

RESEARCH

Open Access



The aftermath of war; mental health, substance use and their correlates with social support and resilience among adolescents in a post-conflict region of Sri Lanka

Lasith Dissanayake^{1*}, Sameeha Jabir¹, Thomas Shepherd², Toby Helliwell², Lavan Selvaratnam³, Kaushalya Jayaweera¹, Nihal Abeysinghe¹, Christian Mallen² and Athula Sumathipala^{1,2}

Abstract

Background Armed conflicts impact on the health and well-being of everyone, but its effect on adolescent mental health is a significant, yet under-explored area in global health. Mental health disorders which develop during adolescence often lead to behavioural problems, risky decision-making, under-age substance use and can adversely impact on educational attainment. This study aimed to estimate the prevalence of common mental disorders, substance use and their correlates with social support and resilience among adolescents (age 12–19 years) in Vavuniya; a post-conflict region of Sri Lanka.

Methods A population-based cross-sectional study was conducted, with a modified cluster sampling method used for participant selection. Eight culturally adapted instruments were used for data collection. A total of 585 adolescents participated in the study. Analyses were performed using SPSS Version 23 statistical software package. All statistical tests were two-sided ($p < 0.05$) and p-values less than 0.05 were considered significant. Chi-square tests were used to explore associations between variables of interest. Spearman rank order correlation was used to examine correlations among depression, hopelessness, quality of life, social support, and resilience.

Results The mean age of participants was 15.02 (± 2.13) years. Ninety-one (15.6%) participants reported being exposed to one or more war-related events, and 85 (93.4%) participants in this group reported being internally displaced due to war. Fifty-two (8.9%) had dropped out of school and the prevalence of depression (3.9%) and substance use (7%) were low. Correlational analyses revealed that depression and hopelessness were significantly negatively correlated with social support, resilience, and quality of life ($p < 0.01$). Linear regression analysis suggested that 40% of the variance in resilience of the participants can be explained by perceived social support.

Conclusion The low prevalence of hopelessness and depression highlights the resilience of this group in the face of adversity. Furthermore, significant negative correlations between hopelessness and depression with perceived social support and resilience suggest that social support and resilience could be protective factors against mental health

*Correspondence:
Lasith Dissanayake
chinthana89@gmail.com

Full list of author information is available at the end of the article



© The Author(s) 2023. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

issues in these adolescents. However, the prevalence of school dropouts calls for a focus on academic attainment to promote better educational outcomes in the adolescents of this conflict-affected region.

Keywords Adolescents, Substance use, School Dropouts, Depression, Hopelessness, Sri Lanka

Introduction

Adolescent Mental Health

Armed conflicts are known to have a marked impact on the health and well-being of children and adolescents who may experience an array of negative events including displacement, separation/death of parents, witnessing death and destruction, and being forced to leave school [1]. Whilst some may adjust to the trauma and recover from the emotional distress, the direct or indirect exposure to war can inflict harm on adolescents that persists over their entire life course. The World Health Organisation (WHO) estimates that “among people who have experienced war or other conflicts in the previous 10 years, one in five (22%) will have depression, anxiety, post-traumatic stress disorder, bipolar disorder or schizophrenia” [2, 3].

The impact on adolescent mental health is one of the most significant, yet under-explored after-effects of war [4, 5]. The long-term accumulation of a range of stressors and risk factors puts children and adolescents in post-conflict regions at an increased risk of mental health problems such as depression and anxiety [6]. The four “P” framework of case formulation (predisposing, precipitating, perpetuating, and protective factors) also provide insight into the factors that may contribute to the development of mental health disorders in this group [7, 8]. Mental health disorders in adolescents are also known to present themselves in other ways such as through absenteeism, aggressiveness, substance use, medically unexplained pain, and antisocial behaviour, especially among those in post-conflict regions [9, 10].

Impact of Civil War in Sri Lanka

The three decade long civil war (1983–2009) in Sri Lanka is undeniably the most brutal internal conflict which befell the country. It took the lives of more than 70,000 people and left nearly a million people in the Northern and Eastern provinces displaced. Furthermore affected regions were left with weakened infrastructure, increased poverty and dramatically under-functioning education and healthcare systems [11, 12]. This civil conflict also had a devastating impact on the mental health of the country’s population, especially on children and adolescents in the areas of Northern and Eastern provinces [9, 13].

The lack of infrastructure, along with under-functioning healthcare systems in post-conflict settings in the country, in addition to the social stigma attached with mental health problems, poses a serious risk to

adolescent mental health [3, 14]. Moreover, despite having an effective primary health care system, Sri Lanka has a significant mental health treatment gap, particularly in post-conflict areas [9, 15].

Vavuniya district is in the Northern Province of the country and experienced high levels of conflict during the civil war. It was also one of the districts that experienced repeated displacements during the conflict, resulting in 256,287 internally displaced persons (IDPs) moving to Vavuniya during the civil war period [16].

Objectives

The study aimed to estimate the prevalence of common mental disorders, suicidal ideation, substance use (alcohol, tobacco, and illicit drugs) and their correlates with social support and resilience among adolescents in Vavuniya, a post-conflict region of Sri Lanka.

Methodology

Study Design

This cross-sectional study used a population-based sample in Vavuniya district of Sri Lanka. Data was collected from July 2019 to October 2020.

Study setting

Vavuniya district is one of the 25 districts of Sri Lanka, and it can be divided in to four Divisional Secretariat Divisions (DSDs) and 102 Grama Niladhari Divisions (GNDs) (the smallest administrative unit) [17]. The population in Vavuniya district is multi-ethnic and multi-cultural with 82.37% of Sri Lankan Tamil ethnicity [18]. The district has both rural and urban sectors, with the majority of the population (79.8%), residing in rural areas. Vavuniya DSD is the most populated DSD and is home to 117,153 people [18].

Study Population

The study population included adolescents aged 12 to 19 years living permanently in Vavuniya district for five or more years. The initial aim was to recruit adolescents aged between 10 and 19 years. However, following Community Involvement and Engagement (CIE) activities and the recommendations of the Ethics Review Committee (ERC), this was changed to 12 years. A five-year residency period was implemented, as it takes time to become familiarized with Vavuniya.

Inclusion criteria

Adolescents who speak Tamil, Sinhala or English languages and living permanently in the district of Vavuniya for five or more years were included in this study.

Exclusion criteria

Adolescents were excluded if they had a diagnosis of severe hearing problems, speech problems, autism and significant intellectual disability, severe chronic diseases such as cancer or significant respiratory problems. Adolescents living in non-household arrangements, such as orphanages, and those who were unable to understand the process of consent, or the questionnaires were also excluded.

Sample size calculation

Vavuniya district has an adolescent population (ages 10 to 19 years) of 34,123 [18]. However, exact prevalence estimates for mental disorders and substance use among adolescents were not available for the district, therefore; an estimated prevalence of 50% was used [19]. OpenEpi, Version 3, open-source calculator was used to calculate the sample size (<http://openepi.com/>) [20].

$$n = [(DEFF) Np(1 - p)] / [(d^2/Z^2(1 - \alpha/2))(N - 1) + p(1 - p)]$$

An initial sample size of 570 was obtained for high precision (95% confidence intervals) and a design effect of 1.5. Assuming a non-response rate of 20% the final sample size was inflated to 700 participants.

Sampling and participant recruitment

A cluster sampling method was used to select the sample. A modified version of the 'Expanded Program on Immunization Cluster Survey design' widely used by the WHO [21], which has been demonstrated to improve on the original design [22]. This approach is widely used in LMIC settings and is a practical method to obtain a representative sample for a cross-sectional study in a large geographical area.

The total sample originated from 29 GNDs, with 24 participants from 28 GNDs and 48 participants from one GND. We selected the eldest adolescent, if two or more eligible adolescents were living in one housing unit.

Instruments

Data was collected using the following instruments.

- Socio-demographic Questionnaire.
- Youth Quality of Life Questionnaire [23].
- Child and Youth Resilience Measure [24].
- Multidimensional Scale of Perceived Social Support [25].
- Patient Health Questionnaire [26, 27].
- Brief Questionnaire on War [28].
- Beck Hopelessness Scale [29].

- Questionnaire on Substance use.

A comprehensive substance use questionnaire was developed and adapted for this study based on the Student Questionnaire on Substance Use developed by the United Nations Office on Drugs and Crime [30].

Culturally adapting the Instruments

The languages used in Vavuniya are primarily Tamil & Sinhala and therefore, study instruments in the English language were translated and adapted to these two languages. Rather than following the traditional forward and backwards direct translation method, we used a qualitative and quantitative approach with consensus generation developed by Sumathipala and Murray in 2000, which is widely used internationally and recommended locally [31–33].

Two teams with three and five members per group, were involved in translating the documents to Sinhala and Tamil languages, respectively. Due to the number of different dialects used in the Vavuniya region we formed a CIE group consisting of lay people, counsellors, a teacher, and a pastor. Four members of the nine-member bilingual CIE group had adolescent children. The CIE group worked with the study team, checking for errors in translation, sentence composition, and the meaning of translated phrases in the context of Vavuniya. Words and phrases were changed where necessary to match the colloquial language of Vavuniya while retaining the original theme. Based on the CIE group's advice, questionnaires deemed to be too sensitive for children were removed; especially a questionnaire which focused on suicidal ideation.

Ethical considerations and data Collection Method

The ERC suggested to exclude questions on suicidal ideation and hopelessness, and to increase the minimum age of the recruitment criteria up to 12 years which we adopted.

Research Assistants (RAs) received training on the ethical complications and sensitivity related to research on adolescents. First, they explained the study to the parents/guardians of the adolescent, and obtained their permission to speak with the adolescent. After which the study was explained to the adolescents in simple language. Information leaflets were given to both parents/guardians and the adolescents. Written; permission from parents, and assent/consent from adolescents was obtained before data collection.

To protect participant privacy the interviews were conducted out of their houses and in an open area, with the permission of parents/guardians. Printed questionnaire booklets were used, and the data collection was conducted using a combination of interviewer administered and self-administered methods. Sensitive questions

on depression and certain sections of the substance use questionnaire were filled out by the participants themselves.

Statistical analysis

Analyses were performed using SPSS Version 23 statistical software package. All statistical tests were two-sided ($p < 0.05$) and p-values less than 0.05 were considered significant. Chi-square tests were used to explore the association between variables of interest. Spearman rank order correlation was used to examine correlations among depression, hopelessness, quality of life, social support, and resilience. Linear regression analysis was used to explore the independent effect of different variables on depression and hopelessness symptoms.

Results

Demographic characteristics

Due to the COVID-19 pandemic and restrictions that were in place at the time, data collection stopped in October 2020. A total of 585 adolescents participated in the study. The mean age of participants was 15.02 (± 2.13) years. There were almost equal representations of males and females in the study, with 50.4% of the participants being female. Among the participants, 52 (8.9%) had

dropped out of school. Out of those who had dropped out of school, a higher percentage were males ($n=29$; 55.8%), than females ($n=23$; 44.2%).

War-related events

Among the 585 respondents, 91 (15.6%) reported being exposed to one or more war-related events. A majority ($n=85$, 93.4%) of the participants who had been exposed to war-related events reported that they were internally displaced due to the war. Families of 80 (87.9%) participants had lost property and other belongings due to conflicts in the region.

Substance use

Respondents were asked about their tobacco, alcohol and illegal substance use with 7.0% ($n=41$) reporting a history of using these substances during their lifetime. The majority of the participants (females – 98.6% and males – 87.2%) were lifetime abstainers of alcohol, tobacco, and other substances. Among the males who reported tobacco, alcohol or any substance use, the majority were in the age group of 15–19 years (81.1%).

Among participants who reported lifetime tobacco, alcohol or any substance use, the majority ($n=33$, 80.5%) reported using tobacco-containing products. Most

Table 1 Distribution of respondents by socio-demographic characteristics

Variables	Males		Females		Both Sexes	
	n	%	n	%	n	%
Age group (In years)						
12–14 years	134	46.2	113	38.3	247	42.2
15–16 years	75	25.9	100	33.9	175	29.9
17–19 years	81	27.9	82	27.8	163	27.9
		n = 290		n = 295		n = 585
Ethnicity						
Tamil	264	91.0	273	92.5	537	91.8
Sinhala	26	9.0	22	7.5	48	8.2
		n = 290		n = 295		n = 585
District Secretariat Division						
Vavuniya North	22	7.6	26	8.8	48	8.2
Vavuniya South	26	9.0	22	7.5	48	8.2
Vavuniya	196	67.6	197	66.8	393	67.2
Vengalacheddikulam	46	15.9	50	16.9	96	16.4
		n = 290		n = 295		n = 585
Dropped out of school						
Yes	29	10.0	23	7.8	52	8.9
No	261	90.0	272	92.2	533	91.1
		n = 290		n = 295		n = 585
Mother's availability at home						
Yes	261	90.0	267	90.5	528	90.3
No	29	10.0	28	9.5	57	9.7
		n = 290		n = 295		n = 585
Father's availability at home						
Yes	224	77.2	216	73.2	440	75.2
No	66	22.8	78	26.4	144	24.6
		n = 290		n = 294		n = 584

Table 2 Distribution of respondents by exposure to different war-related events

Variables	Males		Females		Both Sexes	
	n	%	n	%	n	%
Exposure to at least one war-related event						
Yes	39	13.4	52	17.6	91	15.6
No	251	86.6	243	82.4	494	84.4
		n = 290		n = 295		n = 585
Sustained injuries because of war						
Yes	0	0	2	0.7	2	0.3
No	290	100%	293	99.3	583	99.7
		n = 290		n = 295		n = 585
Lost a family member / close friend because of war						
Yes	20	6.9	22	7.5	42	7.2
No	270	93.1	273	92.5	543	92.8
		n = 290		n = 295		n = 585
A family member or friend was injured because of war						
Yes	18	6.2	20	6.8	38	6.5
No	272	93.8	275	93.2	547	93.5
		n = 290		n = 295		n = 585
Displaced because of war						
Yes	35	12.1	50	16.9	85	14.5
No	255	87.9	245	83.1	500	85.5
		n = 290		n = 295		n = 585
Lost property because of war						
Yes	32	11.0	48	16.3	80	13.7
No	258	89.0	247	83.7	505	86.3
		n = 290		n = 295		n = 585

Table 3 Lifetime alcohol, tobacco, and substance use

Variables	Males		Females		Both Sexes	
	n	%	n	%	n	%
Exposure to lifetime alcohol, tobacco, or substance						
Yes	37	12.8	4	1.4	41	7.0
No	253	87.2	291	98.6	544	93.0

(34.21%) of the respondents reported that the first substance they used was Bidi (a tobacco-based small cigarette), followed by Betel quid (23.7%) and Beer (15.8%). The rest (26.29%) reported using other substances such as Cigarettes, Spirits, Wine, Babul (pieces of Babul plant with tobacco) and Mawa (dried areca nut with tobacco flakes).

Curiosity (80%), a friend/friends using it (72.5%) and easy access to a particular substance (70%) were the reasons reported by adolescents for substance use. Some participants also reported that they used substances because they were feeling unhappy or lonely (27.5%).

Mental Health Disorders

The study explored different mental health issues and symptoms including depression and hopelessness. Moderate - severe depression was present in only 3.9% (n=23) of the participants. Moderate to severe hopelessness was reported by 5.2% (n=8) of the participants aged 17 years and above.

Quality of life, perceived social support and resilience

The study assessed quality of life, perceived social support and resilience. Respondents reported that they received high levels of social support with a mean score of 6.24 ± 0.80 (the maximum score being 7.0).

The mean quality of life score was $88.4 (\pm 8.73)$ (the maximum score – 100). Participants reported a mean resilience score of $54.10 (\pm 5.15)$ (the maximum score – 60).

Depression, substance use and dropping out of school were prevalent in the age 15–19 years category. Depression was significantly associated with hopelessness, age, dropping out of school and perceived social support. Hopelessness showed a significant association with perceived social support. The chi-square associations are shown in Table 6.

The crude odds ratio of depression to hopelessness was 9.20 (95% CI: 1.89–44.77). High perceived social support was seen to reduce the odds of both depression (OR: 0.21; 95% CI: 0.08–0.57) and hopelessness (OR: 0.13; 95% CI: 0.03–0.55).

Table 4 Prevalence of Depression and Hopelessness in the study population

Variables	Males		Females		Both Sexes	
	n	%	n	%	n	%
Depression						
Minimal – mild depression	279	96.2	283	95.9	562	96.1
Moderate – moderately severe depression	11	3.8	12	4.1	23	3.9
		n = 290		n = 295		n = 585
Hopelessness						
None to mild hopelessness	73	97.3	74	92.5	147	94.8
Moderate to severe hopelessness	2	2.7	6	7.5	8	5.2
		n = 75		n = 80		n = 155

Table 5 Perceived Social Support

Variables	Males		Females		Both Sexes	
	n	%	n	%	n	%
Perceived social support						
Low social support	0	0	1	0.4	1	0.2
Moderate social support	25	10.3	16	6.5	41	8.4
High social support	217	89.7	228	93.1	445	91.4

Table 6 Association of Depression and Hopelessness with selected variables

	Variables	Chi-square value	P-value
Depression	Hopelessness	10.458	0.01
	Substance use	1.338	0.21
	Age	7.040	0.01
	Gender	0.029	0.86
	Perceived social support	11.081	0.01
	Dropping out of school	8.744	0.01
Hopelessness	Substance use	1.273	0.26
	Gender	1.847	0.28
	Perceived social support	10.031	0.01
	Dropping out of school	0.910	0.68

Table 7 Strength of Association of Depression and Hopelessness with selected variables

	Variables	Unadjusted Odds	P-value
Depression	Hopelessness	9.200	< 0.001
	Substance use	2.068	0.25
	Age	2.969	0.01
	Gender	1.075	0.86
	Perceived social support	0.209	< 0.001
	Dropping out of school	3.959	0.01
Hopelessness	Substance use	2.549	0.27
	Gender	2.959	0.19
	Perceived social support	0.125	0.01
	Dropping out of school	0.369	0.36

Correlational analysis and linear regression

Bivariate Spearman correlations suggested that depression and hopelessness had highly negative correlations with social support and quality of life. Perceived social support was negatively correlated with depression ($r = -0.20$, $p < 0.01$) and hopelessness ($r = -0.40$, $p = 0.000$). Quality of life was also negatively correlated with depression ($r = -0.28$, $p = 0.000$) and hopelessness ($r = -0.40$, $p < 0.01$), and positively related with social support ($r = 0.50$, $p = 0.000$). Resilience was negatively correlated with

hopelessness ($r = -0.49$, $p < 0.01$) and depression ($r = -0.14$, $p < 0.01$), and positively correlated with perceived social support ($r = 0.60$, $p < 0.01$).

Linear regression analysis revealed that the R^2 value between resilience and perceived social support was 0.40, suggesting that 40% of the variance in resilience of the participants can be explained by perceived social support. Also, the β coefficient was 4.04 (CI: 3.55–4.533), meaning that for a unit increase in perceived social support scores, resilience scores increase by 4.04.

The R^2 value between youth quality of life and perceived social support was 0.22, suggesting that 22% of the variance in the quality of life of the participants can be explained by perceived social support. The β coefficient was 5.6 (CI: 4.650–6.627), meaning that for a unit increase in perceived social support scores, resilience scores increase by 5.6.

Discussion

Empirical research evidence suggests that violence and stress related to war can have a detrimental impact on children's mental health [34, 35]. A study conducted among 551 adolescents in Northern Uganda, four years after the civil war ended reported that depressive symptoms were positively associated with multiple risk behaviours (OR: 1.11; 95% CI: 1.07–1.14, $p < 0.001$) [36]. A similar study conducted with 2766 adolescents in Donetsk, Ukraine two years after the Russian invasion in 2014, reported significantly increased risks of PTSD (OR: 4.11; 95% CI: 2.37–7.13), severe anxiety (OR: 3.10; 95% CI: 1.83–5.27), and moderately severe/severe depression (OR: 2.65; 95% CI: 1.79–3.92) [37]. The present study was conducted in the Vavuniya district, ten years after the civil war in Sri Lanka ended in 2009. The oldest adolescents (19 years of age) who participated in the study were 9-year-old children during the last year of the civil war. There is a high possibility that the participants might have already recovered from the trauma and were leading normal lives, and this could be one of the main reasons for the significantly low prevalence of depression (3.9%) reported among adolescents.

Another significant finding was the low prevalence of hopelessness (5.2%) among the participants. Participants reported high resilience scores (Mean=54.10, the maximum score =60) and high perceived social support scores (Mean=6.28, the maximum score =7) despite Vavuniya being a conflict-affected region. Furthermore, hopelessness and depression were significantly negatively correlated with perceived social support and resilience ($P < 0.05$), suggesting that social support and resilience could be protective factors against mental health issues in these adolescents.

According to Somasundaram (2010), some, if not, all IDPS in the Northern region have demonstrated remarkable resilience and post-traumatic growth immediately following the war, despite multiple displacements, losses, separations, and heart-wrenching experiences they had to endure during the conflict period [13]. Tamil families are known to be close-knit and tend to function as a unit, rather than individuals in the event of a traumatic experience. The religious and spiritual beliefs along with cultural practices followed in these communities can be considered as major supportive factors. Hence social support from family, friends, and community relationships

and the sense of belonging appeared to be a vital protective factor which played an important role in their recovery.

Alcohol, tobacco, and substance use were reported low numbers (7.0%, $n=41$). However, an Island-wide STEPS survey conducted by the WHO in 2015, reported that approximately one-fifth (22.3%) of the younger age group 18–29 are estimated to be current smokers, and according to the National Youth Health Survey conducted by the Family Health Bureau, Sri Lanka in 2015, the current alcohol prevalence among adolescents, both school going and non-school going, was 10.2% [38, 39].

During the project planning stages, medical officers working in the Vavuniya district, our CIE group members, schoolteachers and parents of adolescents informed the research team about the high use of substances by adolescents in the Vavuniya district and the related social and family problems. Whilst measures were taken to protect the privacy and confidentiality of the participants, our results suggest that substance use is under-reported. This has previously been identified as a major problem in adolescents research [40, 41].

The present study also found that adolescents who dropped out of school were more likely to have depression and used at least one substance during their lifetime compared to adolescents who did not. These results agree with a study conducted by Gore (2001), which found that “young people who drop out of high school are more likely to be depressed than high school graduates” and Valkov (2018), states that “high school dropouts, have much higher rates of substance use compared to non-dropouts” [42, 43].

According to Rowan-Kenyon (2007), “Socioeconomic status is a well-known factor affecting dropout” [44]. This could explain the almost equal percentages of both males and females dropping out of school. The impact of poverty and the acceleration of inequality on adolescent mental health and school dropout have been reported globally [45–47]. Due to the prevailing extreme poverty in the rural areas of North, North Central, North Western and Eastern Provinces of Sri Lanka, many adult parents leave for foreign employment opportunities, leaving behind their children with grandparents or other family members [48, 49]. This could lead to negative impacts such as child neglect, mental health problems, poor school performance and dropping out, teenage pregnancies and substance use [50–53].

Dropping out of school, depression, hopelessness, and substance use constitutes small percentages in the study. Substance use itself seems to be underreported, as participants may not have been willing to share information. Adolescents' reluctance to participate and provide correct answers in research has been reported as a major concern [54–56].

Conclusions

The low prevalence of hopelessness and depression highlights the fact that these adolescents appear to be resilient in the face of adversity. Furthermore, significant negative correlations between hopelessness and depression with perceived social support and resilience suggest that social support and resilience could be protective factors against mental health issues in these adolescents. However, the prevalence of school dropouts calls for a focus on academic attainment to promote better educational outcomes in the adolescents of this conflict-affected region.

Abbreviations

DSDs	Divisional Secretariat Divisions
ERC	Ethics Review Committee
GNDs	Grama Niladhari Divisions
IDPs	Internally Displaced Persons
CIE	Community Involvement and Engagement
RAs	Research Assistants
WHO	World Health Organisation

Acknowledgements

We would like to thank all the participants and their family members. We are eternally grateful to the team of RAs; Mayuran Velintina, Kanchana Pathirana, Vasantha Kalaichselvi, Selvarasa Sinthuya, Murukaiyah Vijitharan, Prananthu Kanthan and Rasatheepan Thanusiya for their hard work in field data collection. We would also like to extend our gratitude to the staff members of MOH office Vavuniya; Rajkumar Wijekumari, Raveendra Garunya, and Thiva Seelan for facilitating the training sessions, translator Mrs Sujatha for her valuable contribution, and the CIE group of the study for their continues support. We would like to thank the Regional Director of Health Services, Zonal Education Directors, and Medical Officers of Health in the Vavuniya district.

We are grateful to the staff members of IRD; Lakshan Warnakula, Shavindya Abeygunaratne, Chavika Samarasinghe, Vimukthi Jayasundara and Nadun Perera for assisting the proposal development and field data collection. Maneesha Jayaweera, Aruna Walisundara, Thirumalayandi Jayakumar, Shiran Chamika and Kalpani Abhayasinghe for conducting the training sessions, and Chamali Jayasinghe and Janani Marasinghe for the administrative support.

Authors' contributions

LS, KJ, AS, NA and CM study conceptualization, design and training. LD overall project coordination. SJ and KJ data analysis and interpretation of results. SJ, KJ, LD, TH and TS manuscript preparation. All authors reviewed the results and approved the final version of the manuscript.

Funding

This project is partly funded by the Institute for Research & Development in Health and Social Care, Sri Lanka and by a 1-year Newton Fund, UK grant.

Data Availability

Collected data is stored in a password-protected hard drive at the Institute for Research and Development, Sri Lanka. Individual Researchers/Organizations who are interested in using this data, can make an official request through info@ird.lk and obtain the data.

Declarations

Ethics approval and consent to participate

The study was approved by the ERC of the Rajarata University of Sri Lanka [ERC/2019/016]. Informed written consent or assent was obtained from the participants. Informed written permission was taken from the parents/guardians. All study procedures and methods were performed by the relevant guidelines and regulations of the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Institute for Research and Development in Health & Social Care, Off Robert Gunawardena Mawatha, Battaramulla 10120, Sri Lanka

²School of Medicine, Keele University, Staffordshire ST5 5BG, United Kingdom

³Ministry of Health and Indigenous Medical Services, Colombo 01, Sri Lanka

Received: 11 April 2023 / Accepted: 12 August 2023

Published online: 31 August 2023

References

- Samuels F, Jones N, Hamad BA. Psychosocial support for adolescent girls in post-conflict settings: beyond a health systems approach. *Health Policy Plan*. 2017;32:v40–51.
- Charlson F, van Ommeren M, Flaxman A, Cornett J, Whiteford H, Saxena S. New WHO prevalence estimates of mental disorders in conflict settings: a systematic review and meta-analysis. *Lancet* [Internet]. 2019 Jul 20 [cited 2023 Jul 16];394(10194):240–8. Available from: <http://www.thelancet.com/article/S0140673619309341/fulltext>.
- WHO. Mental Health in Emergencies [Internet]. 2022. p. 1–70. Available from: <https://www.who.int/news-room/fact-sheets/detail/mental-health-in-emergencies>.
- Somasundaram DJ, Sivayokan S. War trauma in a civilian population. *Br J Psychiatry*. 1994;165(OCT):524–7.
- Murthy RS, Lakshminarayana R. Mental health consequences of war: a brief review of research findings. *World Psychiatry* [Internet]. 2006;5(1):25–30. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/16757987%0Ahttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC1472271>.
- Catani C. Mental health of children living in war zones: a risk and protection perspective. Vol. 17, *World Psychiatry*. World Psychiatric Association; 2018. pp. 104–5.
- Carr A. The handbook of child and adolescent clinical psychology: a contextual approach. The handbook of child and adolescent clinical psychology: a Contextual Approach. Taylor and Francis; 2015. 1–1043 p.
- Winters NC, Hanson G, Stoyanova V. The Case Formulation in Child and Adolescent Psychiatry. Vol. 16, *child and adolescent Psychiatric clinics of North America*. Child Adolesc Psychiatr Clin N Am; 2007. pp. 111–32.
- Siriwardhana C, Wickramage K. Conflict, forced displacement and health in Sri Lanka: A review of the research landscape. *Confl Health* [Internet]. 2014;8(1):9. Available from: <http://www.conflictandhealth.com/content/8/1/22>.
- Jong J. Trauma, War, and Violence: Public Mental Health in Socio-Cultural Context [Internet]. Jong J, editor. Trauma, War, and Violence: Public Mental Health in Socio-Cultural Context. Boston: Kluwer Academic Publishers; 2002 [cited 2022 Dec 30]. (The Springer Series in Social/Clinical Psychology). Available from: <http://link.springer.com/https://doi.org/10.1007/b109606>.
- UN. Report of the Secretary-General's Internal Review Panel on United Nations Action in Sri Lanka [Internet]. UN; 2012 [cited 2023 Jul 16]. Available from: <https://digitallibrary.un.org/record/737299>.
- HRDAG. Sri Lanka [Internet]. 2023 [cited 2023 Jul 16]. Available from: <https://hrdag.org/srilanka/>.
- Somasundaram D. Collective trauma in the Vanni- a qualitative inquiry into the mental health of the internally displaced due to the civil war in Sri Lanka. *Int J Ment Health Syst* [Internet]. 2010 Jul 28 [cited 2020 Apr 30];4(1):22. Available from: <http://jmhhs.biomedcentral.com/articles/https://doi.org/10.1186/1752-4458-4-22>.
- Hinshaw SP. The stigmatization of mental illness in children and parents: developmental issues, family concerns, and research needs. Vol. 46, *Journal of child psychology and Psychiatry and Allied Disciplines*. John Wiley & Sons, Ltd; 2005. 714–34.
- Nagai M, Abraham S, Okamoto M, Kita E, Aoyama A. Reconstruction of health service systems in the post-conflict Northern Province in Sri Lanka. *Health Policy* (New York). 2007;83(1):84–93.

16. OCHA. Refworld | Map of Vanni IDP Movements, as of 28 May 2009 [Internet]. 2009. 2009 [cited 2020 Apr 30]. Available from: <https://www.refworld.org/docid/4a24dcac0.html>.
17. Northern Provincial Council. Statistical Information 2017: Northern Province. 2018 [cited 2022 Dec 30]; Available from: http://np.gov.lk/pdf/publications/Statistical_Information_NPC_2017.pdf.
18. DCS Sri Lanka. Census of Population and Housing 2012 [Internet]. 2015 [cited 2018 Oct 24]. Available from: <http://www.statistics.gov.lk/PopHouSat/CPH2011>.
19. Naing L, Winn T, Rusli BN. Practical Issues in Calculating the Sample Size for Prevalence Studies. *Arch Orophac Sci* [Internet]. 2006 [cited 2022 Jul 15];1:9–14. Available from: https://www.researchgate.net/publication/45459002_Practical_Issues_in_Calculating_the_Sample_Size_for_Prevalence_Studies.
20. Sullivan KM, Dean A, Soe MM, Minn MS. OpenEpi: A web-based epidemiologic and statistical calculator for public health. *Public Health Rep* [Internet]. 2017 [cited 2022 Jul 12];124(3):471–4. Available from: [/pmc/articles/PMC2663701/](https://pmc/articles/PMC2663701/).
21. Turner AG, Magnani RJ, Shuaib M. A not quite as quick but much cleaner alternative to the Expanded Programme on Immunization (EPI) Cluster Survey design. *Int J Epidemiol* [Internet]. 1996 Feb 1 [cited 2019 Mar 13];25(1):198–203. Available from: <https://academic.oup.com/ije/article-lookup/doi/https://doi.org/10.1093/ije/25.1.198>.
22. Milligan P, Njie A, Bennett S. Comparison of two cluster sampling methods for health surveys in developing countries. *Int J Epidemiol* [Internet]. 2004 May 27 [cited 2019 Mar 13];33(3):469–76. Available from: <https://academic.oup.com/ije/article-lookup/doi/https://doi.org/10.1093/ije/dyh096>.
23. Patrick DL, Edwards TC, Topolski TD. Adolescent quality of life, part II: initial validation of a new instrument. *J Adolesc*. 2002;25(3):287–300.
24. Liebenberg L, Ungar M, LeBlanc JC. The CYRM-12: a brief measure of resilience. *Can J Public Health* [Internet]. 2013;104(2):e131–5. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23618205>.
25. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The Multidimensional Scale of Perceived Social Support. *J Pers Assess*. 1988;52(1):30–41.
26. Johnson JG, Harris ES, Spitzer RL, Williams JB. The patient health questionnaire for adolescents. *J Adolesc Heal*. 2002;30(3):196–204.
27. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606–13.
28. Siribaddana SH, Ball HA, Hewage SN, Glozier N, Kovas Y, Dayaratne DARKARK et al. Colombo Twin and Singleton Study (CoTASS): A description of a population based twin study of mental disorders in Sri Lanka. *BMC Psychiatry* [Internet]. 2008 Jun [cited 2017 Aug 11];8(8):1–8. Available from: <http://www.biomedcentral.com/1471-244X/8/49>.
29. Beck AT, Weissman A, Lester D, Trexler L. The measurement of pessimism: the hopelessness scale. *J Consult Clin Psychol*. 1974;42(6):861–5.
30. UNODC. Conducting school surveys on drug abuse (Global Assessment Programme on Drug Abuse Toolkit Module 3) [Internet]. New York ; 2003. Available from: http://www.unodc.org/documents/GAP/GAP_Toolkit_Module_3_ENGLISH.pdf.
31. Maneesriwongul W, Dixon JK. Instrument translation process: A methods review [Internet]. Vol. 48, *Journal of Advanced Nursing*. 2004 [cited 2020 Mar 27]. p. 175–86. Available from: <http://doi.wiley.com/https://doi.org/10.1111/j.1365-2648.2004.03185.x>.
32. Sumathipala A, Murray J. New approach to translating instruments for cross-cultural research: A combined qualitative and quantitative approach for translation and consensus generation. *Int J Methods Psychiatr Res* [Internet]. 2000;9(2):87–95. Available from: <http://onlinelibrary.wiley.com/doi/https://doi.org/10.1002/mpr.83/abstract>.
33. Suraweera C, Hanwell R, Sivayokan S, De Silva V. Rating Scales validated for Sri Lankan populations. *Sri Lanka J Psychiatry* [Internet]. 2013 Dec 30 [cited 2017 Aug 14];4(2):16–24. Available from: <http://www.sljol.info/index.php/SLJPSYC/article/view/6320>.
34. Catani C, Jacob N, Schauer E, Kohila M, Neuner F. Family violence, war, and natural disasters: A study of the effect of extreme stress on children's mental health in Sri Lanka. *BMC Psychiatry* [Internet]. 2008 Dec 2 [cited 2022 Jun 25];8(1):1–10. Available from: <https://bmcp psychiatry.biomedcentral.com/articles/https://doi.org/10.1186/1471-244X-8-33>.
35. Bürgin D, Anagnostopoulos D, Anagnostopoulos D, Doyle M, Eliez S, Fegert JM et al. Impact of war and forced displacement on children's mental health—multilevel, needs-oriented, and trauma-informed approaches. *Eur Child Adolesc Psychiatry* [Internet]. 2022 Mar 14 [cited 2022 Jun 25];1(6):1–9. Available from: <https://link.springer.com/article/10.1007/s00787-022-01974-z>.
36. Okello J, Nakimuli-Mpungu E, Musisi S, Broekaert E, Derluyn I. War-related trauma exposure and multiple risk behaviors among school-going adolescents in Northern Uganda: the mediating role of depression symptoms. *J Affect Disord*. 2013;151(2):715–21.
37. Osokina O, Silwal S, Bohdanova T, Hodes M, Sourander A, Skokauskas N. Impact of the Russian Invasion on Mental Health of Adolescents in Ukraine. *J Am Acad Child Adolesc Psychiatry* [Internet]. 2023 Mar 1 [cited 2023 Jul 16];62(3):335–43. Available from: <http://www.jaacop.org/article/S0890856722018913/fulltext>.
38. WHO. Non Communicable Disease Risk Factor Survey Sri Lanka. 2015 [Internet]. 2015 [cited 2022 Dec 17]. Available from: <https://www.who.int/teams/noncommunicable-diseases/surveillance/data/sri-lanka>.
39. Family Health Bureau. National Youth Health Survey 2012/2013 [Internet]. 2015 [cited 2022 Dec 30]. Available from: [http://www.fhb.health.gov.lk/images/FHBResources/AdolescentHealth/Publication/National_Youth_health_survey_2012-2013\(cover_page-58\).pdf](http://www.fhb.health.gov.lk/images/FHBResources/AdolescentHealth/Publication/National_Youth_health_survey_2012-2013(cover_page-58).pdf).
40. Delaney-Black V, Chiodo LM, Hannigan JH, Greenwald MK, Janisse J, Paterson G et al. Just say I don't: lack of concordance between teen report and biological measures of drug use. *Pediatr* [Internet]. 2010 Nov [cited 2022 Dec 18];126(5):887–93. Available from: [/pmc/articles/PMC3508771/](https://pmc/articles/PMC3508771/).
41. Khalili P, Nadimi AE, Baradaran HR, Janani L, Rahimi-Movaghar A, Rajabi Z et al. Validity of self-reported substance use: research setting versus primary health care setting. *Subst Abuse Treat Prev Policy* [Internet]. 2021 Dec 1 [cited 2022 Dec 18];16(1):1–13. Available from: <https://substanceabusepolicy.biomedcentral.com/articles/https://doi.org/10.1186/s13011-021-00398-3>.
42. Liem J, Dillon CO, Gore S. Mental Health Consequences Associated with Dropping Out of High School by Colleen O'Neill Dillon. 2001 Aug [cited 2022 Dec 30];(109th). Available from: <https://eric.ed.gov/?id=ED457502>.
43. Valkov P. School dropout and substance use: consequence or predictor? *Trakia J Sci*. 2018;16(2):95–101.
44. Rowan-Kenyon HT. Predictors of delayed college enrollment and the impact of socioeconomic status. *J High Educ*. 2007;78(2):188–214.
45. Díaz Y, Hessel P, Avendano M, Evans-Lacko S. Multidimensional poverty and adolescent mental health: unpacking the relationship. *Soc Sci Med*. 2022;311:115324.
46. Adjei NK, Schlüter DK, Straatmann VS, Melis G, Fleming KM, McGovern R et al. Impact of poverty and family adversity on adolescent health: a multi-trajectory analysis using the UK Millennium Cohort Study. *Lancet Reg Heal - Eur* [Internet]. 2022 Feb 1 [cited 2023 Jul 16];13:100279. Available from: <http://www.thelancet.com/article/S2666776221002659/fulltext>.
47. Dashiff C, Dimicco W, Myers B, Sheppard K. Poverty and adolescent mental health. *J Child Adolesc Psychiatr Nurs* [Internet]. 2009 [cited 2023 Jul 16];22(1):23–32. Available from: <https://pubmed.ncbi.nlm.nih.gov/19200289/>.
48. ADB, Poverty. and human development in Sri Lanka [Internet]. European Space Agency; 2009 [cited 2022 Dec 30]. Available from: <https://www.adb.org/sites/default/files/publication/27993/poverty-human-dev-sri-lanka.pdf>.
49. World Bank. SRI LANKA POVERTY UPDATE Background report to Sri Lanka Poverty Assessment [Internet]. 2021 [cited 2022 Dec 30]. Available from: <https://documents1.worldbank.org/curated/en/703091634229318506/pdf/Sri-Lanka-Poverty-Update-Background-Report-to-Sri-Lanka-Poverty-Assessment.pdf>.
50. Cortes P. The feminization of International Migration and its Effects on the children left behind: evidence from the Philippines. *World Dev*. 2015;65:62–78.
51. Fortin L, Marcotte D, Potvin P, Royer É, Joly J. Typology of students at risk of dropping out of school: Description by personal, family and school factors. *Eur J Psychol Educ* [Internet]. 2006 [cited 2022 Dec 18];21(4):363–83. Available from: <https://link.springer.com/article/https://doi.org/10.1007/BF03173508>.
52. Hawkins RL, Jaccard J, Needle E. Nonacademic factors Associated with Dropping out of High School: adolescent problem behaviors. *J Soc Social Work Res*. 2013;4(2):58–75.
53. Lu Y. Internal migration, international migration, and physical growth of left-behind children: a study of two settings. *Heal Place*. 2015;36:118–26.
54. Fan X, Miller BC, Park KE, Winward BW, Christensen M, Grotevant HD, et al. An exploratory study about inaccuracy and invalidity in adolescent self-report surveys. *Field methods*. 2006;18(3):223–44.
55. Langhinrichsen-Rohling J, Arata C, O'Brien N, Bowers D, Klibert J. Sensitive research with adolescents: Just how upsetting are self-report surveys anyway? *Violence Vict* [Internet]. 2006 Aug 1 [cited 2022 Jun 25];21(4):425–44. Available from: <https://connect.springerpub.com/content>.
56. Pew Research Center. The challenges of conducting surveys of youth | Pew Research Center [Internet]. 2013 [cited 2022 Jun 25].

Available from: <https://www.pewresearch.org/fact-tank/2013/06/21/the-challenges-of-conducting-surveys-on-youths/>.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.