Factors Associated with Risky Sexual Behavior among Unmarried Most-at-Risk Young People in Cambodia

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Abstract **Background:** Recent surveys suggest that adolescents and young adults in Southeast Asian nations are at great risks of sexual reproductive health issues. This study explored factors associated with risky sexual behavior (RSB) among unmarried most-at-risk young people in Cambodia. **Methods:** A two-stage cluster sampling method was used to select 1,204 boys and 1,166 girls aged 10-24 from 252 hotspots in the capital city and seven provinces. A five-item scale was constructed to measure RSB. All variables were entered simultaneously in multivariate logistic regression models if they were significantly associated with RSB in bivariate analyses. **Results:** Of total, 37.7% of boys and 18.5% of girls had sexual intercourse in the past three months; of them, 69.6% of boys and 52.5% of girls were involved in commercial sex. Only 43.3% of boys and 6.5% of girls reported always using condom with unpaid regular partners in the past three months. Among sexually active girls, 43.5% reported having been pregnant and of them, 42.4% reported having induced abortion as a result of their most recent pregnancy. After adjustment, boys with higher levels of RSB were significantly more likely to live in an urban area, to have completed ≥ 9 years of formal education, and to be not currently living with parents. In contrast, girls with higher levels of RSB were significantly less likely to have completed ≥ 9 years of formal education and to have both parents alive. Both boys and girls with higher levels of RSB were significantly more likely to be in the age group of 20-24, to be not currently in school, to be employed, to becurrent alcohol drinkers, to becurrent heavy alcohol drinkers, to be current illicit drug users, and to have been tested for HIV. **Conclusions:** Unmarried young people in this study are exposed to several sexual reproductive health problems such as HIV and sexually transmitted infections, unwanted pregnancy, and unsafe abortion. These findings suggest the need for research and prevention programs for these key populations taking into account risk factors identified in this study.

Keywords: most-at-risk young people, risky sexual behavior, risk factors, HIV/AIDS, sexual reproductive health, Cambodia

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1. Introduction

Adolescents and young adults, particularly young women, have been identified as the most vulnerable group in sexual reproductive health issues. In 2009, young people aged 15–24 accounted for approximately 40% of all new HIV infections worldwide [1], and 2.1 million adolescents aged 10–19 were estimated to be living with HIV in low- and middle-income countries [2]. Despite this alarming situation, only a few studies have been conducted to explore factors associated with sexual reproductive health behavior among young people in the resource-limited countries. Most recent surveys in Southeast Asian nations, including Cambodia, and anecdotal reports suggest that risky sexual behavior (RSB) among adolescents and young adults in these countries are very common [3-7].

Cambodia has one of the most youthful populations in Southeast Asia with approximately 32% of the total population between the ages of 10 and 24 [8]. Regarding HIV, Cambodia is among the few countries in the world to reverse the spread of HIV epidemic and has received a Millennium Development Goals award from the United Nations as a global recognition of the efforts to reduce HIV prevalence and achieve the universal access to antiretroviral therapy [2]. However, challenges remain to eliminating new HIV and other sexually transmitted infections (STIs), which are currently concentrated in key populations such as female entertainment workers, men who have sex with men, transgender individuals, and drug

users [2]. Most of people in these high-risk groups are under the age of 24 [9].

Various socio-economic factors may expose young people to sexual reproductive health problems; among these factors, gender is the most important one. In our previous study among adolescent students in Cambodia, boys were significantly more likely to engage in RSB compared to girls [7]. Similar findings have also been reported in studies in other countries including the United States, China, Myanmar, and several other developing countries [5,10,11,12]. Boys are also more likely to have the first sexual intercourse at younger age and to have premarital sexual intercourse than girls [7,11,13]. However, girls are more vulnerable to the hardship and changes in socio-economic conditions and more likely to be coerced into sexual debut and exploitation than boys [14,15].

A survey in Cambodia highlighted that out-of-school adolescents and young adults tend to engage in more RSB than those attending school [16]. In China, unmarried migrant young people were found to be exposed to premarital sex, and most of them lack knowledge and skills to avoid sexual reproductive health risks [17]. Moreover, they are naive to city life and unlikely to access to appropriate sexual reproductive health information and services [18,19]. In Cambodia, it is common that young people from poor, rural families migrate to cities in order to seek for job opportunities. Many migrant women enter into some form of transactional sexual relationship to augment their meager wages so they can sustain their lives in the cities and fulfill their obligations to send money home [20]. In turn, unmarried young people having an early sexual debut are at great risk of HIV and STIs, unwanted pregnancy, and unsafe abortion [21]. Other social factors associated with RSB among adolescents and young adults include substance use [7,22], peer affiliation [7,23,24], parental monitoring [25], parental trust [26], family relationship [27], family structure [28], and school engagement [23].

The critical issues of sexual reproductive health among this young population, together with the need for evidence in order to design relevant programs set the backdrop for research addressing multiple RSB and risk settings among Cambodian young people. We, therefore, conducted this study to explore risk factors associated with RSB among unmarried most-at-risk young people aged 10-24 in Cambodia. RSB is commonly defined as behavior that increases one's risk of contracting HIV and STIsor experiencing unintended pregnancies [30]. Findings from this study will serve as basic indicators of sexual reproductive health practices and associated characteristics among this key population, which will be useful for future research, development of school curriculum for adolescents, and designing intervention programs.

2. Materials and Methods

2.1. Study Sites

This cross-sectional study was conducted in February 2010 in Phnom Penh, the capital city and seven provinces including Battambang, Banteay Mean Chey, Kampong Cham, Siem Reap, Preah Sihanouk, Koh Kong, and SvayRieng. These provinces were identified as priority sites for the study based on several criteria: (1) high number of female entertainment workers (e.g., girls working in entertainment establishments such as karaoke parlors, bars, restaurants, massage parlors, night clubs, beer gardens, etc.); (2) high HIV prevalence among female entertainment workers; (3) major tourist destinations; (4) high number of youth hostels and guesthouses; (5) high number of human trafficking victims; (6) high number of rape cases; (7) border areas; and (8) high number of men who have sex with men. In these selected sites, hotspots were identified and listed for the survey.

2.2. Study Population and Sampling

Young people in this study included entertainment workers, men who have sex with men, drug users, out-of-school youths, and students. Representatives from these groups were involved as advisors in the study design, field work, consultations, and dissemination of the findings. To be included in this study, a person must: (1) be in the age group of 10-24; (2) present in the selected hotspots; and (3) agree to participate in the interview. 'Hotspots' were defined as locations where young people were known to congregate, involve in health risk behavior such as alcohol drinking and drug use, or meet new sexual partners. Using this definition, hotspots included bars, night clubs, karaoke parlors, massage parlors, street corners, places where youth frequently gather (football field, skating field…), public parks, snooker clubs, and computer game shops. Since the survey populations were not associated with a site, a time-location sampling method which is suitable for floating populations was used.
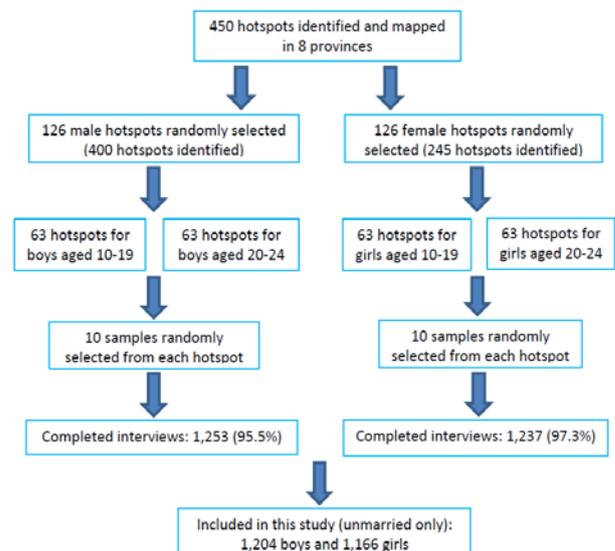

Figure 1. Sampling procedure

Sample size was calculated based on the expected prevalence of several variables to be measured in this study. Findings from the National Youth Behavior Survey 2004 [16] were used as a proxy for the expected prevalence in this estimation. Assuming that the lowest estimated prevalence of RSB the survey sought to estimate was 5% with a 2.2% margin of error, a 5% significance level and a design effect of 1.5, the sample size required

for each male and female group was 1,260 taking into account 12% refusal rate.

Figure 1 shows the sampling procedure of the study. In total, 450 hotspots in the selected city and provinces were identified, mapped, and listed by the research teams. A two-stage cluster sampling method was used to select the study samples. The first stage involved the random selection of 252 hotspots from the list (126 hotspots for boys and 126 hotspots for girls). Out of these 126 hotspots, 63 hotspots were selected for the age group of 10-19 and 63 hotspots for the age group of 20-24 in order to enable a deeper analysis of RSB in different age groups. At the second stage, 10 samples were randomly selected from each hotspot for interviews. In total, interviews were completed with 1,253 boys and 1,237 girls, yielding a response rate of 95.5% and 97.3% among boys and girls, respectively. In this study, we included only unmarried participants in the analyses.

2.3. Training and Data Collection Procedure

A four-day training was conducted for all interviewers and data collection supervisors. The training contents included a review on the study protocol and questionnaires, field practices, sampling techniques, consent forms, and preparation of the survey documents. Data were collected through interviews by two male and two female data collection teams. Each team composed of five members including a team leader and four interviewers. Survey coordinators and principal investigators regularly conducted field supervision.

2.4. Questionnaire Development and Measurements

The questionnaires were developed separately for boys and girls. We initially developed the survey questionnaire in English and then translated it into Khmer, the national language of Cambodia. Another translator back-translated it into English to ensure that the "content and spirit" of every original item were maintained. Clear instructions and explanations were addressed to avoid any confusion during the interviews. We adapted several items that have been used widely in previous studies in Cambodia [7,8,9,16,29].

2.4.2. Socio-demographic Characteristics, Health Behavior, and HIV Testing

Socio-demographic characteristics included age, residential area, years of formal education completed, current schooling status, current main occupation, and family living situations including questions on whether the respondents were living with parents and whether they had both parents alive. Age was grouped into two categories (0= 10-19, 1= 20-24), and years of education was also dichotomized using mean value of nine years as a cutoff (0< 9 years, 1≥ 9 years). We also used yes/no questions to collect information on substance use including alcohol and illicit drug use and their perception regarding the level of their alcohol consumption. Respondents would be considered as 'current alcohol drinkers' or 'current illicit drug users' if they responded 'yes' to the questions asking whether they have drunk a full glass of any kind of alcohol or used any kind of illicit drugs in the past three

months. Respondents were regarded as 'heavy drinkers' if they responded 'yes' to a question asking if they considered themselves as a 'heavy drinker.' Regarding HIV-related information, we asked whether they had been tested for HIV (0= no, 1= yes), place where the most recent HIV test was performed and whether they received the result of the most recent test (0= no, 1= yes). We also asked whether they had received HIV education (0= no, 1= yes) and the sources of the information they received in the past three months.

2.4.3. Sexual Behavior

Several items were adapted to measure sexual behavior. To construct RSB scale, five items were selected including: (1) age at the first instance of sexual intercourse, (2) number of sexual partners in the past three months, (3) buying or selling sex in the past three months, (4) not always using condom when having sexual intercourse with 'unpaid regular partners' in the past three months, and (5) not always using condom when having sexual intercourse with commercial partners in the past three months. In this study, 'sexual intercourse' included vaginal and anal sex, but not oral sex. 'Commercial sex partner' refers to a partner with whom the respondents may have sexual intercourse in exchange for money or gifts, while 'unpaid regular partners' refers to a partner with whom respondents may have sexual intercourse not in exchange for money or gifts.

For age at the first instance of sexual intercourse, responses were coded as follows: 0 if the respondents never had sexual intercourse, 1 if the age reported was 18 or older, and 2 if the age reported was younger than 18. Similarly, number of sexual partners in the past three months was coded as 0 if the respondents never had sexual intercourse or did not have sexual intercourse in the past three months, 1 if the number reported was one, and 2 if the number reported was two or more. For other variables, responses were coded as 0 if the participants never had sexual intercourse or did not have sexual intercourse with the specified partners in the past three months, 1 if the answer was 'no,' and 2 if the answer was 'yes.' The total score of the five measures was calculated, ranging from 0 to 10 with higher score indicating higher levels of RSB.

2.5. Data Analyses

Double data entry was performed using Epi Data. All data were analyzed separately for boys and girls to address gender differences. The study samples were divided into two groups using median value of the total score of RSB. The respondents were categorized in 'low risk group' if they had the total RSB score of ≤ 2, and in 'high risk group' if the total RSB score was < 2. In bivariate analyses, Chi-square test or Fisher's exact test was used as appropriate for categorical variables, and *t*-test was used for continuous variables to assess bivariate association between socio-demographic characteristics and levels of RSB. Multivariate logistic regression models were then constructed to detect the association between all expected risk factors and levels of RSB controlling for the effects of potential confounders. All variables were entered simultaneously in the models if they were found to have significant association with levels of RSB at a level of $p<0.05$ in bivariate analyses. SPSS version 20.0 (IBM

Corporation, New York, NY, USA) was used for all statistical analyses.

2.6. Ethical Statement

This study was approved by the National Ethics Committee for Health Research, the Ministry of Health, Cambodia (Ref. no. 133 NECHR). Participation in this study was voluntary, and an informed consent was obtained from each study participant before the interview. Moreover, the study participants had an opportunity to refuse or to discontinue participation at any time. Privacy was strictly protected by conducting the interviews in a private place, and we ensured confidentiality by removing all personal identifiers from the survey questionnaires.

3. Results

3.1. Characteristics of Participants

Table 1 shows socio-demographic characteristics, health risk behavior, HIV testing history, and HIV education of the respondents. In total, 1,204 boys and 1,166 girls were included in this study with similar mean ages (19.3 years ± 2.9 and 19.1 ± 2.9, respectively). Education levels were also similar in boys and girls with more than half had completed ≥ 9 years of formal education, but less than half were currently in school. Regarding living situations, boys were more likely to be currently living with their parents (75.7% vs. 52.8%), but the proportion of respondents who had both parents alive was similar (82.5% vs. 81.3%). More than half of boys (56.3%) and girls (55.2%) reported being currently unemployed, which also included being a student. It is worth-noting that 36.6% of girls reported their current job in 'other' category, which included mostly jobs in entertainment establishments such as bars, karaoke parlors, massage parlors, nightclubs or discotheques, beer gardens, restaurants, etc.

Table 1. Socioeconomic characteristics, health risk behavior, HIV testing, and HIV education among unmarried young people recruited from hotpots in Cambodia

Characteristics	Boys (*n*= 1,204)	Girls (*n*= 1,166)
	n(%)	*n*(%)
Currently living in an urban area	754 (63.2)	940 (81.0)
Longer duration of living in the current area [*]	581 (48.8)	578 (49.7)
Mean age (± SD)	19.3 ± 2.9	19.1 ± 2.9
Aged 20 - 24	885 (48.6)	557 (47.8)
Completed ≥ 9 years of formal education	779 (64.8)	713 (61.1)
Not currently in school	525 (43.6)	514 (44.1)
Currently living with parents	912 (75.7)	615 (52.8)
Current employment		
Unemployed	677 (56.3)	642 (55.2)
Self-employed business	68 (5.7)	28 (2.4)
Farmer/non-skilled laborer	347 (28.8)	67 (5.8)
Other [†]	111 (9.2)	425 (36.6)
Having both parents alive	992 (82.5)	946 (81.3)
Father is employed	1180 (98.0)	1122 (96.3)
Mother is employed	879 (73.0)	932 (80.0)
Current alcohol drinkers	1058 (87.9)	799 (68.5)
Current heavy alcohol drinkers	20 (1.6)	142 (17.8)
Current illicit drug users	176 (14.6)	37 (3.2)
Current injecting drug users	1 (0.1)	6 (0.5)
Having been tested for HIV	178 (14.8)	202 (17.4)
Place of the most recent HIV test		
Private facility	51 (28.7)	49 (24.0)
Public facility	85 (47.8)	81 (39.7)
NGO facility	37 (20.8)	57 (27.9)
Other	5 (2.8)	17 (8.3)
Received the result of the most recent HIV test	173 (97.7)	193 (95.1)
Received any form of HIV education in past 3 months	969 (80.6)	774 (66.6)
Source of HIV education obtained in the past 3 months		
Television	723 (60.1)	459 (39.5)
Radio	451 (37.5)	243 (20.9)
Newspaper	92 (7.7)	35 (3.0)
Billboard	251 (20.9)	132 (11.3)
Lectures/trainings/workshops	216 (18.0)	205 (17.6)
Health facilities	56 (4.7)	36 (3.1)
School	262 (21.8)	252 (21.7)
Friends/family	239 (19.9)	198 (17.1)
Other	49 (3.9)	3 (0.3)

Abbreviations: NGO, non-governmental organization; SD, standard deviation.
[*]Median duration of living in the current area (13 years for boys and 3 years for girls) was used to divide respondents into two groups.
[†]Other included working in entertainment establishments such as bars, night clubs, karaoke parlors, massage parlors, restaurants, etc.

Regarding health risk behavior, 87.9% of boys and 68.5% of girls reported drinking at least a full glass of alcohol in the past three months, and 1.7% of boys and 17.8% of girls perceived themselves as heavy drinkers. For other substance use, 14.6% of boys and 3.2% of girls reported using illicit drugs in the past three months, but only 0.1% of boys and 0.5% of girls reported injecting drugs in the past three months. When asked about HIV testing, 14.8% of boys and 17.4% of girls reported having been tested for HIV at least once in their lifetime. Regarding HIV-related information, 80.6% of boys and 66.6% of girls reported receiving some form of HIV education in the past three months.

3.2. Sexual Behavior

Comparisons of sexual behavior among boys and girls are shown in Table 2. Compared to girls, boys were significantly more likely to have sexual intercourse in the past three months (OR= 2.6, 95% CI= 2.2-3.2) but significantly less likely to have their first sexual intercourse before the age of 18 (OR= 1.9, 95% CI= 1.3-2.7). Boys were also significantly more likely to have two or more sex partners in the past three months (OR= 1.4, 95% CI= 1.1-2.0) but significantly less likely to have sexual intercourse in change for money or gifts in the past three months (OR= 12.4, 95% CI= 8.2-18.9). The majority of boys (85.5%) reported buying sex in the past three months. The rates of consistent condom use with commercial partners were high and not significantly different in boys and girls. However, boys were significantly more likely to report always using condom with unpaid regular partners in the past three months than girls (OR= 11.8, 95% CI= 5.3-26.7).

Among sexually active girls (*n*= 215), 43.5% reported having been pregnant at least once in their lifetime and of them, 42.4% reported having induced abortion as a result of their most recent pregnancy. Among girls who had experienced abortion, only 11.1% received the most recent abortion services at a public health facility, while 46.7% sought the services at a private health facility, and the remaining 42.2% received the abortion services from other unskilled providers such as traditional birth attendants, traditional healers, or pharmacies.

Table 2. Risky sexual behavior among unmarried boys (*n*=1,204) and girls (*n*=1,166) recruited from hotspots in Cambodia

Sexual behaviors	Boys	Girls	
	n(%)	*n*(%)	OR (95% CI)
Had sexual intercourse in the past 3 months			
No	752 (62.6)	948 (81.5)	2.6 (2.2-3.2)[‡]
Yes	450 (37.4)	215 (18.5)	Reference
Age at the first sexual intercourse			
≥ 18 years	347 (77.1)	137 (63.7)	1.9 (1.3-2.7)[†]
< 18 years	103 (22.9)	78 (36.3)	Reference
Number of sex partners in the past 3 months			
< 2	164 (43.0)	111 (51.6)	1.4 (1.1-2.0)[*]
≥ 2	217 (57.0)	104 (48.4)	Reference
Gave money or gifts in exchange for sex in the past 3 months			
No	53 (14.5)	N/A	-
Yes	313 (85.5)	N/A	-
Had sexual intercourse in exchange for money or gifts in the past 3 months			
No	406 (91.1)	84 (42.6)	12.4 (8.2-18.9)[‡]
Yes	44 (8.9)	113 (57.4)	Reference
Always used condom with commercial partners in the past 3 months			
No	24 (11.7)	12 (12.4)	1.1 (0.5-2.2)
Yes	181 (88.3)	85 (87.6)	Reference
Had sexual intercourse with unpaid regular partner in the past 3 months			
No	178 (44.3)	405 (79.1)	4.8 (3.6-6.4)[‡]
Yes	224 (55.7)	107 (20.9)	Reference
Always used condom with unpaid regular partners in the past 3 months			
No	117 (54.6)	100 (93.5)	11.8 (5.3-26.7)[‡]
Yes	97 (45.4)	7 (6.5)	Reference

Abbreviations: CI, confidence interval; OR, odds ratio.
Notes: N/A, data were not collected from girls; [*]p-value< 0.05; [†]p-value< 0.01; [‡]p-value< 0.001.

Table 3. Comparisons of sexual behavior among boys and girls in the age groups of 10-19 and 20-24 recruited from hotspots in Cambodia

		Boys (*n*= 1,204)			Girls (*n*= 1,166)		
		Aged 10-19	Aged 20-24		Aged 10-19	Aged 20-24	
		n(%)	*n*(%)	OR (95% CI)	*n*(%)	*n*(%)	OR (95% CI)
Had sexual intercourse in the past 3 months							
	No	510 (82.4)	241 (41.5)	Reference	554 (91.1)	394 (71.0)	Reference
	Yes	109 (17.6)	341 (58.5)	6.6 (5.1-8.6)[‡]	54 (8.9)	161 (29.0)	4.2 (3.0-5.9)[‡]
Number of sex partners in the past 3 months							
	< 2	48 (50.0)	116 (40.7)	Reference	22 (40.7)	89 (55.3)	Reference
	≥ 2	48 (50.0)	169 (59.3)	1.5 (0.9-2.3)	32 (59.3)	72 (44.7)	1.8 (0.9-3.4)
Gave money/gifts in exchange for sex in the past 3 months							
	No	14 (14.1)	39 (14.3)	Reference	N/A	N/A	-
	Yes	79 (84.9)	234 (85.7)	1.1 (0.5-2.1)	N/A	N/A	-
Had sex in exchange for money or gifts in the past 3 months							
	No	596 (96.6)	563 (96.2)	Reference	26 (53.1)	58 (39.2)	Reference
	Yes	21 (3.4)	22 (3.8)	1.1 (0.6-2.0)	23 (46.9)	90 (60.8)	1.8 (0.9-3.4)
Always used condom with commercial partners in the past 3 months							
	No	4 (7.8)	20 (13.0)	Reference	3 (15.8)	9 (11.5)	Reference
	Yes	47 (92.2)	134 (87.0)	1.8 (0.6-5.4)	16 (84.2)	68 (88.5)	1.4 (0.3-5.9)
Had sexual intercourse with unpaid regular partner in the past 3 months							
	No	75 (54.7)	103 (38.9)	Reference	217 (87.5)	188 (71.2)	Reference
	Yes	62 (45.3)	162 (61.1)	1.9 (1.3-2.9)[†]	31 (12.5)	76 (28.8)	2.8 (1.8-4.5)[‡]
Always used condom with unpaid regular partners in the past 3 months							
	No	14 (29.2)	55 (46.6)	Reference	28 (90.3)	73 (94.8)	Reference
	Yes	34 (70.8)	63 (53.4)	2.1 (1.1-4.4)[*]	3 (9.7)	4 (5.2)	2.0 (0.4-9.3)

Abbreviations: CI, confidence interval; OR, odds ratio.
Notes: N/A, data were not collected from girls; [*]p-value< 0.05; [†]p-value< 0.01; [‡]p-value< 0.001.

Table 3 shows comparisons of selected sexual behavior among boys and girls in the age groups of 10-19 and 20-24. Among boys, respondents in the age group of 20–24 were significantly more likely to be sexually active in the past three months (OR= 6.6, 95% CI= 5.1-8.6) and significantly less likely to report always using condom with unpaid regular partners in the past three months (OR= 2.1, 95% CI= 1.1-4.4). Similarly, girls in the age group of 20-24 were significantly more likely to be sexually active in the past three months (OR= 4.2, 95% CI= 3.0-5.9) compared to girls in the age group of 10-19.

3.3. Bivariate Analysis Results

As shown in Table 4, among boys, high levels of RSB were significantly associated with several socio-economic characteristics such as living in an urban area (OR= 2.0, 95% CI= 1.5-2.6), being in the age group of 20-24 (OR= 5.0, 95% CI= 3.8-6.6), having completed ≥ 9 years of formal education (OR= 1.4, 95% CI= 1.1-1.8), being not currently in school (OR= 3.3, 95% CI= 2.5-4.2), not having both parents alive (OR= 1.6, 95% CI= 1.2-2.2), and being currently employed (OR= 3.1, 95% CI= 2.4-4.0). High levels of RSB were also significantly associated with health risk behavior including alcohol drinking(OR= 25.3, 95% CI= 8.0-80.0), being a heavy alcohol drinker (OR= 4.4, 95% CI= 3.4-5.7), illicit drug use(OR= 5.2, 95% CI= 3.7-7.3), and HIV testing history (OR= 3.8, 95% CI= 2.7-5.2).

Table 4. Results of bivariate analyses of the relationship between socio-demographic and behavioral factors with levels of RSB among unmarried young people recruited from hotspots in Cambodia

	Boys (*n*= 1,204)			Girls (*n*= 1,166)		
	RSB ≤ 2	RSB > 2		RSB ≤ 2	RSB >2	
	n (%)	*n* (%)	OR (95% CI)	*n* (%)	*n* (%)	OR (95% CI)
Current living area						
Urban	485 (58.6)	269 (73.5)	2.0 (1.5-2.6)‡	748 (79.0)	197 (89.7)	2.3 (1.5-3.7)‡
Rural	342 (41.4)	97 (26.5)	Reference	199 (21.0)	22 (10.3)	Reference
Living duration in the current city						
< 13 years	424 (51.5)	185 (50.5)	1.0 (0.8-1.3)	406 (42.9)	178 (82.8)	6.4 (4.4-9.3)‡
≥ 13 years	400 (48.5)	181 (49.5)	Reference	541 (57.1)	37 (17.2)	Reference
Age group						
10 – 19	525 (62.9)	94 (25.2)	Reference	555 (58.4)	54 (25.1)	Reference
20 – 24	309 (37.1)	276 (74.6)	5.0 (3.8-6.6)‡	396 (41.6)	161 (74.9)	4.2 (3.0-5.8)‡
Years of formal education completed						
< 9 years	312 (37.5)	112 (30.3)	Reference	283 (29.8)	170 (79.1)	Reference
≥ 9 years	521 (62.5)	258 (69.7)	1.4 (1.1-1.8)*	668 (70.2)	45 (20.9)	8.9 (6.2-12.7)‡
Currently in school						
No	290 (34.8)	235 (63.5)	3.3 (2.5-4.2)‡	312 (32.8)	202 (94.0)	31.8 (17.8-56.6)‡
Yes	544 (65.2)	135 (36.5)	Reference	638 (67.2)	13 (6.0)	Reference
Currently living with parents						
No	195 (23.4)	97 (26.2)	1.2 (0.9-1.5)	369 (38.8)	181 (84.2)	8.4 (5.7-12.4)‡
Yes	639 (76.6)	273 (73.8)	Reference	581 (61.2)	34 (15.8)	Reference
Having both parents alive						
No	127 (15.2)	84 (22.7)	1.6 (1.2-2.2)†	129 (13.6)	88 (41.1)	4.4 (3.2-6.2)‡
Yes	706 (84.8)	286 (77.3)	Reference	820 (86.4)	126 (58.9)	Reference
Current employment status						
Employed	294 (35.3)	232 (62.7)	3.1 (2.4-4.0)‡	328 (34.6)	192 (89.3)	15.8 (10.0-24.8)‡
Unemployed	539 (64.7)	138 (37.3)	Reference			Reference
Drank at least a full glass of alcohol in the past 3 months						
No	143 (17.1)	3 (0.8)	Reference	359 (37.7)	8 (3.7)	Reference
Yes	691 (82.9)	367 (99.2)	25.3 (8.0-80.0)‡	592 (62.3)	207 (96.3)	15.7 (17.7-32.2)‡
Perceived being heavy alcohol drinkers						
No	592 (71.0)	133 (35.9)	Reference	881 (92.6)	50 (23.3)	Reference
Yes	242 (29.0)	237 (64.1)	4.4 (3.4-5.7)‡	70 (7.4)	165 (76.7)	41.5 (27.9-61.9)‡
Used any kind of illicit drugs in the past 3 months						
No	769 (92.3)	258 (69.7)	Reference	944 (99.6)	182 (84.7)	Reference
Yes	64 (7.7)	112 (30.3)	5.2 (3.7-7.3)‡	4 (0.4)	33 (15.3)	42.8 (15.0-122.3)‡
Ever been tested for HIV						
No	755 (90.9)	268 (72.4)	Reference	875 (92.3)	85 (39.7)	Reference
Yes	76 (9.1)	102 (27.6)	3.8 (2.7-5.2)‡	73 (7.7)	129 (60.3)	18.2 (12.7-26.2)‡
Received HIV education in the past 12 months						
No	165 (19.8)	68 (18.4)	Reference	308 (32.5)	81 (37.7)	Reference
Yes	667 (80.2)	302 (81.6)	1.1 (0.8-1.5)	640 (67.5)	134 (62.3)	0.8 (0.6-1.1)

Abbreviations: CI, confidence interval; OR, odds ratio; RSB, risky sexual behavior.
Notes: N/A, data were not collected from girls; *p-value< 0.05; †p-value< 0.01; ‡p-value< 0.001.

Among girls, high levels of RSB were significantly associated with living in an urban area (OR= 2.3, 95% CI= 1.5-3.7), living in the current city for a shorter period (OR= 6.4, 95% CI= 4.4-9.3), being in the age group of 20-24 (OR= 4.2, 95% CI= 3.0-5.8), being not currently in school (OR= 31.8, 95% CI= 17.8-56.6), not currently living with parents (OR= 8.4, 95% CI= 5.7-12.4), not having both parents alive (OR= 4.4, 95% CI= 3.2-6.2), being currently employed (OR= 15.8, 95% CI= 10.0-24.8), and living with unemployed father (OR= 2.0, 95% CI= 1.1-3.9). High levels of RSB were also significantly associated with health risk behavior including alcohol drinking(OR= 15.7, 95% CI= 17.7-32.2), being heavy alcohol drinkers(OR= 41.5, 95% CI= 27.9-61.9), illicit drug use(OR= 42.8, 95% CI= 15.0-122.3), and HIV testing history (OR= 18.2, 95% CI= 12.7-26.2).However, unlike boys, girls with high levels of RSB were significantly less likely to have completed ≥ 9 years of formal education (OR= 8.9, 95% CI= 6.2-12.7).

An additional analysis among girls who had sexual intercourse in exchange for money or gifts in the past three months showed that girls who had two or more

sexual partners in the past three months were significantly more likely to report always using condom in the past three months compared to those having less than two sexual partners in the past three months (89.9% vs. 62.5%, OR= 5.3, 95% CI= 1.1-6.1).

3.4. Multivariate Analysis Results

Results from the multivariate analyses are presented in Table 5. Among boys, after adjustment for other covariates in the model, high levels of RSB remained significantly associated with several socio-economic factors including living in an urban area (AOR= 1.5, 95% CI= 1.1-2.1), being in the age group of 20-24 (AOR= 2.6,

95% CI= 1.9-3.6), having completed ≥ 9 years of formal education (AOR= 1.7, 95% CI= 1.2-2.5), being not currently in school (AOR= 1.7, 95% CI= 1.2-2.5), not currently living with parents (AOR= 1.5, 95% CI= 1.1-2.1), and being currently employed (AOR= 1.6, 95% CI= 1.1-2.3). Regarding its relationship with health risk behavior, boys with high levels of RSB remained significantly more likely to be current alcohol drinkers (AOR= 6.2, 95% CI= 1.9-20.2), to be current heavy alcohol drinkers (AOR= 2.1, 95% CI= 1.5-2.8), to be current illicit drug users (AOR= 3.0, 95% CI= 2.0-4.4), and to have been tested for HIV (AOR= 2.0, 95% CI= 1.3-2.9).

Table 5. Results of multivariate analyses of factors associated with levels of risky sexual behaviors among unmarried most-at-risk young people

Factors included in the models[*]	Boys (n= 1,204)		Girls (n= 1,166)	
	AOR[†] (95% CI)	p-value	AOR[†] (95% CI)	p-value
Current living area		0.009		0.69
Urban	1.5 (1.1-2.1)		0.9 (0.4-1.8)	
Rural	Reference		Reference	
Age groups		<0.001		0.03
10 - 19	Reference		Reference	
19 - 20	2.6 (1.9-3.6)		1.8 (1.1-2.9)	
Years of formal education completed		0.005		0.17
≥ 9 years	1.7 (1.2-2.5)		1.5 (0.8-2.8)	
< 9 years	Reference		Reference	
Currently in school		0.008		0.001
No	1.7 (1.2-2.5)		3.9 (1.7-9.1)	
Yes	Reference		Reference	
Currently living with parents		0.03		0.23
No	1.5 (1.1-2.1)		1.5 (0.8-2.9)	
Yes	Reference		Reference	
Having both parents alive		0.26		0.02
No	1.3 (0.9-1.9)		1.8 (1.1-3.1)	
Yes	Reference		Reference	
Currently employed		0.01		0.93
No	Reference		Reference	
Yes	1.6 (1.1-2.3)		1.0 (0.5-2.1)	
Duration of living in current city		0.43		0.42
≥ 3 years	Reference		Reference	
< 3 years	0.9 (0.6-1.2)		0.8 (0.4-1.5)	
Living with unemployed father		0.81		0.34
No	Reference		Reference	
Yes	0.9 (0.3-2.5)		0.6 (0.2-1.8)	
Being current alcohol drinkers		0.003		0.003
No	Reference		Reference	
Yes	6.2 (1.9-20.2)		3.7 (1.5-8.7)	
Being heavy alcohol drinkers		<0.001		<0.001
No	Reference		Reference	
Yes	2.1 (1.5-2.8)		6.3 (3.6-10.9)	
Being current illicit drug users		<0.001		0.01
No	Reference		Reference	
Yes	3.0 (2.0-4.4)		5.8 (1.5-22.0)	
Having been tested for HIV		0.001		<0.001
No	Reference		Reference	
Yes	2.0 (1.3-2.9)		6.8 (4.1-11.3)	

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval.
[*]All variables significantly associated with the levels of risky sexual behavior (p<0.05) in bivariate analyses were included in the multivariate logistic regression models.
[†]The analyses were adjusted for all other covariates simultaneously included in the models.

In the model for girls, high levels of RSB remained significantly associated with being in the age group of 20-24 (AOR= 1.8, 95% CI= 1.1-2.9), being not currently in school (AOR= 3.9, 95% CI= 1.7-9.1), and not having both parents alive (AOR= 1.8, 95% CI= 1.1-3.1). Similar to boys, girls with high levels of RSB remained significantly more likely to becurrent alcohol drinkers(AOR= 3.7, 95% CI= 1.5-8.7), to be current heavy alcohol drinkers (AOR= 6.3, 95% CI= 3.6-10.9), to be current illicit drug users(AOR= 5.8, 95% CI= 1.5-22.0), and to have been tested for HIV (AOR= 6.8, 95% CI= 4.1-11.3).

4. Discussion

Findings from this study indicate the high prevalence of RSB and highlight several related socio-economic and health risk behavior factors among unmarried young people recruited from hotspots in Cambodia. Approximately half of the sexually active respondents had two or more sexual partners, and more than half had been involved in commercial sexual activities in the past three months. Although the majority of the respondents reported always using condom with commercial sex partners, the

prevalence rates of reported consistent condom use with unpaid regular partners were very low, particularly among girls. Such behavior may expose these young people to increased risks of HIV and STIs as well as other health and socio-cultural issues such as unwanted pregnancy and induced abortion, which were found to be common among this key population. Furthermore, we also found that access to safe abortion was also limited among girls in this study.

We found that socio-demographic factors such as older age and being out of school were significantly associated with higher levels of RSB among both boys and girls. These results support findings from previous studies in different settings (5,16,31). Previous studies in China and Myanmar also found that out-of-school youths had limited opportunity to receive sexual reproductive health information [5,32]. This finding highlights the lack of solutions on providing sexual reproductive health education to this vulnerable group in recent education programs, even though the importance of schooling status for sexual reproductive health education has been internationally recognized and addressed [5].

It is worth-noting that boys and girls with high levels of RSB were significantly more likely to have been tested for HIV. However, due to the small proportion of respondents who had not received the result of HIV test, we could not further analyze to see whether levels of RSB were different among boys and girls who knew the result of their most recent test compared to those who did not know it. A meta-analysis of the short- and long-term outcomes of HIV prevention interventions found that knowing one's HIV status was strongly associated with lower RSB that may support the roles of post-test counseling in changing sexual behavior of the testers [33]. However, our finding may simply indicate that people who had been involved in RSB may be more concerned about their HIV status and in turn, more likely to get tested. Future study should explore the roles of pre- and post-test counseling in changing sexual behavior among these most-at-risk young people in Cambodia.

The finding of the association between substance use and RSB extends the widespread evidence that substance use and RSB tend to co-occur among young people [22,34]. Similar findings have also been reported in our previous study among adolescent students in Cambodia [7]. In terms of specific RSB, some studies have linked substance use to higher number of sexual partners and less consistent condom use [35,36], whereas other studies have failed to find such an association [37]. Among South African youth, the use of various substances was associated with having ever had sexual intercourse but not associated with the failure to use condom in the last sexual intercourse [38].

The most frequently cited explanation for the link between substance use and RSB is "sensation-seeking behavior," which is defined as a disposition characterized by the tendency to pursue novel, exciting, and optimal levels of stimulation [39]. Another possible explanation for this co-variation is that intoxication with substances, such as alcohol or drugs, may have disorganizing effects on cognitive functions leading to poor decision-making on involvement with RSB [40,41]. In Cambodia, visits to sex workers after drinking parties are a social activity involving male friends [42], and this might also explain the relation between substance use and RSB among unmarried young people in this study.

A cross tabulation was conducted to see if there was a trend between number of clients a woman was sexually active with and levels of consistent condom use. We found that girls who reported having two or more sex partners in the past three months were more likely to report always using condom compared to those who reported having less than two sex partners. Similar finding was also reported in a previous study in South Africa [43], where consistent condom users had three times the odds of having had only one sexual partner in the past year compared to inconsistent users. This finding may indicate that girls who have fewer clients are more likely to have the same clients and form a closer relationship with the clients than girls who had more clients. As a result, both girls and their clients could feel they are less at risk for transmission of HIV and STIs from one another.

This study has several limitations. First, the cross-sectional nature prohibited us from concluding on a causal relationship between the risk factors and RSB. Second, there might be inherent biases and the potential for both underreporting and over-reporting as a result of the use of questionnaire survey. Given the cultural norms governing sexual behavior in Cambodian society, sexual behavior tends to be over-reported by boys and under-reported by girls. However, this bias has been minimized by using interviewers who were similar to respondents in terms of age group and gender with intensive training and support. The final limitation concerns the representativeness of the study population. Young people targeted in this study were at-risk populations; therefore, they may not represent young people in Cambodia as a whole. Furthermore, this survey included only hotspots in the capital city and seven provinces purposefully selected to include a higher likelihood of having youths who are at risks; therefore, the findings are not nationally representative even within the most-at-risk populations. However, given that probability sampling was used coupled with careful mapping of hotspots using time-location method, the samples are representative of the key populations within the selected city and provinces.

5. Conclusions

Unmarried young people in this study are at remarkably high risk of sexual reproductive health problems such as HIV, STIs, unwanted pregnancy, and unsafe abortion. Their RSB are associated with a number of socio-economic factors and health risk behavior such as alcohol and substance use. These findings suggest the need for research and prevention programs for these young people. Further studies are needed to understand who are at the greatest risks, and where the real hotspots are among these key populations. HIV prevention programs should be developed to change individual behavior under the guidance of health promotion theoretical frameworks. One such framework is the information-motivation-behavioral skills (IMB) model that has been tested in various at-risk groups in different countries [44,45,46,47].

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Statement of Competing Interests

The authors have no competing interests.

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