Supporting Information

S1 Table. Descriptive and bivariate statistics for HIV related knowledge items. Descriptive and bivariate statistics for HIV/AIDS related knowledge items associated with self-reported HIV infection. Complex SE = Standard error of estimate under complex sampling analysis. DEFF = Design effect. P value calculated using the second-order Rao-Scott adjusted chi-square statistic
(DOCX)

S2 Table. Descriptive frequency statistics for reason of dropping out of school. This table shows distribution of reasons for dropping out of school and self-reported HIV infection.* Where excluded because they were considered too young to reliably know the reason for dropping out of school since they did not complete primary school education
(DOCX)

S1 Dataset. Dataset of this study,
(SAV)

S1 Questionnaire. siSwati and English version of the questionnaire.
(DOCX)

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Author Contributions

Conceptualization: BWL MK MOK.

Data curation: BWL.

Formal analysis: BWL TT SPS CE PMM MK MOK.

Investigation: BWL SH OBT.

Methodology: BWL MK.

Project administration: BWL SH OBT MK MOK.

Supervision: MK.

Validation: BWL MK.

Writing – original draft: BWL MK.

Writing – review & editing: BWL TT SPS PPM CE SH OBT MOK MK.

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Protocol

Efficacy of Mobile Serious Games in Increasing HIV Risk Perception in Swaziland: A Randomized Control Trial (SGprev Trial) Research Protocol

Bhekumusa Wellington Lukhele, MPH; Patou Musumari, MD, PhD; Christina El-Saaidi, MPH; Teeranee Techasrivichien, MSc, PhD; S. Pilar Suguimoto, MD, PhD; Masako Ono Kihara, PhD; Masahiro Kihara, MD, PhD

Kyoto University, Department of Global Health and Socio Epidemiology, Kyoto University, Kyoto, Japan

Corresponding Author:
Bhekumusa Wellington Lukhele, MPH
Department of Global Health and Socio Epidemiology
Frontier Laboratory Bldg, 2nd Fl.
Kyoto University School of Public Health Yoshida Konoe-cho, Sakyo-ku
Kyoto, 6068501
Japan
Phone: 81 757534350 ext 4350
Fax: 81 757534349
Email: bhekumusa.lukhele.36x@st.kyoto-u.ac.jp

Abstract

Background: The human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) continue to be a major public health problem in Sub-Saharan Africa (SSA), particularly in Swaziland, which has the highest HIV prevalence in this region. A wide range of strategies and interventions have been used to promote behavior change, though almost all such interventions have involved mass media. Therefore, innovative behavior change strategies beyond mass media communication are urgently needed. Serious games have demonstrated effectiveness in advancing health in the developed world; however, no rigorous serious games interventions have been implemented in HIV prevention in SSA.

Objective: We plan to test whether a serious game intervention delivered on mobile phones to increase HIV risk perception, increase intention to reduce sexual partnerships, and increase intention to know own and partners HIV status will be more effective compared with current prevention efforts.

Methods: This is a two-arm randomized intervention trial. We will recruit 380 participants who meet the following eligibility criteria: 18-29 years of age, own a smartphone running an Android-based operating system, have the WhatsApp messaging app, live in Swaziland, and can adequately grant informed consent. Participants will be allocated into a smartphone interactive, educational story game, and a wait-list control group in a 1:1 allocation ratio. Subsequently, a self-administered Web-based questionnaire will be issued at baseline and after 4 weeks of exposure to the game. We hypothesize that the change in HIV risk perception between pre- and post-intervention assessment is greater in the intervention group compared with the change in the control group. Our primary hypothesis is based on the assumption that increased perceived risk of HIV provides cues to engage in protective behavior. Our primary outcome measure is HIV risk perceived mean change between pre- and post-intervention compared with the mean change in the wait-list control group at 4-weeks post-intervention. We will use standardized regression coefficients to calculate the effect of the intervention on our primary outcome with *P* values. We will conduct both intention to treat and as treated analysis.

Results: This study is funded by Hayao Nakayama Foundation for Science & Technology and Culture; Grant number H26-A2-41. The research and development approval has been obtained from Kyoto University Graduate School and Faculty of Medicine Ethics Committee, Japan, and Swaziland's Ministry of Health Ethics and Scientific committee. Results are expected in February 2017.

Conclusions: This study will provide evidence on the efficiency of a mobile phone interactive game in increasing HIV risk perception in Swaziland. Our findings may also be generalizable to similar settings in SSA.

Trial Registration: University Hospital Medical Information Network Clinical Trial Registry ID number (UMIN-CTR):UMIN000021781; URL:https://upload.umin.ac.jp/cgi-open-bin/ctr_e/ctr_view.cgi?recptno=R000025103 (Archived by WebCite at http://www.webcitation.org/6hOphB11a).

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(JMIR Res Protoc 2016;5(4):e224) doi:10.2196/resprot.6543

KEYWORDS

eHealth; mHealth; gamification; Internet; HIV prevention; innovation

Introduction

It is estimated that 35.3 million people are living with human immunodeficiency virus (HIV) globally [1]. Sub-Saharan African (SSA) is the most affected region and the disease burden varies considerably between countries. In Swaziland, a land-locked, lower-middle income country surrounded by South Africa and Mozambique, HIV prevalence is estimated to be 26% among men and women of 15-49 years [2]. The overall HIV prevalence among the reproductive age population (18-49) has remained unchanged between 2006 and 2011 at 31% [3,4]. A recent, longitudinal, cohort study between December 2010 and June 2011 has estimated the incidence of HIV at 1.7% in men and as high as 3.1% in women [5]. Unprotected heterosexual transmission accounts for 94% of all new infections in the country [6]. More specifically, multiple concurrent partnerships have been identified as key drivers of HIV infection in Swaziland [6]. A recent qualitative study found that social and structural factors played a role in creating an enabling environment for high-risk sexual partnerships, and these factors included social pressure and norms, a lack of social trust, poverty and a desire for material goods, and geographical separation of partners [7].

Other key drivers have been highlighted in the Extended National Multi-sectoral HIV/AIDS Framework for 2014–2018 (eNSF) as: low rates of HIV testing (only 40% of people aged 15-49 had tested for HIV 12 months preceding a household survey) [8]; early sexual debut; low levels of medical male circumcision; and low HIV risk perception [8,9].

HIV is the leading public health concern in Swaziland [4]. National efforts have emphasized the scale-up of a combination of prevention approaches including: HIV testing and counseling, social behavior change communication, medical male circumcision, and HIV care and antiretroviral services. Despite this cocktail of prevention approaches, risky behaviors remain high. For example, Bicego and colleagues [4] note that there is still a low/late uptake of HIV testing services by men, which is consistent with late entry into care and treatment. Furthermore, according to the Swaziland Demographic Health Survey of 2006/07 and the Multiple Indicator Survey of 2010, the overall prevalence of multiple sexual partners remained unchanged at approximately 11% between 2006 and 2010 (data recalculated) [9,10]. On another note, the eNSF 2014-2018 points out that the Swaziland Social and Behavior Change strategy developed in 2010 has had limited success in facilitating desired levels of behavior change most importantly influencing personal HIV risk perception that focus on translating HIV awareness into protective action [8]. Beliefs about personal risk of HIV infection are central to motivate people to engage in behaviors that reduce their risk of HIV infection [11]. The Swaziland HIV testing and counseling guidelines includes HIV risk assessments to enhance self-perception of risk [12]. Models such as the Protection Motivation Theory and the Health Belief Model offer insights into the significance of perceived risk in adopting protective behavior. To date, there has been limited randomized control trials aimed at influencing how people perceived their risk of HIV in Swaziland.

Furthermore, anecdotal information suggests that there is information fatigue from the target audience in receiving HIV prevention messages from the mass media because most prevention campaigns have been dominantly delivered through mass media. One strategy that can break this perceived fatigue is the use of target audiences' mobile phones. In developing countries, decreasing costs and increasing mobile network coverage provide a wide range of opportunities for apps using mobile phones [13]. Although comprehensive up to date data for mobile phone usage in Swaziland is limited, mobile phone penetration is estimated at 87% [14]. Our consultative meeting with the only mobile carrier in Swaziland revealed that there are currently 206,880 smartphones on the mobile network (as of June 2015). Therefore, our study seeks to use serious games delivered via mobile smartphones to engage the target audience in creative ways to increase personalization of HIV risk.

In this study, we adopt the definition of Serious Games as proposed by Alvarez and Djaouti [15], "a computer application whose intended purpose is to coherently combine both serious aspects such as, but not limited to teaching, learning, communication, or information, with game playing aspects from video games." These combined serious aspects and playing aspects form a utilitarian scenario, which in computer terms uses a sound and graphics package, a story and appropriate rules, and is therefore distinct from simple entertainment [15]. Alvarez and Djaouti [15] summarize this definition by the following relationship:

Utilitarian scenario + gaming scenario => Serious Games.

Current literature suggests that serious games are effective in changing behavior. For example, a randomized trial (in the United States) designed to improve treatment adherence among 13- to 29-year-old patients with malignancies including acute leukemia, lymphoma, and soft-tissue sarcoma found that among 200 participants who were prescribed oral trimethoprim-sulfamethoxazole and 6-mercaptopurine, 16% indicted an increase in adherence for the serious games intervention group compared with the control group. Mixed-effect linear model analyses of chemotherapy metabolite concentrations showed that patients in the intervention group maintained significantly higher chemotherapy metabolite levels over time than did patients in the control group (significant group × time interaction; P=.002)[16]. Additionally, another clinical trial conducted in the United States among 935 males who had sex with males between 18- and 24-years old aimed at reducing risky sexual behavior and sexual shame, found that exposure to a serious games intervention led to immediate shame reduction for those in the serious games intervention group compared with the control group (mean [M]=−0.08, standard

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deviation [SD]=0.51, n=437 compared with M=0.07, SD=0.54, n=484, respectively; the difference was statistically significant at $t_{(919)}$=4.24, P< .001) [17]. Despite the success of serious games in advancing health, no randomized intervention trials have been conducted in HIV prevention in SSA or in Swaziland. To address these research gaps, our goal is to design a serious game to increase HIV risk perception and use randomization to evaluate the efficacy of this intervention among 18- to 29-year-old people in Swaziland.

Methods

Study Design and Hypotheses

The Swaziland Serious Games–Based HIV Prevention Trial (SGprev trial) will be a 4-week, two-arm randomized intervention trial. Participants will be randomized into 2 groups (the intervention group and a wait-list control group) in a 1:1 allocation ratio (Figure 1) [18]. The intervention will be downloadable from our website, on the Google Play store, and in popular cellular shops around Swaziland. These cellular shops already serve as distribution sites for other mobile software and apps, such as antiviruses, Opera mini, and WhatsApp, and are thus very popular in Swaziland. Additionally, the game will also be available from kiosks in all tertiary institutions in the country. Downloading the game will not be synonymous with enrolling in the trial. After downloading the game, potential participants will be redirected or prompted to visit our website where information about the trial and eligibility screening will be provided.

We plan to test whether a serious game intervention delivered on mobile phones to increase HIV risk perception, increases the intention to reduce multiple sexual partnerships, intention to know own HIV status, and intention to know all sexual partners' HIV status will be more effective compared with current prevention efforts. Therefore, our hypotheses are that

1. The change in HIV risk perception between pre- and post-intervention assessment is greater in the intervention group compared with the change in the control group.

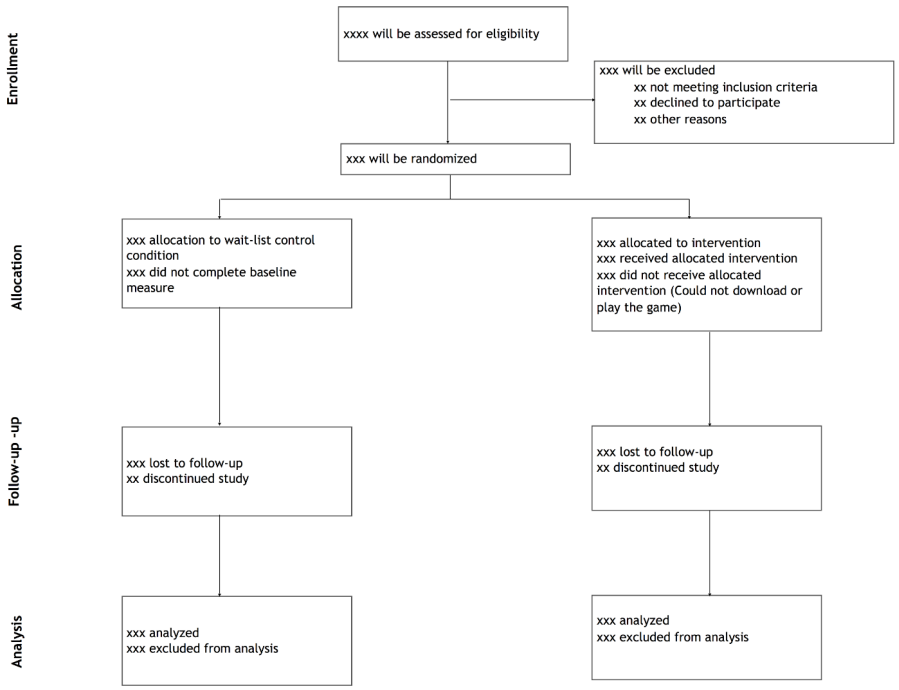
2. The change in HIV risk perception between pre- and post-intervention assessment will be greater among those reporting high HIV risk behavior in the intervention group compared with the control group.

3. The change in intention to have an HIV test between pre- and post-intervention assessment will be greater in the intervention group compared with the change in the control group.

4. The change in intention to reduce multiple concurrent partnerships between pre- and post-intervention assessment will be greater in the intervention group compared with the change in the control group.

5. The intervention group will report higher rate of condom use in the last sexual encounter compared with the control group.

Figure 1. CONSORT diagram for Swaziland serious games-based trial.



Participants, Setting, and Intervention

Our target population is Swazi males and females between 18- to 29-years old currently in Swaziland. Our intervention study targets people between 18- and 29-years old for the following reasons: (1) according to Bicego and colleagues [4], young people between this age group are most vulnerable to HIV because of their low HIV-testing behavior, (2) our primary study recruitment platform will be Facebook because the majority of mobile phone users in Swaziland also use Facebook, and (3) in our formative research (unpublished work, 2014) we found that this age group is likely to use smartphones and be literate on

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navigating the Internet compared with younger than 18-years-old or older than 29-years-old participants. Moreover, this age group is likely to find the SwaziYolo game entertaining.

Inclusion Criteria

For this study, we will include males and females if they meet the following criteria: (1) are between 18 and 29 years of age, (2) own a smartphone running an Android-based operating system, (3) currently have the WhatsApp messaging app, (4) currently live in Swaziland, and (5) are able to adequately grant informed consent.

Sampling Method

To recruit participants, we will post a targeted (based on our inclusion criteria), clickable banner advertisement on Facebook. After clicking on the advertisement, potential participants will be redirected to our website. Those who meet our eligibility criteria and have granted informed consent will be sent a unique trial verification code via text message and email. This unique trial verification code will be used to take our survey. Moreover, participants eligible for this trial will be entered into a lottery draw with a 1:100 chance of receiving US $20.

Study Setting

The Kingdom of Swaziland, situated in Southern Africa, is a small land-locked country, the area of Swaziland is estimated to be 17,364 km^2 with an estimated population of 1,146,050 (2006) [19]. According to Facebook there are currently approximately 160,000 people on Facebook, of those, 97,000 of them are man and women between the ages of 18- and 29-years old. Our primary recruitment site will be Facebook. Facebook is one of the most widely used social networking platforms in Swaziland and allows for targeted advertisements specifically to send people to our website. These two factors make Facebook an ideal platform to reach the Internet population in Swaziland. Participants do not need to be Facebook users to participate in the trial because our website can be assessed directly from the Internet. Participants will not be discouraged to share the study website link on other platforms, such as WhatsApp, Instagram, Email, and others.

Description of the Intervention

SwaziYolo (a smartphone game) is an interactive, educational story game that puts the player in the role of a young adult looking for love in Mbabane (the capital city of Swaziland), making important choices about relationships and sexual health (see Multimedia Appendix 1 for an overview of the steps taken in developing the intervention). The intervention is guided by cognitive-based approaches such as the Theory of Planned Behavior to target intentions to engage in HIV protective behavior [20-22] and the Health Belief Model to target perceived susceptibility of acquiring HIV infection [20]. While capitalizing on elements of serious games such as immersion, role-playing, and a dynamic storyline, the game exists in two major parts: the first is set in an imaginary social network called SwaziYolo, which is meant to resemble a combination of existing tools like Facebook, OKCupid, and Whatsapp. Here, players register (registration and login screen), view pictures (potential love interests "Connections" screen) and profiles of potential love interests (profile mode screen), and have Web-based chats (chat mode screen) with various characters. The other half of the game takes place in various made-up locations around Mbabane, such as nightclubs and cafes (meet up at a club screen) where players regularly go on dates referred to in the game as "meet-ups." In both parts of the game, players are regularly required to choose between several courses of action to progress a conversation or storyline with a friend or love interest (chat mode screen). The decisions they make will influence the opinions and behavior of other characters, as well as the player's own health and safety. Eventually, feedback is given based on choices made (feedback from a medical doctor at a clinic screen). In the game, the various character dialogues and scenes, will address the issues identified in our formative research such as HIV risk perception, raising knowledge of their own HIV status as well as a sexual partner's HIV status, reducing multiple concurrent sexual partnerships, and consistent condom use.

The goal of the game is to maintain relationships with the characters, while staying healthy and happy. Once all the interactions with the characters have been completed, the game will give feedback on choices made and the risks those choices might carry. The game is expected to have an immense appeal to the youth, as an exciting new way to use their smartphones (see Figure 2 for the actual SwaziYolo screenshots). Participants in the wait-list control condition will complete the baseline and the immediate posttest measures as those in the SwaziYolo intervention condition, but will not play the game until the post-intervention assessment.

Game Play

Player's curiosity to "know what happens when they make a choice" is key to user engagement. The game's narrative is primarily concerned with matters of sexual health, especially as it relates to HIV. Players will usually find themselves in situations where they have to make important decisions about their health, for example, resisting the pressure to have unprotected sex. The game keeps track of how well a player's relationship is going with other characters using "TRUST" ratings (intimacy ratings), and a "YOLO" rating: how safe (safe relates to making choices that do not expose player to HIV risk) they have been during the course of the game. While players enjoy game play, they are exposed to valuable learning situations and are encouraged to care more about the various characters. Some will give good advice, while others will find themselves in difficult situations where they ask other players for help and guidance.

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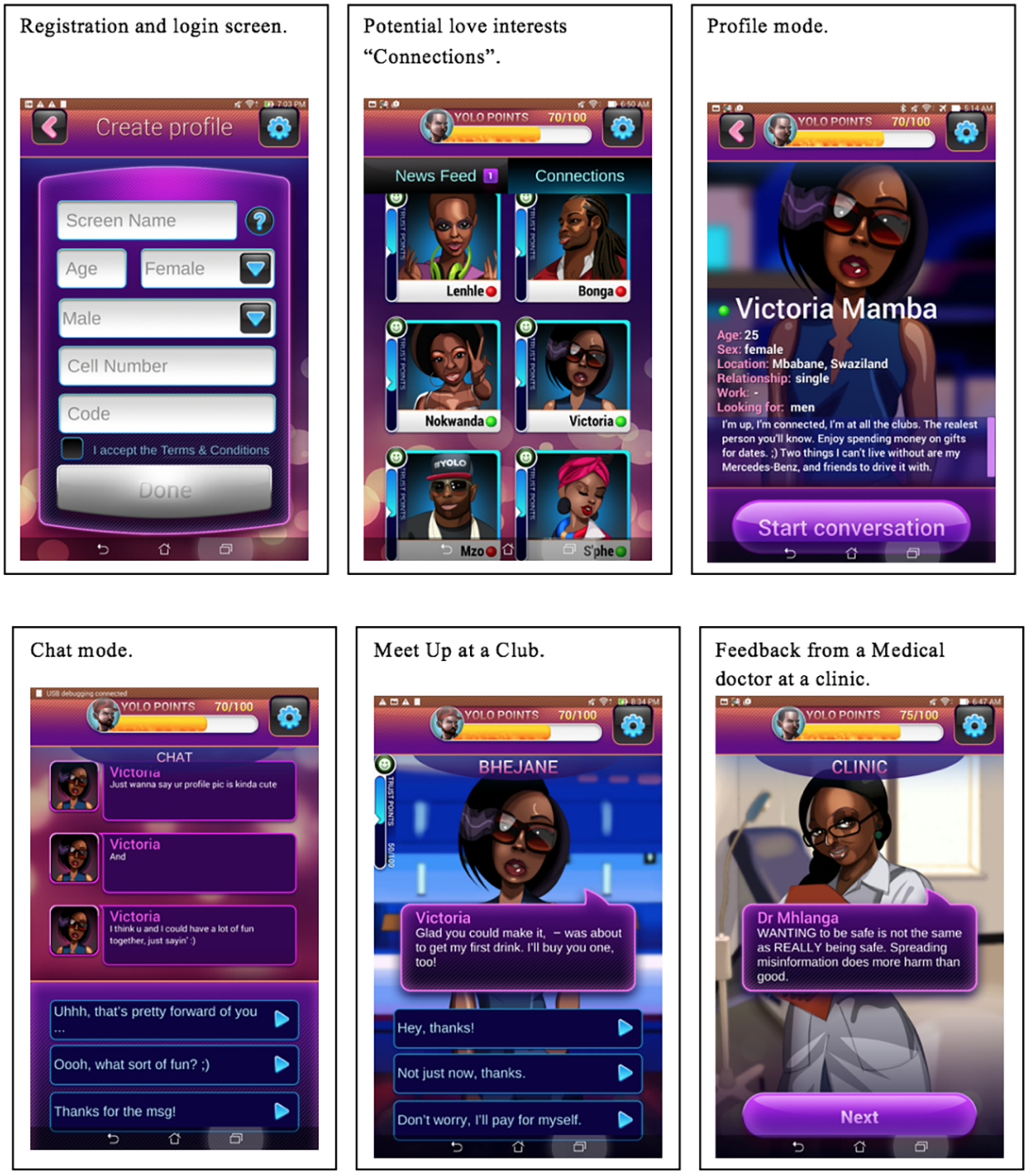
Figure 2. SwaziYolo screenshots.



Sample Size Calculation

The trial will be powered on the primary outcome measure and based on comparison of the change in HIV risk perception score from pre- to post-intervention assessment in the intervention group at 4 weeks. A study conducted in Uganda estimated mean HIV risk perception of M=3.27, SD = 1.03, therefore, we used this estimation as our baseline mean and SD to calculate our effect size [21]. Assuming a moderate effect size of 0.477 (identified by Chu et al [22]), alpha (two-tailed)=0.05, beta=0.20, with 1:1 allocation ratio between both groups, and a SD of the outcome in the population of 1.03, the total sample required to sufficiently power the study would be 146 (73 for each group). Moreover, assuming a 30% loss to follow-up rate [15], we then inflated the sample by 30% to yield a sample of 190. After that, we considered gender differences and once more inflated the sample by a factor of 2 to give a final sample size of 380. Finally, to ensure a balance between males and females in both groups we will recruit 190 females and 190 males. The sample size was calculated using Web-based sample size calculation software [23,24].

Randomization

Upon confirmation of participants' trial registration, participants will be assigned another unique code called "game unlock code," which will be used for randomization using secure, remote,

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Web-based computer software within 24 hours of recruitment. As stated in the research design, participants will be randomized into 2 groups; the intervention group and the wait-list control group in a 1:1 ratio. The data analysis team will be blinded in this study, however, participants will not be blinded.

Measurement Instrument

A self-administered structured Web-based questionnaire was created based on review of both Swazi and international literature. For example, questions relating to sociodemographic characteristics were adopted from the 2007 Swaziland Demographic Health Survey, and those related to risky sexual behavior and intention to change behavior were developed from our formative studies. Additionally, the Perceived Risk of HIV Infection Scale (PRHS; found to have excellent internal consistency Cronbach alpha=0.88) [11] will be used to assess the primary outcome of this study. Past research has used a variety of approaches to measure HIV risk perception including single likelihood assessments [21,25]. The 8-item PRHS scale incorporates items assessing cognitive assessments of risk (eg, chance of infection), as well as intuitive assessments (eg, feeling vulnerable, worry, gut feeling about likelihood), and salience of risk (eg, thought about risk, can picture it happening) to provide a more comprehensive measure of perceived risk of HIV infection, thus our choice to use this scale. The questionnaire will be converted into a Web-based format accessible via a link. Detailed variables assessed by the questionnaire are described in the section below and the questionnaire is presented in Multimedia Appendix 2. The trial tools were piloted among respondents known to the principal investigator, who will not be part of the main trial, in order to assess Web-based eligibility screening functionality; user verification; participant randomization functionality; questionnaire skip logic functionality; and the average length of time it takes to complete the questionnaire.

Primary Outcome Measure

Adding one or more comparison groups to a pre- and post-intervention assessment will result in a stronger intervention design than having a single intervention group to a pre- and post-intervention assessment [26]. Therefore, the primary intervention outcome will be the change in HIV risk perception score from pre- to post-intervention assessment in the intervention group compared with the change in the wait-list control group. High perception is considered to be the first stage toward behavioral change and has been associated with HIV protective HIV behavior [27,28]. HIV risk perception using the PRHS will be used to measure the primary outcome at baseline and at 4-weeks follow-up.

Secondary Outcomes Measure

The secondary outcomes for this intervention are self-reported intention to have an HIV test; intention to reduce multiple concurrent sexual partnerships; and an increase in reported condom use in the last sexual encounter (Table 1).

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Table 1. Secondary outcome measures.

Measures	Baseline	Follow-up at 4 weeks
Sexual reproductive history		
Condom use in the last sex	X[a]	X
Number of sexual partners	X	X
Intent to change behavior		
Intention to test for HIV and know partners' HIV status	X	X
Intention to reduce multiple concurrent partnerships	X	X
Intention to use a condom	X	X
Steady sexual partner's history		
Has current sexual partner ever tested for HIV?	X	X
Knowledge of current partner's HIV status	X	X
Demographics		
Age	X	
Level of education	X	
Employment status	X	
Income level	X	
Marital status	X	
Ever tested for HIV	X	X
Contact information		
Cellphone number and email	X	
User experience		
Would you recommend the game to your friends?		X
How did you hear about this game?		X
Number of times player reached the end of the game		X
Level of satisfaction about the game		X

[a]Timing of assessment.

Data Collection Procedures

Baseline Data Collection

Participants will be recruited from Facebook users in Swaziland via a targeted Facebook advertisement. Potential participants will be directed to the study Web page where information about the intervention trial will be given and if willing, screening for eligibility will be done. After screening for eligibility, eligible individuals interested in participating in the trial will have an opportunity to ask detailed questions via free text message service offered by the WhatsApp app, Facebook messenger, or calling us. Sufficient time will be allowed for making an informed decision about participation in the study. Recruitment into this study will continue until our sample size is achieved.

After informed consent, a trial verification code will be sent to the participants via their mobile phones to prevent multiple identities in line with the CONSORT-EHEALTH guidelines 4a(ii) [29]. Upon confirmation of the unique verification code, participants will be enrolled in the trial and randomized into a control or intervention group. Subsequently, participants will be asked to answer the baseline Web-based questionnaire. In addition to study variables, contact information in the form of cellphone numbers will be collected at baseline to facilitate location of the research participants in the 1-month follow-up period [23,30]. The detailed questionnaire is outlined in Multimedia Appendix 2.

Four-Weeks Follow-Up Data Collection

Trial participants will be followed-up for 4 weeks, the game will collect log data and send this data to our servers when the participant goes on the Internet, this will allow us to assess the exposure to the intervention without over burdening our participants to manually send us their usage data. Data captured will be limited to login data. In addition to this, a Web-based questionnaire will be sent to participants at the end of the follow-up period. Participants who will miss their 4-week follow-up assessment will be actively traced though phone calls and text messages.

Data Management and Statistical Analysis

Data Quality Assurance

First, Web-based questionnaires must be usable even for less experienced and knowledgeable Internet users [31], therefore

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we will exploit specific technical possibilities offered by open source Web-based questionnaires, such as visually highlighting buttons and predefined input fields. Additionally, we will use help features and input checks to assist participants when filling out the Web-based questionnaire. Beyond this, we will pilot test all filters and instructions given in the questionnaire. Second, to limit undesired multiple participation [32], either at baseline assessment or follow-up assessment, "sessions" will be used together with a verification code that participants will receive upon giving informed consent. Third, a specific problem that is faced by Web-based surveys is that respondents may "click through" the questionnaire, a phenomenon that becomes apparent when the interview is completed in less than the theoretical minimum time [31], therefore, the responses will be checked for plausibility and consistency and inconsistent records will be documented and censored from the final analysis.

Baseline Characteristics

Initially, descriptive statistics for the sample characteristics will be done for the intervention group and the wait-list control group to assess the distribution of important predictors of the outcome between both groups at baseline.

Primary Outcome Measure: HIV Risk Perception Score

First, we will use bivariate analysis to calculate the mean between baselines and follow-up. Next, to estimate the difference between the 2 groups, we will calculate the difference between the mean change of the intervention group and the mean change of the wait-list control group using two-sample paired *t* test. We will not perform interim analysis.

Secondly, in the case that, even after randomization, we observe some baseline differences, we will use multiple linear regression to adjust for those differences; where the outcome will be the follow-up score and the independent variables will be the intervention group, baseline scores, age, gender, marital status, level of education employment status, current monthly income, and number of times players played SwaziYolo. We will present our results in standardized regression coefficients for the intervention effect on the outcome variable as previously done for this type of hypothesis [25].

Although great effort will be put to minimize attrition, it is common for eHealth trials to typically have substantial attrition [26]. For this reason, our primary outcome analysis will prioritize analysis of the subjects who adhered to their group assignment and were sufficiently exposed to the intervention. Therefore, both pre-protocol analysis (as treated analysis) as well as intention to treat analysis will be done and both results will be reported. The approach of conducting both "intention to treat analysis" together with "as treated analysis" has been observed in literature for example, Weinstein and colleagues [33] followed this approach in their randomized trial comparing surgical versus nonoperative treatment for lumbar disk herniation.

Secondary Outcome Measures

Two-sample generalization McNemar's test will be done to assess whether a significant change occurred between the pre- and the post-intervention assessments for dichotomous variables such as: intention to know self and partners HIV status, intention to reduce multiple sexual partners, and intention to use a condom the next time a participant has sexual intercourse. Each of these, outcomes will be assessed separately (individually). In order to judge the change, we will calculate the proportions of the dichotomous variable pre- and post-intervention in both groups. After that, we will obtain the pre- and post-intervention difference percentage at a *P* value within group and a *P* value in the intervention versus waitlist control group. This technique is documented by Katz [26]. Additionally, we will conduct a subgroup analysis of those with low-risk perception who report no condom use at last sexual encounter. This subgroup analysis will give us a more nuanced insight of the effect of the intervention to the most as risk subgroup in our study.

Informed Consent

All participants will be required to give Web-based informed consent (Multimedia Appendix 3) before participation in the study. An online forum via Facebook and WhatsApp will be setup to allow participants to ask questions related to this research. They will be informed about the purpose of the study, its strict confidentiality, importance, and voluntary nature of their participation, their right to end the participation at any time without having to state a reason. Lastly, participants will be informed that the aggregated results (not individual case data) will be disseminated to improve the intervention package and general HIV prevention in Swaziland (see SGprev Trial information sheet in Multimedia Appendix 4).

Protection of Personal Information

The following measures will be taken to protect participant's personal information:

1. Permission will be sought from study participants to collect game usage data (login data) automatically.

2. All participants' data will be stored under encrypted servers to protect participants' information.

3. Participants' cellphone numbers will be stored in a password protected file and will not be used for purposes other than those outlined in this protocol. After the trial, all cellphone numbers will be deleted.

Expected Adverse Effects and Countermeasures

During or after the study, participants may develop psychological distress or embarrassment. All efforts to prevent this psychological distress or embarrassment will be put in place. If despite our efforts any psychological issue arises during the intervention and data collection, the research team will refer the participants' to the nearest counselor (who is well vest on psychological issues) for appropriate psychological care and support via text messaging or calling. Participants will be encouraged to self-report any feelings of distress or discomfort to the research team using Web-based tools such as the WhatsApp app, Facebook private message, or via our contact details provided in the study information sheet including a toll-free number for HIV counseling.

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Data Storage

All data will be stored in the password-encrypted servers. Upon completion of the survey, all data will be exported to a password protected desktop computer at Kyoto University Department of Global Health and Socio-Epidemiology. Persons not part of the research team will not have any access to the collected data.

Incentive

A lottery draw at baseline with a 1:100 chance of receiving US $20 will be given to all participants at the end of data collection as an incentive for their time in taking part in this trial. This amount was chosen carefully not to cause undue influence to the target population in that it is not excessive and is fair considering the country's socioeconomic status.

Results

Current Status

The status of the study is in preinitiation stage. Results are expected in February 2017. We will present results as percentages, observed means with 95% confidence intervals, mean difference and 95% confidence intervals, standardized regression coefficients, and *P* values. All analysis will be performed using SPSS for Windows.

Ethical Considerations

The study will be conducted according to the principles outlined in the Declaration of Helsinki International Guidelines for Ethical Review of Epidemiological Studies (CIOMS, 1991 Geneva). Furthermore, the research and development approval has been obtained from Kyoto University Graduate School and Faculty of Medicine Ethics Committee, Japan, and Swaziland's Ministry of Health Ethics and Scientific committee. Caution will be taken to protect participant's privacy during the data collection, data handling, and data reporting.

Funding

Development of "SwaziYolo" serious game was funded by Hayao Nakayama Foundation for Science & Technology and Culture; Grant number H26-A2-41. The research implementation will be sponsored by the Department of Global Health and Socio-Epidemiology, Kyoto University, Japan.

Discussion

Overview

The risk of HIV infection is high among young people who practice risky sexual behavior, often they do not perceive their risk to be high, a phenomenon termed optimistic bias [11,27,28,34-36]. Some studies have reported that increased risk perception leads to subsequent increase in HIV protective behaviors, such as acceptance of HIV testing [37] or condom use [38]. The mechanism that increased perception leads to protective behavior is implicit in many behavioral theories as noted by Napper and colleagues [11]. Consequently, the joint United Nations Programme on HIV/AIDS (UNAIDS) guidance note on "social and behavior change programming" outlines risk perception as a thematic focus area for effective HIV prevention [39].

Trial Implications

In line with the guidance form UNAIDS, this trial will provide a robust and rigorous evaluation of the efficacy of mobile serious games in increasing HIV risk perception in a resource limited setting such as Swaziland. Findings from this study will be made available to Swaziland authorities and stakeholders working to improve HIV prevention in Swaziland. We envision that the results of this study will be highly relevant to HIV prevention interventions in Swaziland and will inform future innovative strategies for HIV prevention. We are hopeful that our results will be generalizable to other settings in SSA. To our knowledge this is the first randomized control trial of a mobile serious games–based study to increase HIV protective behaviors in Swaziland and SSA; therefore, our findings will be a timely contribution to literature.

Acknowledgments

We would like to acknowledge Formula D Interactive for development of the game and Net Storm Technologies for the website development. Further, we thank Mr Norihisa Wada for his advice and support.

Authors' Contributions

MK, MOK and BWL led study conception, intervention design, and methodology, statistical design, programing platform, and intervention user interface design, and will lead study implementation. CE participated in the study design and intervention development. PPM participated in the study conception, statistical design, and intervention development. TT and SPS participated in the study conception, design and statistic design, and intervention development. BWL will establish recruitment and randomization of participants. BWL and MK drafted the protocol, and all authors read and edited drafts of the protocol and approved the final protocol manuscript.

Conflicts of Interest

The authors declare that they have no competing interests. Though as stated earlier, BWL received funding for intervention development from Hayao Nakayama Foundation for Science & Technology and Culture, our funding agreement gives us full

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control over primary data, statistical analysis, and the freedom to publish findings whether negative or positive, as is standard precaution to ensure potential competing interests are kept in check [21].

Multimedia Appendix 1

Intervention development.

[PDF File (Adobe PDF File), 33KB - resprot_v5i4e224_app1.pdf]

Multimedia Appendix 2

Pre- and post-intervention questionnaire for the SGpriv trial.

[PDF File (Adobe PDF File), 109KB - resprot_v5i4e224_app2.pdf]

Multimedia Appendix 3

Informed consent form.

[PDF File (Adobe PDF File), 22KB - resprot_v5i4e224_app3.pdf]

Multimedia Appendix 4

Trial information sheet.

[PDF File (Adobe PDF File), 112KB - resprot_v5i4e224_app4.pdf]

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Abbreviations

AIDS: acquired immune deficiency syndrome
eNSF: Extended National Multi-sectoral HIV/AIDS Framework for 2014–2018
HIV: human immunodeficiency virus
M: mean
PRHS: perceived risk of HIV infection scale
SSA: Sub-Saharan Africa
UNAIDS: United Nations Programme on HIV/AIDS

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Multiple sexual partnerships and their correlates among Facebook users in Swaziland: an online cross-sectional study

Bhekumusa Wellington Lukhele*, Teeranee Techasrivichien, Patou Masika Musumari, Christina El-saaidi, S. Pilar Suguimoto, Masako Ono-Kihara and Masahiro Kihara

Department of Global Health and Socio-Epidemiology, Kyoto University School of Public Health, Kyoto, Japan
**Corresponding author email: bhekie.l@gmail.com*

Social networking sites (SNSs) have been suggested to facilitate risky sexual activities. However, it is unknown and of concern how SNSs such as Facebook shape risky sexual activities in developing settings such as Swaziland, the country hardest hit by HIV and AIDS. We conducted an online cross-sectional study in 2012 to explore the prevalence of multiple sexual partnerships (MSPs) and their correlates among Facebook users in Swaziland. The response rate was 44.1% (*N* = 882); relatively, an equal proportion of men 82.7% (341/414) and 82.9% (388/468) women had ever had sex. Of those sexually active, 44.9% of men and 30.7% of women reported having sex with someone they met on Facebook. Approximately half of the participants (61.6% men, 41.0% women and 50.6% total) reported MSPs over the past 12 months. Multiple logistic regression analysis revealed that time spent on Facebook, "finding it easier to initiate a romantic conversation on Facebook" and having had sex with someone met on Facebook were significantly associated with having MSPs (adjusted odds ratio = 1.6–3.8). The potential impact of risky sexual behaviour among Facebook users should be appropriately addressed particularly in high HIV-prevalent settings like Swaziland.

Keywords: Africa, HIV, internet, risky sexual behaviour, social networking sites

Introduction

Swaziland, which borders South Africa and has a population of approximately 1.3 million, has faced the most severe HIV epidemic worldwide, with HIV prevalence among 18–49-year-olds at 24% in 2006 and 25% in 2011 in men and 36% in 2006 and 39% in 2011 in women (Bicego et al., 2013; MOH DHS, 2007). In a recent cohort study HIV incidence among men between 18 and 49 years was estimated at 1.7/100 person-years and was almost twice as high among women of the same age range, at 3.1/100 person-years (Ministry of Health [MOH] Swaziland Health Indicator Measurement Survey [SHIMS], 2012). Modeling studies have attributed 94% of new infections to heterosexual transmission for both genders (Mngadi et al., 2009). More specifically, multiple concurrent sexual partnerships (MCPs) and multiple sexual partnerships (MSPs) have been identified as key behaviours that increase vulnerability to HIV infection in Swaziland. As a result, the Swaziland Ministry of Health has prioritised the reduction of MSPs, including MCPs, as a key strategy for HIV prevention (MOH Swaziland National Strategy for Social & Behaviour Change Communication [SBCC], 2010; MOH, 2012).

Online social networking technologies have rapidly grown in use and have been linked with increased risky sexual behaviours, mainly in developed settings (McFarlane, Bull, & Rietmeijer, 2000; 2002; Young, Szekeres, & Coates, 2013). Studies conducted in the United States have suggested that people use social networking to search for and meet sex partners and that those who use these technologies are more likely to engage in sexual behaviours that increase HIV risk, though all studies identified have been among MSM and homeless populations in developed settings (Rice, Monro, Barman-Adhikari & Young, 2010; Young & Rice, 2011; Young et al., 2013). Developing countries, including those in sub-Saharan Africa, have also been experiencing a dramatic increase in the use of social media fueled by low-cost mobile telephony (Mwangi et al., 2013). Facebook is one of the most popular networking sites globally. As of June 2012, Facebook had over 900 million active users worldwide (Facebook, 2012), of which approximately 51 million were in Africa, including Swaziland. Consequently, Facebook has emerged as a prominent new social networking platform in Swaziland and globally (Internet World Stats, 2013).

There is therefore an urgent need to explore the characteristics of sexual risk behaviours of SNS users in developing countries, particularly in sub-Saharan Africa. To address this research gap, we studied the prevalence of MSPs and their correlates among the users of Facebook, the most popular SNS in Swaziland.

Methods

This is an online cross-sectional survey of Facebook users in Swaziland.

Sample size

One of our main objectives was to investigate the correlates of MSPs among Facebook users. In the absence of

similar types of studies in Africa, we used marital status as a typical correlate of MSPs for sample size calculation since never-married has been frequently associated with MSPs. The proportions of the people who never married among those with MSP and those without MSPs have been suggested to be 58% and 41% (MOH Swaziland Demographic Health Survey [SDHS], 2007). The sample size required to detect the effect size statistical significance was 264 for both groups, at an α level of 0.05 (two-sided) and a power of 80% (Eng, 2003, 2012). Because of the low response rates of approximately 12–25% for online surveys reviewed by Deutskens, De Ruyter, Wetzels and Oosterveld (2004), we increased our sample size to 2 000.

Eligibility criteria and sampling procedures

The eligibility criteria were as follows: (1) Facebook users 18 years of age or older; (2) Swazi citizens; and (3) people who display their full surnames publicly on Facebook (Patricks, 2002 was used as a reference for Swazi surnames). At the time of the study, 63 720 individuals were estimated to be using Facebook in Swaziland (Socialbakers, 2012), accounting for around 8.3% of the Swazi population aged 15 years and above (United Nations Population Fund, 2015). The selection procedure was conducted in many steps. At first, a list of persons eligible for the study was compiled. This was performed using an inventory list of Swazi surnames previously documented elsewhere (Patricks, 2002). For example, a search on Facebook using a typical Swazi surname such as “Bhembe” helped document all individuals with the same surname along with their first names. In order to clearly distinguish individuals, and because it is common for Swazi people to have identical name and surnames, additional parameters among those publicly shared by Facebook users were enumerated. These parameters included any three of the following; “age”, “name of the school they studied at”, “name of work place”, “name of where they are from”, “number of friends”, “gender”, or “all information not shared publicly”. This information allowed us to send a message to the right person in case two or more Facebook users shared the same name and surname on Facebook. In this step, a total of 23 406 Facebook users were documented. The second step was the random selection of participants from the documented 23 406 users. A total of 2 000 participants were randomly selected without replacement using Microsoft Excel 2010. In the third step, the selected participants were contacted through Facebook messages informing them about the study and asking them to participate in the study. Those who agreed on participation were provided with an explanation sheet and an informed consent form, and a questionnaire that was accessible via a link. Figure 1 illustrates the sampling procedures. In total, 882 respondents completed the survey (response rate = 44.1%).

We had seven research assistants who worked from 08h00 to 17h00 continually for 21 days to do the enumeration. Our research assistants did not previously have Facebook accounts and had no friends in the duration of the 21 days. Recruitment and data collection were accomplished between September and November 2012.

Addressing duplicate responses

Duplicate responses are common in online surveys (Young, 2012). To address this issue, we asked the participants to submit their completed questionnaires together with their cell phone numbers, which served two purposes. First, the cellphone numbers were used to provide airtime reimbursement. Second, these numbers allowed us to identify duplicate questionnaire submissions. Eighty-six duplicate entries were identified and excluded from the study.

Development of the survey instrument

To facilitate development of a culturally appropriate questionnaire and to gain insights into recruitment issues, a preliminary qualitative study was conducted before this study (Creswell, 2003; Suguimoto, Ono-Kihara, Feldman & Kihara, 2012). Twenty-two Facebook users were recruited for focus group interviews (FGIs). The FGIs focused on a range of topics related to HIV and AIDS, activities on Facebook, opinions and experiences associated with seeking sexual partners on Facebook and sexual behaviours. The results from these FGIs and a literature review (MOH DHS, 2007; MOH, 2010) were used to draft our questionnaire, which consisted of the following: 25 items covering six socio-demographic variables, including age, gender, and marital status; 14 items related to sex or HIV, including the number of sexual partners over the last 12 months, condom use during the last sexual encounter, and perception that the steady sexual partner has other sexual partners; and five items related to Facebook use, including the time spent on Facebook each day, sexual experience with individuals encountered on Facebook, and the possible use of a health information Facebook page, if available. Furthermore, the questionnaire was piloted among 12 participants. Our pilot study had several aims: (1) to test the intelligibility of our questionnaire and resolve unclear or ambiguous language since the questionnaire was in English, (2) to test the compatibility of the questionnaire across different smartphone screen sizes and internet browsers, (3) to test the skip logic of the questionnaire and (4) to estimate the length of time it takes to complete the questionnaire. Then, attempts to reword unclear questions and offer additional explanations were made. For example, since some respondents said they were puzzled in answering the question “how old are you” because they were close to their next birth day, we added a clarification to this question to report their age on their last birth date. Such efforts improved the overall comprehension of our study.

Data analysis

Data were analysed using SPSS 21 for Windows (IBM Inc., Chicago, Illinois, USA). The outcome variable of interest, multiple sexual partnerships (MSPs) over the past 12 months (defined in our study in line with other behavioural surveys such as the Swaziland Demographic Health Survey (2007) as “having more than one sexual partner over the past 12 months”), was dichotomised as 1 (present) and 0 (absent). Univariate analysis was used to describe the population and bivariate analysis was performed to determine associations between MSPs and other factors in the form of odds ratio (OR). Finally, factors with *p* values below 0.10 in bivariate analysis and those considered epidemiologically important were simultaneously entered into a multivariate logistic regression model to calculate adjusted odds ratios (AORs)

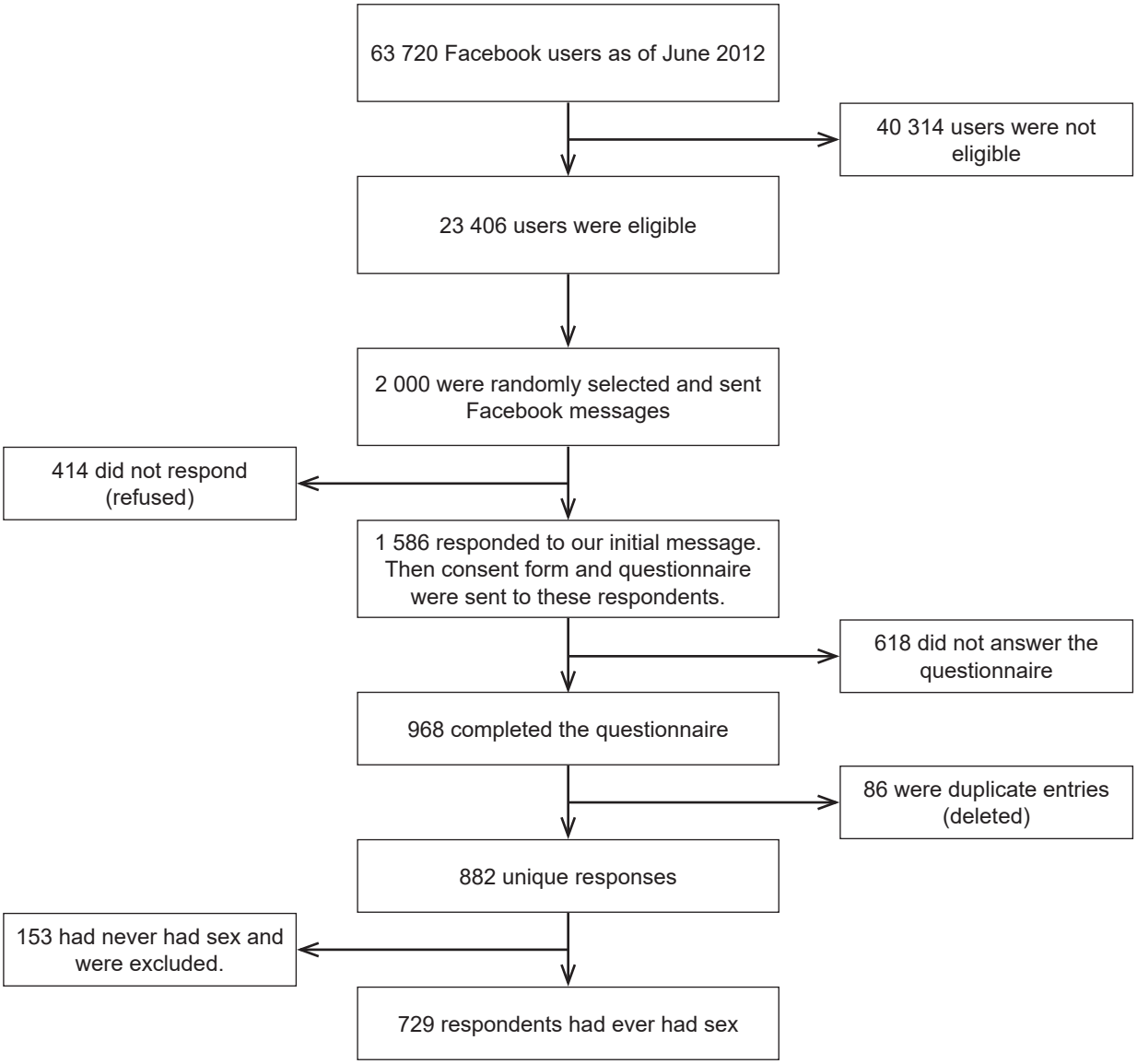

Figure 1: Flow diagram for sampling procedures

and 95% confidence intervals (CIs) to assess the magnitude of independent association of these factors with MSPs. We analysed men and women separately to account for gender-related differences in sexual behaviour.

Ethical considerations

This study was conducted according to the ethical principles outlined in the Declaration of Helsinki, and ethical approval was received from Kyoto University Graduate School and Faculty of Medicine Ethics Committee, Japan (Reference: E1432), and from Swaziland's Ministry of Health Ethics and Scientific Committee (Reference: MH/599C). After providing the participants with the study information sheet hyperlinked in a Facebook message explaining the purpose of the study, study procedures and participants' rights as human subjects, we obtained web-based informed consent from all participants. Questionnaire responses were anonymised, and identifying information was removed before data analysis to ensure the respondents' privacy and confidentiality.

Results

Socio-demographic characteristics

In total, 882 (44%) participants responded to the survey, 414 were men and 468 were women. Almost equal proportions of men and women had ever had sex (82.7% vs. 82.9%). The current data analysis is restricted to the participants who had ever had sex. Most respondents were in the age group of 20–29 years; 232 (68%) and 267 (68.8%) for men and women respectively. The majority of the participants were never married (73.6% for men, 64.7% women and 68.9% in total) and 90.3% for men, 93.6% for women and 92% in total had completed secondary school.

Bivariate logistic regression analysis

Table 1 displays the results of bivariate logistic regression analyses of the sexually active participants (n = 729). Approximately half of the participants (61.6% men, 41.0% women and 50.6% in total) reported MSPs over the past 12 months. Younger age was significantly and

Table 1: Socio-demographic information and bivariate analysis of factors associated with multiple sexual partnerships among 729 sexually active participants

Characteristics		Total (N = 729)			Males (n =341)			Females (n = 388)		
		Total	n with MSPs (%)	OR (95% CI)	Total	n with MSPs (%)	OR (95% CI)	Total	n with MSPs (%)	OR (95% CI)
Demographic variables										
Age (years)	18–19	44	26 (59)	2.1 (1.1–4.1)*	19	11 (58)	4.7 (1.3–17.1)*	25	15 (60)	3.5 (1.4–8.6)**
	20–24	301	171 (57)	1.9 (1.3–2.7)**	132	98 (74)	1.5 (1.0–2.7)	169	73 (43)	1.8 (1.0–3.0)*
	25–29	198	96 (48)	1.4 (0.9–2.0)	100	54 (54)	0.8 (0.4–1.4)	98	42 (43)	1.7 (0.9–3.1)
	30–51	186	76 (41)	ref	90	47 (52)	ref	96	29 (30)	ref
Gender	Male	341	210 (62)	2.3 (1.7–3.1)**	n/a	n/a	n/a	n/a	n/a	n/a
	Female	388	159 (41)	ref	n/a	n/a	n/a	n/a	n/a	n/a
Marital status	Never married	502	286 (57)	2.3 (1.7–3.2)**	251	173 (69)	3.2 (1.9–5.2)**	251	113 (45)	1.6 (1.1–2.9)*
	Ever married	227	83 (37)	ref	90	37 (41)	ref	137	46 (34)	ref
Employment	Not employed	342	184 (54)	1.3 (1.0–1.7)	149	99 (66)	1.4 (0.9–2.3)	193	85 (44)	1.2 (0.9–1.7)
	Employed	387	185 (48)	ref	192	111 (58)	ref	195	74 (38)	ref
Highest level of education										
	Secondary	58	39 (67)	2.2 (1.2–4.0) **	33	23 (70)	1.4 (0.7–3.2)	25	16 (64)	3.0 (1.3–7.0)*
	High School	233	120 (52)	1.1 (0.8–2.3)	116	69 (79)	0.9 (0.6–1.5)	117	51 (44)	1.2 (0.9–2.0)
	Tertiary	438	210 (48)	ref	192	118 (62)	ref	246	92 (37)	ref
Sexual variables										
Circumcision status	Yes	n/a	n/a	n/a	190	122 (64)	1.3 (0.8–1.9)	n/a	n/a	n/a
	No				151	88 (58)	ref			
Condom use during last sexual encounter	Yes	500	266 (53)	1.4 (1.0–1.9)	236	153 (65)	1.6 (1.0–2.5)	264	113 (43)	1.3 (0.8–2.0)
	No	229	103 (45)	ref	105	57 (54)	ref	124	46 (37)	ref
Thinks steady partner has other sexual partners	Yes	443	263 (59)	2.5 (1.8–3.4)**	196	138 (70)	2.4 (1.5–3.8)**	247	125 (51)	3.2 (2.0–5.1)**
	No	286	106 (37)	ref	145	72 (50)	ref	141	34 (24)	ref
Facebook variables										
Time spent on Facebook per day	<30 minutes	270	121 (45)	ref	130	70 (54)	ref	140	51 (36)	ref
	30 minutes ≤3 hours	275	126 (46)	1.0 (0.7–1.5)	129	76 (59)	1.2 (0.8–2.0)	146	50 (34)	0.9 (0.7–1.5)
	3 hours ≤6 hours	96	53 (55)	1.5 (0.9–2.4)	42	29 (69)	1.9 (0.9–4.0)	54	24 (44)	1.4 (0.7–2.6)
	≥ 6 hours	88	69 (78)	4.5 (2.6–7.8)**	40	35 (88)	6.2 (2.2–16)**	48	34 (71)	4.2 (2.1–8.6)*
Sex with someone met on Facebook	Yes	272	202 (74)	5.1 (3.6–7.1)**	153	123 (80)	4.7 (2.9–7.8)**	119	79 (66)	4.8 (3.0–7.6)**
	No	457	167 (37)	ref	188	87 (46)	ref	269	80 (30)	ref
Ease of using Facebook to initiate a romantic conversation on Facebook than initiating it face-to-face	Yes	255	168 (66)	1.2 (0.9–1.6)	140	98 (70)	1.0 (0.7–1.6)	115	70 (61)	1.4 (0.9–2.3)
	Else	474	201 (42)	ref	201	112 (56)	ref	273	89 (33)	ref
Number of Facebook friends	0–49	62	29 (47)	ref	32	18 (56)	ref	30	11 (37)	ref
	50–299	338	155 (46)	0.9 (0.6–1.7)	150	87 (58)	1.0 (0.5–2.3)	188	68 (36)	0.9 (0.4–2.2)
	300–499	144	78 (54)	1.4 (0.7–2.4)	69	44 (64)	1.3 (0.6–3.2)	75	34 (45)	1.4 (0.6–3.4)
	500–5000	185	107 (58)	1.6 (0.9–7.8)	90	61 (68)	1.6 (0.7–3.7)	95	46 (48)	1.6 (0.6–3.8)
Would use a Facebook health page to seek information	Yes	510	273 (54)	1.5 (1.1–2.0)*	233	152 (65)	1.6 (1.0–3.6)*	277	121 (44)	1.5 (0.9–2.4)
	No	219	96 (44)	ref	108	58 (54)	ref	111	38 (34)	ref
Perception										
Perception of HIV risk	Low	442	202 (46)	ref	200	114 (57)	ref	242	88 (36)	ref
	Medium	214	128 (60)	1.8 (1.3–2.5)**	100	71 (71)	1.8 (1.1–3.0)*	114	57 (50)	1.7 (1.1–2.7)*
	High	73	39 (53)	1.4 (0.8–2.2)	41	25 (61)	1.1 (0.6–2.3)	32	14 (44)	1.3 (0.6–2.8)

Bivariate analysis for factors associated with multiple sexual partnerships in the total population, in males and females
MSP = Multiple sexual partnerships; OR = odds ratio; CI = 95% confidence interval; *p < 0.05. **p < 0.01; n/a = not applicable

dose-dependently associated with MSPs (odds ratio [OR] = 1.3–2.1). Similarly, male gender (OR = 2.3, $p < 0.01$), never having been married (OR = 2.3, $p < 0.01$), and having completed a secondary school education (OR = 2.2, $p < 0.01$) were significantly associated with MSPs. The majority of participants 60.8% (57.5% for men and 63.7% for women) believed that their "steady partner has other sexual partners" and this perception was significantly associated with MSPs (OR = 2.5, $p < 0.01$), as well as HIV risk perception of a medium magnitude (OR = 1.8, $p < 0.01$). Time spent on Facebook was dose-dependently associated with MSPs, and having "ever had sex with someone met on Facebook," reported by 37.3% (44.9% men and 30.8% women) of the sexually active participants, was strongly associated with MSPs (OR = 5.1, $p < 0.01$). Up to 70.0% of the sexually active participants responded that they would use a health information Facebook page if it became available in future, and those who had MSPs were approximately twice as likely to report willingness to use such a page as those who did not (OR = 1.5, $p < 0.05$).

Multivariate logistic regression analysis

Table 2 displays the results of multivariate logistic regression analyses of the sexually active participants ($n = 729$), which revealed that male gender, never having been married, an education of up to secondary school, condom use during the last sexual encounter, the belief that their "steady partner has other sexual partners," having a high HIV risk perception, over six hours of Facebook use per day, and having sex with someone met on Facebook were significantly associated with MSPs (AORs = 1.6–3.8). The risk profiles were similar between genders; however, those who had completed secondary education and "finding it easier to initiate a romantic conversation on Facebook than initiating it face-to-face" were significantly correlated with MSPs in women (AORs = 6.0 and 2.2, respectively) but not in men (AORs = 1.1 and 1.0, respectively). Condom use during the last sexual encounter was significantly correlated with MSPs among all participants but did not reach statistical significance when it was separately analysed in men and women.

Discussion

To our knowledge, our study is the first to describe the prevalence of MSPs and their correlates among Facebook users in Swaziland and sub-Saharan Africa at large. Our study has greater methodological strength compared with previous online studies because the participants were sampled randomly with a relatively high response rate (44%), and a mixed methods approach (Creswell, 2003) was employed to develop a culturally appropriate questionnaire. Response rates in studies of this nature have ranged from 12% to 25% as reported by Deutskens et al. (2004).

Prevalence of MSPs among Facebook users

Having MSPs has been highlighted as a risky sexual behaviour and is one of the key drivers of the HIV epidemic in Swaziland (MOH DHS, 2007; Mngadi et al. 2009). The

Table 2: Multivariate logistic regression analysis of factors associated with MSPs

Characteristic	Total ($N = 729$)			Males ($n = 341$)			Females ($n = 388$)		
	AOR	95% CI	*p*-value	AOR	95% CI	*p*-value	AOR	95% CI	*p*-value
Demographic variables									
Age	1.0	0.9–1.0	0.71	1.0	0.9–1.0	0.38	0.9	0.9–1.0)	0.03
Gender (male/female)	1.9	1.3–2.9	0.00	n/a	n/a	n/a	n/a	n/a	n/a
Marital status (never married/ever married)	1.8	1.1–2.8	0.03	2.8	1.3–5.7	0.00	1.4.	0.7–2.7	0.35
Employment status (no/yes)	1.1	0.7–1.6	0.78	1.1	0.6–2.0	0.69	1.1	0.6–2.2	0.60
Highest level of education (≤secondary/>secondary)	2.7	1.7–5.6	0.01	1.1	0.4–2.8	0.87	6.0	1.7–22.0	0.00
Sex-related variables									
Circumcision status (yes/no)	n/a	n/a	n/a	1.0	0.6–1.8	0.86	n/a	n/a	n/a
Condom use during the last sexual encounter (yes/no)	1.6	1.1–2.5	0.03	1.5	0.8–2.8	0.16	1.6	0.8–2.9	0.18
Thinks steady partner has other sexual partners (yes/no)	2.6	1.7–4.0	0.00	2.4	1.4–4.3	0.00	2.9	1.5–5.4	0.00
Perception of risk of HIV infection (high/low)	1.6	1.1–2.4	0.00	1.4	0.8–2.7	0.17	2.0	1.1–3.7	0.02
Facebook-related variables									
Time spent on Facebook per day (<30 minutes)	ref			ref			ref		
(≥30 minutes <6 hours)	1.4	0.8–2.5	0.27	1.5	0.6–3.7	0.40	1.2	0.6–2.8	0.60
(≥6 hours)	3.0	1.5–6.0	0.03	3.3	1.0–11.0	0.05	2.6	1.0–6.5	0.04
Ease of using Facebook to initiate a romantic conversation on Facebook than initiating it face-to-face (yes/else)	1.4	0.9– 2.1	0.10	1.0	0.6–1.7	0.96	2.2	1.2–4.1	0.01
Sex with someone met on Facebook (yes/no)	3.8	2.5–5.8	0.00	3.7	2.0–6.7	0.00	4.3	2.4–8.0	0.00
Would use a health Facebook page to seek health information (yes/no)	2.7	0.8– 9.6	0.12	7.5	0.7–79.0	0.76	1.2	0.8–2.9	0.87

Multiple logistic regression analysis of variables associated with multiple sexual partnerships in the total population, in males, and females. n/a = not applicable. Denominator indicates the reference group. ref = reference group. "Else" = represents collapsed response categories of "no" and "I have never had this experience". AOR = adjusted odds ratio. CI = 95% confidence interval. We adjusted the sexual related variables and Facebook variables for demographic variables.

MSP prevalence among the sexually active population has been estimated at 11.1% and 11.4% in two recent nationwide surveys (MOH, DHS 2007; MOH, 2010). Although we cannot directly compare the prevalence of MSPs in our study with those of these surveys, its prevalence in our study appears greater than that in the general population because even the most conservative estimate is 20.0% (369/1847), which was calculated assuming that all non-responders in our study (n = 1 118) were sexually active but did not have MSPs. Even this conservative estimate is two times greater than the rate in the general population. The high rate of risky sexual behaviours found in our study is consistent with observations in the United States; Young adults who seek sex on the internet participate in more risky sexual behaviours than the general population (McFarlane et al., 2000) and the same observation was reported among men who have sex with men and homeless populations in developed settings (Rice et al., 2010; Young & Rice, 2011; Young et al., 2013). However, in view of about 40 000 Facebook users excluded from our study and the potential bias introduced in our eligible population, interpretation of our finding requires great caution before it is confirmed in community-based studies comparing between SNS users and non-users. One possibility would be that people with multiple sexual partnerships tend to use Facebook for communication with multiple partners, which should be also explored in future studies including ethnography. Whatever the case may be, in a country where approximately 26% of the general population is living with HIV, the potentially high MSP prevalence among Facebook users warrants for future studies and targeted HIV interventions.

Correlates of MSPs among Facebook users

Our study revealed risk factors for MSPs among Facebook users in Swaziland that were related to Facebook use. Of the risk factors identified, time spent on Facebook and "having had sex with someone met on Facebook" were significantly associated with an increased likelihood of MSPs in men, women and overall. In our study, "someone met on Facebook" was defined as "someone the participant has talked to -for the first time- on Facebook". This includes not only people they know but also strangers who are presumably friends of friends or people who are in similar Facebook groups. The rational of this definition lies in the fact that a substantial proportion of Facebook users (24%) accept friend requests from strangers (Pempek, Yermolayeva & Calvert, 2009).

The phenomenon of accepting strangers as friends on Facebook and the associated reasons are commonly reported despite the fact that many SNSs including Facebook restrict such an activity due to security and privacy reasons. For example, it was recently qualitatively revealed that some Facebook users prefer to accept friend requests from strangers than someone they know in real life (Rashtian, Boshmaf, Jaferian & Beznosov, 2014): "*I prefer to have more of these unknown guys instead of our neighbour's son, as some of them post cool stuff and I don't need to be worried about my posts, because none of them would tell my dad what I am doing!*" and *"the fact that the friend requester is an active Facebook user is sometimes the most important factor, even more than knowing the requester"*. Gender is also reported as an effective strategy to get friend requests: *"I am sorry to say it but a picture of a pretty girl would get hundreds of friendship requests or even messages"*. Although only a limited number of studies are available, it is likely that becoming friends with strangers on Facebook is more prevalent than what Facebook intends in its user policy.

Further, "finding it easier to initiate a romantic conversation on Facebook than initiating it face-to-face" was significantly associated with MSPs only in women. Taken together, these findings may suggest that Facebook has emerged as a new platform for young people in Swaziland to seek sexual partners. In the United States, studies among homeless youth concluded that "As online social network usage continues to increase, users will develop innovative and easier ways to find sex partners online. In order to prevent the spread of HIV and other STIs, it is important to understand the role that online social networking technologies play in the lives of people who face disproportionate risk" (Young & Rice, 2011, p. 259; Young et al., 2013). Although a direct comparison with our study is difficult because of differences in population characteristics and variables assessed, the results of these studies are consistent with those of our study. In a developing setting, a qualitative study of young women SNS users conducted in Thailand reported that users found it easier to initiate romantic conversations over the internet because people are less shy and more daring than when talking face-to-face (Boonmongkon et al., 2013). This finding particularly relates to the significant correlation of "finding it easier to initiate a romantic conversation on Facebook than initiating it face-to-face" with MSPs in women but not in men in this study. Swazi and Thai women, who are under the social pressure of chastity (van Rooyen & Hartell 2010; Boonmongkon et al., 2013), may find that SNSs are avenues for expression of their sexuality. Time spent on Facebook was dose-dependently associated with MSPs, which can be interpreted as either a cause or an effect. Nevertheless, HIV prevention programmes in Swaziland should target people spending hours on Facebook because they are at high risk of having MSPs, particularly those spending over 6 hours, 70–90% of whom have MSPs.

Another significant correlate of MSPs in men, women and overall, was the perception that the "steady partner has other sexual partners", which was shared by approximately 60% of the total participants. This finding suggests that having MSPs is regarded as a widespread practice or even the norm within this subset of the study population. Addressing this perception is an important target for HIV prevention programmes. More studies are needed to explore this perception in relation to actual sexual practices between steady couples.

Approximately 70% of the survey participants had never been married, and these individuals were found to be twice as likely to have MSPs compared to those who had married. If Facebook use keeps expanding among young single people and the availability of increasingly affordable cell phones continues to spread, their MSP prevalence may increase, potentially placing them at risk of HIV infection. Education levels were relatively similarly distributed between the genders, under 7% having completed secondary school education. However, education level was differentially related

to MSPs by gender, as determined by multivariate analysis (women, AOR > 5; men, AOR = 1.1). Although the reason for this difference is unknown, women with a low education level may have poor health literacy, preventing them from engaging in safe sexual behaviours, or they may be placed in an economically compromised situation that forces them to seek sex on SNSs in exchange for paying of their living expenses or material goods as has been suggested in studies of MSM and homeless youth in the United States.

Potential of Facebook as a health communication tool

Approximately 70% of all participants and over 75% of those with MSPs reported that they would use a health information Facebook page if it became available. Although the types of information that they need and how such a page should be constructed to attract sustained interest are unknown, this finding suggests that SNSs including Facebook may be effective and interactive channels for health communication, particularly for the subset of Facebook users at high risk of HIV infection. Recently, Facebook launched a service called "Free basics by Facebook" through which organisations can submit applications to Facebook to make their online services such as HIV prevention available free of cost to users in developing settings. More importantly, systematic research with the goal of creating such a novel communication tool may be very valuable in future HIV prevention programmes in Swaziland.

Study limitations

The findings of our study are subject to the limitations inherent in online-based surveys and cross-sectional studies. First, while our response rate was higher than most other online studies, the large non-response could have resulted in participation bias in the study, particularly if the respondents were biased toward sexual inactivity/activity. Moreover, our eligibility criteria included Facebook users who had made their surnames public on Facebook. Thus, those who used pseudonyms or made their surnames private on Facebook were excluded from this study, which may have excluded users who joined Facebook for the sole intention of meeting potential sexual partners and may have caused underestimation of important variables. Second, although this study was designed based on findings from a preliminary qualitative study, an additional qualitative study would give insights into the dynamics of how young Swazis are using Facebook to expand their sexual partnerships. Without such a qualitative inquiry, interpretation of the observed association between "finding it easier to initiate a romantic conversation on Facebook than initiating it face-to-face" and MSPs should be understood with due caution. Therefore, we call for qualitative studies to capture details of such Facebook use. Third, because of the cross-sectional nature of this study, cause-effect relationships cannot be established between our outcome variable and other independent variables. Fourth, this study did not explicitly differentiate whether "someone met on Facebook" was a stranger or a non-sexual relationship that transformed into a sexual relationship that should also be explored in future studies. Notwithstanding these limitations, this study contributes to shed light on the potential relationship of social media with risky sexual practice and points out the necessity of future research and HIV prevention considerations.

Conclusion

The main finding from our study is that a significant proportion of our study population has ever had sex with someone they met on Facebook, and that the prevalence of MSPs in this population was high. Although we were able to identify important factors associated with MSPs (time spent on Facebook, "finding it easier to initiate a romantic conversation on Facebook" and having had sex with someone met on Facebook), there remain important question of how people use Facebook to meet and or transform relationships into sexual ones for which future research should endeavour to address. On the other hand, Facebook appears to have potential for use as a novel channel for health communication. This was supported by the finding that the majority of participants with MSPs expressed positive attitudes towards using a health communication Facebook page if it became available. More research in this area is warranted in order to determine the effectiveness of using Facebook as a platform for behavioural change communication.

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Research article

Development of a prediction model for child maltreatment recurrence in Japan: A historical cohort study using data from a Child Guidance Center

Hiroyuki Horikawa[a,c,*], S. Pilar Suguimoto[b,c], Patou Masika Musumari[c], Teeranee Techasrivichien[c], Masako Ono-Kihara[c], Masahiro Kihara[c]

[a] Shiga Prefectural Mental Health and Welfare Center, Mureyama-so House, Kasayama 8-Chome 5-130, Kusatsu City, Shiga, 525-0072, Japan
[b] Center for Medical Education, Graduate School of Medicine, Kyoto University, Faculty of Medicine Building E Room 109, Yoshida Konoe-cho, Sakyo-ku, Kyoto, 606-8501, Japan
[c] Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Science Frontier Laboratory Room 204, Yoshida Konoe-cho, Sakyo-ku, Kyoto, 606-8501, Japan

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ABSTRACT

To develop a prediction model for the first recurrence of child maltreatment within the first year after the initial report, we carried out a historical cohort study using administrative data from 716 incident cases of child maltreatment (physical abuse, psychological abuse, or neglect) not receiving support services, reported between April 1, 1996 through March 31, 2011 to Shiga Central Child Guidance Center, Japan. In total, 23 items related to characteristics of the child, the maltreatment, the offender, household, and other related factors were selected as predictive variables and analyzed by multivariate logistic regression model for association with first recurrence of maltreatment. According to the stepwise selection procedure six factors were identified that include 9–13 year age of child (AOR = 3.43/95%CI = 1.52–7.72), <40 year age of the offender (AOR = 1.65/95%CI = 1.09–2.51), offender's history of maltreatment during childhood (AOR = 2.56/95%CI = 1.31–4.99), household financial instability or poverty (AOR = 1.64/95%CI = 1.10–2.45), absence of someone in the community who could watch over the child (AOR = 1.68/95%CI = 1.16–2.44), and the organization as the referral source (AOR = 2.21/95%CI = 1.24–3.93). Using these six predictors, we generated a linear prediction model with a sensitivity and specificity of 45.2% and 82.4%, respectively. The model may be useful to assess the risk of further maltreatment and help the child and family welfare administrations to develop preventive strategies for recurrence.

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Abbreviations: CGC, Child guidance center; AIC, Akaike's information criterion; ROC, receiver-operating characteristic; AUC, areas under the curve; SD, standard deviation; IQR, interquartile range; OR, odds ratio; 95%CI, 95% confidence interval; AOR, adjusted odds ratio.

* Corresponding author at: Shiga Prefectural Mental Health and Welfare Center, Mureyama-so House, Kasayama 8-Chome 5-130, Kusatsu City, Shiga, 525-0072, Japan.

E-mail addresses: hir.horikawa@gmail.com (H. Horikawa), suguimoto.pilar.2w@kyoto-u.ac.jp (S.P. Suguimoto), patoumus@yahoo.fr (P.M. Musumari), techasrivichien.teeranee.2a@kyoto-u.ac.jp (T. Techasrivichien), kihara.masako.2u@kyoto-u.ac.jp (M. Ono-Kihara), kihara.masahiro.4n@kyoto-u.ac.jp (M. Kihara).

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1. Introduction

Children who experience maltreatment are at increased risk of long term physical, psychological, and behavioral consequences (Berlin, Appleyard, & Dodge, 2011; Norman et al., 2012; Tanaka, Georgiades, Boyle, & MacMillan, 2015; Tanaka, Wekerle, Schmuck, & Paglia-Boak, 2011; Widom, Czaja, Bentley, & Johnson, 2012). Reports of child maltreatment have been steadily increasing since the late 1990s in Japan (Equal Employment, Children and Families Bureau, 2013a, 2015). In response, Child Abuse Prevention Law in 2000 was enacted in 2000, introducing a series of measures to prevent maltreatment and protect children who have suffered maltreatment including health support for pregnant women (Equal Employment, Children and Families Bureau, 2009); home visiting services for all parents of new infants before 4 months of age (Equal Employment, Children and Families Bureau, 2007a); strengthening of the foster parent system (Equal Employment, Children and Families Bureau, 2012); confirmation of the child's safety within 48 h after receiving a notification (Equal Employment, Children and Families Bureau, 2007b); and the partial revision of the Civil Law to restrict parental authority (Equal Employment, Children and Families Bureau, 2011). Despite all these measures, the number of child abuse consultations handled at the Child Guidance Center (CGC), the main organization that deals with child maltreatment, nationwide has not subsided. The consultations increased by 8077%, from 1101 in 1990 to 88,931 in 2014 (Equal Employment, Children and Families Bureau, 2013a, 2015), indicating that child maltreatment has become a serious social concern in Japan.

In 2008, the National Association of Child Guidance Center Directors conducted a nationwide survey on the situation of response, service provision and treatment for child maltreatment cases at the CGCs, but did not include questions about recurrence (Maruyama, 2009; National Association of Child Guidance Center Directors, 2009). Later in 2010, as part of the policy evaluation, the Ministry of Internal Affairs and Communications carried out the only survey to date, albeit not random, describing the proportion of child maltreatment recurrence as 9.5% (269/2823), 9.1% (272/2974), and 5.0% (166/3322) in 2007, 2008 and 2009, respectively (Administrative Evaluation Bureau, 2013). Unfortunately, systematic statistical data and studies with robust methodology are still lacking in Japan.

It is important to ensure that the child has a safe and an adequate environment enabling both mental and physical growth. In this regard, a thorough understanding of factors associated with maltreatment recurrence is of vital importance and very useful to guide effective preventive strategies. Studies on predictors of recurrence have been carried out in many countries, especially in the United States. However, results varied greatly probably due to differences in the study population, study design, definition and classification of maltreatment, as well as methods for data collection (Fluke & Hollinshead, 2003; Hindley, Ramchandani, & Jones, 2006; White, Hindley, & Jones, 2015). Numerous factors have been identified as predictors for maltreatment recurrence that include case characteristics of child, offender, caregiver, and family (Bae, Solomon, & Gelles, 2009; Casanueva et al., 2015; DePanfilis & Zuravin, 1999a; Dorsey, Mustillo, Farmer, & Elbogen, 2008; Drake, Jonson-Reid, & Sapokaite, 2006; English, Marshall, Brummel, & Orme, 1999; Fluke, Chabot, Fallon, MacLaurin, & Blackstock, 2010; Fluke, Shusterman, Hollinshead, & Yuan, 2008; Fluke, Yuan, & Edwards, 1999; Fryer & Miyoshi, 1994; Hélie & Bouchard, 2010; Helie, Laurier, Pineau-Villeneuve, & Royer, 2013; Putnam-Hornstein, Simon, Eastman, & Magruder, 2015; Sledjeski, Dierker, Brigham, & Breslin, 2008), agency factors and resources in community (Maguire-Jack & Font, 2014), sequence towards substantiation (Casanueva et al., 2015; Eastman, Mitchell, & Putnam-Hornstein, 2016; Putnam-Hornstein et al., 2015), and effects of service provisions after initial report (DePanfilis & Zuravin, 2002; Eastman et al., 2016; Jonson-Reid, Chung, Way, & Jolley, 2010; MacMillan et al., 2009).

Although there are common predictors identified in the literature such as young age (Bae et al., 2009; Drake et al., 2006; Fluke et al., 1999, 2008; Fryer & Miyoshi, 1994), prior reports (Bae et al., 2009; Fluke et al., 1999, 2008; Fryer & Miyoshi, 1994) and neglect (DePanfilis & Zuravin, 1999a; Drake et al., 2006; Fluke et al., 1999; Fryer & Miyoshi, 1994), because many other factors differ between studies, a universal standardized recurrence risk assessment tool does not exist (D'Andrade, Austin, & Benton, 2008; DePanfilis & Scannapieco, 1994; Gillingham, 2015; Johnson, 2011).

The Japanese government issued guidelines to assess the need for temporary protective custody (Equal Employment, Children and Families Bureau, 2013c) and there is a proposed assessment tool that is being widely used to manage support in the community (Fujiwara, Okuyama, & Ishii, 2006; Kato, 2009; Sato, 2008), but there is no standardized assessment tool that could help the CGC make an initial rapid judgment of the necessary measures to prevent the recurrence of maltreatment (Administrative Evaluation Bureau, 2013; Equal Employment, Children and Families Bureau, 2013c). Therefore, the aim of our study is to develop a multivariate model to identify children with significantly increased risk for first recurrence of child maltreatment within a year in a historical cohort study using the database of the CGC in one prefecture of Japan.

2. Methods

2.1. Data source

In Japan, the main authority responsible for child and family welfare is the CGC, who can work in cooperation with the Municipal Child Family Support Division (Equal Employment, Children and Families Bureau, 2010). The CGC manages the investigation, confirmation and initial response of reported cases of child maltreatment, and may provide services to the family or separate the child from the family. Upon notification of maltreatment, the CGC assesses the case. A multidisciplinary team, consisting of a medical doctor, child welfare officer, child psychologist, childcare instructor and childcare guidance staff work with the abused child, offender, family members and other concerned parties to take a course of action in the best

interest of the child (Equal Employment, Children and Families Bureau, 2013b). The CGC may separate a maltreated child from the offender to ensure the child's safety, but also at the request of parents or guardians.

This study is based on secondary data obtained from Shiga Central CGC. The center service area covered rural and semi-urban areas in Shiga prefecture during the period of our study. Also the estimated total and child population residing in the area of the Shiga CGGs had little variation; 1,299,046 total population and 282,534 (21.7%) child population in 1996, compared to 1,403,977 total populations and 255,472 (18.7%) child population in 2010. The database used standardized items on case attributes and assessment indicators adopted from the survey of the National Association of Child Guidance Center Directors performed in 1996 (National Association of Child Guidance Center Directors, 1997). Results of the initial investigation of suspected maltreatment cases were recorded at first in a paper-based registration form and later converted to digital format by a database manager. The database included all suspected cases of child maltreatment (physical abuse, psychological abuse, sexual abuse, and neglect) reported between April 1, 1996 and March 31, 2011 to the Shiga Central CGC, accounting for a total of 4201 cases. Although the original database included personal information such as name, address and phone number to help track the cases, they were removed from the database prior to this study except for the unique identification number associated to the case and its recurrence notification. In accordance to the Child Welfare Law and Child Maltreatment Prevention Law, only cases of children under 18 years of age are registered in this database at the first report of maltreatment. However, once the child is registered, even if s/he turns 18, the regional council at the Municipal Child Family Support Division monitors the case for a minimum duration of one year after registration and may continue until the child reaches 20. Along this time, the local CGC provides support if it is necessary.

2.2. Sample selection

We selected the cases of substantiated child maltreatment (physical abuse, psychological abuse, or neglect) newly reported between April 1, 1996 and March 31, 2011 that after initial assessment of the Shiga Central CGC were all kept under observation (monitoring) and had at least one-year of follow up. Fig. 1 shows in detail the selection method. We excluded cases where the initial report was after April 1, 2010 because they had less than one year of follow up by March 31, 2011, end of the study period (616 cases), and the cases of abuse or neglect that could not be substantiated (339 cases), cases where provision of service was suspended (19 cases), cases where the main form of abuse was sexual (91 cases) because the handling of these cases is substantially different from other forms of abuse or neglect; the child is immediately distanced from his/her home and placed in a temporary protection center for 2–4 weeks generally, and both the child and the family go through a series of treatment for at least a year thereafter to prevent recurrence (National Association of Child Guidance Center Directors, 2013). We also excluded cases where the child was separated from the family (278 cases), had confirmed history of previous abuse or neglect (1402 cases), or were receiving any medical, psychological, or clinical social support (740 cases). Cases receiving any support were excluded because no recurrence is to be recorded during support period even if it happened. Inclusion of these cases therefore results in an underestimation of the rate of recurrence.

2.3. Variables

2.3.1. Study outcome: child maltreatment first recurrence. In our study, child maltreatment first recurrence was defined as a first substantiated report of maltreatment including physical abuse, psychological abuse, sexual abuse or neglect that occurred within 1 year from a prior substantiation involving the same child.

Shiga Central CGC used definitions of physical abuse, psychological abuse, sexual abuse and neglect as considered in the Child Welfare Law. Child maltreatment constituted an event happening inside the family or an act by any of the family members. Physical abuse included the acts of hitting, kicking, throwing and shaking, burning, drowning, or strangling. Psychological abuse included verbal threatening, ignoring, discriminatory treatment between brother and sisters, or witnessing domestic violence. Sexual abuse included involving a child in sexual acts, witnessing any sexual activities, touching a child's sex organs, guiding a child to touch any sex organs, or subjecting a child to pornography. It was considered neglect when there was no parental caregiving or there was disregard for the child such as not providing enough meals, keeping a filthy and dangerous house environment, not providing healthy daily routine, not taking the child to the hospital even in case of a serious illness, or leaving the child unattended in a car.

2.3.2. Independent variables. Based on standardized items on case attributes and assessment indicators adopted from the survey of the National Association of Child Guidance Center Directors performed in 1996 and previous studies of historical cohort design (Bae, Solomon, & Gelles, 2007; Bae et al., 2009; Sledjeski et al., 2008; Wolock & Magura, 1996), we selected 23 items as independent (predicting) variables and explored their association with maltreatment recurrence. These variables are common between the standardized items used in Japan and those in international literature except for the variables "presence of community member(s) who could watch over the maltreated child" and "neighbor as referral source" that are unique and important in Japan's social context. The items included were: (1) type of the maltreatment (Bae et al., 2009; Fryer & Miyoshi, 1994; Sledjeski et al., 2008) and frequency (English et al., 1999); (2) child characteristics such as gender (Fluke et al., 2008; Jonson-Reid, Drake, Chung, & Way, 2003; Sledjeski et al., 2008), age (Fluke et al., 1999; Helie et al., 2013), medically diagnosed symptoms at the time of registration (Sledjeski et al., 2008), mental or physical disability (Bae et al., 2009; DePanfilis & Zuravin, 1999b; Drake et al., 2006; Sledjeski et al., 2008), emotional or behavioral problems (Drake et al.,

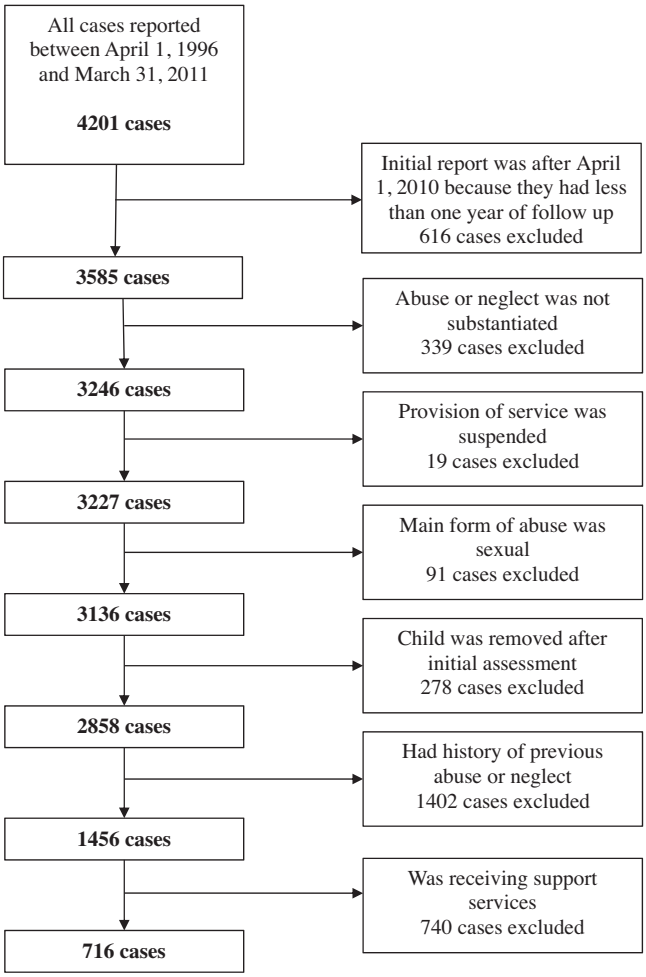

Fig. 1. Flow diagram of cases included and excluded from our study.

2006), reactive emotional instability (Sledjeski et al., 2008), and other upbringing problems (Drake et al., 2006); (3) items regarding the offender such as main offender (Jonson-Reid et al., 2003; Sledjeski et al., 2008) and offender's age (Dorsey et al., 2008), disability (Barth, Gibbons, & Guo, 2006; Sledjeski et al., 2008; Wolock & Magura, 1996), history of maltreatment during childhood (Dorsey et al., 2008; English et al., 1999; Wolock & Magura, 1996), whether or not the offender lived with the victimized child (Sledjeski et al., 2008), and willingness to cooperate with the CGC (Sledjeski et al., 2008); (4) household characteristics such as number of family members (Bae et al., 2007, 2009), siblings with history of maltreatment (Eastman et al., 2016; Putnam-Hornstein et al., 2015), presence of an adult family member who could protect the maltreated child from the offender (Sledjeski et al., 2008), financial instability or poverty (Barth et al., 2006; Wolock & Magura, 1996), and family discord or domestic violence (Dorsey et al., 2008; Sledjeski et al., 2008); and (5) other relevant items such as the presence of someone in the community (relatives, neighbors or volunteers) who could watch over and stay informed about the maltreated child (Wolock & Magura, 1996), previous welfare consultation to the CGC (Fluke et al., 2008), and referral source such as individual or organization (Bae et al., 2007, 2009), neighbors, and the maltreated child or his/her family. Disability of offenders included mental disorders, intellectual disability, physical problems, substance abuse or other problems. All these independent variables were collected at the initial registration and do not reflect any change that may have occurred after registration.

2.4. Statistical analyses

We conducted a historical cohort analysis of child maltreatment incident cases and first recurrence within one year of follow up. Since maltreatment is a phenomenon occurring in the household, some studies have used the household as a unit for data analysis (Bae et al., 2007, 2009; Murphy, Bishop, Jellinek, Quinn, & Poitrast, 1992; Sledjeski et al., 2008). However,

in this study the unit of analysis was the individual; in other words, "a child that was subjected to maltreatment", as used in other studies (Fluke et al., 1999; Inkelas & Halfon, 1997).

We assessed the association between the predictive variables and maltreatment recurrence in a binary logistic analysis and reported the crude odds ratios and p values. Predictive variables with p values < 0.1 were entered into the multiple regression model simultaneously, stepwise, and using backward elimination procedures. There was no evidence of multicollinearity following the diagnostic procedures; inter-correlation coefficient with any of other variable was less than 0.45. We compared the models fit using Akaike' s Information Criterion (Akaike, 1973) and the Hosmer–Lemeshow test. After selecting the most appropriate model variables, we estimated the regression coefficients using bootstrapping (1000 times of simple random sampling) and evaluated the stability of each regression coefficient using DfBeta as suggested by Pregibon (Pregibon, 1981). We rounded the regression coefficients from the stepwise model to the nearest integer and multiplied by 10 to generate a simplified prediction model (Hasan et al., 2010). Then, we computed the Receiver-Operating Characteristic (ROC) curves and the area under the curve (AUC) to compare this simplified model to the original regression models. A p value of <0.05 was considered statistically significant. Finally, we calculated sensitivity and specificity at various cut-off points to examine practical applicability of the prediction model.

3. Results

Overall, we selected 716 cases. All were of Japanese nationality. Tables 1 and 2 show the descriptive statistics of maltreatment cases and results of the bivariate logistic regression analyses. The age at initial report ranged from 0 to 17, with an average age of 7.1 years (SD = 4.6) and median of 7 years (IQR: 3–11) (not shown in the table). Among all cases, the main forms of maltreatment at the initial report were physical abuse (303 cases, 42.3%) and neglect (299 cases, 41.8%). A quarter of all cases (177 cases, 24.7%) experienced a recurrence of maltreatment within 1 year of follow up. Regarding the time of recurrence, 12.4% (22 cases) occurred in 30 days or less after registration, 48.6% (86 cases) between 31 days to 180 days, and 39.0% (69 cases) between 181 days to 365 days (not shown in the table). In most cases (638 cases, 89.1%) the main offender was a biological parent, and in only 6.8% (49 cases) and 4.1% (29 cases) the main offender was a stepparent and a guardian, respectively (not shown in the table). Those who reported frequent initial maltreatment were significantly more likely (odds ratio (OR) = 1.62/95% confidence interval (CI) = 1.12–2.35) to experience recurrence. Also, when the offender was under age 40 (OR = 1.82/95%CI = 1.24–2.68), had a disability (OR = 1.61/95%CI = 1.14–2.27) or history of maltreatment during his/her childhood (OR = 2.99/95%CI = 1.59–5.63) maltreatment was more likely to recur. Other factors significantly associated with recurrence of maltreatment were: financial instability or poverty (OR = 1.89/95%CI = 1.29–2.77), absence of an adult family member who could protect the child (OR = 1.47/95%CI = 1.03–2.11), absence of a community member who could watch over the child (OR = 1.51/95%CI = 1.07–2.14), and having a history of consultation with CGC (OR = 1.63/95%CI = 1.05–2.53). In our sample there were no multiple concurrent cases of child maltreatment in the same household. However, 14.5% (104 cases) reported siblings with history of maltreatment.

Table 3 shows the results of multiple logistic regression analysis using a stepwise approach. Our study revealed that six items were significantly associated with maltreatment recurrence: 9–13 year age of child (AOR = 3.43/95%CI = 1.52–7.72), <40 years age of the offender (AOR = 1.65/95%CI = 1.09–2.51), history of maltreatment during offender's childhood (AOR = 2.56/95%CI = 1.31–4.99), financial instability or poverty (AOR = 1.64/95%CI = 1.10–2.45), absence of someone in the community who could watch over the child (AOR = 1.68/95%CI = 1.16–2.44), and the official organization as referral source (AOR = 2.21/95%CI = 1.24–3.93). This multiple logistic regression model was statistically significant (model chi square = 62.91, $p < 0.001$) and showed sufficient fit to the actual values (−2 log likelihood = 737.93, AIC = 755.93 and p value of the Hosmer-Lemeshow test = 0.71). Almost identical results were obtained for the model developed by the backward elimination procedure (data not shown). Precision of the regression coefficients of the stepwise entry model were further estimated using bootstrapping with results quite similar with those in Table 3 (data not shown), validating the stabilities of the regression coefficients of the model. The stability of the prediction model was also evaluated using DfBeta, which ranged between −0.023 and 0.064, showing that there is no single case exerting a large influence on the model. To evaluate the effect of possible changes in the procedures for notification, investigation and services over the 15 years, we applied the same multivariate analytical procedure separately among the cases reported between April 1, 1996 to March 31, 2005 and those between April 1, 2005–March 31, 2010, confirming that the same set of the variables were associated with the maltreatment recurrence to almost the same extent (not shown in the tables).

The far right column of Table 3 shows the scores for our prediction model consisted of six factors: child age, offender's age, history of abuse or neglect during offender's childhood, financial instability or poverty of the household, presence of someone in the community who can watch over the victim, and referral source. The AUC of the prediction model was 0.66 (95%CI: 0.61–0.70), similar to the AUC of the stepwise entry model (0.69; 95%CI: 0.64–0.73).

When comparing the prediction scores computed by the prediction model and the observed proportion of maltreatment recurrence, the maximum discrimination between maltreatment recurrence and non-recurrence was attained at the score of 20. According to the model, the estimated risks of recurrence at score 0–9, 10–20 and 21–28, and 29–44 were 11. 7%, 21.8%, 37.7%, and 43.8% respectively (Table 4). When cutoff was set at scores 9, 20 or 28, sensitivity and specificity were 93.8% and 17.4%; 45.2% and 82.4%; and 7.9% and 94.1%, respectively (Data not shown).

Table 1
Bivariate association of child and household's selected predictive variables with first maltreatment recurrence within 1 year.

Predictive Variables	Number of Cases	Recurrence Cases		Crude Odds Ratio	95% Confidence Interval		*p* value
		N	(%)		Lower	Upper	
Child characteristics							
Gender							
Male	368	87	(23.6)	reference			
Female	348	90	(25.9)	1.13	0.80	1.58	0.49
Age (years)							
0–4	247	62	(25.1)	2.76	1.26	6.08	0.01
5–8	190	43	(22.6)	2.41	1.08	5.42	0.03
9–13	205	64	(31.2)	3.74	1.70	8.26	<0.001
14–17	74	8	(10.8)	reference			
Number of medically diagnosed symptoms							
0	225	45	(20.0)	reference			
1	387	99	(25.6)	1.37	0.92	2.05	0.12
2 or more	104	33	(31.7)	1.86	1.10	3.15	0.02
Mental or physical disability							
Yes	70	18	(25.7)	1.06	0.60	1.87	0.84
No	646	159	(24.6)	reference			
Emotional or behavioral problems							
Yes	56	18	(32.1)	1.49	0.83	2.69	0.18
No	660	159	(24.1)	reference			
Reactive emotional instability							
Yes	656	158	(24.1)	reference			
No	60	19	(31.7)	1.49	0.83	2.69	0.18
Other upbringing problems							
Yes	162	42	(25.9)	0.92	0.62	1.38	0.69
No	554	135	(24.4)	reference			
Household characteristics							
Number of family members							
2	53	16	(30.2)	1.57	0.75	3.29	0.23
3	238	63	(26.5)	1.30	0.76	2.23	0.33
4	314	74	(23.6)	1.12	0.66	1.88	0.68
5 or more	111	24	(21.6)	reference			
Sibling(s) with history of maltreatment							
Yes	104	33	(31.7)	1.86	1.10	3.15	0.02
No	387	99	(25.6)	1.37	0.92	2.05	0.12
Undetermined	225	45	(20.0)	reference			
Presence of an adult family member who could protect the maltreated child							
Yes	495	111	(22.4)	reference			
No	221	66	(29.9)	1.47	1.03	2.11	0.03
Financial instability or poverty							
Yes	162	56	(34.6)	1.89	1.29	2.77	<0.001
No	554	121	(21.8)	reference			
Family discord or domestic violence							
Yes	110	27	(24.5)	0.99	0.62	1.59	0.96
No	606	150	(24.8)	reference			

CGC: Child Guidance Center.

4. Discussion

Although the importance of having an assessment tool to determine if a child is at risk for maltreatment recurrence has been previously claimed by child health, education, forensic, and welfare practitioners in Japan (Administrative Evaluation Bureau, 2013; Equal Employment, Children and Families Bureau, 2013c, 2014), to the best of our knowledge, this is the first study in Japan to develop a practical prediction model assessing child maltreatment first recurrence within 1 year after initial report. Our study identified six variables as significant predictors of maltreatment recurrence. These included being a child aged 9–13 years, less than 40 years age of the offender, history of maltreatment during offender's childhood, financial instability or poverty, absence of someone in the community who could watch over the child, and the official organization as referral source. The simple linear prediction model developed from this analysis was demonstrated to enable the monitoring of the unsupported cases with weighted caution according to the probability of maltreatment recurrence. This

Table 2
Bivariate association of offender, maltreatment at initial report and other selected predictive variables with first maltreatment recurrence within 1 year.

Predictive Variables	Number of Cases	Recurrence Cases		Crude Odds Ratio	95% Confidence Interval		*p* value
		N	(%)		Lower	Upper	
Offender							
Main offender							
Father (biological, foster, or stepfather)	226	56	(24.8)	1.04	0.42	2.55	0.94
Mother (biological, foster, or stepmother)	461	114	(24.7)	1.03	0.43	2.48	0.94
Other (grandparent, relative or sibling)	29	7	(24.1)	reference			
Offender's age							
<40	474	134	(28.3)	1.82	1.24	2.68	<0.001
40 or more	242	43	(17.8)	reference			
Disability of the offender							
Yes	361	105	(29.1)	1.61	1.14	2.27	0.01
No	355	72	(20.3)	reference			
History of maltreatment during childhood							
Yes	42	20	(47.6)	2.99	1.59	5.63	<0.001
No	674	157	(23.3)	reference			
Living with the maltreated child							
Yes	620	160	(25.8)	1.62	0.93	2.81	0.09
No	96	17	(17.7)	reference			
Willing to cooperate with the CGC							
Yes	647	158	(24.4)	reference			
No	69	19	(27.5)	1.18	0.67	2.05	0.57
Maltreatment at initial report							
Main type of maltreatment							
Neglect	299	82	(27.4)	1.28	0.77	2.12	0.34
Physical abuse	303	69	(22.8)	1.00	0.60	1.67	0.99
Psychological abuse	114	26	(22.8)	reference			
Frequency							
Frequent	186	59	(31.7)	1.62	1.12	2.35	0.01
Occasional	530	118	(22.3)	reference			
Other							
Presence of community member(s) who could watch over the maltreated child							
Yes	338	70	(20.7)	reference			
No	378	107	(28.3)	1.51	1.07	2.14	0.02
History of consultation with CGC							
Yes	109	36	(33.0)	1.63	1.05	2.53	0.03
No	607	141	(23.2)	reference			
Referral source							
Maltreated child or his/her family	102	19	(18.6)	reference			
Neighborhood	329	63	(19.1)	1.03	0.59	1.83	0.91
Official organization	285	95	(33.3)	2.18	1.25	3.81	0.01

CGC: Child Guidance Center.

is a significant progress in the prediction of maltreatment recurrent among unsupported cases which used to be judged only empirically by factors such as past maltreatment history, intervention history by protective agencies, guardian's unawareness of maltreatment, and guardian's mental instability or other mental issues (Equal Employment, Children and Families Bureau, 2013c) and by the individualized assessments of the child, the guardian, and the their living conditions (Administrative Evaluation Bureau, 2013).

Unlike Japan, other countries (Cash, 2001; Coohey, Johnson, Renner, & Easton, 2013; D'Andrade et al., 2008; Gillingham, 2015) have developed assessment tools for maltreatment recurrence. However even though previous studies of cohort design on child maltreatment recurrence were focused, they were heterogeneous in children characteristics, definition and classification of maltreatment, risk factors, follow-up procedures, as well as data analyses methods (Fluke & Hollinshead, 2003; Hindley et al., 2006; White et al., 2015). Low child age has been suggested as a risk factor for recurrence (Fluke et al., 1999; Fryer & Miyoshi, 1994), but the other studies argued that there are more complicated mechanisms beneath the effect of child age on recurrence (Helie et al., 2013; Palusci, 2011). In our study, children between 9 and 13 years of age rather than younger age group were the most likely to experience recurrence. This suggests that more studies are needed in order to unveil the effect of age on recurrence of maltreatment in Japan and other settings. Previous studies have found that having a history of maltreatment or prior involvement with child protection services had higher probability of recurrence (English et al., 1999; Sledjeski et al., 2008). In our study, history of maltreatment during the offender's childhood was the second

Table 3
Multivariate logistic regression model using the stepwise method and scores for the prediction model.

Predictive Variables	Regression Coefficient	Adjusted Odds Ratio	95% Confidence Interval		p value	Prediction Model Scores[a]
			Lower	Upper		
Child characteristics						
Age (years)						
0–4	0.63	1.88	0.82	4.28	0.13	6
5–8	0.62	1.85	0.80	4.29	0.15	6
9–13	1.23	3.43	1.52	7.72	<0.001	12
14–17		reference				0
Offender						
Offender's age						
<40	0.50	1.65	1.09	2.51	0.02	5
40 or more		reference				0
History of maltreatment during childhood						
Yes	0.94	2.56	1.31	4.99	0.01	9
No		reference				0
Household characteristics						
Financial instability or poverty						
Yes	0.50	1.64	1.10	2.45	0.02	5
No		reference				0
Other						
Presence of community member(s) who could watch over the maltreated child						
Yes		reference				0
No	0.52	1.68	1.16	2.44	0.01	5
Referral source						
Maltreated child or his/her family		reference				0
Neighborhood	0.03	1.03	0.57	1.87	0.93	0
Official organization	0.79	2.21	1.24	3.93	0.01	8

[a] Prediction model scores were calculated multiplying the regression coefficients by 10 and rounding to the nearest integer.

Table 4
Comparison of the prediction model scores and the observed proportion of maltreatment recurrent cases.

	Prediction Model Scores[a]			
	0–9	10–20	21–28	29–44
Number of cases in the score range (n = 716)	94	444	146	32
Proportion of cases in the score range	13.1%	62.0%	20.4%	4.5%
Proportion of cases with recurrence of maltreatment in the score range	11.7%	21.8%	37.7%	43.8%

[a] Prediction model scores were calculated multiplying the regression coefficients by 10 and rounding to the nearest integer.

strongest predictor of child maltreatment recurrence, but history of consultation with the CGC was not a predictor in the multivariate model. The fact that we excluded cases with prior reports of child maltreatment could explain this difference. Other studies have suggested family discord or domestic violence (English et al., 1999; Sledjeski et al., 2008); offender with physical or mental disability (Marshall & English, 1999; Wood, 1997); and neglect as risk factors (DePanfilis & Zuravin, 1999b; Fluke et al., 1999; Wood, 1997). One study found that the highest risk of subsequent maltreatment was within 30 days after the initial report (DePanfilis & Zuravin, 1999a). In our study, however, family discord or domestic violence, and neglect were not associated with recurrence after one year of the initial report; offender's disability was associated with recurrence but was not statistically significant in the multivariate model; and there was no tendency of recurrence to concentrate within 30 days of the initial report. All these suggest that the risk factors for maltreatment recurrence may be different between Japan and other countries, and therefore suggests a need for a tailored prediction model.

Our model, framed by a cumulative approach and an ecological approach to risk factors (Eastman et al., 2016; Maguire-Jack & Font, 2014), provides an indication of the degree of risk for recurrence and can provide an estimate on the amount of follow-up needed. Scores may be utilized in the following way: (1) scores between 9 and 19 considered as "low risk case", requiring cautious observation; (2) scores between 20 and 27 considered as "medium risk case", where implementation of preventive measures are put in place; and (3) scores of 28 or more considered as "high risk case", indicating the need for guided intervention and continuous support. If the cases are classified according to these categories, it could help limited human resource to be allocated in an efficiently and effective way. We can select different cut-off points depending on the purpose of prediction.

In our model three out of the six predictive variables are "static variables". The age of the child, age of the offender, and referral source are often identified at the initial notification of maltreatment with acceptable accuracy. For example, if the case is an adolescent between 9 and 13 years of age, the offender is under 40, and referred by a public organization, then

the predictive model score of 25 can be categorized as a case in need for guided intervention, continuous support, and to promptly start planning the necessary course of actions. On the other hand, the other 3 variables (history of maltreatment during childhood of offender, household with financial instability or poverty, and presence of someone in the community who could watch over the victim) are "intervenable variables", the status of which can change in the follow-up support program. Even though the history of abuse or neglect in the offender's childhood is a fixed fact at the time of investigation, the mental status of the offender can be improved through appropriate care or psychological support, which may in turn change the attitude of offender to the victim. Also, the economic status of the household can change if the family is found eligible for public assistant programs. Finally, reaching out to the community can find a person who would be willing to stay informed about the child. Thus, fixed factors should be used as the basic information, and intervenable factors as supporting targets and indicators, so that recurrence preventive measures can be planned out efficiently. In addition, information about the score and predictive factors should be shared among related agencies such as the Municipal Child Family Support Divisions, the CGCs, and other agencies supporting the daily life of families to create preventive education programs; increase awareness of child abuse in the community; enhance child watch systems; formulate policy-based support; and develop an effective and viable intervention system. Ultimately, the joint efforts may promote public measures that are child-centered, community-based and solution-focused.

We recognize there are some limitations to our study that should be considered. First, due to lack of established scales many variables in the model depended on the subjective judgment of whoever did the investigation. Also, because staff involved in maltreatment cases is normally overstretched many items were assessed and recorded as a dichotomous data, limiting the power of statistical analyses. Second, our results may not be applicable to other CGC as our model is based on data from a single CGC. But, the items registered in our database were based in the 1996 nationwide survey of the National Association of Child Guidance Center Directors. Our prediction model is potentially applicable to other similar facilities, but recurrence risk factors may vary between regions. Our model is of course not applicable to other international settings; in this regard, it should be noted that potential reason for the possible difference of predictor variables between our study and those in other countries may include the fact that numerous exclusion criteria were applied to the current samples, especially the children with substantiated sexual abuse that are usually included in this kind of studies and the fact that many important predictors of recurrence such as caregiver's mental health, substance abuse and criminality were not available in this study. The third limitation is inherent to the research design of its observational and historical nature. Although not the consequence of the recurrence, independent variables are not necessary causal factors for the recurrence. In addition the predictive power of our model may vary if associations between maltreatment recurrence and predictive variables change over time or if new factors emerge. Although within our study period associations between maltreatment recurrence and predictive variables was unlikely much changed because multivariate analyses conducted separately among the cases registered early and latter half of the study periods yielded the same result, the validity of our model requires continuous verification.

In conclusion, it is essential to reduce the risk of future harm among children by assessing the risk of recurrence at the initial response and adopting the necessary countermeasures. We developed the first multivariate prediction model in Japan for child maltreatment first recurrence within one year among unsupported cases using only six items. Despite many limitations, our predictive model may be useful for child welfare organizations at least in part to assess the potential risk of maltreatment recurrence and the needs for preventive measures among unsupported cases who are otherwise left just unsupported.

Ethics approval and consent to participate

The study protocol was reviewed and approved by the Ethics Committee of Kyoto University Graduate School and Faculty of Medicine (No. E1337). We also fully explained the purpose of our study, a description of the procedures, and dissemination plan of the results to officials at Shiga Central CGC; and obtained written consent from the Director. Before our study team gained access to the database, staff at the CGC removed all personal identifiers from the cases. Given the retrospective nature of our study, formal consent from the cases was not required.

Availability of data and materials

The data supporting the conclusion of this article is not included within the article, because the authors are not supposed to share the dataset due to restrictions in Shiga Prefecture Personal Data Protection Regulation.

Competing interests

HH worked at Shiga Central CGC until March 2012. However, all authors declare that they have no competing interests.

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Author contributions

HH, SPS, MOK and MK discussed and conceived the study design. HH obtained the approval to use the dataset from Shiga Central CGC and carried out the statistical analyses, closely supervised by all co-authors. HH and MK wrote the first draft of this manuscript. All authors participated in the revision of the manuscript and approved the final version.

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RESEARCH ARTICLE

Prevalence and Correlates of HIV Testing among Young People Enrolled in Non-Formal Education Centers in Urban Chiang Mai, Thailand: A Cross-Sectional Study

Patou Masika Musumari[1], Arunrat Tangmunkongvorakul[2]*, Kriengkrai Srithanaviboonchai[2,3], Sawang Yungyuankul[2], Teeranee Techasrivichien[1], S. Pilar Suguimoto[1,4], Masako Ono-Kihara[1], Masahiro Kihara[1], Suwat Chariyalertsak[2,3]

1 Department of Global Health and Socio-epidemiology, Kyoto University School of Public Health, Kyoto, Japan, **2** Research Institute for Health Sciences, Chiang Mai University, Chiang Mai, Thailand, **3** Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, **4** Center of Medical Education, Graduate School of Medicine, Kyoto University, Kyoto, Japan

* arunrat@rihes.org

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Abstract

Background

HIV testing is the gateway to HIV prevention, treatment, and care. Despite the established vulnerability of young Thai people to HIV infection, studies examining the prevalence and correlates of HIV testing among the general population of Thai youth are still very limited. This study investigates socio-demographic, behavioral, and psychosocial factors associated with HIV testing among young Thai people enrolled in Non-formal Education Centers (NFEC) in urban Chiang Mai, Northern Thailand.

Methods

This was a cross-sectional quantitative study conducted among young unmarried Thai youth—between the ages of 15 and 24—who were enrolled in NFEC in urban Chiang Mai. Multiple logistic regressions were used to identify correlates of "ever tested for HIV" among the sexually active participants.

Findings

Of the 295 sexually active participants, 27.3% reported "ever tested for HIV;" 65.4% "did not consistently use condom;" and 61.7% "had at least 2 lifetime partners." We found that "self-efficacy" (AOR, 4.92; CI, 1.22–19.73); "perception that it is easy to find a location nearby to test for HIV" (AOR, 4.67; CI, 1.21–18.06); "having at least 2 lifetime sexual partners" (AOR, 2.05; CI, 1.09–3.85); and "ever been pregnant or made someone pregnant" (AOR, 4.06; CI, 2.69–9.15); were associated with increased odds of having ever been tested. On the other hand, "fear of HIV test results" (AOR, 0.21; CI, 0.08–0.57) was associated with lower odds of ever having been tested for HIV.

study design, data collection and analysis, decision to publish, or preparation of the manuscript.

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Conclusion

The main finding is that a substantially high proportion of Thai youth is engaged in risky sexual behaviors—yet reports low rates of ever having been tested for HIV. This highlights an urgent need to develop appropriate interventions—based on the identified correlates of HIV testing. There is also an urgent need to enhance HIV testing and to promote safer sexual behaviors among young Thai people—particularly those who are out-of-school.

Introduction

The prospect of ending the HIV/AIDS epidemic has crystalized over time. Increasing evidence today shows the potential for antiretroviral therapy (ART). It has a strong therapeutic effect, and it also has the ability to dramatically reduce both the transmission and acquisition of HIV infection [1]. HIV testing—as the gateway to effective HIV prevention, treatment, and care—must absolutely be optimized, before this enthusiastic hope to end the HIV/AIDS epidemic could translate to palpable reality. There is extensive literature in support of the finding that individuals substantially reduce risky sexual behaviors after they become aware of their HIV status [2, 3]. Moreover—for infected individuals—HIV testing prompts early initiation of ART, which, in turn, is associated with significantly reduced risk of HIV transmission [1].

However, today, the proportion of individuals who know their HIV status still remains unacceptably low. At the global level, as of the end of 2012, only 50% of people were aware of their HIV status, with great variation within and between countries and regions [4]. This sobering fact indicates that—despite the current expansion of HIV prevention, treatment and care programs worldwide—tremendous efforts are still necessary to improve HIV testing behavior, in order to achieve the optimum possible level of prevention and treatment of HIV infection.

In Thailand, the first anonymous HIV testing and counseling (HTC) clinic was established by the Thai Red Cross Society in mid-1991. The Ministry of Public Health (MoPH) aligned its efforts with those of the Thai Red Cross Society. It adopted HIV counseling and testing (HTC) as part of the country's prevention strategies in 1992, and subsequently made the service available in all government health clinics in all the provinces [5, 6]. Currently, HIV testing services are delivered through public health facilities, such as government hospitals; government clinics; and health centers. Testing services are also delivered at both for-profit and non-profit private organizations, and at private clinics and hospitals.

Studies on HIV testing in Thailand reflect the concentrated nature of the epidemic in the country [7, 8]. They have mostly focused on the most at-risk populations (both youth and adults). These include men who have sex with men (MSM); female and male sex workers; and people who inject drugs (PWID) [9–13]. Very few studies have examined HIV testing at the overall population level [14–16]. Thus far, records of studies focusing specifically on the general Thai youth remain extremely scarce [17].

Young Thais are a particularly vulnerable population when it comes to HIV infection. There exists strong evidence showing that they engage in behavioral patterns that increase their risk of HIV infection. For example, the Bureau of Epidemiology [18] and the Ministry of Social Development and Human Security [19] have reported an increasing trend of unintended pregnancies and sexually transmitted infections (STIs) among Thai adolescents over the past 15 years. This occurrence points to an increasing rate of unprotected sex—probably as a result of the failure of safe sex messages to reach the general Thai youth population. A recent population-based study conducted in Nonthaburi province in Thailand [20], supporting previous

similar findings [14, 21, 22], indicates a profound change in sexual norms among young Thais. This is characterized by a decline in the age of sexual initiation and a shift in the typical sexual partner—away from commercial sex workers to boyfriends or girlfriends in committed romantic relationships. In addition, there is, on average, a larger number of lifetime sexual partners, and a greater social acceptance of adolescent premarital sex.

Young people comprise a heterogeneous group of individuals whose sexual behaviors and vulnerability to HIV infection vary widely [23]. Previous research conducted in urban Chiang Mai, Thailand, found that out-of-school young people had a higher prevalence of risky sexual behaviors than those enrolled in general school and university (the sample for this group was recruited from Non-formal Education Centers (NFEC) and public spaces in Chiang Mai City). Out-of-school young people were also more likely to be sexually experienced. They also had a lower mean age of sexual debut, and a larger number of lifetime sexual partners, in comparison with their counterparts who attended general school and university [21, 24, 25]. Despite the documented profile of risky sexual behaviors among out-of-school Thai young people, nothing is known about the prevalence and correlates of HIV testing in this out-of-school population. Also, the general literature on HIV testing in general for Thai youth remains remarkably scarce.

The present study endeavors to fill this gap by documenting the prevalence and correlates of HIV testing among out-of-school young people enrolled in NFEC in urban Chiang Mai, Thailand. Our investigation focuses on the socio-demographic, behavioral, and psychosocial factors associated with HIV testing.

Methods

Ethics statement

The study was approved by the Office of Research Ethics, Human Experimentation Committee of the Research Institute for Health Sciences, Chiang Mai University (Certificate of Ethical Clearance No. 5/2015). Participants were first informed about the study's objectives; their roles; and their rights to give or not to give any information during the interview. Additional topics discussed with participants were confidentiality of the personal data and manner in which findings would be presented. Participants provided verbal informed consent. Verbal informed consent was selected in preference to written informed consent, based on the vulnerable nature of our study population. Another reason for this was to prevent potential harm to the participants that could result from a breach of confidentiality. This process of informed consent was deemed appropriate by the Office of Research Ethics. For participants who were under 18 years old, written informed consent was obtained from their guardians—after providing the guardians with all the information regarding the study.

Study design, participants, & setting

This was a cross-sectional study conducted between June and September 2015. Our study participants were defined as "young people aged 15–24, enrolled in NFEC in urban Chiang Mai, Thailand. Urban Chiang Mai—also referred to as Chiang Mai city, has rapidly expanded and developed as the epicenter of technology, industry, and education of Northern Thailand. Therefore, the area attracts an increasing number of young people from the countryside and neighboring provinces in search of education and work opportunities. Urban Chiang Mai is organized into 16 sub-districts, each comprising one NFEC. Non-formal Education in Thailand—run by the office of the Non-Formal Education Commission of the Thai Ministry of Education—offers the opportunity to youth and to adults who are out of school to get basic education. Also, these youth have the chance to continue their higher education via the

certificate they are provided with upon completion of the program [26]. Young people enrolled in NFEC are provided with a three-hour tutorial class on a weekend basis. They may attend a class on Saturday and/or Sunday, and they may also attend a morning or afternoon program. The type of class they enroll in depends on their level of previous education. They will select a class at either primary, secondary, or high school level.

Our participants were recruited from all the 16 NFEC of Chiang Mai City. The procedure was that all age-eligible youths present on a teaching day were invited to participate—after having the survey explained to them. Our field research team included young investigators with extensive training both in field research and in quantitative and qualitative research methods.

Survey Instrument

A structured, self-administered questionnaire was developed by the survey team. The questionnaire included 73 items, and was designed to address issues related to sexual and reproductive health of young people. It included items on participants' socio-economic and demographic characteristics; recreational activities; alcohol, tobacco, and drug use; relationships; sexual identity and experience; sexually transmitted infections; birth control, pregnancy and abortion; need for sexual health services; and HIV testing.

While most questionnaire items were directly obtained from the literature [27, 28], other items—especially those related to HIV testing—were designed to fit the objectives of the current study. The questionnaire was first pre-tested. It was then refined in accordance with the test results—in order to ensure the clarity of the items. Participants completed the questionnaire in the classroom with desks spaced far enough to ensure privacy. Neither teachers nor any school-affiliated staff members were present while the students were completing the questionnaire. On average, it took 30 minutes to complete the questionnaire. The current study exclusively focuses on HIV testing.

Variables

The outcome variable of interest was the past HIV testing status. This was assessed using the item "Have you ever been tested for HIV?" Firstly, the covariates included socio-demographic variables: age; sex; living status; employment status; and whether or not one currently has a boyfriend/girlfriend. The next category of variables was behavioral factors: "ever had sex"; "history of STI", "ever been pregnant or made someone pregnant", "number of lifetime sexual partners", and "consistent use of condom"—specifically defined as using a condom for every act of sexual intercourse. The third category of variables was psychosocial variables. Among these, the first one was one's self-efficacy of HIV testing—exemplified by the sentence, "I think I am able to get tested for HIV." The second factor was one's attitude toward HIV testing—to what degree did each participant think that "Getting tested for HIV is a responsible thing to do."? Other psychosocial variables were subjective norms about HIV testing. Examples of positive norms included ideas such as "My family [parents, siblings] find it important that I have myself tested for HIV frequently." Other examples were "My friend(s) find(s) it important that I have myself tested for HIV frequently." Additional related variables were one's perceived risk of HIV and one's perceived risk of STIs and one's degree of fear of HIV test results. The final variable was the perceived ease or difficulty of finding a nearby location to test for HIV.

Statistical Analysis

The analysis was performed using SPSS (PASW) for Windows 17 (SPSS Inc., Chicago, Illinois, USA). Univariate analysis was used to obtain descriptive statistics of the selected variables. Chi-square was performed to document the associations of categorical covariates with the

outcome of interest "ever tested for HIV" in the bivariate analysis. Multiple logistic regression was used to obtain adjusted odds ratios (AOR) and 95% confidence intervals (CI). Descriptive statistics were provided for the entire sample; however, bivariate and multivariate analyses were performed specifically in the subgroup of participants who were sexually active.

Two models were specified in the multiple logistic regression analysis. The first model included all the covariates. The second model included variables identified in the bivariate analysis with a $P \leq 0.10$, and the variable "sex," which was considered epidemiologically important. The diagnostic procedures yielded no evidence of multicollinearity.

Results

Participant characteristics

A total of 519 participants were recruited, and none of them declined to participate. First considering the demographic characteristics, the median age was 19 years [Interquartile range (IQR): 17.0–21.2]. The marital status of all participants was single. Slightly over half of them were female (53.2%); had work with income (56.3%); reported currently having a boyfriend or girlfriend (53.0%); and reported previously ever having had sex (56.8%).

Among those who were sexually active, 42% reported a history of STI—with self-reported symptoms or diagnosed by medical personnel. Among the total, 22% had ever been pregnant or made someone pregnant—of which 23.1% had ended up with an abortion or miscarriage. Also, 15.6% initiated sex before age 15. A substantial proportion had at least 2 lifetime partners (61.7%), and did not use condoms consistently (65.4%). The proportion of participants who reported ever having had an HIV test was 18.3% in the entire group. Among those who were sexually active, it was 27.8% (see Table 1).

Factors associated with ever tested for HIV

Table 2 shows the association of socio-demographic characteristics, behavioral factors, and psychosocial variables with ever tested for HIV. The bivariate analysis indicated that being female, aged 20–25 years, ever been pregnant or made someone pregnant, having two or more lifetime sexual partners, perception that testing for HIV is a responsible thing to do, perception that it is easy to find a location nearby to get tested for HIV, fear of HIV test result, and self-efficacy of HIV testing were significantly associated with increased odds of ever tested for HIV.

We specified two models for the multiple logistic regressions. Overall, these models displayed similar results. Of the two models, Model 2 presented estimates with better precision; therefore, it was the one selected in the current report. (Table 3). The odds of "ever had HIV" was higher for participants who had "ever been pregnant or made someone pregnant;" who "had at least 2 lifetime sexual partners;" and who perceived that it is "easy to find a location nearby to test for HIV." On the other hand, the odds were lower for those who "feared" or were not sure if they feared HIV test results. Regarding self-efficacy for HIV test, participants who perceived they were able to get tested for HIV and those who were uncertain, were more likely to ever had an HIV test than participants who did not have such a perception.

Discussion

To our knowledge, this study is the first to examine HIV testing and its correlates in the population of out-of-school Thai youth attending the NFEC in Chiang Mai, Thailand. Our study revealed a significantly low prevalence of HIV testing—coupled with a high prevalence of risky sexual behaviors among our participants. Respectively, 65.4%, 61.7%, and 27.8% of sexually active young people did not consistently use condoms, had at least 2 lifetime partners; and

Table 1. Socio-Demographic & Behavioral Characteristics of Participants.

	N = 519	%
Sex		
Male	243	46.8
Female	276	53.2
Age		
14–19 years	276	53.2
20–25 years	218	42.0
Missing	25	4.8
Median (IQR)	*19 (17–21.25)*	
Living status		
Living at home	223	43.0
Renting/Dormitory/other	293	56.5
Missing	3	0.6
Employment with income		
No	227	43.7
Yes	292	56.3
Having boy/girlfriend		
No	275	53.0
Yes	221	42.6
Missing	23	4.4
Ever had sex		
No	218	42.0
Yes	295	56.8
Missing	6	1.2
Ever tested for HIV testing		
No	390	75.1
Yes	95	18.3
Missing	34	6.6
Ever tested for HIV[#]		
No	200	67.8
Yes	82	27.8
Missing	13	4.4
History of STI[#]		
No	165	55.9
Yes	124	42.0
Missing	6	2.0
Ever pregnant or made someone pregnant[#]		
No	194	65.8
Yes	65	22.0
Missing	36	12.2
Sexual debut[#]		
< 15 years	46	15.6
$\geq$ 15 years	239	81.0
Missing	10	3.4
Number of life time sexual partners[#]		
1 partner	86	29.2
$\geq$ 2 partners	182	61.7
Missing	27	9.2

(*Continued*)

Table 1. (*Continued*)

	N = 519	%
Consistent condom use[#]		
No	193	65.4
Yes	83	28.1
Missing	19	6.4

IQR, interquartile range;

[#], data restricted to the subgroup of sexually active youth.

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reported ever having had been tested for HIV. The low HIV testing rate—coupled with the high prevalence of risky sexually behaviors—nurture a perfect environment where HIV can continue to be transmitted between partners who are in ignorance of their situation. It is also alarming to note that—despite the highly reported history of STIs (43.3%), which also reflect the low prevalence condom use—the majority of participants did not perceive themselves to be at risk for HIV infection. Additionally, what is of particular importance is the fact that no association was found between HIV testing and history of STIs or condom use. This finding signals a lack of concern about HIV infection among out-of-school Thai youth attending the NFEC.

As a result, there is a great need to rapidly develop evidence-based, youth-friendly strategies likely to improve HIV testing and to decrease risky sexual behaviors among out-of-school young Thai enrolled in NFEC in Chiang Mai, and Thailand at large. Such interventions should particularly be built on the correlates of HIV testing—such as those documented in this study. We found that the perceptions that it is easy to find a location nearby to test for HIV—and of self-efficacy for HIV testing—were associated with a high likelihood of "ever having had an HIV test." Other factors associated with having had an HIV test were ever having been pregnant or made someone pregnant and having two or more lifetime sexual partners. On the other hand, fear of HIV test results was associated with decreased odds of ever having been tested for HIV.

The finding that participants who perceived it was easy to find a location nearby to test for HIV were more likely to report ever had an HIV test has two important implications. Firstly, it may tacitly imply that alleviation of distance as a structural barrier to accessing HIV testing sites could possibly improve HIV testing behavior among the young people. The second implication is that—in addition to addressing barriers such as distance—there is a need to ensure that young people are knowledgeable as to the availability of HIV testing services. This could take place, for example, through sensitization campaigns. This is particularly important because, in studies conducted in other settings, the lack of knowledge of service availability, and/or the lack of knowledge of the closest HIV testing site—rather than the actual unavailability of services—have been identified as barriers to HIV testing [29, 30].

We found that self-efficacy for HIV testing was associated with increased odds of "ever having been tested for HIV." It is most likely that, in our study, self-efficacy for HIV testing is the outcome of a previous HIV testing experience, rather than being causal to it. This suggests that past experience of HIV testing—by enhancing self-efficacy—may be a facilitator for future HIV testing behavior. This is very important, considering that HIV testing should be regarded as a continuous behavior over the human life-course, rather than as a one-time event. In a previous study, self-efficacy was identified as strong predictor of willingness to test for HIV. However, in this study, self-efficacy was a complex concept based on people's ability to engage in abstinence; remain faithful; and negotiate condom use. In our study, on the other hand, self-

Table 2. Bivariate associations of socio-demographic, behavioral, and psychosocial factors with "ever tested for HIV" among sexually active participants.

	Ever Tested for HIV			Crude OR (95% CI)	*P* value[a]
	Yes n (%)	No n (%)	Total n (%)		
Sex					
Male	34 (41.5)	110 (55.0)	144 (51.1)	1.00	
Female	48 (58.5)	90 (45.0)	138 (48.9)	1.72 (1.02–2.90)	0.039
Age					
14–19 years	24 (30.4)	93 (48.4)	117 (43.2)	1.00	
20–25 years	55 (69.6)	99 (51.6)	154 (56.8)	2.15 (1.23–3.75)	0.006
Living status					
Living at home	36 (44.4)	97 (48.5)	133 (47.3)	1.00	
Renting/Dormitory/other	45 (55.6)	103 (51.5)	148 (52.7)	1.71 (0.61–4.76)	0.537
Employment with income					
No	27 (32.9)	79 (39.5)	106 (37.6)	1.00	
Yes	55 (67.1)	121 (60.5)	176 (62.4)	1.33 (0.77–2.28)	0.301
Currently having boy/girlfriend					
No	18 (22.8)	53 (27.3)	71 (26.0)	1.00	
Yes	61 (77.2)	141 (72.7)	202 (74.0)	1.27 (0.69–2.35)	0.439
History of STI[&]					
No	45 (54.9)	112 (57.4)	157 (56.7)	1.00	
Yes	37 (45.1)	83 (42.6)	120 (43.3)	1.11 (0.66–1.86)	0.695
Ever pregnant or made someone pregnant					
No	38 (52.1)	151 (84.4)	189 (75.0)	1.00	
Yes	35 (47.9)	28 (15.6)	63 (25.0)	4.96 (2.69–9.15)	< 0.001
Sexual debut					
< 15 years	15 (19.2)	26 (13.3)	41 (15.0)	1.00	
≥ 15 years	63 (80.8)	169 (86.7)	232 (85.0)	0.64 (0.32–1.29)	0.218
Number of life time sexual partners					
1 partner	16 (21.9)	68 (36.6)	84 (32.4)	1.00	
≥ 2 partners	57 (78.1)	118 (63.4)	175 (67.6)	2.05 (1.09–3.85)	0.024
Consistent condom use					
No	60 (74.1)	124 (67.8)	184 (69.7)	1.00	

(*Continued*)

Table 2. (*Continued*)

	Ever Tested for HIV			Crude OR (95% CI)	*P* value[a]
	Yes n (%)	No n (%)	Total n (%)		
Yes	21 (25.9)	59 (32.2)	80 (30.3)	0.73 (0.41–1.32)	0.303
Testing for HIV is a responsible thing to do					
No	6 (7.3)	46 (23.8)	52 (18.9)	1.00	
Yes	76 (92.7)	147 (76.2)	223 (81.1)	3.96 (1.62–9.69)	0.001
Finding a location nearby to get HIV test is. . .					
Difficult	5 (6.1)	43 (21.7)	48 (17.1)	1.00	
Easy	58 (70.7)	98 (49.5)	156 (55.7)	5.09 (1.90–13.58)	0.001
Not sure	19 (23.2)	57 (28.8)	76 (27.1)	2.86 (0.99–8.28)	0.052
I fear the result of HIV test					
No	64 (78.0)	99 (49.7)	163 (58.0)	1.00	
Yes	14 (17.1)	60 (30.2)	74 (26.3)	0.36 (0.18–0.69)	0.003
Not sure	4 (4.9)	40 (20.1)	44 (15.7)	0.15 (0.05–0.45)	0.001
I think I am able to get tested for HIV					
No	5 (6.1)	43 (21.9)	48 (17.3)	1.00	
Yes	59 (72.0)	91 (46.4)	150 (54.0)	5.57 (2.08–14.89)	0.001
Not sure	18 (22.0)	62 (31.6)	80 (28.8)	2.49 (0.86–7.23)	0.092
My family (parents, siblings) find it important I have myself tested for HIV frequently					
No	25 (30.9)	69 (35.6)	94 (34.2)	1.00	
Yes	33 (40.7)	58 (29.9)	91 (33.1)	1.57 (0.84–2.93)	0.158
Not sure	23 (28.4)	67 (34.5)	90 (32.7)	0.94 (0.49–1.83)	0.872
My friends find it important I have myself tested for HIV frequently					
No	27 (33.3)	80 (41.2)	107 (38.9)	1.00	
Yes	34 (42.0)	55 (28.4)	89 (32.4)	1.83 (0.99–3.37)	0.052
Not sure	20 (24.7)	59 (30.4)	79 (28.7)	1.00 (0.51–1.96)	0.990
HIV risk perception					
No	57 (70.4)	140 (72.5)	197 (71.9)	1.00	
Yes	24 (29.6)	53 (27.5)	77 (28.1)	1.11 (0.62–1.97)	0.716
STI risk perception					
No	51 (63.0)	125 (64.8)	176 (64.2)	1.00	

(*Continued*)

Table 2. (*Continued*)

	Ever Tested for HIV			Crude OR (95% CI)	*P* value[a]
	Yes n (%)	No n (%)	Total n (%)		
Yes	30 (37.0)	68 (35.2)	98 (35.8)	1.08 (0.63–1.85)	0.776

OR, odds ratio; CI, confidence interval;

[a] *P* values based on chi-square test of proportions unless otherwise specified; STI, sexually transmitted infection; &, referred to both diagnosed and self-reported symptoms of sexually transmitted infections.

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efficacy was considered to be a direct measure of people's ability to go for an HIV test as in our study [31].

In line with other previously conducted studies [30, 32, 33], we have found that fear of HIV test results negatively impacts on the HIV testing behavior of young people. Interventions that address fear of HIV test results would be likely to improve HIV testing. However, the success of such interventions will largely depend on our understanding of drivers of fear of HIV testing. Many studies have linked fear of HIV test results to HIV risk perception in such a way that individuals who are perceived to be at risk for HIV as a result of their sexual behavior feared a positive HIV test result. Therefore, these people were more reluctant to go for an HIV test [34–36]. However, such a link was not established in our study. Both HIV and STI risk perception were neither associated with fear of HIV test result nor with ever had tested for HIV. Other studies have attributed fear of HIV test results—particularly, of positive test results—to a number of factors. These possible factors have included doubts about the availability and effectiveness of HIV medication; perceived stigma and discrimination accompanying a positive HIV status; and perceived lack of support from friends, family, and the community [32, 37]. In the case of Thailand, more studies are needed to unveil the context-specific factors underlying fear of HIV test results among the young in general—and specifically among out-of-school Thai youth attending the NFEC.

Participants who ever had been pregnant or made someone pregnant had increased odds of ever having had an HIV test in our study. Our findings support results from a previous study which found "ever been pregnant" as the highest predictor for HIV testing uptake among young people in South Africa [38]. A well-established explanation is that pregnant women—through the antenatal clinic—are more likely to undergo HIV testing under the Provider Initiated HIV Testing and Counseling (PIHTC) service delivered in the context of the prevention of mother-to-child transmission of HIV (PMTCT). Through the same context of PMTCT, male partners who made someone pregnant are also more likely to undergo HIV testing [38–41]. The increased contact of females with the health care system through antenatal clinics and other reproductive health services in many settings has been at the center of the generally observed gender differential in HIV testing, with females being more likely to test for HIV than males.

Although not significant, in our study, there was a notable trend for female participants to more likely report ever had an HIV test—compared to male participants. Our findings that the odds of reporting ever tested for HIV was higher among participants who had a larger number of lifetime partners—and among those who had ever had sex—were previously documented in other settings [42–45]. It is not obviously clear what factors mediate these associations in the context of our study. The mediating effect of HIV/STI risk perception on the association

Table 3. Multivariate analysis of factors associated with ever tested for HIV among sexually active participants.

	Models Adjusted OR (95%CI)	
	(1)	(2)
Sex Female (vs Male)	2.50 (0.88–7.08)	2.03 (0.88–4.67)
Age 20–25 years (vs. 14–19 years)	1.20 (0.45–3.18)	1.03 (0.47–2.25)
Employment with income Yes (vs. none)	1.07 (0.41–2.78)	
Living status Living at home (vs. renting/dormitory/other)	1.70 (0.65–4.45)	
Currently having boy/girlfriend Yes (vs. no)	0.57 (0.20–1.62)	
Testing for HIV is a responsible thing to do Yes (vs no)	1.57 (0.39–6.36)	2.18 (0.65–7.31)
Finding a location nearby to get an HIV test is…		
Difficult	1.00	1.00
Easy	5.01 (1.11–22.68)*	4.67 (1.21–18.06)*
Not sure	4.07 (0.71–23.12)	3.31 (0.73–14.88)
I fear the results of HIV testing		
No	1.00	1.00
Yes	0.11 (0.03–0.38)†	0.21 (0.08–0.57)**
Not sure	0.09 (0.02–0.45)**	0.11 (0.02–0.47)**
I think I am able to get tested for HIV		
No	1.00	1.00
Yes	12.65 (2.10–76.26)**	4.92 (1.22–19.73)*
Not sure	17.08 (2.50–116.47)**	4.71 (1.01–21.92)*
My family (parents, siblings) find it important that I have myself tested for HIV frequently		
No	1.00	
Yes	1.32 (0.22–7.79)	
Not sure	0.57 (0.11–2.95)	
My friends find it important that I have myself tested for HIV frequently		
No	1.00	1.00
Yes	1.25 (0.25–6.32)	1.82 (0.75–4.41)
Not sure	0.97 (0.19–4.96)	1.01 (0.38–2.69)
History of STI& yes (vs no)	0.56 (0.22–1.40)	
HIV risk perception yes (vs no)	2.84 (0.68–11.79)	
STI risk perception yes (vs no/don't know)	0.52 (0.14–1.86)	
Ever pregnant or made someone pregnant yes (vs no)	6.34 (2.24–17.91)†	4.11 (1.76–9.60)**
Sexual debut $\geq$ 15 years (< 15 years)	0.48 (0.13–1.79)	
Number of lifetime sexual partners $\geq$ 2 partner (vs 1 partner)	2.59 (0.84–7.96)	2.63 (1.10–6.27)*
Consistent condom use yes (vs no)	1.17 (0.44–3.08)	

Adjusted OR, Adjusted odds ratio; CI, confidence interval;

* *P* value < 0.05;

** *P* value < 0.01;

†*P* value <0.001; STI, sexually transmitted infection; &, referred to both diagnosed and self-reported symptoms of sexually transmitted infections.

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between sexual risk behaviors and HIV testing, documented elsewhere [32, 46–48], was not established in our study. This remains an open issue that future research will endeavor to clarify.

Our study also highlights the vulnerability to HIV infection and STIs of out-of-school Thai youth enrolled in NFEC—by showing both low levels of HIV testing and high risk sexual behaviors in this population. A prior research in the same population in urban Chiang Mai found that sexual risk behaviors were much more prevalent among out-of-school Thai youth—compared to their counterparts engaged in formal education [21, 24, 25]. Our study has identified correlates of HIV testing which can importantly inform future interventions aiming to improve HIV testing among Thai youth attending NFEC.

There is increasing support for a holistic approach to sexual and reproductive health for young people [49–51]. This approach should include interventions of varying nature (school-based, mass media, etc.), designed based on relevant contextual factors. These interventions should address a range of outcomes (HIV testing, sexual behaviors, HIV/AIDS knowledge) at different levels (individual, community, structural, etc.). This approach is recommended, as opposed to isolated interventions singling out one specific outcome. School-based interventions—which have been shown to be effective in increasing knowledge and decreasing HIV risk behaviors among youth [23]—potentially could enhance HIV testing among Thai youth enrolled in NFEC under the following circumstances.

First, they should be delivered in the form of health education and life skills programs. These programs should include counseling addressing factors such as fear of HIV testing results; self-efficacy; and HIV/STI risk perception. They should be coupled with interventions that promote access to HIV testing services both from a legal perspective (such as parental consent for HIV testing for adolescents aged under age 18) and a structural perspective (such as service availability and distance to testing sites).

A number of limitations to this study need to be acknowledged. Our study is cross-sectional by nature; thus, this design prohibits any causal inference. There was some risk of a "social desirability" bias in the data—given the sensitivity inherent to sexual health topics. However, the fact that we used young, well-trained investigators who could relate well to the study population might have minimized this bias. There was also a fair amount of missing values across all the covariates which could affect the results of our study.

One important limitation includes the fact that the variable "sexual identity" was not reliably collected so as to allow its inclusion in the analysis. "Sexual identity" in our study is a derived variable from two variables (gender of the participant & gender of the partner), and had important flaws. Firstly, the item on the gender of partner was restricted to the subsample of participants who stated that they currently had a partner. However, 26% of participants who were sexually active in general did not currently have a boyfriend or girlfriend. Secondly, the derived variable "sexual identity" does not explicitly tell how the participants identify themselves in terms of their sexual orientation. In addition, the lack of data on types of sexual intercourse (male-to-male; male-to-female; anal versus vaginal, etc.) limits the interpretation of risk in our study. This is particularly relevant because of the very high HIV risk documented among young MSM, male sex workers, and transgenders in Thailand [52, 53]. It is also important to note that the single items used to measure psychosocial variables -such as attitudes to HIV testing and self-efficacy—may not have captured well the various dimensions of those constructs. Future studies should use full and validated scales for our population of interest. The variable "History of STI" includes both actual STI diagnoses and self-reported symptoms of STIs. Self-reported symptoms are not accurate measures of STI—because genital infections may also be caused by non-sexually transmitted conditions. Lastly, although the results of this study—to a large extent—represent the situation of young people enrolled in NFE in Chiang

Mai, it is not clear to what extent they can be generalized to young people enrolled in NFE in other provinces of Thailand and/or to out-of-school young people who do not attend NFE.

In summary, we found that a substantially high proportion of Thai youth who engaged in risky sexual behavior, yet reported low rates of ever having been tested for HIV. We were able to identify a number of individual-level factors (such as fear of HIV test results and perception that it is easy to locate an HIV testing site nearby) which can serve as useful guidelines for future interventions to enhance HIV testing uptake among young people enrolled in NFEC in Thailand. Such interventions should, however, consider the broader contextual and structural landscape within which young people live.

Supporting Information

S1 Dataset. Dataset of the study.
(SAV)

S1 Questionnaire. Questionnaire Thai version.
(DOC)

S2 Questionnaire. Questionnaire English Version.
(DOCX)

Acknowledgments

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Author Contributions

Conceived and designed the experiments: AT PMM KS SY TT SS MO MK SC. Performed the experiments: AT PMM KS SY TT SS MO MK SC. Analyzed the data: PMM AT KS SY TT SS MO MK SC. Wrote the paper: PMM AT KS SY TT SS MO MK SC.

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Perceived Difficulties Regarding HIV/AIDS Services among Public Health Nurses in the Kinki Region of Western Japan: Implications for Public Health Nursing Education in Japan

Yumiko H. Nishimura[1], Mieko Iwai[2], Akiyo Ozaki[3], Asuka Waki[4], Yasuharu Hidaka[5]

[1]School of Nursing, Kansai University of Nursing and Health Sciences, Hyogo, Japan
[2]HRD Training & Consulting Office Double Eyes, Hyogo, Japan
[3]Ikeda-Shiritsu Shibutani Junior High School, Osaka, Japan
[4]School of Nursing, Senri Kinran University, Osaka, Japan
[5]Takarazuka University School of Nursing, Osaka, Japan
Email: y.nishimura@kki.ac.jp

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Abstract

Objective: To determine the perceived difficulties in providing HIV/AIDS services among public health nurses and to identify their correlates, we carried out a cross-sectional study in the Kinki region of western Japan. **Methods:** Structured self-administered questionnaires were distributed to all public health nurses in the region, and 1535 valid questionnaires were retrieved (valid response rate 78.7%). **Results:** More than half of the participants (52.8%) reported difficulties with HIV/AIDS services. The factors associated with perceived difficulties were having a negative attitude towards consultations on sexual matters (adjusted odds ratio [AOR] 2.2, $p < 0.001$), a perceived lack of encounters with homosexual people and people with HIV/AIDS during practice (AOR 1.6, $p = 0.002$ and AOR 1.8, $p < 0.001$), poor knowledge of sexual diversity (AOR 2.0, $p < 0.001$), lack of training in sexual diversity in public health nursing education (AOR 1.4, $p = 0.016$), and low permissiveness of the diversity of sexual behavior (AOR 2.0, $p < 0.001$). **Conclusions:** Overall, our results suggest that nursing and public health nursing education in Japan should cover sexual issues and HIV/AIDS in a more systematic way.

Keywords

Perceived Difficulties, HIV/AIDS, Public Health Nursing Education, Sexual Diversity

1. Introduction

According to the Japan Ministry of Health, Labour and Welfare's HIV/AIDS Surveillance Committee, 1056 and 473 new HIV and AIDS cases were reported in 2011, respectively. The annual number of reported HIV and AIDS cases in Japan peaked in 2008, and has since stabilized at around 1500 new cases annually. HIV is primarily transmitted through male homosexual behavior—among the reported new cases of HIV and AIDS in 2011, 68% and 55% respectively were among men who had sex with men (MSM) [1]. This situation led the Japanese government to update a special guideline on HIV and AIDS in January 2012, which emphasized the need to improve counseling and testing services for these conditions by making them more accessible to those most vulnerable to HIV infection, such as MSM [2].

In Japan, free and anonymous HIV tests and counseling are provided at public health centers of all prefectures and some large cities. These counseling and testing services are fairly well known to MSM—an Internet study in 2008 indicated that more than half of MSM who ever tested for HIV had used these services [3]. One study carried out in public health centers throughout Japan indicated that public health nurses were in charge of 84.5% of pre-counseling and 61.9% of negative results notification for HIV testing [4]. Given that public health nurses play a key role in providing these services, they are expected to be crucial in implementing HIV prevention programs throughout the country.

Despite this, many public health nurses do not appear to be confident in providing HIV/AIDS services. They consider such counseling/testing services difficult to execute, and feel hesitant, unwilling, or uncomfortable in providing these services [4]. This lack of confidence and discomfort in relation to a particular subject or activity is called a "sense of nigate" in Japanese. Specifically, a sense of nigate refers to a feeling or attitude that can be expressed as "I'm not good at …"; it can apply to people (e.g., in social psychology, a sense of nigate can be defined as an awkward and uncomfortable feeling towards specific others in an interpersonal situation) [5], actions (e.g., waking up early or speaking in public), subjects (e.g., mathematics or gymnastic class), and other phenomenas that people might face in their daily lives. A sense of nigate is synonymous with low or a complete lack of self-efficacy; however, it is more commonly used in Japanese daily lives as an excuse for not doing a particular activity. To facilitate a more universal understanding, we use the English translation of "perceived difficulties" for "sense of nigate" in this article. Thus, perceived difficulties herein refer to having unfavorable and reluctant feelings and attitudes concerning a particular subject caused by a lack of experience or knowledge and emotional reactions that are discordant with one's own values.

As mentioned above, perceived difficulties related to HIV/AIDS services and sex-related matters may be prevailing among public health nurses, which can act as an impediment to the promotion of HIV testing services at public health centers. Despite this, no study has yet directly assessed perceived difficulties related to HIV/AIDS services among public health nurses in Japan. However, there have

been studies on other populations in Japan: one study among Japanese dental health care workers indicated that the majority of them were hesitant to perform dental treatment on HIV-positive patients because of an inadequate knowledge on HIV and AIDS [6]. In another study, primary care physicians in Japan demonstrated a negative attitude towards patients with HIV/AIDS, which was due to the complexity of treatments, prejudice, and fear [7]. Furthermore, a study on Japanese nurses working at hospitals and clinics reported that 59% of subjects reported reluctance to care for a patient with HIV or hepatitis B or C virus (HBV/HCV), which might arise from a perceived risk of infection and having a prejudicial attitude [8]. In western countries, there is a large body of research on HIV-related stigma and discrimination among health care providers, including nurses, but little work has been done specifically with public health nurses [9] [10] [11]. With regard to sex-related matters, in the U.S., Eliason reported a notable silence about lesbian, gay, bisexual, and transgender issues in nursing education [12]. Overall, there is a growing body of literature on nurses' attitude towards sexual minorities, which has clear implications and suggestions for nursing education on these issues [13] [14]. However, given the lack of studies on these issues in Japan, we thought it necessary to assess the perceived difficulties regarding HIV/AIDS services among public health nurses in the western region of Japan.

We were also interested in understanding the factors that correlate with the perceived difficulties related to HIV/AIDS services in order to identify methods of reducing these difficulties. According to the existing literature, the factors underlying perceived difficulties include individuals' experience, knowledge, and values. A qualitative study on the causes of diffidence among mid-level public health nurses who were supporting people with mental disorders identified seven categories of causes, such as a lack of experience and problems with developing a perspective regarding their particular field [15]. Additionally, old age might be a factor, as evidenced by a nationwide Internet survey on prejudice toward individuals with HIV or hepatitis B and C among the working-age population of Japan [16]. A study in Taiwan showed that nurses with longer careers, self-labels of "absolute heterosexual," and high religiousness were more likely to have negative attitudes towards homosexuality [17]. Another study of physicians and physician assistants in Southeast China found that unfavorable attitudes towards people with HIV/AIDS were reported mostly by physicians from remote areas, which the authors of the study interpreted as being influenced by their educational background [18]. Given these findings, the second objective of this study was to explore the factors that correlate with perceived difficulties regarding HIV/AIDS services among Japanese public health nurses.

The objectives of this study are (1) to assess the level of perceived difficulties regarding HIV/AIDS services and (2) to identify their correlates among public health nurses in the western region of Japan. The specific hypotheses examined are as follows: (1) public health nurses with less experience in dealing with people living with HIV/AIDS or sexual minorities will report higher perceived difficulties regarding HIV/AIDS services; (2) public health nurses with less knowledge of

sexual diversity will have higher perceived difficulties regarding HIV/AIDS services; and (3) public health nurses with low permissive attitudes towards diversity of sexual behavior will have higher perceived difficulties regarding HIV/AIDS services.

2. Method

2.1. Study Design

A cross-sectional study using a structured anonymous self-administered questionnaire was carried out in the Kinki region of western Japan between November and December 2011.

2.2. Target Population

The target group of this study was full-time public health nurses working in 6 prefectures and 12 cities of the Kinki region. This region is the second largest economic zone of Japan, and is the location of metropolitan cities such as Osaka, Kyoto, and Kobe. In terms of HIV/AIDS, the Kinki region requires attention because it has the second highest number of reported HIV cases annually, following Tokyo and its surrounding region [1]. In this study, Public health nurses who were on leave at the time of data collection were excluded from the study. No other selection criterion was adopted in recruiting participants. According to the results of a pre-survey administered to local governments in the region, the target population was 1951.

2.3. Questionnaire

The questionnaire was initially designed by a research team comprising public health specialists, a pedagogist, a school nurse, and a midwife specializing in nursing education. The drafted questionnaire was reviewed and revised by several public health nursing officers, and then pre-tested with 23 public health nurses outside the Kinki region. Efforts to increase face validity of the questionnaire were made in this process. Reliability of the whole questionnaire was not statistically assessed because of time constraint. Instead, the internal consistency of some constructs was assessed after data collection.

The outcome variable, perceived difficulties regarding HIV/AIDS services, was assessed by a single item, as follows: "What is the level of your perceived difficulties (sense of nigate) regarding HIV/AIDS services?" There were four response options: "a lot," "some," "little," and "not at all." Although this might be considered somewhat subjective, it is a commonly understood feeling among Japanese people; thus, there was a high likelihood that participants would understand what the question and responses meant.

The correlates of perceived difficulties were categorized into three dimensions: experience, knowledge, and values. The experience dimension included experience with an attitude towards offering consultations on sexual matters, experience with dealing with homosexual people or people with HIV during practice, and whether or not they are friends with homosexual people.

The knowledge dimension comprised knowledge of sexual diversity and educational experiences. Participants' knowledge of sexual diversity was assessed with eight items (e.g., "Homosexuality is a mental disorder"), each with the following three response options: "yes, I think so," "no, I do not think so," or "I do not know" (Figure 1). These items were originally developed for this study. A total score on knowledge of sexual diversity was calculated by counting the number of correct answers (with a perfect score being 8). Using the median split, we categorized those with 6 points or over as the "high knowledge group" and those with 5 points or less as the "low knowledge group." For educational experience, the questions centered on whether they had learned about sexual diversity and HIV/AIDS in their public health nursing education or in any on-the-job training course. Data about the specific contents of these trainings were also collected. In addition, the questionnaire asked about their future needs related to learning about sexual matters and HIV and their favored styles of training.

The values dimension included 11 items assessing individuals' attitudes towards permissiveness of diversity of sexual behavior (Figure 2). For each item, participants responded with one of four options: "acceptable," "maybe acceptable," "may not be acceptable," "not acceptable," and "I do not know." These items and responses were derived from the HIV & Sex survey in 2000 in Japan [19]. The internal consistency of the 11 items was satisfactory (α = 0.84). The score of permissiveness of diversity of sexual behavior was then calculated by assigning points to the response options, with "I do not know" being 0 point, "acceptable" being 1 point, and "not acceptable" being 4 points; thus, lower (higher) scores would indicate greater (lower) permissiveness. Again, using a medium split, we categorized those with a score of 27 or less as the high permissiveness group and those with a score of 28 or more as the low permissiveness group.

The obtained demographic information included age, years of working as a public health nurse, and gender. We also asked participants about their current field of work to obtain some basic background information. At the end of the

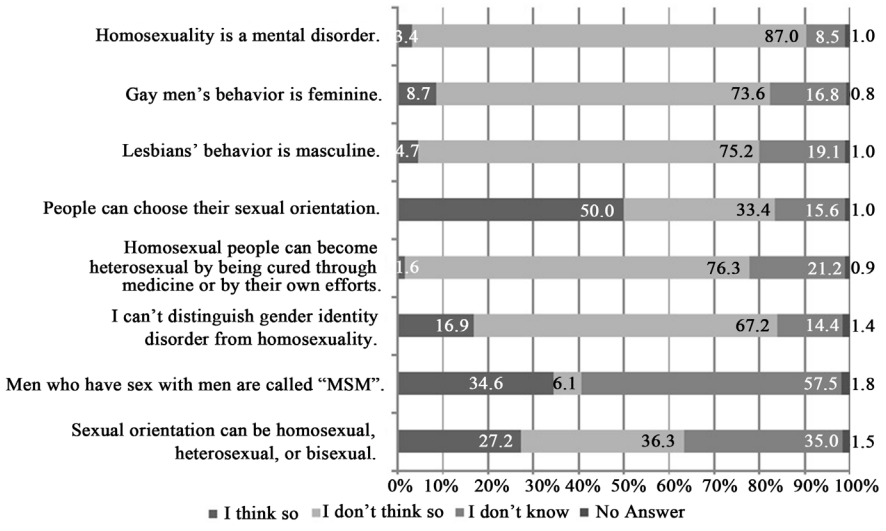

Figure 1. Knowledge on diversity of sexuality.

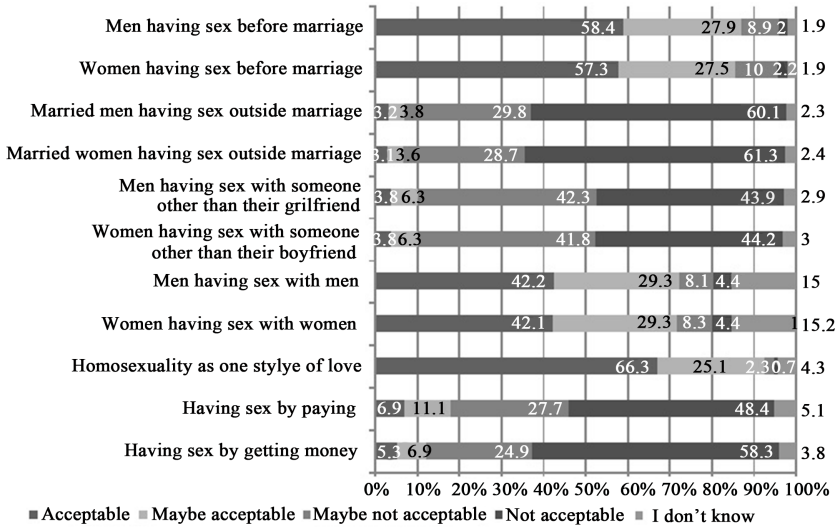

Figure 2. Attitude towards diversity of sexual behavior.

questionnaire, one open-ended question asked how they would like to interact with sexual minorities as a public health nurse.

The questionnaires were distributed and collected through local government offices in each study area. The participants completed the questionnaires on their own and then sealed the questionnaires in envelopes. They handed the envelopes to the officers in charge, who sent the envelopes to the research team by post.

2.4. Statistical Analyses

Statistical analyses were performed using IBM SPSS Statistics 20.0 (IBM Japan Corp., Tokyo, Japan). First, we calculated frequencies and descriptive statistics of all variables. Second, with perceived difficulties regarding HIV/AIDS services as the outcome variable, bivariate and multivariate associations with the dichotomous correlates were assessed using chi-square tests and logistic regression models. The threshold for significance was $p < 0.05$. Qualitative data from the open-ended question were used to complement interpretation of the numerical data.

2.5. Ethical Consideration

The study proposal was reviewed and approved by the Kansai University of Nursing and Health Sciences Research Ethics Committee (on September 29, 2011). In all research procedures, we followed the Declaration of Helsinki (amended in Seoul, 2008) of the World Medical Association and the ethical guidelines for epidemiological studies (amended on December 1, 2008) of the Japanese Ministry of Health, Labour and Welfare and Ministry of Education, Culture, Sports, Science and Technology. The purpose of this study, its procedures, the voluntary basis of participation, and the lack of any need to answer questions that they do not want to answer were written on the first page of the questionnaire. Only participants who gave their consent to participate in the study submitted their finished questionnaire. No identifying information was collected. All the administered ques-

tionnaires and memory sticks containing the study data were kept in the locked cabinet of the principal investigator.

3. Results

By the end of December 2011, 1545 questionnaires had been collected, of which 10 were incomplete and therefore omitted. As a result, we obtained 1535 valid questionnaires for further analysis (valid response rate 78.7%).

3.1. Demographic Characteristics of Participants

Participants' mean age was 40.1 years and they had worked as public health nurses for 17.0 years on average. The vast majority of participants (97.3%) were female. The fields in which they were engaged at the time of this study (multiple answers) were maternal and child health (38.0%), non-communicable diseases (25.0%), tuberculosis (23.6%), mental health (22.8%), HIV/AIDS (22.0%), cancer/lifestyle-related diseases, and other infectious diseases (20.8%).

3.2. Perceived Difficulties Regarding HIV/AIDS Services

More than half of the participants reported having perceived difficulties regarding HIV/AIDS services (with 7.4% having "a lot" and 45.4% having "some") (Table 1).

3.3. Experiences as a Public Health Nurse

The vast majority of participants (87.4%) had experience in offering consultations on sexual matters. The issues raised in these consultations included sexually transmitted diseases (83.3%), HIV (78.2%), family planning (51.4%), sexual matters for young adults and adolescents (48.8%), and sexual orientations (35.9%). With regard to the item asking about their attitude towards consultations on sexual matters, 77.7% responded "I deal with sexual matters as a duty," whereas only 14.3% responded that "I deal with sexual matters in a positive manner." The reasons for responses such as "I feel hesitant to deal with sexual matters (4.8%)" and "I do not want to deal with sexual matters" were assessed using a single question with multiple answers, which revealed that a lack of knowledge of these issues (66.3%) and never having learnt how to handle these matters (42.2%) were commonly reported.

A large proportion (49.3%) of participants had encountered homosexual people during practice, but most (59.2%) did not have homosexual people as their friends. Notably, there were high rates of "do not know" responses to these questions (36.8% and 28.0%, respectively) (Table 1).

3.4. Knowledge of Sexual Diversity and Educational Experience

Participants' responses to the items assessing their knowledge on diversity of sexuality are shown in Figure 1. There were some evident misperceptions among the participants. For example, 50% responded "I think so" to the statement "People can choose their sexual orientation," despite the fact that sexual orientation is not a choice, a notion which causes distress to many sexual minorities. Additionally,

Table 1. Demographic characteristics of participants, perceived difficulties regarding HIV/AIDS services, and experiences as a public health nurse (n = 1535).

	Number	%
Demographic characteristics		
Age		
Less than 40 years	666	43.4
40 years and more	828	53.9
No answer	41	2.7
Work experience as a public health nurse		
<20 years	841	54.8
≥20 years	686	44.7
No answer	8	0.5
Gender		
Female	1493	97.3
Male	24	1.6
Other	0	0.0
No answer	18	1.2
Perceived difficulties regarding HIV/AIDS services		
A lot	114	7.4
Some	697	45.4
Little	599	39.0
Not at all	97	6.3
No answer	28	1.8
Experiences as a public health nurse		
Offered consultations on sexual matters		
Yes	1341	87.4
No	128	8.3
No answer	66	4.3
Attitude towards consultations on sexual matters		
Deal with sexual matters in a positive manner	219	14.3
Deal with sexual matters as a duty	1193	77.7
Feel hesitant in dealing with sexual matters	73	4.8
Do not want to deal with sexual matters at all	9	0.6
Other	3	0.2
No answer	38	2.5

Continued

Encounter homosexual people during practice		
Yes	757	49.3
No	207	13.5
Do not know	565	36.8
No answer	6	0.4
Friends with homosexual people		
Yes	188	12.2
No	909	59.2
Do not know	430	28.0
No answer	8	0.5
Encounter people with HIV during practice		
Yes	497	32.4
No	310	20.2
Do not know	720	46.9
No answer	8	0.5

response rates of "I do not know" were relatively high for the statements, "Men who have sex with men are called 'MSM'" and "Sexual orientation can be homosexual, heterosexual, or bisexual" (57.5% and 35.9%, respectively).

For educational experiences, very few (12.1%) had learned about homosexuality and gender dysphoria during their public health nursing education. In contrast, 41.2% had learned of these issues after being qualified as public health nurses. Most of them had learned about HIV/AIDS in their public health nursing education (51.1%) and after they had become a public health nurse (76.4%).

Regarding their needs for future training on sexual diversity, participants reported wanting to learn how to interact with clients who were sexual minorities (66.7%), the opinions and perspectives of sexual minority clients (62.3%), and the relationships of sexual minority clients with their own communities (60.6%). Regarding HIV/AIDS, they wanted to learn the latest guidelines on treatment (81.0%), social welfare for HIV-positive people (68.5%), and the practices of HIV prevention (66.0%). One-day training courses were preferred by 60.5% of participants, and preferred educational materials were handbooks (68.7%), websites (54.3%), and pamphlets (53.7%).

3.5. Values

The results regarding permissiveness towards diversity of sexual behavior are shown in Figure 2. A fairly large number of participants considered sex before marriage as "acceptable." However, more than half of the participants considered sex outside marriage and sex in exchange for money as "not acceptable."

3.6. Correlates of Perceived Difficulties Regarding HIV/AIDS Services

The correlates of perceived difficulties towards HIV/AIDS services were identi-

fied by chi-square tests and logistic regression analysis (adjusted odds ratios [AORs]) (Table 2). In the multivariate analysis, we found that age and work experiences as a public health nurse were not associated with the outcome variable.

Regarding experience, we found that having a negative attitude towards consultations on sexual matters (i.e., treating it as a duty, feeling hesitant, and not wanting to consult at all) (AOR 2.2 [1.6 - 3.1], $p < 0.001$), lack of encountering

Table 2. Dichotomous correlates of perceived difficulties (a sense of nigate) regarding HIV/AIDS services among public health nurses (n = 1535).

		HIV/AIDS services		Odd ratio	p^a	AOR	p^b
		High perceived difficulties	Low perceived difficulties	(95% CI)		(95% CI)	
		Number (%)	Number (%)				
Demographic							
Age	<40 years old	396 (59.9%)	265 (40.1%)	1.6 (1.3 - 2.0)	<0.001	1.2 (0.8 - 1.6)	0.366
	≥40 years old	392 (48.4%)	418 (51.6%)	1		1	
Work experience as PHN[c]	<20 years	427 (58.9%)	298 (41.1%)	1.5 (1.2 - 1.8)	<0.001	1.3 (1.0 - 1.8)	0.089
	≥20 years	384 (49.0%)	399 (51.0%)	1		1	
Experience							
Offered consultations on sexual matters	No	90 (70.9%)	37 (29.1%)	2.2 (1.5 - 3.3)	<0.001	1.0 (0.6 - 1.6)	0.973
	Yes	689 (52.2%)	630 (47.8%)	1		1	
Attitude towards consultations on sexual matters	Negative (As duty/feel hesitant/do not want to)	719 (57.3%)	536 (42.7%)	2.6 (1.9 - 3.5)	<0.001	2.2 (1.6 - 3.1)	<0.001
	Positive	74 (34.1%)	143 (65.9%)	1		1	
Encounter homosexual people during practice	No/do not know	520 (68.3%)	241 (31.7%)	3.4 (2.7 - 4.1)	<0.001	1.6 (1.2 - 2.1)	0.002
	Yes	290 (38.9%)	455 (61.1%)	1		1	
Friends with homosexual people	No/do not know	731 (55.3%)	590 (44.7%)	1.7 (1.3 - 2.4)	0.001	1.2 (0.8 - 1.7)	0.452
	Yes	77 (41.8%)	107 (58.2%)	1		1	
Encounter people with HIV during practice	No/do not know	635 (62.7%)	377 (37.3%)	3.1 (2.5 - 3.9)	<0.001	1.8 (1.4 - 2.4)	<0.001
	Yes	174 (35.3%)	319 (64.7%)	1		1	
Knowledge							
Knowledge of sexual diversity	Low	584 (64.8%)	317 (35.2%)	3.1 (2.5 - 3.9)	<0.001	2.0 (1.5 - 2.5)	<0.001
	High	222 (37.1%)	377 (62.9%)	1		1	
Learned about sexuality in PHN education	No/do not remember	556 (63.3%)	322 (36.7%)	2.6 (2.1 - 3.2)	<0.001	1.4 (1.1 - 1.8)	0.016
	Yes	246 (39.7%)	374 (60.3%)	1		1	
Learned about HIV/AIDS in PHN education	No/do not know	307 (69.9%)	132 (30.1%)	2.8 (2.1 - 3.6)	<0.001	1.3 (0.9 - 1.9)	0.178
	Yes	500 (47.3%)	557 (52.7%)	1		1	
Values							
Permissiveness of sexual behavior diversity	Low	423 (59.7%)	285 (40.3%)	1.6 (1.3 - 2.0)	<0.001	1.5 (1.2 - 2.0)	<0.001
	High	383 (48.3%)	410 (51.7%)	1		1	

a. Chi-square test, b. Logistic regression, c. Public health nurse.

homosexual people during practice (AOR 1.6 [1.2 - 2.1], $p = 0.002$), and lack of encountering people with HIV during practice (AOR 1.8 [1.4 - 2.4], $p < 0.001$), were associated with greater odds of having high perceived difficulties regarding HIV/AIDS. However, the experiences of offering consultations on sexual matters or being friends with homosexual people were not significantly associated with perceived difficulties regarding HIV/AIDS services. Thus, Hypothesis 1 (public health nurses with less experience with people living with HIV/AIDS or sexual minorities will have high perceived difficulties regarding HIV/AIDS) was only partially supported.

Concerning knowledge, having low knowledge of sexual diversity was associated having high perceived difficulties regarding HIV/AIDS services (AOR 2.0 [1.5 - 2.5], $p < 0.001$). Thus, Hypothesis 2 (public health nurses with less knowledge on sexual diversity will have high perceived difficulties regarding HIV/AIDS services) was supported. With regard to educational experiences, not learning about sexual diversity in public health nursing education was associated with having high perceived difficulties regarding HIV/AIDS services (AOR 1.4 [1.1 - 1.8], $p = 0.016$). In contrast, not having learned about HIV/AIDS in public health nursing education was not significantly associated with the outcome variable.

Finally, low permissiveness of diversity of sexual behavior was found to be significantly associated with having high perceived difficulties regarding HIV/AIDS services (AOR 1.5 [1.2 - 2.0], $p < 0.001$). Thus, Hypothesis 3 (public health nurses with low permissive attitudes towards diversity of sexual behavior will have high perceived difficulties regarding HIV/AIDS services) was supported.

4. Discussion

4.1. Perceived Difficulties and Correlates

In this cross-sectional study, we assessed the perceived difficulties regarding HIV/AIDS services among public health nurses working for the local governments of the Kinki region of western Japan, and identified their correlating factors. As expected, more than half of the participants (52.8%) reported some or many perceived difficulties regarding HIV/AIDS services. This prevailing perception has likely hindered the execution of HIV/AIDS-related services, including counseling and testing, at the public health centers in this region. Therefore, it is necessary to determine the means of reducing these perceived difficulties so that public health nurses feel more confident and comfortable in providing HIV/AIDS-related services. The other findings of this study have much to contribute in this regard.

First, a complete lack of experience of encountering homosexual people and people with HIV during practice was associated with greater odds of having high perceived difficulties (AOR 1.6 and 1.8, respectively) compared to those who have had such experiences. Furthermore, although there is a study suggesting that being friends with sexual minorities would have a positive impact on nurses' attitudes towards such minorities, our findings suggest that this has no real im-

pact on perceived difficulties regarding HIV/AIDS services [20]. Thus, as a first step to facilitate provision of HIV/AIDS services among public health nurses, a future training and education session might incorporate opportunities for public health nurses who have encountered sexual minorities and HIV-positive people during practice to share their experiences with those who have not encountered these groups.

Interestingly, attitudes towards offering consultations on sexual matters, rather than actual experience, were significantly associated with having high perceived difficulties regarding HIV/AIDS services. As noted above, most participants (87.4%) had experience in offering consultations on sexual matters, which suggests that knowledge and techniques related to dealing with sexual matters and sexuality are fundamental for public health nurses. However, very few nurses (only 12.1%) had actually learned about sexual diversity in their formal training; this was reflected in the low number of correct answers for certain items regarding knowledge of sexual diversity. These findings suggest that the gap should be filled by including sexual matters in the public health nursing education curriculum.

With regard to knowledge, public health nurses with less knowledge on sexual diversity had greater odds of having high perceived difficulties regarding HIV/AIDS services (AOR 2.0) compared to those with high knowledge, as expected. Relatedly, those who did not have a chance to learn about sexuality in their public health nursing education had greater odds of having high perceived difficulties regarding HIV/AIDS services. Interestingly, however, learning about HIV/AIDS in their formal education was not significantly associated with perceived difficulties, which implies that the content in public health nursing education does not match nurses' needs for their practical work. The in-depth questions revealed that content on HIV/AIDS in their formal education was mostly limited to biomedical knowledge (84.6%), modes of transmission (91.5%), and ways of prevention (86.4%). For their future educational needs, we noted that nurses desired to listen to the voices and understand the lives of sexual minorities and people living with HIV/AIDS, suggesting that such information should be included in public health nursing curriculum. This would ensure that, by the time that nursing students become qualified public health nurses, they feel sufficiently confident to interact with sexual minorities and people with HIV/AIDS as their clients.

Finally, the multivariate analysis indicated that low permissiveness towards diversity of sexual behavior was associated with having high perceived difficulties. In the in-depth open-ended question on this topic, we also found that nurses reported having to continuously struggle to handle concerns of sex and HIV/AIDS without prejudice or bias; indeed several nurses reported "Sex was taboo when I was trained as a public health nurse" or "Sexuality was not as diverse as it is now, when I was young." However, participants said that in working with clients and obtaining knowledge through on-the-job training, they were able to broaden their perspective and change their own perceptions. Given that the clients of public health nurses are becoming increasingly diverse in terms of back-

ground—not only in terms of sexuality, but also in many other aspects of life—training to obtain cultural humility might be included in public health nurses' education. This would enable greater self-reflection before they begin interacting with clients and will help them reconcile their own values with those of their clients [21]. In this way, students might feel more comfortable in executing their health education, which is a required skill for public health nurses [22].

4.2. Implications for Public Health Nursing Education

To reduce the prevailing perceived difficulties regarding HIV/AIDS services among Japanese public health nurses, systematic efforts should be integrated into public health nursing education. Currently, there is an opportunity for implementation of such efforts, as nursing and public health nursing education in Japan are currently undergoing reform and growth, with the rapid proliferation of nursing schools at the undergraduate university level and an amendment to the Act on Public Health Nurses, Midwives, and Nurses in 2009.

It is important to ensure that opportunities to learn about sexuality are given in undergraduate nursing education, which precedes formal public health nursing education. According to Kayashima's report on teaching sexual health in nursing education in Japan, the importance of supporting the understanding of sexuality in nursing practice was recognized by many parties, but so far there has been no concerted effort to actually teach nurses practical skills for use in consultations on sexual matters [23]. Additionally, Mizuno reviewed the syllabi of 80 (out of the 140) schools of nursing at the undergraduate level to identify the status of sexuality education. Finding it largely wanting, she proposed that a course on sexual diversity and its related issues be provided to freshman nursing students [24]. In practice, it might be helpful to adapt a fully developed curriculum created in western countries, such as the Mims-Swenson sexual health model, into the Japanese context [13].

In public health nursing education, providing students with opportunities to listen to the real voices of sexual minorities or people with HIV/AIDS would likely help students better understand these clients. Students might be able to visualize the lives of these people even by reading their accounts or blogs on the Internet. As noted by Carabez, a course assignment to conduct structured interviews with nurses on care of sexual minorities might also help Japanese public health nursing students recognize these issues [25].

Currently working public health nurses also require basic knowledge of sexual diversity and a fuller understanding of the lives of sexual minorities and people with HIV/AIDS. On-the-job training courses may be organized for working public health nurses. This would likely help to reduce prevailing perceived difficulties regarding HIV/AIDS among public health nurses, and hence improve the quality of HIV counseling and testing services at public health centers.

4.3. Limitations

Since this study is cross-sectional, we cannot make inferences on the direction of

the causal relationships for any of the correlations observed. Another possible limitation is the lack of consideration of certain other covariates that might underlie the association found. Furthermore, regarding the items assessing participants' attitudes, we could not eliminate the possible influence of social desirability bias. Finally, this study explanatorily assessed perceived difficulties regarding HIV/AIDS services using a single question; the development and validation of a scale to assess this construct in more detail would be needed, especially in light of the global movement to develop standardized measures of HIV-related stigma and discrimination [26] [27]. By overcoming these limitations, future studies could develop and test the effectiveness of actual interventions that seek to reduce these perceived difficulties by increasing Japanese public health nurses' confidence in dealing with HIV/AIDS and sexual matters.

5. Conclusion

This cross-sectional study revealed that 52.8% of public health nurses in western Japan had perceived difficulties regarding HIV/AIDS services. Considering the factors correlated with these prevailing perceived difficulties in HIV/AIDS, public health nursing education in Japan should focus on sexual issues and HIV/AIDS in a more systematic way.

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ORIGINAL ARTICLE

Three 25-NBOMe-type drugs, three other phenethylamine-type drugs (25I-NBMD, RH34, and escaline), eight cathinone derivatives, and a phencyclidine analog MMXE, newly identified in ingredients of drug products before they were sold on the drug market

Asuka Kaizaki-Mitsumoto[1] · Naoki Noguchi[1] · Saki Yamaguchi[1] · Yuki Odanaka[2] · Satoko Matsubayashi[2] · Hiroki Kumamoto[3] · Kiyoshi Fukuhara[3] · Masahiko Funada[4] · Kiyoshi Wada[5] · Satoshi Numazawa[1]

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Abstract Twenty-two samples of ingredients of recreational drugs before being sold on the drug market obtained from a dubious drug dealer were analyzed by gas chromatography/mass spectrometry, high-resolution mass spectrometry, and nuclear magnetic resonance (NMR) spectroscopy. The present study showed 15 novel designer drugs, which have not been described in scientific literature. They included three NBOMe drugs 25H-NBOMe, 25D-NBOMe, and 25E-NBOMe, three other phenethylamine-type drugs 25I-NBMD, RH34, and escaline, eight cathinone derivatives 5-DBFPV, 3,4-MDPHP, 3,4-dimethyl-NEB, 3,4-dimethyl-α-ethylaminopentiophenone, 3,4-dimethyl-α-PVP, 4F-α-ethylaminopentiophenone, bk-IVP, and bk-IBP, and a phencyclidine derivative MMXE. In addition to the above novel compounds, known compounds such as 25I-NBOMe, ADB-CHIMINACA, 5F-ADB, and butane-1,4-diol were also identified from some samples. The electron ionization mass spectra, high-resolution data of molecular formulae, and NMR spectra presented in this article seem very useful for forensic toxicologists, who are obliged to identify new psychotropic drugs in any dubious products and/or human specimens.

Keywords New 25-NBOMe-type designer drugs · 5-DBFPV · 3,4-MDPHP · bk-IVP · MMXE · Identification of newly emerged psychotropic drugs

✉ Satoshi Numazawa
numazawa@pharm.showa-u.ac.jp

[1] Division of Toxicology, Department of Pharmacology, Toxicology and Therapeutics, Showa University School of Pharmacy, 1-5-8 Hatanodai, Shinagawa-ku, Tokyo, Japan

[2] Center for Instrumental Analysis, Showa University School of Pharmacy, Tokyo, Japan

[3] Department of Medicinal and Industrial Chemistry, Showa University School of Pharmacy, Tokyo, Japan

[4] National Institute of Mental Health, National Center of Neurology and Psychiatry, Kodaira, Tokyo, Japan

[5] Saitama Prefectural Psychiatric Hospital, Kitaadachi-gun, Saitama, Japan

Introduction

Tightening of regulations by the government, including the identification of black market channels, regulation of ship cargos at harbors, and increasing the number of designated drugs or "shitei yakubutsu" by the Pharmaceutical Affairs Law, has been effective in reducing the recreational drug market in Japan. However, the form of drug marketing changes in circulation process according to the regulations. Furthermore, the supply of recreational drugs to consumers is being kept underground.

In recent years, most recreational drug products spreading in the Japanese drug market contain synthetic cannabinoids, which provoke hallucination symptoms through cannabinoid (CB_1) receptors, similar to marijuana, and the synthetic cathinones, which provoke central stimulation actions similar to methamphetamine [1]. Because of this serious situation, the government began regulating a drug group with basic structures of synthetic cannabinoids [(1*H*-indol-3-yl)(naphthalen-1-yl)methanones] in February 2013 (770 compounds), and a drug group with basic structures of synthetic cathinones (2-amino-1-phenyl-propan-1-ones) in December 2013 (495 compounds); this type of regulation is called generic scheduling. However,

after enactment of the law, the clandestine drug producers have modified or changed the basic structures and continue to supply recreational drugs, which have not yet been regulated, to consumers. In response to the evasion, additional individual drugs were designated by the Pharmaceutical Affairs Law, and another cathinone series of compounds were further designated by the generic scheduling in May 2015, which resulted in 2297 compounds. However, this approach only regulates some new drugs after they are created and sold, which means that the government is always trailing behind the drug producers.

Therefore, a novel methodology that attempts to identify possible new modifications of the chemicals actually spreading across the drug market and then linking the information to the generic scheduling is necessary. From this point of view, we made efforts to enlist the cooperation of research collaborators, conducted a drug search on a relatively large scale for recreational drugs on the drug market in Japan, and obtained relatively pure samples from a dubious dealer. In this study, we analyzed the ingredients of recreational drugs that had not yet been sold on the market and disclosed 15 novel psychotropic designer drugs to be available on the drug market (Fig. 1a).

Materials and methods

Samples

The research collaborator obtained 22 samples (Table 1), intended for use as ingredients in the recreational drug product prior to being sold on the drug market, from a recreational drug dealer in August 2014. There was one liquid sample labeled "sample No. 1", and "sample Nos. 2–22" were all in powder form.

Gas chromatography/mass spectrometry analysis

A 10-μL aliquot of liquid sample or 10 mg each powder sample was initially dissolved into 2 mL methanol and arbitrarily diluted. Gas chromatography/mass spectrometry (GC/MS) analysis was performed using GC–MS-QP2100 Ultra (Simadzu, Kyoto, Japan) equipped with a DB5MS capillary column (30 m × 0.25 mm i.d., 0.25 μm film thickness; Agilent, Santa Clara, CA, USA.) with a helium carrier gas flow at 1.56 mL/min. The injection port was set at 260 °C and an injection volume was 1 μL in the splitless mode. The initial oven temperature was set to 60 °C, which was held for 2 min, and then increased by 10 °C/min up to 320 °C and held for 10 min. Electron ionization (EI) was used with a temperature of the ion source set to 200 °C and operation in full scan (*m/z* 40–700) mode. GC/MS data analysis was performed using the SWGDRUG MS Library ver. 2.2 supplied by Scientific Working Group for the analysis of seized drugs (SWGDRUG) [2] and Cayman Spectral Library (Cayman Chemical) [3].

Nuclear magnetic resonance analysis

A 10-mg sample of each powder (sample Nos. 13–22, which could not be identified by GC/MS) was dissolved in 1 mL methanol-d_4 (99.8 %) or pyridine-d_5 (99.8 %). Nuclear magnetic resonance (NMR) spectra were measured using an ECX-500 instrument (JEOL RESONANCE Inc., Tokyo, Japan) at 500 MHz for ^{1}H and 125 MHz for ^{13}C. The signals were assigned on the basis of 2D NMR experiments, which involved correlated spectroscopy (COSY), distorsionless enhancement by polarization transfer (DEPT135), heteronuclear multiple quantum coherence (HMQC), and heteronuclear multiple-bond coherence (HMBC) spectral analyses.

High resolution mass spectrometry analysis

High resolution mass spectrometry (HRMS) analyses of sample Nos. 13-22 were carried out using JMS-700 V (JEOL Inc., Tokyo, Japan) operated by fast atom bombardment (FAB) in the positive mode with xenon gas. Glycerol or 3-nitrobenzyl alcohol was used as matrix. The spectra were run in a mass range from *m/z* 10 to 1000. PEG 200 and PEG 400 were used for mass calibration. Resolution performance was 3000.

Results and discussion

Twenty-two samples were measured by GC/MS and searched for by the spectral libraries. Every sample was composed of a single compound, showing a purity of more than 90 % (data not shown). Twelve samples (10 compounds) matched with the data of the spectral libraries and were identified as specific compounds (Table 1, Fig. 1).

Although the compounds **1**–**6** could be easily identified by matching each spectrum with that described in the libraries, they have not appeared in scientific literature. Therefore, we presented their EI mass spectra as useful information to forensic toxicologists (Fig. 2). Among 25-NBOMe designer drugs, 25I-NBOMe and 25B-NBOMe are most common and detected from seized materials [4] and human specimens [5–7].

However, the fragmentation patterns of the other 10 samples did not match those of the libraries (Table 1, Fig. 3). For the determination of these nine compounds, NMR and HRMS analyses were performed (Tables 2, 3). As a result, eight synthetic cathinones (compounds **7**–**14**) and one phencyclidine derivative (compound **15**) were identified as novel designer drugs for the recreational

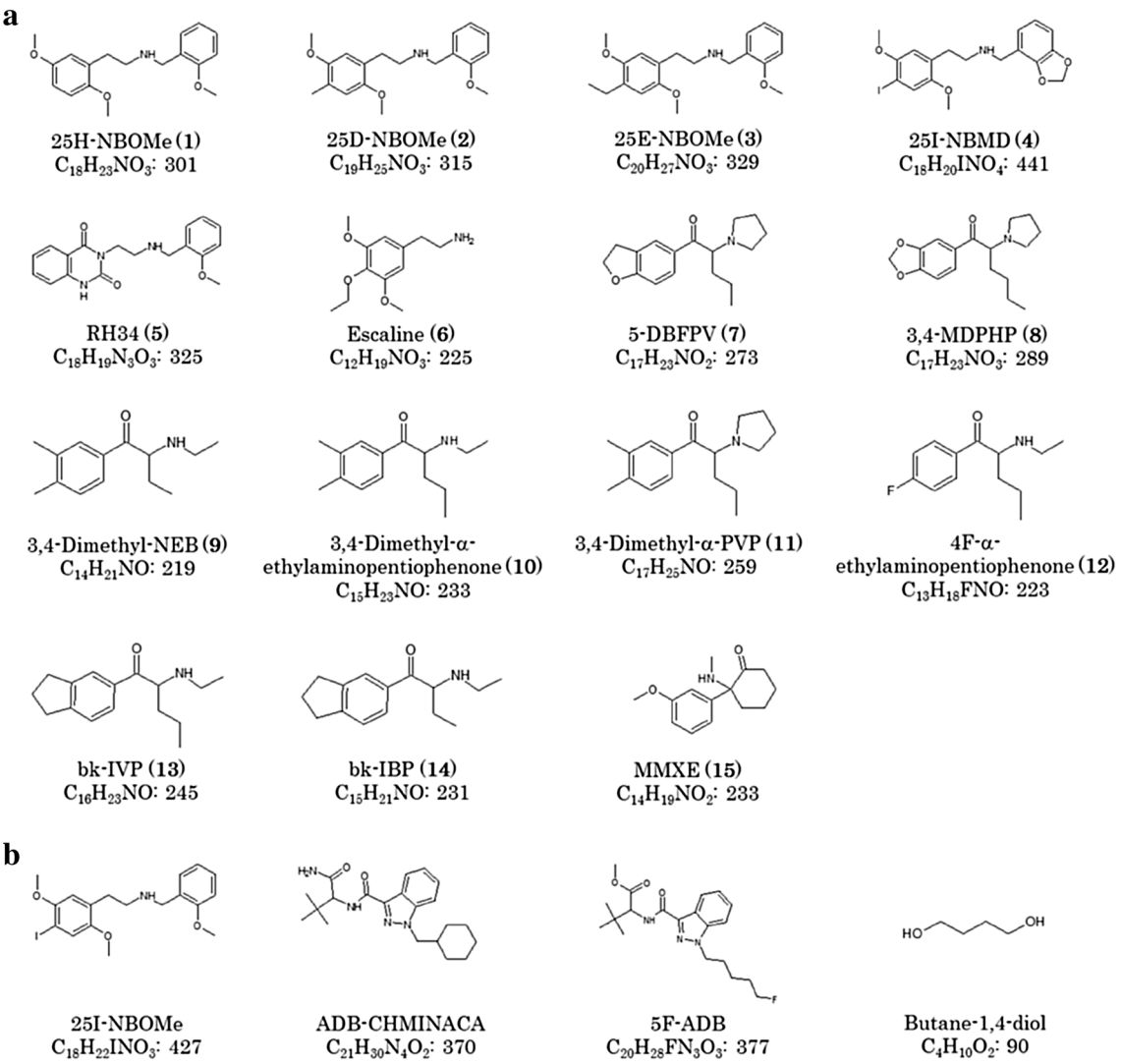

Fig. 1 Structures of the newly disclosed compounds (**1**–**15**; **a**) and known compounds (**b**) identified in the present study

samples (Fig. 1). Analysis data on the structural determination of compounds are indicated below.

Identification of compounds 7–15

Sample No. 13 was analyzed by GC/MS. Figure 3 shows the EI mass spectrum of compound **7** at 21.08 min with peaks at *m/z* 126, 127, and 55. HRMS analysis indicated the $[M + H]^+$ value at *m/z* 274.1816, and the protonated molecular formula was estimated to be $C_{17}H_{24}NO_2$ (calculated value 274.1807, accident error 0.9 ppm; Table 2). Compound **7** was eventually identified as 1-(2,3-dihydro-1-benzofuran-5-yl)-2-(pyrrolidin-1-yl)pentan-1-one (5-DBFPV) by NMR (Table 3, Fig. 1).

Sample Nos. 14 and 15 were analyzed by GC/MS and both samples indicated exactly the same EI mass spectra and the same retention time at 20.95 min with peaks at *m/z* 140, 141, and 84 (Fig. 3), indicating these are the same compound (compounds **8**). HRMS analysis indicated the $[M + H]^+$ value at *m/z* 290.1752, and the protonated molecular formula was estimated to be $C_{17}H_{24}NO_3$ (calculated value 290.1756, accident error −0.4 ppm for sample No. 14 and −1.4 ppm for sample No. 15; Table 2). Compound **8** was eventually identified as 1-(1,3-benzodioxol-5-yl)-2-(pyrrolidin-1-yl)hexan-1-one (3,4-MDPHP) by NMR (Table 3, Fig. 1).

For sample No. 16 (compound **9**), EI mass spectrum showed peaks at *m/z* 86, 58, and 41 at 15.47 min. HRMS analysis indicated the $[M + H]^+$ value at *m/z* 220.1694, and the protonated molecular formula was estimated to be $C_{14}H_{22}NO$ (calculated value 220.1701, accident error −0.7 ppm; Table 2). Compound **9** was eventually identified as 1-(3,4-dimethylphenyl)-2-(ethylamino)butan-1-one (3,4-dimethyl-NEB) by NMR (Table 3, Fig. 1).

Table 1 Samples for identification by gas chromatography/ mass spectrometry (GC/MS) using two libraries

Sample No.	Compound name	Category of the drug identified
1	Butane-1,4-diol	Alkyldiol
2	ADB-CHMINACA	Synthetic cannabinoid
3	ADB-CHMINACA	Synthetic cannabinoid
4	5F-ADB	Synthetic cannabinoid
5	5F-ADB	Synthetic cannabinoid
6	25H-NBOMe (**1**)	Phenethylamine
7	25I-NBOMe	Phenethylamine
8	25E-NBOMe (**3**)	Phenethylamine
9	25D-NBOMe (**2**)	Phenethylamine
10	25I-NBMD (**4**)	Phenethylamine
11	RH34 (**5**)	Phenethylamine
12	Escaline (**6**)	Phenethylamine
13	Compound **7**	–[a]
14	Compound **8**	–
15	Compound **8**	–
16	Compound **9**	–
17	Compound **10**	–
18	Compound **11**	–
19	Compound **12**	–
20	Compound **13**	–
21	Compound **14**	–
22	Compound **15**	–

[a] Not matched using the GC/MS libraries [2, 3]

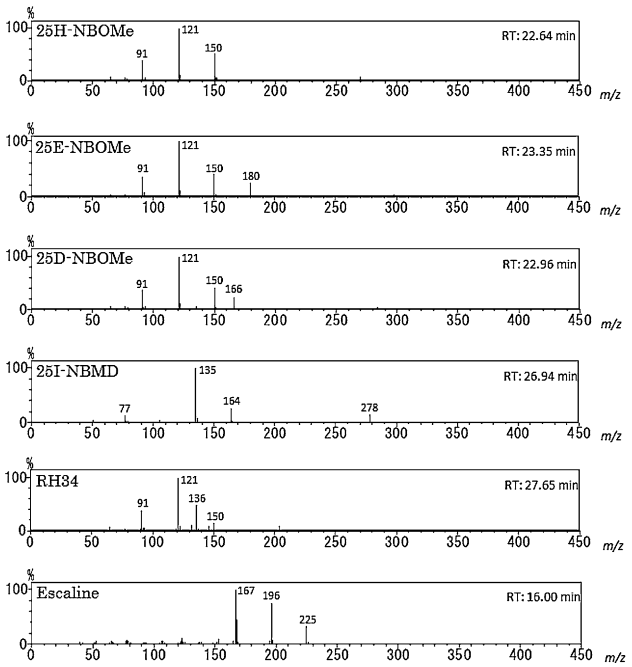

Fig. 2 Election ionization (EI) mass spectra of compounds **1–6**, which could be identified by matching each spectrum with that described in the libraries [2, 3]

Table 2 High-resolution protonated molecular weight data for compounds **7–15**

Compound	Observed *m/z*	Calculated *m/z*	Error (ppm)
7	274.1816	274.1807	0.9
8	290.1752	290.1756	−0.4
8	290.1742	290.1756	−1.4
9	220.1694	220.1701	−0.7
10	234.185	234.1858	−0.8
11	260.2018	260.2014	0.4
12	224.1444	224.1451	−0.7
13	246.1873	246.1858	1.5
14	232.1689	232.1701	−1.2
15	234.1502	234.1494	0.8

For sample No. 17 (compound **10**), EI mass spectrum showed peaks at *m/z* 100, 58, and 101 at 16.40 min. HRMS analysis indicated the $[M + H]^+$ value at *m/z* 234.1850, and the protonated molecular formula was estimated to be $C_{15}H_{24}NO$ (calculated value 234.1858, accident error −0.8 ppm; Table 2). Compound **10** was eventually identified as 1-(3,4-dimethylphenyl)-2-(ethylamino)pentan-1-one (3,4-dimethyl-α-ethylaminopentiophenone) by NMR (Table 3, Fig. 1).

For sample No. 18 (compound **11**), EI mass spectrum showed peaks at *m/z* 126, 127, and 55 at 18.68 min. HRMS analysis indicated the $[M + H]^+$ value at *m/z* 260.2018, and the protonated molecular formula was estimated to be $C_{17}H_{26}NO$ (calculated value 260.2014, accident error 0.4 ppm; Table 2). Compound **11** was eventually identified as 1-(3,4-dimethylphenyl)-2-(pyrrolidin-1-yl)pentan-1-one (3,4-dimethyl-α-PVP) by NMR (Table 3, Fig. 1).

For sample No. 19 (compound **12**), EI mass spectrum showed peaks at *m/z* 100, 58, and 95 at 13.39 min. HRMS analysis indicated the $[M + H]^+$ value at *m/z* 224.1444, and the protonated molecular formula was estimated to be $C_{13}H_{19}FNO$ (calculated value 224.1451, accident error −0.7 ppm; Table 2). Compound **12** was eventually identified as 2-(ethylamino)-1-(4-fluorophenyl)pentan-1-one (4F-α-ethylaminopentiophenone) by NMR (Table 3, Fig. 1).

For sample No. 20 (compound **13**), EI mass spectrum showed peaks at *m/z* 100, 58, and 101 at 18.21 min. HRMS analysis indicated the $[M+H]^+$ value at *m/z* 246.1873, and the protonated molecular formula was estimated to be $C_{16}H_{24}NO$ (calculated value 246.1858, accident error 1.5 ppm; Table 2). Compound **13** was eventually identified as 2-(ethylamino)-1-(indan-5-yl)pentan-1-one (bk-IVP) by NMR (Table 3, Fig. 1).

For sample No. 21 (compound **14**), EI mass spectrum showed peaks at *m/z* 86, 58, and 115 at 17.43 min. HRMS

Table 3 Nuclear magnetic resonance (NMR) data for compounds **7–15**

Compound No.	NMR	Data
7	^{1}H	δ: 0.88 (t, J = 7.4 Hz, 3H, H-5), 1.17–1.32 (m, 2H, H-4 × 2), 1.97–2.24 (m, 6H, H-3 × 2, H-2″ ×2 and H-3″ ×2), 2.96–3.02 (m, 1H, H-4″), 3.28–3.34 (m, 3H, –OCH_2CH_2– and H-1″), 3.59–3.64 (m, 1H, H-4″), 3.66–3.71 (m, 1H, H-l″), 4.70 (t, J = 8.8 Hz, 2H, –OCH_2–), 5.19–5.21 (m, 1H, H-2), 6.90 (d, J = 8.5Hz, 1H, H-5′), 7.92 (dd, J = 8.5 and 2.0 Hz, 1H, H-6′), 7.97 (d, J = 2.0 Hz, 1H, H-2′)
	^{13}C	δ: 14.2 (C-5), 18.6 (C-4), 24.0 (C-3″), 24.2 (C-2″), 29.6 (–OCH_2CH_2–), 33.8 (C-3), 53.1 (C-l″), 56.2 (C-4″), 70.0 (C-2), 74.0 (–OCH_2), 110.7 (C-5′), 127.5 (C-2′), 128.8 (C-1′), 130.7 (C-3′), 132.6 (C-6′), 167.9 (C-4′), 195.0 (C-l)
	HMBC	1_3,2′,6′ 2_3,4″,1″ 3_2,4,5 4_3,5 5_3,4 l′_5′ 2′_6′ 3′_5′,OCH_2CH_2,OCH_2 4′_2′,5′,6′,OCH_2CH_2,OCH_2 6′_2′ 1″_2,2″,4″ 2″_1″,3″,4″ 3″_1″,2″,4″ 4″_2 OCH_2_ OCH_2CH_2 OCH_2CH_2_OCH_2
8	^{1}H	δ: 0.83 (t, J = 7.0 Hz, 3H, H-6), 1.10–1.32 (m, 4H, H-4 × 2 and H-5 × 2), 1.98–2.06 (m, 4H, H-3 × 2 and H-3″×2), 2.11 (br, 1H, H-2″), 2.21 (br, 1H, H-2″), 3.01 (br, 1H, H-4″), 3.33 (br, 1H, H-l″), 3.62 (br, 1H, H-4″), 3.68 (br, 1H, H-l″), 5.19–5.21 (m, 1H, H-2), 6.13 (s, 2H, –OCH_2–), 7.02 (d, J = 8.2 Hz, 1H, H-5′), 7.51 (d, J = 1.7 Hz, 1H, H-2′), 7.74 (dd, J = 8.2 and 1.7 Hz, 1H, H-6′)
	^{13}C	δ: 13.9 (C-6), 23.5 (C-5), 24.0 (C-3″), 24.1 (C-2″), 27.1 (C-4), 31.4 (C-3), 53.1 (C-l″), 56.2 (C-4″), 70.1 (C-2), 104.1 (-O–CH_2–), 108.8 (C-2′), 109.5 (C-5′), 127.5 (C-6′), 130.2 (C-1′), 150.4 (C-3′), 155.3 (C-4′), 195.0 (C-l)
	HMBC	1_3,2′,6′ 2_3,4 3_2,4,5 4_2,3,5,6 5_3,4,6 6_4,5 l′_2,3,2′,6′ 2′_5′,6′ 3′_2′,5′,OCH_2 4′_2′,5′,6′,OCH_2 5′_2′ 6′_2′ 1″_2
9	^{1}H	δ: 0.88 (t, J = 7.7 Hz, 3H, H-4), 1.35 (t, J = 7.1 Hz, 3H, H-2″), 1.99-2.13 (m, 2H, H-3 × 2), 2.37 (m, 6H, 3′-CH_3 and 4′-CH_3), 3.00–3.14 (m, 2H, H-l′×2), 5.14–5.16 (m, 1H, H-2), 7.35 (d, J= 7.8 Hz, 1H, H-5′), 7.79 (dd, J = 7.8 and 2.0 Hz, 1H, H-6′), 7.84 (m, 1H, H-2′)
	^{13}C	δ: 8.5 (C-4), 11.7 (C-2″), 19.8 (3′-CH_3), 20.2 (4′-CH_3), 24.9 (C-3), 43.2 (C-l″), 63.7 (C-2), 127.7 (C-6′), 130.8 (C-2′), 131.5 (C-5′), 133.1 (C-1′), 139.2 (C-4′), 146.4 (C-3′), 196.3 (C-l)
	HMBC	1_2,3,2′,6′ 2_3,4,1′ 3_2,4 4_2,3 l′_5′ 2′_6′,3′-CH_3 3′_2′,6′,3′-CH_3,4′-CH_3 4′_5′,3′-CH_3,4′-CH_3 5′_4′-CH_3 6′_2′ 1″_2, 2″ 2″_1′ 3′-CH_3_2′ 4′-CH_3_5′
10	^{1}H	δ: 0.88 (t, J = 7.4 Hz, 3H, H-5), 1.16–1.27 (m, 1H, H-4), 1.30–1.39 (m, 1H, H-4), 1.35 (t, J = 7.4 Hz, 3H, H-2″), 1.89–2.00 (m, 2H, H-3), 2.36–2.37 (m, 6H, 4′-CH_3 and 5′-CH_3), 2.99–3.14 (m, 2H, H-l″×2), 5.13-5.15 (m, 1H, H-2), 7.35 (d, J = 8.0 Hz, H-5′), 7.78 (dd, J = 8.0 and 1.7 Hz, 1H, H-6′), 7.83 (m, 1H, H-2′)
	^{13}C	δ: 11.7 (C-2″), 14.1 (C-5), 18.6 (C-4), 19.8 (3′-CH_3), 20.2 (4′-CH_3), 33.9 (C-3), 43.3 (C-l″), 62.9 (C-2), 127.7 (C-6′), 130.8 (C-2′), 131.5 (C-5′), 133.2 (C-1′), 139.2 (C-4′), 146.5 (C-3′), 196.4 (C-l)
	HMBC	1_2,3,2′,6′ 2_3,1″ 3_2,4,5 4_2,3,5 5_3,4 l′_5′ 2′_6′,4′-CH_3 3′_2′,6′,4′-CH_3 4′_5′,4′-CH_3 5′_4′-CH_3 6′_2′ 1″_2, 2′ 2″_1″ 3′-CH_3_2′ 4′-CH_3_5′
11	^{1}H	δ: 0.73 (t, J = 7.4 Hz, 3H, H-5), 1.33–1.51 (m, 2H, H-4 × 2), 1.85–1.94 (m, 4H, H-2″×2 and H-3″×2), 2.12–2.17 (m, 8H, H-3 × 2, H-3′-CH_3 and H-4′-CH_3), 3.34 and 3.5l (each as br, each as 2H, H-l″×2 and H-4″×2), 5.41 (m, 1H, H-2), 7.24 (d, J = 7.3 Hz, 1H, H-5′), 8.07-8.09 (m, 2H, H-2′ and H-6′)
	^{13}C	δ: 14.1 (C-5), 19.5 (C-4), 19.5 (3′-CH_3), 19.8 (4′-CH_3), 24.0 (C-2″ and C-3″), 32.6 (C-3), 51.7 (C-l″ and C-4″), 65.9 (C-2), 127.1 (C-6′), 130.2 (C-2′), 130.5 (C-5′), 134.7 (C-1′), 137.8 (C-4′), 144.4 (C-3′), 197.7 (C-l)
	HMBC	1_2,3,2′,6′ 2_3,4 3_2,4,5 4_2,3,5 5_3,4 l′_5′ 2′_6′ 3′_2′,6′,3′-CH_3 4′_5′,3′-CH_3 5′_4′-CH_3 6′_2′
12	^{1}H	δ: 0.89 (t, J = 7.3 Hz, 3H, H-5), 1.17–1.29 (m, 1H, H-4), 1.32–1.42 (m, 1H, H-4), 1.36 (t, J = 7.3 Hz, 3H, H-2″), 1.91–2.03 (m, 2H, H-3 × 2), 3.02-3.08 (m, 1H, H-l″), 3.10–3.17 (m, 1H, H-l″), 5.18–5.20 (m, 1H, H-2), 7.31–7.36 (m, 2H, H-3′ and H-5′), 8.16 (m, 2H, H-2′ and H-6′)
	^{13}C	δ: 11.7 (C-2″), 14.1 (C-5), 18.6 (C-4), 33.7 (C-3), 43.4 (C-1″), 63.1 (C-2), 117.5 (d, JC,F = 22.7 Hz, C-3′ and C-5′), 131.8 (d, JC,F = 2.3 Hz, C-1′), 133.1 (d, JC,F = 9.5 Hz, C-2′ and C-6′), 168.2 (d, JC,F = 256.3 Hz, C-4′), 195.3 (C-1)
	HMBC	1_2,3,2′,6′ 2_3,4,1″ 3_2,4,5 4_2,3,5 5_3,4 1′_3′,5′ 3′,5′_2′,6′ 4′_2′,3′,5′,6′ 1″_2, 2″ 2″_1″
13	^{1}H	δ: 0.88 (t, J = 7.1 Hz, 3H, H-5), 1.17–1.29 (m, 1H, H-4), 1.32–1.41 (m, 1H, H-4), 1.35 (t, J = 7.4 Hz, 3H, H-2″), 1.90–2.01 (m, 2H, H-3 × 2), 2.14 (m, 2H, H-2‴×2), 2.98–3.07 (m, 5H, H-3‴×2, H-l‴×2 and H-1″), 3.09-3.16 (m, 1H, H-l″), 5.15–5.17 (m, 1H, H-2), 7.42 (d, J = 7.8 Hz, 1H, H-5′), 7.85 (dd, J = 7.8 and 1.4 Hz, 1H, H-6′), 7.91 (m, 1H, H-2′)
	^{13}C	δ: 11.7 (C-2″), 14.1 (C-5), 18.6 (C-4), 26.4 (C-2‴), 33.4 (C-l‴), 33.9 (C-3), 34.1 (C-3‴), 43.3 (C-l″), 63.0 (C-2), 125.7 (C-2′), 126.1 (C-5′), 128.6 (C-6′), 133.7 (C-1′), 146.9 (C-4′), 154.0 (C-3′), 196.4 (C-l)
	HMBC	1_2,3,2′,6′ 2_3,1″ 3_2,4 4_2,3,5 5_3,4 l′_l‴,5′ 2′_6′ 3′_2′,6′,1‴,2‴ 4′_5′,1‴,2‴ 5′_3‴ 6′_2′,5′,3‴ 1‴_2′, 2‴,3‴ 2‴_3‴ 3‴_5′,2‴ 1″_2,2″ 2″_1″

Table 3 continued

Compound No.	NMR	Data
14	^{1}H	δ: 0.88 (t, *J* = 7.7 Hz, 3H, H-4), 1.36 (t, *J* = 7.4 Hz, 3H, H-2″), 2.00–2.17 (m, 4H, H-3 × 2 and H-2‴×2), 2.97-3.07 (m, 5H, H-3‴×2, H-l‴×2 and H-1″), 3.09–3.16 (m, 1H, H-l″), 5.15–5.18 (m, 1H, H-2), 7.42 (d, *J* = 7.9 Hz, 1H, H-5′), 7.85 (dd, *J* = 7.9 and 1.5 Hz, 1H, H-6′), 7.92 (m, 1H, H-2′)
	^{13}C	δ: 8.6 (C-4), 11.7 (C-2″), 24.9 (C-3), 26.4 (C-2‴), 33.4 (C-l‴), 34.1 (C-3‴), 43.3 (C-l″), 63.8 (C-2), 125.7 (C-2′), 126.1 (C-5′), 128.6 (C-6′), 133.7 (C-1′), 146.9 (C-4′), 154.0 (C-3′), 196.4 (C-l)
	HMBC	1_2,3,2′,6′ 2_3,4,1″ 3_2,4 4_2,3 l′_1‴,5′ 2′_6′ 3′_2′,6′,2‴,3‴ 4′_5′,2‴,3‴ 5′_3‴ 6′_2′,3‴ 1‴_2′,2‴ 2‴_1‴ 3‴_5′, 2‴ 1″_2,2″ 2″_1″
15	^{1}H	δ: 1.70–1.88 (m, 2H, H-4 and H-5), 1.94 (dd, *J* = 13.3 and 3.7 Hz, 1H, H-6), 1.98–2.00 (m, 1H, H-5), 2.06–2.11 (m, 1H, H-4), 2.31 (s, 3H, NH-CH_3), 2.42 (dt, *J* = 13.6 and 6.2 Hz, 1H, H-3), 2.47-2.51 (m, 1H, H-3), 3.20 (ddd, *J* = 13.6, 5.6 and 2.8 Hz, 1H, H-6), 3.84 (s, 3H, O-CH_3), 6.93 (t, *J* = 2.3 Hz, 1H, H-2′), 7.00–7.02 (m, 1H, H-6′), 7.12–7.14 (m, 1H, H-4′), 7.51 (t, *J* = 8.3 Hz, 1H, H-5′)
	^{13}C	δ: 22.9 (C-5), 27.1 (NH-CH_3), 28.5 (C-4), 32.8 (C-6), 40.1 (C-3), 56.0 (O-CH_3), 72.8 (C-l), 115.2 (C-2′), 116.8 (C-4′), 121.2 (C-6′), 132.4 (C-1′), 132.5 (C-5′), 162.4 (C-3′), 207.2 (C-2)
	HMBC	1_6,2′,6′,NHCH_3 2_3,6 3_5 4_3,5,6 5_3,6 6_5 1′_6,5′ 2′_4′,5′ 3′_2′,4′,5′,6′,OCH_3 6′_2′,4′,5′

HMBC heteronuclear multiple-bond coherence

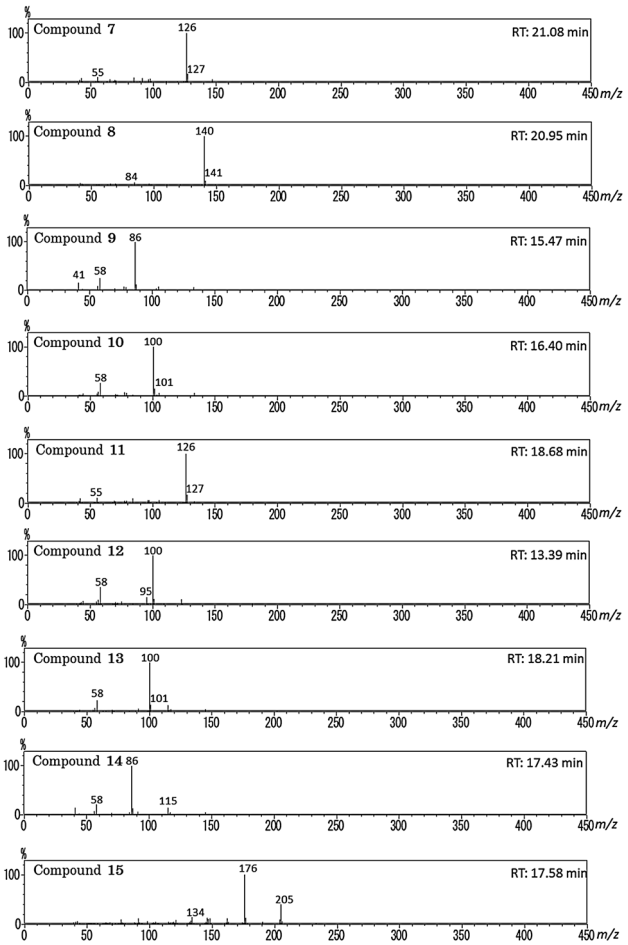

Fig. 3 EI mass spectra of compounds **7**–**15**, which could not be identified only by matching each spectrum with that described in the libraries [2, 3]; they were finally identified by high-resolution mass spectrometry together with nuclear magnetic resonance spectroscopy

analysis indicated the $[M + H]^+$ value at *m/z* 232.1689, and the protonated molecular formula was estimated to be $C_{15}H_{22}NO$ (calculated value 232.1701, accident error -1.2 ppm; Table 2). Compound **14** was eventually identified as 2-(ethylamino)-1-(indan-5-yl)butan-1-one (bk-IBP) by NMR (Table 3, Fig. 1).

For sample No. 22 (compound **15**), EI mass spectrum showed peaks at *m/z* 176, 205, and 134 at 17.58 min. HRMS analysis indicated the $[M + H]^+$ value at *m/z* 234.1502, and the protonated molecular formula was estimated to be $C_{14}H_{20}NO_2$ (calculated value 234.1494, accident error 0.8 ppm; Table 2). Compound **15** was eventually identified as 2-(3-methoxyphenyl)-2-(methylamino)cyclohexanone (MMXE) by NMR (Table 3, Fig. 1).

Regulation status in Japan for the 19 drugs identified in this study

Of the 19 compounds identified in this study, there were seven types of phenethylamine derivatives, two types of synthetic cannabinoids, eight types of synthetic cathinones, one type of phencyclidine analog, and one other (Fig. 1). Among seven phenethylamine derivatives detected, only 25H-NBOMe was regulated at the time when samples were obtained, and 25I-NBOMe and 25D-NBOMe became designated drugs in October 2014 and March 2015, respectively, and 25E-NBOMe and RH34 followed in May 2015. 25I-NBMD and escaline were still non-regulated drugs as of July 2015; however, their structures are similar to mescaline, which is regulated by the Narcotics and Psychotropics Control Act. Thus, it is possible that 25I-NBMD and escaline cause similar psychological effects as mescaline. Both ADB-

CHMINACA [8] and 5F-ADB [9], which are synthetic cannabinoids, were unregulated during the acquisition time, but became designated drugs in September 2014 and October 2014, respectively. Butane-1,4-diol [10] was a non-regulated drug at the present time (July 2015); however, it is known to be metabolized into GHB (gamma-hydroxybutyrate) in the body, which is regulated by the Narcotics and Psychotropics Control Act. The novel phencyclidine derivative MMXE was non-regulated drug at the present time (July 2015). However, the structure is very similar to methoxetamine (MXE) [11], which has been regulated since June 2014.

We determined the chemical structure of 8 novel synthetic cathinones, including a modification of a new basic structure of synthetic cathinone, 5-DBFPV (benzofuran derivative). The benzofuran derivatives of the cathinone have not been included in the recent generic scheduling, and it is, therefore, possible that such series based on this chemical structure will expand on the drug market in the near future.

Among the eight synthetic cathinones, only 4F-α-ethylaminopentiophenone was regulated by the generic scheduling in August 2014. However 3,4-MDPHP and 5-DBFPV became regulated in November 2014, and then bk-IBP, bk-IVP, 3,4-dimethyl-NEB, and 3,4-dimethyl-α-ethylaminopentiophenone followed in January 2015. Finally 3,4-dimethyl-α-PVP became regulated in March 2015. Thus, all eight synthetic cathinone compounds detected in this study became designated substances to date in Japan.

Conclusions

Nineteen compounds were detected out of 22 samples that were acquired before being sold on the drug market. Among those, only two compounds were regulated at the time when the samples were obtained. However, 15 compounds have become designated in a year. Based on these findings, it is suggested that these compounds will actually spread across the Japanese drug market in a year. In this study, we have disclosed as many as 15 compounds as novel designer drugs. 25I-NBMD, escaline, and MMXE are out of the regulation list in Japan. The toxicity, pharmacological actions and metabolism for the 15 novel compounds remain to be explored. The forensic toxicologists should be alert in their duty work for the newly emerging designer drugs described in this article.

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Compliance with ethical standards

Conflict of interest There are no financial or other relations that could lead to a conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

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Regular Article

Clinical behavior of Japanese community pharmacists for preventing prescription drug overdose

Takuya Shimane, MPH, PhD,* Toshihiko Matsumoto, MD, PhD and Kiyoshi Wada, MD, PhD
Department of Drug Dependence Research, National Center of Neurology and Psychiatry, Tokyo, Japan

Aim: Prescription drug abuse, including benzodiazepines, is a growing health problem in Japan. This study examined the community pharmacist's clinical behavior regarding patients who overdose on prescribed drugs, and explored the possibility of overdose prevention by community pharmacists.

Methods: We surveyed all registered community pharmacies with dispensing functions ($n = 1867$) in the Saitama Pharmaceutical Association. An anonymous self-administered questionnaire was mailed to each pharmacy. Respondents were asked about clinical behavior such as medication counseling and referral to the prescriber if prescription drug overdose was identified.

Results: Among respondents, 26% of community pharmacists reported clinical experience of working with patients who overdosed on prescribed drugs in the previous year. Half of respondents evaluated their practice such as medication counseling and referral to the prescriber as 'good'. On multivariate analysis, a 'poor' self-evaluation of referral to the prescriber was significantly associated with the following perceptions: 'insufficient confidence in communication with prescribers' (odds ratio [OR], 2.7; 95% confidence interval [95%CI]: 1.4–5.3), and 'to avoid trouble with prescribers' (OR, 1.7; 95%CI: 1.0–2.7).

Conclusion: Japanese community pharmacists could prevent prescription drug abuse in their practice, but the pharmacists who have insufficient confidence in communication with prescribers and who are afraid of trouble with a prescriber, reported poor self-evaluation for referral to the prescribers. All prescribers should understand the importance of referral by community pharmacists, to assist community pharmacists in playing a critical role in prevention of prescription drug abuse.

Key words: addiction psychiatry, drug overdose, pharmacist, prescription drug misuse, suicidology.

THE NON-MEDICAL USE or abuse of prescribed drugs, including benzodiazepines, is a growing health problem in Japan. An association between prescription drug overdose and suicide risk has been reported. A psychological autopsy study indicated that in more than half of successful suicides in which the patient had been under psychiatric treatment, they had overdosed on prescribed prescription drugs including benzodiazepines before their impulsive fatal suicidal behavior, which included hanging and jumping from great heights.[1] This suggests that the disinhibiting effects caused by overdosing on prescription drugs might promote lethal, suicidal behavior. Japan has one of the world's highest suicide rates: according to the Cabinet Office, Government of Japan, 30 651 people (24.0 per 100 000) committed suicide in 2011.[2] Furthermore, drug dependence caused by abuse of prescription drugs is increasing in Japan. According to a nationwide psychiatric hospital survey, the proportion of patients with sedative (mainly benzodiazepine)-related disorders has more than doubled in the last decade.[3]

The Japanese Ministry of Health, Labour and Welfare has expected pharmacists to act as 'gatekeepers', facilitating early identification of individuals at

*Correspondence: Takuya Shimane, MPH, PhD, Department of Drug Dependence Research, National Center of Neurology and Psychiatry, 4-1-1 Ogawa-Higashi, Kodaira, Tokyo 187-8553, Japan.
Email: shimane@ncnp.go.jp
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high risk of overdosing on prescription drugs, supplying medication counseling to the patients, and helping to introduce these patients to appropriate medical care.[4] Furthermore, promoting the cultivation of gatekeepers in a variety of fields including pharmacy is one of the main points in the new General Principles of Suicide Prevention proposed by the Cabinet Office, Government of Japan. The actual practices of pharmacists regarding suicidal individuals, however, are largely unknown.

While all health-care professionals including hospital pharmacists can play a role in preventing prescription drug abuse, the role of the community pharmacist is vital in addressing this problem. In recent years, the dispensing of prescriptions has been moving rapidly from inside to outside hospitals, with prescription drugs being dispensed mainly at community pharmacies. According to the 2012 Survey of Medical Care Activities in Public Health Insurance, for example, the rate of external prescriptions was 72.9% for hospitals, and 63.2% for clinics.[5] These data showed that most outpatients on psychiatric drug treatment obtain prescription drugs from community pharmacists. Moreover, prescription drugs such as benzodiazepines are widely used in psychiatry, but they are prescribed not only by psychiatrists, but also by other professionals, including primary care physicians. The community pharmacy receives prescription forms issued by multiple hospitals and clinics, and community pharmacists can identify inappropriate use of prescription drugs including overdose.

This study examined the community pharmacist's clinical behavior regarding patients who have overdosed on prescribed drugs, and explored the possibility of overdose prevention by community pharmacists.

METHODS

Procedure

We surveyed all registered community pharmacies with dispensing functions ($n = 1867$) in the Saitama Pharmaceutical Association (SPA). We used a questionnaire developed by an occupational ability committee of the SPA and the authors. The questionnaire was a voluntary and anonymous self-administered survey, and no incentive was provided to respondents. The questionnaire was sent to the manager of all registered community pharmacies, together with a covering letter and postpaid return envelope. The requirement for written consent was waived by the ethics committee, because the questionnaire was voluntary and anonymous. The questionnaire was first mailed in November 2011 and reminders were sent after 2 and 4 weeks by broadcast facsimile service through the SPA. The addresses and names of pharmacy were provided by the SPA and used strictly for study purposes. To exclude overlapping responses from the same pharmacy, we mailed one questionnaire to each pharmacy, and the pharmacy selected one eligible respondent. The study protocol was reviewed and approved by the Ethics Committee of the National Center of Neurology and Psychiatry in Japan.

Measures

According to a survey of drug overdose patients admitted to the emergency room of a general hospital in Japan, benzodiazepines were the most frequent cause of overdose (63.4%).[6] A broad range of psychotropic drugs, however, such as antipsychotics (14.1%) and selective serotonin re-uptake inhibitors (9.9%) were also reportedly involved in overdose. Based on that study, we defined prescription drugs as a broad range of psychotropic drugs.

Drug overdoses can occur accidentally or intentionally, and pharmacists could identify both types of overdose in pharmacies. To prevent inappropriate use (or abuse) of prescription drugs, however, we believe that pharmacists should focus on intentional overdoses. We defined overdose as intentional use of prescribed drugs at a higher dosage than instructed by the prescriber, regardless of suicidal intention.

We used the Acknowledge-Care-Tell (ACT) model[7] to define clinical behavior for community pharmacists to prevent prescription drug abuse. The ACT model is known as the Signs of Suicide (SOS), the school-based suicide prevention program.[7] The ACT works as follows. First, acknowledge the signs of suicide that others display and take them seriously. Next, let that person know you care about him or her and that you want to help. Then, tell a responsible adult. To apply this model to pharmacist clinical behavior, we defined as follows: acknowledge the suicidal patients who overdose on prescribed drugs; care for the patients through medication counseling; tell and refer to the prescribers.

The questionnaire was structured and contained 17 questions. It included pharmacist characteristics,

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pharmacy characteristics (number of prescriptions received per month, type of prescriptions), and the clinical behavior with prescription drug abusers. To examine the acknowledge behavior, the respondents were asked about their clinical experience of working with patients who had overdosed on prescribed drugs in the previous year. The respondents who had this experience were asked to self-evaluate their clinical behavior. To assess each respondent's clinical behavior, the following item was used: 'Please rate your overall quality of clinical behavior with prescription drug overdose patients about (i) "care" medication counseling, and (ii) "tell" referral to the prescriber, with 4-point response scales (1, very good; 2, good; 3, poor; and 4, very poor).' The perception of care (what is the essential factor in conducting high-quality medication counseling with prescription drug abusers; eight items), and of tell (what factors interfere with active referral to the prescribers; seven items) were also included in the questionnaire.

To clarify the questions, we sent instruction sheets together with the questionnaire to the pharmacists, and a supplementary explanation was provided in the questionnaire.

Statistical analysis

We first divided the pharmacists into two groups according to experience with overdose patients. One group consisted of pharmacists who reported clinical experience of working with patients who had overdosed on prescribed drugs in the previous year (overdose group), and the other group included those who had not reported such a clinical experience (control group). Fisher's exact tests were used to compare the two groups.

Data from pharmacists in the overdose group were analyzed in the following steps. We divided the pharmacists into two groups according to self-evaluation of their clinical behavior with overdose patients. Two outcomes were examined. Regarding self-evaluation of medication counseling, one group consisted of the respondents who had reported their practice as 'good' (1, very good and 2, good), and the other group included those who had reported their practice as 'poor' (3, poor and 4, very poor). Likewise, regarding self-evaluation of referral to the prescriber, the pharmacists were divided into good and poor. Multiple logistic regression analysis was used to calculate adjusted odds ratios (OR) and 95% confidence intervals (CI) after controlling simultaneously for potential confounders. Variables considered in the models were pharmacist characteristics, pharmacy characteristics, and pharmacist's perception. The threshold for statistical significance was set at $P < 0.05$ (two-tailed).

RESULTS

A total of 1416 pharmacists completed the questionnaire (response rate of 76%); 366 (25.8%) of these reported clinical experience of working with patients who had overdosed on prescribed drugs (overdose group). Table 1 lists the characteristics of the pharmacists and their pharmacies in the two groups. Compared with the control group, the overdose group was significantly more likely to be male and to be 30–49 years old. In addition, the overdose group was significantly more likely to have received prescriptions from specific hospitals (24.6%) than the control group (16.8%). Moreover, the overdose group received significantly more prescriptions per month than the control group.

Tables 2,3 list the results of multiple logistic regression analysis. A total of 353 pharmacists (192 men and 161 women) of the original 366 in the overdose group were included in this analysis: seven were excluded because practice self-evaluation data were missing, five were excluded because their characteristics were missing, and one was excluded because the number of prescriptions received was missing.

Table 2 lists multivariate-adjusted OR for the clinical behavior of medication counseling. Among the overdose group, 175 respondents (49.6%) had reported that their behavior was good (1, very good and 2, good) in this area, while 178 (50.4%) reported that their behavior was poor (3, poor and 4, very poor). On multivariate analysis, poor self-evaluation for medication counseling was significantly associated with the number of prescriptions received: 1001–2000 (OR, 2.1; 95%CI: 1.2–3.6), ≥3000 (OR, 3.1; 95%CI: 1.5–6.4) per month. Pharmacist gender, age, type of pharmacy, and perception of medication counseling were not associated with the pharmaceutical practices of medication counseling.

Table 3 lists the multivariate-adjusted OR for the clinical behavior of referral to the prescriber. In this self-evaluation category, 195 pharmacists (55.2%) regarded themselves as good and 158 (44.8%) as poor. On multivariate analysis, poor self-evaluation of referral to the prescriber was significantly associated with pharmacist gender (OR, 0.5; 95%CI: 0.3–0.8), and type of pharmacy: receiving prescriptions

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Table 1. Pharmacist and pharmacy characteristics

	Patient overdose group[‡] (*n* = 366)		Control group[§] (*n* = 1043)		
	n	%	*n*	%	*P*[†]
Gender					0.009
Female	161	44.8	564	54.1	
Male	192	54.1	467	44.8	
Age group (years)					<0.001
≤29	47	12.8	83	8.0	
30–39	113	30.9	232	22.2	
40–49	106	29.0	224	21.5	
50–59	68	18.6	266	25.5	
≥60	30	8.2	230	22.1	
Pharmacy type: receiving prescriptions from					0.002
Specific clinics	174	47.5	524	50.2	
Specific hospitals	90	24.6	175	16.8	
No specific clinics or hospitals	101	27.6	324	31.1	
No. prescriptions received (monthly)					<0.001
≤1000	124	33.9	548	52.5	
1001–2000	129	35.2	310	29.7	
2001–3000	60	16.4	111	10.6	
≥3001	51	13.9	60	5.8	

[†]Fisher's exact test ($P < 0.05$). [‡]Pharmacists who reported clinical experience of working with patients who overdosed on prescribed drugs in the previous year; [§]pharmacists who did not report clinical experience of working with patients who overdosed on prescribed drugs in the previous year.

from specific hospitals (OR, 1.9; 95%CI: 1.1–3.3), receiving prescriptions from no specific hospitals or clinics (OR, 2.4; 95%CI: 1.4–4.2). We also found that poor self-evaluation of referral to prescriber was significantly associated with a pharmacist having a perception of 'insufficient confidence in communication with prescribers' (OR, 2.7; 95%CI: 1.4–5.3), 'to avoid trouble with prescribers' (OR, 1.7; 95%CI: 1.0–2.7), and 'to avoid trouble with patients and their families' (OR, 2.0; 95%CI: 1.2–3.3). Pharmacist age and number of prescriptions received were not associated with the pharmaceutical practices of referral to the prescriber.

DISCUSSION

Research on pharmacy practice is limited in the field of substance abuse. The role of community pharmacists relevant to HIV prevention and drug treatment services for drug users in England and Wales has been reported.[8] Moreover, Tommasello reported that pharmacists, the most accessible of health-care professionals, are well positioned to help prevent and treat substance use disorders.[9] Although the role of community pharmacists in illicit drug use is described in these reports, the pharmacies' role in prescription medication abuse is not well documented. Meanwhile, Kehoe reported that pharmacists play an important role in attempting to stem the tide of abuse of prescription medications.[10] Moreover, pharmacist roles in combating prescription drug abuse and examples of activities have been reported by members of the American Pharmacists Association.[11] As far as we know, research on actual practice with regard to the prescription drug abuser, of community pharmacists has not been reported internationally. The present study is probably the first to examine the community pharmacist's clinical behavior with regard to patients who overdosed on prescribed drugs.

The community pharmacist's clinical behavior with regard to suicidal individuals is also not well documented internationally. The present study found that 26% of community pharmacists in the Saitama

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Table 2. Multivariate indicators of pharmacist self-evaluation of medication counseling[†]

	Self-evaluation of medication counseling					
	Good (n = 175)		Poor (n = 178)		Adjusted OR	
	n	%	n	%	(95%CI)	P
Gender						
Female	83	47.4	78	43.8	1 [Reference]	
Male	92	52.6	100	56.2	0.9 (0.6–1.4)	0.650
Age group (years)						
≤29	25	14.3	22	12.4	1 [Reference]	
30–39	44	25.1	67	37.6	2.0 (1.0–4.0)	0.067
40–49	50	28.6	53	29.8	1.3 (0.6–2.7)	0.497
50–59	37	21.1	28	15.7	0.9 (0.4–2.0)	0.800
≥60	19	10.9	8	4.5	0.6 (0.2–1.7)	0.306
Pharmacy type: Receiving prescriptions from						
Specific clinics	86	49.1	80	44.9	1 [Reference]	
Specific hospitals	39	22.3	50	28.1	1.4 (0.8–2.4)	0.304
No specific clinics or hospitals	50	28.6	48	27.0	1.4 (0.8–2.4)	0.241
No. prescriptions received (monthly)						
≤1000	74	42.3	46	25.8	1 [Reference]	
1001–2000	56	32.0	71	39.9	2.1 (1.2–3.6)	0.007
2001–3000	29	16.6	27	15.2	1.3 (0.7–2.6)	0.421
≥3001	16	9.1	34	19.1	3.1 (1.5–6.4)	0.003
Factors in conducting high-quality medication counseling (agree)						
Sufficient knowledge of addiction	105	60.0	106	59.6	0.9 (0.6–1.4)	0.670
Sufficient confidence in medication counseling	81	46.3	79	44.4	1.0 (0.7–1.6)	0.925
Attitude to help prescription drug abuser	72	41.1	71	39.9	1.1 (0.7–1.8)	0.612
Good partnerships with patients	129	73.7	128	71.9	1.0 (0.6–1.6)	0.865
Good partnerships with prescribers	114	65.1	119	66.9	1.1 (0.7–1.8)	0.570
Good partnerships with hospitals or clinics	68	38.9	80	44.9	1.4 (0.9–2.2)	0.166
Good partnerships with other pharmacists within pharmacies	69	39.4	72	40.4	1.1 (0.7–1.8)	0.629
Good partnerships with other facilities	59	33.7	70	39.3	1.3 (0.8–2.1)	0.240

[†]Multivariate logistic regression analysis conducted with all variables. CI, confidence interval; OR, odds ratio.

Prefecture of Japan reported clinical experience of working with patients who had overdosed on prescribed drugs in the previous year. Kodaka *et al.* reported that 58.1% of pharmacists have clinical experience with suicidal individuals.[12] This prevalence is considerably higher than the present result. The pharmacists in the Kodaka *et al.* study, however, were those who participated in the Certified Psychiatric Pharmacy Specialist Seminar and therefore most were pharmacists who work in psychiatric hospitals. Of those pharmacists, around 20% were community pharmacists. Prevalence of exposure to suicidal individuals among community pharmacists only has not been reported. Because of the difference in demographics between that study and the present one, it is difficult to compare the data. Generally, pharmacists who work in psychiatric hospitals have more experience with suicidal individuals than community pharmacists. Conversely, all of the present subjects were community pharmacists of the SPA. Saitama Prefecture is the fifth most populated prefecture in Japan, and had a population of approximately 7 million in 2010. According to the survey of medical institutions and the report on public health administration and services, Saitama had 2488 licensed pharmacies in 2010. At the end of November 2011, 1954 community pharmacies were registered in the SPA. Accordingly, most pharmacies in Saitama Prefecture will be registered with the SPA. Given that the present response rate was 76%, it suggests that the representativeness of the data is high and reflects the reality of community pharmacists in Saitama Prefecture.

In the present study half of respondents evaluated themselves as good for medication counseling, but pharmacists who received a high number of prescriptions evaluated themselves as poor. In Japan, the number of pharmacists required for a pharmacy is defined by the number of prescriptions the phar-

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Table 3. Multivariate indicators of pharmacist self-evaluation of referral to the prescriber[†]

	Self-evaluation of referral to the prescriber					
	Good ($n = 195$)		Poor ($n = 158$)		Adjusted OR	
	n	%	*n*	%	(95%CI)	*P*
Gender						
Female	77	39.5	84	53.2	1 [Reference]	
Male	118	60.5	74	46.8	0.5 (0.3–0.8)	0.007
Age group (years)						
≤29	21	10.8	26	16.5	1 [Reference]	
30–39	61	31.3	50	31.6	0.9 (0.4–1.8)	0.875
40–49	65	33.3	38	24.1	0.6 (0.3–1.2)	0.563
50–59	37	19.0	28	17.7	0.6 (0.3–1.2)	0.557
≥60	11	5.6	16	10.1	1.0 (0.4–2.9)	0.941
Pharmacy type: Receiving prescriptions from						
Specific clinics	110	56.4	56	35.4	1 [Reference]	
Specific hospitals	43	22.1	46	29.1	1.9 (1.1–3.3)	0.028
No specific clinics or hospitals	42	21.5	56	35.4	2.4 (1.4–4.2)	0.002
No. prescriptions received (monthly)						
≤1000	65	33.3	55	34.8	1 [Reference]	
1001–2000	75	38.5	52	32.9	1.1 (0.6–1.9)	0.717
2001–3000	31	15.9	25	15.8	1.0 (0.5–1.9)	0.951
≥3001	24	12.3	26	16.5	1.4 (0.7–2.8)	0.390
Factors in inhibition of referral to the prescribers (agree)						
Insufficient knowledge about addiction	31	15.9	23	14.6	0.9 (0.5–1.7)	0.717
Insufficient confidence in communication with prescribers	18	9.2	30	19.0	2.7 (1.4–5.3)	0.003
Busy routine work	24	12.3	20	12.7	1.0 (0.5–2.0)	0.905
Do not want to help prescription drug abuser	4	2.1	2	1.3	0.7 (0.1–4.2)	0.699
To avoid trouble with prescribers (trouble between individuals)	50	25.6	55	34.8	1.7 (1.0–2.7)	0.041
To avoid trouble with hospitals or clinics (trouble between institutions)	46	23.6	28	17.7	0.8 (0.4–1.4)	0.371
To avoid trouble with patients and their families	56	28.7	64	40.5	2.0 (1.2–3.3)	0.005

[†]Multivariate logistic regression analysis conducted with all variables. CI, confidence interval; OR, odds ratio.

macy receives per day. Generally, a pharmacy that receives a high number of prescriptions has many pharmacists. In pharmacies with many pharmacists, the pharmacist who does medication counseling is not always the same, and it may be difficult to provide continuity of medication counseling. It has been reported that pharmacist response is a factor that affects customer satisfaction most in a pharmacy.[13] It is important for the same pharmacist to continue to carry out medication counseling when building a confidential relationship with a patient. When medication counseling is unable to be carried out by the same pharmacist, this may become an obstacle when building such a relationship. In a pharmacy with many prescriptions, there are other patients waiting and private medication counseling may be difficult. It has been reported that patients would be more likely to consult with their pharmacist if they knew a consultation service of up to 30 min was available, where patient privacy was ensured, even if they needed to pay for this service.[14] As mentioned here, it is difficult to build a confidential relationship between a pharmacist and a patient in a busy pharmacy. It is therefore not surprising that those pharmacists evaluated themselves poorly for medication counseling.

We also found that more than half of respondents evaluated themselves as good for referral to the pre-

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scriber. The pharmacists who had received prescriptions from specific hospitals, and those who had not received prescriptions from specific hospitals or clinics, however, reported poor self-evaluation, compared with those who had received prescriptions from specific clinics. Generally, community pharmacies give patient information to prescribers by telephone. Pharmacists who receive prescriptions only from specific clinics communicate with the prescriber daily, and these pharmacists can therefore refer to the prescriber smoothly. In other cases, it may be difficult for pharmacists to build a relationship with the prescribers. This may be true for pharmacists dealing with a large-scale hospital with many prescribers, pharmacists who receive prescriptions from many hospitals and clinics, or those who do not receive a large volume of prescriptions. Such situations may have hindered smooth referral.

Furthermore, pharmacists who reported 'insufficient confidence in communication with prescriber' and who are 'afraid of troubles with a prescriber or a patient', also reported poor self-evaluation for referral to the prescribers. These pharmacists may hesitate to refer to the prescriber because they are afraid of trouble. Community pharmacists have reported trouble telling prescribers of multiple-high dose prescription or overlapping prescriptions. For example, according to a narrative study, community pharmacists hesitate to contact prescribers because some prescribers found it hard to accept the pharmacist's proposal, or unilaterally refused to communicate, despite repeated inquiries about a prescription.[15] Although the Pharmacists Act in Japan states that pharmacists must check prescriptions, some prescribers do not understand the importance of a referral by a pharmacist. It is necessary that all prescribers understand the importance of a referral by a community pharmacist.

The present study should be understood in the light of the following limitations. First, we were unable to recruit community pharmacists who did not belong to the SPA. Therefore, the present results may not represent the community pharmacists in all of Saitama Prefecture. A total of 2488 pharmacies, however, are registered into Saitama Prefecture, of which 1954 belong to the SPA. Accordingly, 79% of the pharmacies in Saitama Prefecture belong to the SPA and were thus represented here. This suggests that we were able to obtain data reflecting all of Saitama Prefecture by recruiting community pharmacists from the SPA.

Second, we were unable to recruit community pharmacists outside Saitama Prefecture. Therefore, the present results do not include the situation of prescription drug overdose in other areas in Japan. Japan consists of 47 prefectures and further research should compare the present results with other prefectures.

Furthermore, we could not obtain data on the type of clinic or hospital (such as psychiatric hospital), when we categorized pharmacy type. Perhaps those pharmacies that mainly receive prescriptions from psychiatric hospitals or clinics have more experience with patients who have overdosed on prescribed drugs. Future studies should include an analysis of a possible association between the type of prescribing clinic or hospital and the clinical behavior of pharmacists.

Finally, although prescription drug overdose was examined in the present study, not all patients who overdose are drug dependent or a suicide risk. It has been reported, however, that patients with prescription-related disorders are more likely to choose prescription drug overdose as a means of suicide attempt.[16] Moreover, it has been reported that 77.7% of overdose patients in emergency departments overdose on benzodiazepines, which is increasing in drug-dependent patients in Japan.[17] Accordingly, it is possible that prescription drug overdose is overlapping with drug dependence and suicide attempt.

Despite these limitations, the present study was a large-scale survey that investigated all the pharmacists belonging to the SPA, and is the first clinical study focusing on community pharmacist practice relating to prescription drug abuse and suicidal individuals in Japan. This study provides a significant insight into the community pharmacist as a gatekeeper for preventing prescription drug overdose.

Conclusion

Japanese community pharmacists are identifying prescription drug abuse in their practice. We found that 26% of respondents reported clinical experience of working with patients who overdosed on prescribed drugs in the previous year. Moreover, half of respondents evaluated their practice regarding medication counseling and referral to the prescriber as good. The present results show that Japanese community pharmacists could prevent prescription drug abuse in their practice, but that those pharmacists who had

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insufficient confidence in communication with prescribers and who were afraid of troubles with a prescriber or a patient, reported poor self-evaluation for referral to the prescribers. All prescribers should understand the importance of the referral by the community pharmacist, to assist the community pharmacists to play a critical role in prevention of prescription drug abuse.

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