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Sexual Risk Behaviour and Associated Factors: a Cross-Sectional Study among Undergraduates in a Lower Resource Setting

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Abstract: Introduction: Sexual Risk Behaviour (SRB) among undergraduates has emerged as an important public health issue worldwide. Therefore, the study objective is to assess the prevalence of SRB and its associated factors among second-year undergraduates in a lower resource setting. Methods: A descriptive-cross-sectional study was carried out among 1290, second-year undergraduates in Sri Lanka using multi-stage stratified cluster sampling. Four universities were randomly selected out of 10 eligible universities. The cluster size was 30 and 43 clusters were allocated proportionate to the total second-year undergraduate population and three faculties selected. University Health Risk Behaviour (UniHRB) Inventory is a self-administered questionnaire (SAQ) developed, translated and validated in a local setting. SRB was assessed using 18 items, and the minimum score obtained was 0 and the maximum possible score was 78. The minimum threshold score for the presence of SRB was 27 based on expert opinion. A SAQ was developed to assess its associated factors. The factors significantly associated with SRB were identified using appropriate significant tests. All the variables significant $p \leq 0.05$ in the bivariate analysis were checked for possible effect modification with each other for SRB. In logistic regression analysis forward stepwise logistic regression method was used to identify Adjusted Odds Ratio (AOR) with 95% Confidence Interval (CI). Results: Overall response-rate for the study was 88.1% ($n=1136$). Prevalence of SRB was 3.5% (95%CI:2.6%-4.7%) and it was more among females (3.9%, 95%CI: 2.5-5.8%) and undergraduates of the Engineering Faculty (5.3%,95%CI:1.8-12.2%). SRB was significantly associated with risky-substance-use (AOR=5.7; 95%CI:1.7-18.4), undue-risk-behavior (AOR=9.0;95%CI:2.6-30.4), being emotionally abused during childhood (AOR=5.9; 95%CI:1.6-20.9), perpetrating physical bullying (AOR=2.2;95%CI 1.5-3.1), discrimination due to religion (AOR=4.1;95%CI:1.2-14.2) and negatively associated with EI (AOR=0.96;95%CI 0.92-0.99). Conclusions: Co-existence and clustering of HRBs were observed, Higher emotional intelligence was significantly negatively associated with SRB.

Keywords: Associated factors, Lower resource setting, Sexual Risk Behavior, Undergraduates.

1. Introduction

Sexual Risk Behavior (SRB) has emerged as an important public health issue worldwide which can lead to unintended pregnancy, HIV and AIDS (CDC, 2019). Extensive research has been carried out among undergraduates as they are a vulnerable population for SRBs. They are particularly involved in many types of SRBs including having sex with multiple partners, having unprotected sex (without condoms), carrying out abortion for unintended pregnancies, having sexual intercourse with strangers, using drugs or alcohol before sex, and group sex (Bui *et al.*, 2012; Caldeira *et al.*, 2009; CDC, 2019). On the other hand, modern behaviors such as sexting and the use of online apps have also been explored in the undergraduate population (Choi, *et al.*, 2017; Cornelius, 2020). Early initiation of sex and unprotected sexual behaviors can precipitate sexually transmitted infections leading to infertility, malignancies and HIV infection causing a chronic care burden on health systems and where can be transmitted to infants as well (WHO, 2011).



There is ample research evidence on undergraduates' sexual risk behavior in Western and African nations, which shows a high prevalence (Dingeta, Oljira, Assefa, 2012; Tura, Alemseged, Dejene, 2012; Soboka & Kejela; 2015; Bayissa, 2016) The prevalence of having at least one sexual partner in the past 12 months was 10.8%. The prevalence of participants who reported having one and two or more sexual partners in the past 12 months was 8.3% and 2.5% respectively and 54.2 % said they or their partners did not use a condom during their most recent sexual encounter (Tura, Alemseged, Dejene, 2012; Soboka & Kejela; 2015; Bayissa, 2016) Sexually transmitting diseases, on the other hand, were very much rare in these Association of South East Asian Nations (ASEAN) nations. In low and middle-income countries including Sri Lanka, youth and young adults are increasingly exposed to a variety of SRBs connected to major socioeconomic transitions (Jackson, Henderson, Frank, Haw, 2012; FHB, 2013) recent survey carried out among Sri Lankan undergraduates revealed that 12.1% of them had risky sexual behavior in the last 3 months before the survey (Perera, and Abeysena, 2018b).

SRBs are considered multi-factorial in their origin. Different factors have been identified as being associated with SRBs among undergraduates from research conducted during the past decades. Socio-economic and demographic factors, personality, self-esteem, health and knowledge and presence of other health risk behaviors such as risky substance use, family and parental factors, adverse childhood events, and school and peer-related factors were significantly associated with SRBs (Bori and Jelena 2015; Caspi *et.al.*, 1997; Espelage, Basile, & Hamburger, 2012; Khalaj, Abadi, John, and Amir, 2011; Kebede, *et.al.*, 2005; Perera, and Abeysena, 2018a; Perera, and Abeysena, 2018b; Ramiro, Madrid & Brown, 2010; Ssewanyan, 2018; Yi, Te, Pengpid, & Peltzer, 2018). Furthermore, Institutional/university-related factors included academic performance, living in hostels, going to parties, presence of a roommate and peer delinquency behavior and societal factors like discrimination faced by undergraduates have been assessed for association with SRBs among undergraduates (Chanakira, O'Cathain, Goyder, & Freeman; 2014; Gardner, & Steinberg, 2005; Piña-Watson, Cox, & Neduveilil, 2021). Among these factors, emotional intelligence (EI) has been identified as an important determinant of SRBs. It has been shown that a higher EI score is associated with unsafe sex and less undue risk-taking (Lana, Baizan, Faya-Ornia, & Lopez, 2015). Currently, there have been few studies conducted to assess SRBs of undergraduates in Sri Lanka and either limited to one single faculty or university or a few universities in the Western Province of Sri Lanka. Furthermore, as a factor of SRB, the role of EI has never been explored. Therefore the objective of this study is to describe the prevalence and factors associated with SRBs including emotional intelligence among second-year undergraduates. The findings of this study will be useful to develop policies and strategies and might be useful as the first step in developing interventions to address the predisposing factors, including EI among them to minimize SRBs.

2. Methods

A cross-sectional study was carried out using a multi-stage stratified cluster sampling method in four randomly selected universities in Sri Lanka from January to March 2020. In each selected university, three faculties were selected randomly. Those who are in the academic year 2016/17 in four main academic streams and undergraduates where more than 100 students enrolled in general degree programmes were selected. While, non-Sri Lankan, clergymen undergraduates, those from medical and allied health courses and absent on the day of data collection were excluded. Altogether, 43 clusters were allocated for four universities based on the calculated sample size (1290) and cluster size (30). Clusters were proportionately stratified based on the total 2nd-year undergraduates eligible for the study. Clusters were selected randomly according to the required number needed in each academic programme based on the tutorial (small group discussion) groups (Fig 1).

The UniHRB-Inventory is a self-administered closed-ended questionnaire developed using deductive and inductive methods following a literature survey and qualitative techniques to assess common SRBs among undergraduates. There were 18 items finalized following modified Delphi technique with expert panel (Table 1). The validity of the questionnaire was assessed based on face content, consensual validity and reliability (Cronbach alpha=0.72, test re-test reliability r=0.74). Item no.1 assesses the age of first sexual contact with five distinct responses. The next three items were on how often engage in sex with different sexual partners. Items no.5 and 6 were on consuming alcohol and other drugs before sex. The next two items measured safe sex practices such as using condoms and other contraception methods. These five items were assessed on a 6-point Likert scale scoring 0 for "never" and "not applicable" to 4 for "more than 4 times per week". Item no.9 was on the attempt of termination



of an unintended pregnancy which scored 0 for “didn’t consider”, “didn’t attempt” and “not applicable” and scored 3 for “attempted”. Item no.10 and 11 assessed paying sexual favour for financial and other benefits whereas item no.12 looked into finding sexual partners using a mobile app or the internet. Item 13 and 14 considered sending and receiving sexting, the next two items were regarding taking videos of sexual activities and the final two items were Sexual transmitted Disease-related questions. All these items were assessed on a 5-point Likert scale and scored 0 for “never” and “not applicable” to 4 for “more than 3 times”

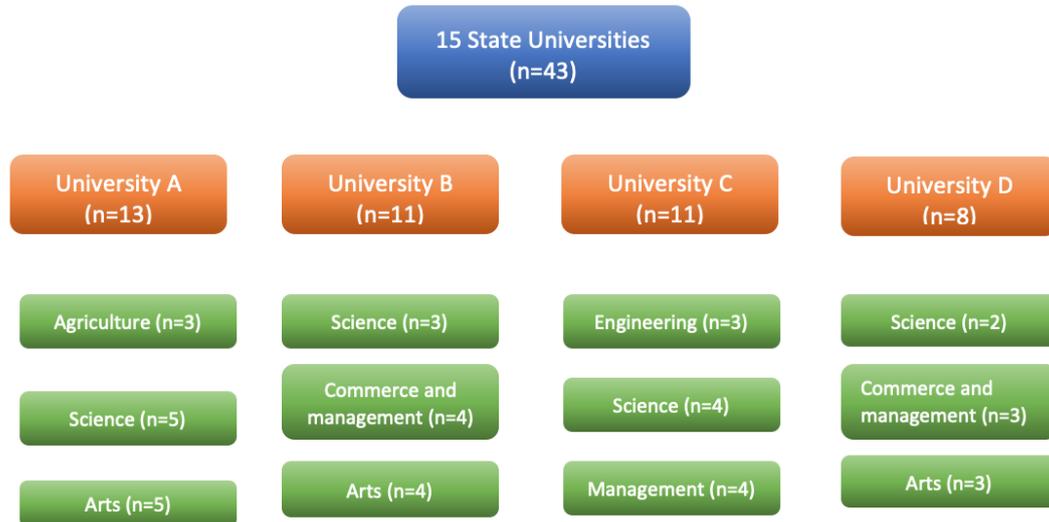


Figure 1. Distribution of clusters among universities and faculties

Table 1. Items and frequency measures of Sexual Risk Behavior

1.	When I had sexual intercourse for the first time, I was	Less than 15 years old	16 to 18 years old	More than 18 years, before entering university	More than 18 years, after entering university	Not applicable	
		Never	Less than once a month	2 to 4 times a month	2 to 3 times a week	More than 4 times a week	Not applicable
2.	I had sexual intercourse with a commercial sex worker						
3.	I had sexual intercourse with a Casual partner/ Person who met accidentally						
4.	I had sexual intercourse with my partner/ girl or boyfriend						
5.	I drink alcohol before sexual intercourse						
6.	I use drugs such as sexual enhancing drugs such as cupid/ Viagra before sexual intercourse						

		Never	Rarely	Sometimes	Frequently	Always	Not applicable
7.	Me or my sexual partner engage in safe sex practices (using condom)						
8.	Me or my partner used contraception methods to prevent pregnancy						
9.	Me or my partner ever terminated an unintended pregnancy?	Attempted	Seek help	Considered but didn't attempt	Attempted	Didn't consider/ attempt	Not applicable
		More than 3	3 times	Twice	Once	Never	
10.	I had to pay sexual favour for financial benefits						
11.	I had to pay sexual favour for other benefits						
12.	I use my mobile phone/internet to find sexual partners						
13.	I have sent sexting during my period in university? (the sending of sexual words, pictures, or videos via technology, typically a mobile phone)						
14.	I have received sexting during my period at university? (the receiving of sexual words, pictures, or videos via technology, typically a mobile phone)						
15.	I have taken videos of my sexual activities						
16.	My sexual partner has taken videos of our sexual activities						
17.	I have checked HIV status after sexual activity						
18.	I have been treated for warts, discharge, and painful vesicular rashes over the genital area						

The minimum score obtained was 0 and the maximum possible score was 78. Each item was given a minimum threshold score by the expert panel, thereby minimum threshold score for the presence of sexual risk behavior was calculated as 27. Therefore, a total score of more than 27 indicates the presence of sexual risk behavior among undergraduates.

A self-administered questionnaire was developed based on literature and qualitative study carried out among Key Informant Interviews and Focus group discussions. According to the Socio-Ecological Model (SEM) Interpersonal, intrapersonal, institutional/structural and societal factors were used to identify associated factors of SRBs (Fig 2). Schutte Self-reported Emotional Intelligence Test (SSEIT), adapted and validated for the undergraduate population was used to assess the EI status among the study participants (Schutte, *et al.*, 1998). Respondents are expected to rate their level of agreement regarding the series of statements using a 5 – point Likert scale. The total score could range from 33 to 165, with a higher score indicating more higher EI.

Several measures were carried out at the stage of development of the questionnaire, sample selection, during data collection and entry to ensure the quality of data. The sample size calculation was done using a scientific formula. A self-administered questionnaire was used. It was considered to be the most reliable method for behaviour-related sensitive questions. Administering an SAQ is more straightforward since the study participants were



undergraduates. Most of the questions were closed-ended instead of double-barrelled ones and the questionnaire was pre-tested and cognitive interviews were carried out before being used in the study. Following this, necessary modifications were made. Data collection was carried out in one day in one faculty for all undergraduates who attended a particular lecture to prevent undergraduates from getting familiar with the questions beforehand. The importance of answering all sections and giving actual responses was stressed before collection and at the end of the collection, questionnaires were checked for completeness, and in case of missing information they were returned and were asked to complete.

Informed written consent was obtained from each participant. Data collection was conducted with least interference of the academic activities of respondents. Confidentiality was ensured. Each participant was identified by a serial number and not by name. A sealed box was kept in the place of data collection to collect the completed questionnaires. Questions that were related to culturally sensitive issues were phrased in a way to avoid social stigma. Participants encountering difficulties with SRBs were planned to be directed to supportive services. When requested, they were given the contact number of PI to consult for advice and further information. This research will guide future planning and services in the prevention of SRBs in universities, which invariably helps an undergraduate's well-being in the future. Incentives were not provided for the participants, and participation in the survey was voluntary.

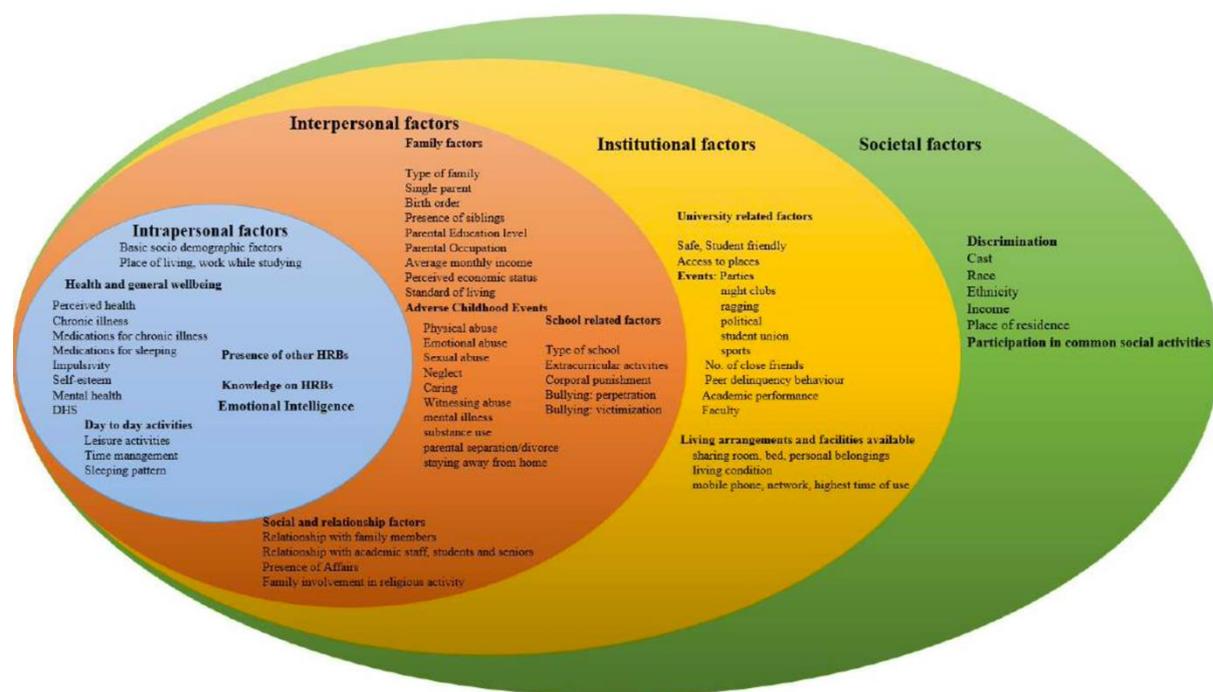


Figure 2. Conceptual framework: Socio-Ecological Model for Sexual Risk Behaviours

Total EI scores and domain scores were compared between those with and without SRBs. The factors significantly associated with SRBs were identified using the Chi-Square Test, Fisher's Exact test and Mann-Whitney U test where appropriate. Odds Ratio with 95% Confidence Interval was calculated for demographic, socio-economic and educational variables such as age, sex, ethnicity and social class. Finally, multivariable analysis of SRBs was carried out using the correlates that were significantly associated in the bivariate analysis, as independent variables. SPSS version 21 was used for statistical analysis. The dependent variable for this study was SRB and coded as "1," whereas those without an SRB were coded as "0." The two groups were mutually exclusive. The threshold for inclusion in the model was set at 0.05, and the threshold for removal was set at 0.1. Before conducting logistic regression analysis, the association between independent variables and sample adequacy was checked (Field, 2009). In logistic regression analysis, enter method was used. The Omnibus test was used to determine the statistical significance of the overall model and the statistical significance of the individual stages acquired through binary logistic regression analysis. Nagelkerke R² values were used as pseudo R² values to describe the percentage of variance explained by the model. The Wald statistic was carried out to determine the significance of individual logistic regression coefficients.

3. Results

Descriptive statistics: The overall response rate for the study was 88.1% (n=1136). Fifty-two per cent (n=594) of undergraduates were males, whereas 47.7% (n=542) were females. The basic socio-demographic characteristics of 1136 undergraduates who participated in the descriptive study are provided in Table 2. The majority of the total respondents (80.7%, n=917) were unmarried, belonged to the Sinhalese ethnicity (66.3 %, n=753) and were Buddhists (68.4%, n=684). The majority of undergraduates belonged to the Arts Faculty (n=414,36.4%), and the lowest proportion was from the Faculty of Engineering (n=75, 6.6%). Most of the undergraduates' (83.2%, n=945) live in their homes. Only 10.2 % (n=116) were in the hostel within the university.

Table 2. Demographic Characteristics of Undergraduates

Characteristic	Frequency (N)	Percentage (%)
Age		
<24 years	758	66.7
≥24 years	378	33.3
Sex		
Male	594	52.3
Female	542	47.7
Marital status		
Married	73	6.4
Unmarried	917	80.7
Co-habiting/ living together	142	12.5
Divorced	4	0.4
Widowed	0	0
Ethnicity		
Sinhala	753	66.3
Tamil	213	18.8
Muslim	170	15.0
Religion		
Buddhist	684	60.2
Hindu	170	15.0
Islam	170	15.0
Catholics	103	9.1
Atheist	6	0.5
Other	3	0.3
Place of living		
Home	945	83.2
Relative's house	26	2.3
Rented house	41	3.6
Boarding place	8	0.7
Hostel	116	10.2
Faculty		
Agriculture	78	6.9
Arts	414	36.4
Commerce and Management	204	18.0
Engineering	75	6.6
Science	365	32.1
Total	1136	100.0



Prevalence of SRB: Three-point five per cent of undergraduates engage in SRB (n=40) with a 95% of confidence interval between 2.6%-4.7%, and it was more among females (3.9%, 95%CI: 2.5-5.8; n=16) and undergraduates of the Engineering Faculty (5.3%,95%CI:1.8-12.2; n=4). Lowest prevalence was seen among Science Faculty students (2.2%,95%CI:1.0-4.1; n=6).

Factors associated with SRB: Out of all significant factors associated with SRBs in bivariate analysis following 10 independent variables were identified as having correlations of >0.8 between each other: Religion and ethnicity, three variables from 3 types of bullying victimization, and five from EI. Religion, physical bullying victimization and EI total were selected among those ten variables to enter the model. None of the independent variables dropped due to sampling inadequacy (lesser expected value in each cell). Thereby finally, 40 factors (37 categorical and 3 scale variables) were identified in the bivariable analysis as important independent variables with a p-value of SRB having a p-value of < 0.05, and 14 interactions based on a theoretical basis were included for multivariable analysis (Table 3) (Hong, Espelage, Grogan-Kaylor & Allen-Meares, 2012; Onwurah, & Makata, 2020; WHO, 2005).

Table 3. Significant Factors Associated with Sexual Risk Behaviours and Interactions Included in the Multivariable analysis

No	Associated factors	OR	95% CI	P-value	Interaction
Intrapersonal factors					
1.	Marital status	2.1	(1.1-4.1)	0.040	
2.	Religion	2.1	(1.1-3.9)	0.022	
3.	Place of living	8.3	(4.3-16.0)	< 0.0001	
4.	Mental health	10.0	(5.1-19.8)	< 0.0001	4X5, 4X6, 5X6, 4X5X6
5.	Attempted deliberate self-harm	4.0	(2.0-7.8)	< 0.0001	
6.	Leisure activities in the last two weeks	2.3	(1.2-4.4)	0.014	
7.	Aggressive and violent behaviour	51.5	(22.6-117.3)	< 0.0001	7X8, 7X19, 8X9
8.	Risky substance use	12.5	(6.3-24.7)	< 0.0001	7X8X9
9.	Undue risk-taking behaviour	33.8	(14.6-78.0)	0.013	
Interpersonal Factors					
10.	Average monthly income of the family	2.1	(1.1-4.2)	0.037	
11.	Perceived economic status	4.2	(2.1-8.4)	< 0.0001	
12.	Presence of ACE	4.1	(1.9-8.9)	< 0.0001	
13.	Physical abuse	3.7	(1.6-8.5)	0.001	
14.	Emotional abuse	3.5	(1.8-6.7)	< 0.0001	
15.	Sexual abuse	3.5	(1.8-6.6)	< 0.0001	
16.	Physical neglect	3.1	(1.4-6.5)	0.005	
17.	Emotional neglect	3.2	(1.7-6.2)	< 0.0001	
18.	Parental separation	3.6	(1.3-10.4)	0.007	
19.	Type of School	2.1	(1.1-3.8)	0.035	
20.	Corporal punishments	3.3	(1.7-6.3)	< 0.0001	
21.	Physical bullying: Victimization	2.3	(1.2-4.4)	0.011	21X22, 21X23, 22X23, 21X22X23
22.	Physical bullying: Perpetration	8.6	(3.6-20.7)	< 0.0001	
23.	Verbal bullying: Perpetration	0.2	(0.1-0.6)	0.012	
24.	Relationship with family members	2.5	(1.2-5.2)	0.023	
25.	Lecturers	2.6	(1.3-4.9)	0.004	
26.	Batchmates	3.7	(1.8-7.4)	< 0.0001	
27.	Peer delinquency behaviour	2.8	(1.4-5.3)	0.002	



Institutional Factors				
28.	Perceived academic performance	7.8	(3.0-20.0)	< 0.0001
29.	Student-friendly	2.5	(1.3-4.8)	0.005
30.	Common room	10.3	(5.3-19.8)	< 0.0001
31.	Pavilion/ground	2.1	(1.1-4.1)	0.023
32.	Ragging	3.5	(1.7-6.9)	< 0.0001
33.	Political activities/meetings	12.4	(4.8-31.8)	< 0.0001
Societal Factors				
34.	Faced discrimination due to religion	5.2	(2.3-11.9)	0.001
35.	Faced discrimination due to race	3.5	(1.7-7.2)	0.001
36.	Faced discrimination due to Income status	3.7	(1.9-7.1)	< 0.0001
37.	Faced discrimination due to Place of residence	0.3	(0.1-0.6)	0.002
Scale variables		Mann-Whitney U test		P-value
Interpersonal factors				
38.	Impulsivity		10346.0	< 0.0001
39.	Self-esteem		9143.0	< 0.0001
40.	Emotional Intelligence (Total)		12268.5	< 0.0001

The omnibus tests of model coefficients revealed a final model with a model Chi-Square of 219.579, which was statistically significant at $p < 0.0001$ level. Therefore, the final model with independent predictors was considered statistically significant at $p < 0.0001$ level. Therefore, the final model with independent predictors was considered statistically significant at $p < 0.0001$ level. At each step, variables that were added at successive steps had significant Chi-square values.

The final model was explained by 66.9% (Nagelkerke R^2) of the variance in SRB. The Hosmer-Lemeshow test supported the fit of the final model with a non-significant Chi-square value ($\chi^2 = 3.230; df = 6; p = 0.779$). This shows that the observed output is not significantly deviating from what was expected and that the model is with satisfactory goodness of fit. Table 4 summarizes the results of the final model retained after binary logistic regression after controlling for confounders. The values of beta coefficient (B), Standard Error (SE), Wald test value with degrees of freedom, p-value, and Adjusted Odds Ratio (AOR) with 95% CI is presented (Table 4).

Six factors were significantly associated with SRBs among undergraduates after controlling for confounding and interaction. None of the interaction terms remained significant in the model. None of the basic socio-demographic factors was found to predict SRBs. However, among the three other HRBs assessed, undue risk-taking remained in the final model. Those with risky substance use behavior were 5.7 times (AOR=5.7; 95%CI: 1.7-18.4; $p < 0.0001$) likely to engage in SRBs. Similarly, those with undue-risk taking behavior were 9.0 times (AOR=9.0; 95%CI: 2.6-30.4; $p < 0.0001$) likely to engage in SRBs (Table 4).

Those who had experienced emotional abuse during childhood were 5.9 times (AOR=5.9; 95%CI:1.6-20.9; $p < 0.0001$) physical bullying perpetration during school was 2.2 times (AOR=2.2;95%CI 1.5-3.1; $p < 0.0001$) and faced discrimination due to religion was 4.1 times (95%CI: 1.2-14.2; $p < 0.05$) likely to engage in SRBs than those who did not have such experiences after adjusting for confounding factors and interactions. EI showed a negative association with SRBs after controlling for confounding. One unit increase in EI would decrease SRB by 0.96 odds (95%CI 0.92-0.99; $p < 0.05$).

Table 4. Associated Factors of Sexual Risk Behaviours Following Multivariable analysis

Factors	B	SE (B)	Wald test	df	p-value	Adjusted OR (Exp B)	95%CI of Exp (B)	
							Lower	Upper
Intrapersonal factors								
Presence of Risky Substance use	1.740	0.599	21.151	1	0.000	5.7	1.7	18.4
Presence of Undue risk-taking behaviour	2.197	0.622	39.158	1	0.000	9.0	2.6	30.4
Interpersonal factors								
Emotional abuse	1.774	0.648	18.200	1	0.000	5.9	1.6	20.9
Perpetration of Physical bullying	0.788	0.584	18.374	1	0.000	2.2	1.5	3.1
Societal factors								
Faced Discrimination due to religion	1.410	0.636	4.864	1	0.027	4.1	1.2	14.2
Emotional intelligence	-.040	0.009	13.135	1	.0020	0.96	0.92	0.99
Constant	-7.535	1.689	19.905	1	.000	.001		

4. Discussion

The survey was carried out in four universities, with 43 clusters allocated proportionately according to the total number of second-year students, with 30 in a cluster for the present study. Since the study was based on self-administered questionnaires, having a cluster size of 30 was feasible. Random selection of universities and faculties from selected universities helped reduce selection bias. However, in our sampling method, the random selection ensured the representation of universities from different geographical and ethnic settings. Since each university has different study programmes, general degree programmes with more than 100 undergraduate students were selected. A similar method was adopted in another local study to select 2nd-year study participants (Perera and Abeysena, 2018b). Inclusion and exclusion criteria were made to get the maximum representative sample.

SRB is a sensitive topic involving a substantial amount of social stigma. Therefore, self-administering questionnaires were used for all components. Most of the research studies on HRBs were based on self-reporting (Perera and Abeysena, 2018b; Somaratna, 2010; WHO, 2017). A self-administered questionnaire would be considered an ideal choice for this study sample considering the high literacy rate. A tool was developed and validated in the local setting to identify SRB among undergraduates. The selection of factors to be assessed for association with HRBs was based on the determinants of adolescent health and development socio-ecological model proposed by WHO (WHO, 2017). The model considers the complex interplay between individual, family, relationships, institutional/organisational and societal factors and allows understanding of the range of factors associated with SRBs in the conceptual framework. It was designed also keeping in mind the different levels at which the prevention can be designed and implemented. Variables in the framework were carefully operationalised for the local setting. Wherever possible, validated tools were used to obtain data.

Prevalence of SRB was 3.5% (95%CI:2.6-4.7) among undergraduates during the period since university entry. There were several studies carried on Sri Lankan undergraduates to assess sexual risk. Perera & Abeysena in 2018 revealed SRB among undergraduates in universities as 12.4% (95% CI 11.8-13.1) the in last one-year period and 12.1% (95% CI: 11.5-12.7) in the last three months. The SRB was defined based on the presence of at least one or more of the eight SRBs assessed (Perera and Abeysena, 2018b). Only over 2% of first-year Agricultural undergraduates at the University of Ruhuna reported several sexual partners in the previous three months in a



descriptive cross-sectional survey by Somaratne in 2010. This observed difference could be attributable to the difference in the sample selected and the present study assessed HRBs based on a scoring system, where each item was given a score based on expert opinion and a minimum threshold score was determined to find SRB based on the total score obtained. Therefore, every behavior was accounted for in the assessment of SRB. However, the broad definition given by Perera and Abysena (2018b) as mentioned earlier could be a reason for the higher prevalence of SRBs, on the other hand, Somaratne (2010) assessed only multiple sexual partners. In addition, the previous studies were carried out in four universities of Western Province and the sample was taken from both 2nd and 3rd-year undergraduates by Perera and Abeysena (2018) and in University of Ruhuna, 1st-year students (Perera and Abeysena, 2018b; Somaratna, 2010) therefore different study setting and sample selected could be another reason for the difference.

In the multivariable analysis, the final model was able to predict a 66.9% variance of SRB, which indicates that a considerable number of variables determining SRB have been identified in the present study. There could be other social determinants such as social norms and attitudes, policies, law and media and community-level determinants such as neighbourhood, faith, communities, stigma and other forms of discrimination and individual-level determinants such as sexuality, personal attitude, values and beliefs associated with SRBs which were not assessed in the present study, that could have contributed to the unexplained variance.

None of the socio-demographic factors were able to predict SRBs among undergraduates in Sri Lanka. However, a multi-country study in ASEAN region showed that SRBs were significantly less likely to be in the age groups of 20–21 years (AOR = 0.48, 95% CI = 0.28–0.82) and 22–30 years (AOR = 0.35, 95% CI = 0.19–0.57), in males (AOR = 0.68, 95% CI = 0.43–0.88) and in those who live away from parents (AOR = 0.37, 95% CI = 0.54) (Yi, Te, Pengpid, & Peltzer, 2018).

Out of three other HRBs, risky substance uses and undue risk-taking behaviour remained in the model to predict SRBs. The present study identified risky substance use as a significant factor associated with SRB, even though the multi-country study in ASEAN university students failed to find an association, many research studies support the fact that drinking increases the likelihood of SRB such as having multiple and casual partners and not using a condom. The amount of alcohol consumed affects sexual behaviour and heavy drinking is associated with sexual risk-taking. Risky substance use is also associated with an increased incidence of Sexually Transmitted Diseases (STDs) and unintended pregnancies. The study by Perera and Abeysena, (2018) revealed a statistically significant positive correlation between alcohol use in the previous three months and risky sexual behaviour (OR=2.59, 95% CI:=1.82-3.70) (Perera and Abeysena, 2018b; Thompson, *et.al.*, 2017). The use of alcohol in conjunction with sexual activity was included in the definition of risky sexual behaviour (RSB) in this case.

Present study identified emotional abuse during childhood as a significant associated factor of SRB (AOR=5.9; 95%CI:1.6-20.9; $p<0.0001$). Similar finding was obtained by Laurie *et al.*, in 2010, those who had emotionally abused during childhood were likely to also have sex with multiple partners (AOR=2.1; 95%CI: 1.5-3.0), experience first unintended pregnancy (AOR=2.2; 95%CI: 1.4-3.4) in later life (Ramiro *et al.*, 2010). All forms of abuse, linked particularly with post-traumatic stress disorder (PTSD), Individuals who were traumatized by a trusted adult were likely to develop PTSD than those who were traumatized by an untrustworthy adult leading to SRBs in later life (Gamache, Van Ryzin, & Dishion, 2016; Thompson *et al.*, 2017).

Being a perpetrator of physical bullying during school was significant predictor of SRB (AOR=2.2;95%CI 1.5-3.1; $p<0.0001$). Bullying at school can have both immediate and long-term health consequences. Bullying that occurred before college may still have an impact on college students' health (Chen & Huang, 2015). Bullying in school indicated sexual harassment and risk behaviour in later life. These findings show that classic bullying may evolve into more gendered harassment and aggressive conduct in the form of sexual harassment and risk behaviour (Espelage *et al.*, 2012).

Present study revealed facing discrimination due to religion, was significantly associated with SRBs (AOR=4.1; 95%CI: 1.2-14.2; $p<0.05$). None of Sri Lankan studies attempted to identify this association. However, perceived racial/ethnic discrimination was significantly associated with HRBs like alcohol use and number of sexual partners ($z = 3.60$, $p < 0.001$) among Mexican American adolescents (Flores *et al.*, 2010). Discrimination is a stressor in ethnic minority, and it's linked to their physical and mental health leading to depressive symptoms, and low self-



esteem. The theory of social stress has been used to explain why racial/ethnic discrimination can be distressing. Individuals judge an event or circumstance as dangerous to them or as producing injury or loss, and they think that they do not have the personal or social resources to handle the stressful event (Cohen, Kessler, & Gordon, 1995; Lazarus & Folkman, 1984).

EI had a negative association with SRBs (AOR=0.96; 95%CI: 0.92-0.99). A similar finding was obtained by a study carried out among nursing undergraduates which showed that the total EI score was low among students who engage in unsafe sex (EI score=119.6 vs 126.5; $p = 0.003$). In the same study, students in the third tertile of EI (the highest score) had a lower probability of engaging in unsafe sex (OR=0.10;95%CI: 0.01-0.74). In addition, a significant dose-response relationship was found between EI and unsafe sex (Lana, Baizan, Faya-Ornia & Lopez, 2015). Low emotional intelligence was linked to a lack of impulse control and more personality problems, as part of an underdeveloped ability to make social decisions, people engage in risky sexual practices, while high emotional intelligence was linked to better health (Matthews, G., Zeidner, M., & Roberts, 2002; Schutte, *et al.*, 2006).

Selection bias which affects the internal validity is likely to be minimal. The study populations were selected using probability sampling techniques, namely simple random sampling and cluster sampling methods which ensured selection of a representative sample from the study population, which in turn is considered as a strength of the study. Higher rates of response rate (88.1%) from the eligible undergraduates, and large sample size (1136) which may have improved the validity of the results, and considered as a strength of the study. Bias due to confounding and this was controlled of by applying multiple logistic regression. This, it may be deduced that the cross-sectional study had minimal biases which confirms its internal validity. This is a strength of this study.

The major limitation was the cross-sectional design of the study. Therefore, it was difficult to assess the cause and effect association between the variables and get supportive evidence to establish causality. Although selection bias is minimal due to random selection of the study sample, there were more male undergraduates than females in this sample, there could be an under-representation of SRB due to gender inequity. Those who refuse to participate may differ from participants in terms of motivation, views regarding SRB, and risk factor status. Non-participants and participants should have had their basic demographic parameters examined to ensure that there were no significant disparities between them. This non-participation bias will only impair the study's capacity to be generalized (external validity), not the results' validity (Hennekens & Buring, 1987). During sampling, undergraduate courses with less than 100 undergraduates were excluded. This can affect the overall representation of undergraduates.

People who have a high level of social desirability have a great desire to be seen positively by others in society. When it comes to self-reporting, this might lead to underreporting of values (Chan, 2012). Similarly, fear of retaliation would also prevent perpetrators from reporting. Self-reporting, however, is preferable to utilizing interviewers, as there will be significant under-reporting due to social desirability bias.

Another form of information bias that could occur is respondent bias where they could provide exaggerated or understated responses has they been aware of the risk factors that are related to SRB. This is considered unlikely. Even though the measures were taken to reduce inaccurate information, some possibility was there to conceal socially unacceptable behavior. It may have affected the results. The cut-off score to determine the prevalence of SRB was based on expert opinion and is not valid as criterion-validated cut-offs. Hence, there may be some form of subjectivity in the assessment method and could introduce misclassification which could affect the findings of logistic regression.

Further the results could be applied for undergraduates in lower resource setting. The university, faculty and participants were selected randomly and considered as representative of the reference population. SRBs among undergraduates is a source of major financial expenditures to the public health system and a source of great social concern. Presence of multiple HRBs in this young population shows the importance of having a good surveillance system for prevention of SRBs. It should target multiple HRBs with lifestyle modifications. Given the importance of emotional intelligence skills as a protective factor, emotional education should be incorporated in any efforts to prevent or minimize SRBs. Universities are good environments for supporting the development of emotional skills so that undergraduates can regulate their own and others' feelings and emotions and respond properly. Universities are a great location for developing emotional abilities in a practical sense since they allow students to engage with their



colleagues. A movement has emerged calling for the incorporation of social and emotional aspects as a solution to some of the most challenging issues in the educational system.

5. Conclusion

The presence of SRBs among undergraduates is seen widely and clustering of other HRBs was observed in the current study. Experiencing emotional abuse in childhood, being a perpetrator of physical bullying and facing discrimination due to religion were considered important predictors of SRBs among undergraduates. Higher emotional intelligence was significantly negatively associated with SRB.

Recommendation

Given the fact that improving EI can reduce SRBs among undergraduates, it is recommended that all universities support undergraduates by providing means to develop their emotional intelligence, inside and outside of the lecture room. Behavioral interventions should target several behaviors and health prevention efforts should be holistic rather than being focused on single isolated behaviors and future research should assess the clustering of HRBs in-depth to plan effective interventions targeting those clusters.

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