Psychological Medicine

Domestic violence and self-poisoning in Sri Lanka

--Manuscript Draft--

Manuscript Number:	PSM-D-20-00664R1
Full Title:	Domestic violence and self-poisoning in Sri Lanka
Article Type:	Original Article
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Manuscript Region of Origin:	SRI LANKA
Abstract:	Background There is increasing evidence that domestic violence (DV) is an important risk factor for suicidal behaviour. The level of risk and its contribution to the overall burden of suicidal behaviour among men and women has not been quantified in South Asia. We carried out a large case-control study to examine the association between DV and self-poisoning in Sri Lanka. Methods Cases (N=291) were patients aged ≥18 years, admitted to a tertiary hospital in Kandy Sri Lanka for self-poisoning. Sex and age frequency matched controls were recruited from the hospital's outpatient department (N=490) and local population (N=450). Exposure to DV was collected through the Humiliation, Afraid, Rape, Kick (HARK) questionnaire. Multivariable logistic regression models were conducted to estimate the association between DV and self-poisoning, and population attributable fractions (PAF) were estimated. Results Exposure to at least one type of DV within the previous 12 months was strongly associated with self-poisoning for women (adjusted OR [AOR] 4·08, 95%CI 1·60-4·78) and men (AOR 2·52, 95%CI 1·51-4·21), compared to those reporting no abuse. Among women, the association was strongest for physical violence (AOR 14·07, 95%CI 5·87-33·72), whereas among men, emotional abuse showed the highest risk (AOR 2·75, 95%CI 1·57-4·82). PAF% for exposure to at least one type of DV was 38% (95%CI 32-43) in women and 22% (95%CI 14-29) in men. Conclusions Multi-sectoral interventions to address DV including enhanced identification in health

	care settings, community-based strategies, and integration of DV support and psychological services may substantially reduce suicidal behaviour in Sri Lanka.

Domestic violence and self-poisoning in Sri Lanka

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Funding statement: This work was supported by UK Medical Research Council (grant number MC_PC_MR/R019622/1).

Word count: 4476

ABSTRACT

Background

There is increasing evidence that domestic violence (DV) is an important risk factor for suicidal behaviour. The level of risk and its contribution to the overall burden of suicidal behaviour among men and women has not been quantified in South Asia. We carried out a large case-control study to examine the association between DV and self-poisoning in Sri Lanka.

Methods

Cases (N=291) were patients aged ≥18 years, admitted to a tertiary hospital in Kandy Sri Lanka for self-poisoning. Sex and age frequency matched controls were recruited from the hospital's outpatient department (N=490) and local population (N=450). Exposure to DV was collected through the Humiliation, Afraid, Rape, Kick (HARK) questionnaire. Multivariable logistic regression models were conducted to estimate the association between DV and self-poisoning, and population attributable fractions (PAF) were estimated.

Results

Exposure to at least one type of DV within the previous 12 months was strongly associated with self-poisoning for women (adjusted OR [AOR] 4·08, 95%CI 1·60-4·78) and men (AOR 2·52, 95%CI 1·51-4·21), compared to those reporting no abuse. Among women, the association was strongest for physical violence (AOR 14·07, 95%CI 5·87-33·72), whereas among men, emotional abuse showed the highest risk (AOR 2·75, 95%CI 1·57-4·82). PAF% for exposure to at least one type of DV was 38% (95%CI 32-43) in women and 22% (95%CI 14-29) in men.

Conclusions

Multi-sectoral interventions to address DV including enhanced identification in health care settings, community-based strategies, and integration of DV support and psychological services may substantially reduce suicidal behaviour in Sri Lanka.

INTRODUCTION

Globally, approximately two thirds of all suicide deaths annually occur in low- and middle-income countries (LMIC) (WHO, 2014). Sri Lanka, a middle-income country has made significant progress in reducing its overall suicide rate (Knipe, Gunnell, & Eddleston, 2017), however suicide remains a key cause of premature mortality and rates of medicinal self-poisoning have increased in recent years, particularly among young women (de Silva, Senanayake, Dias, & Hanwella, 2012; Knipe et al., 2017; Rajapakse, Griffiths, & Christensen, 2013; Senarathna et al., 2012). Understanding the risk factors for suicidal behaviour is crucial in informing prevention efforts. Psychiatric disorders are important determinants of suicidal behaviour, however evidence of this association in LMIC is less clear, highlighting the need for a wider, non-medical approach (Knipe, Williams, et al., 2019). In Sri Lanka, qualitative and case-series studies have consistently reported conflict and verbal disputes with an intimate partner or family member as the most common precipitating factor associated with suicidal behaviour (Konradsen, van der Hoek, & Peiris, 2006; Rajapakse et al., 2013). This is consistent with findings from Pakistan and India where interpersonal conflict, including family arguments and relationship breakdowns, have been identified as an acute trigger in up to 68% of self-harm cases (Parkar, Dawani, & Weiss, 2006; Syed & Khan, 2008).

A systematic review of 37 studies (31 of which originated from HIC) showed strong associations between intimate partner violence (IPV) and suicidal behaviour (McLaughlin, O'carroll, & O'connor, 2012). The WHO multi-country study using population-based surveys from mostly LMIC, showed that women exposed to physical or sexual violence were 3.8 times more likely to attempt suicide than non-abused women (Devries et al., 2011). Evidence from studies conducted in Afghanistan (Paiman, Khan, Ali, Asad, & Azam, 2019) and India (Chowdhary & Patel, 2008) likewise demonstrated strong associations between lifetime exposure to domestic violence (DV) and self-harm (OR 6.4 and 7.2 respectively).

The burden of DV appears to be higher in LMIC, particularly in South Asia where 42% of ever-partnered women have experienced IPV, compared to 23% in high-income countries (WHO, 2013). In Sri Lanka, community-based studies estimate up to 35% of women have experienced violence from

their intimate-partner in their lifetime (Guruge, Jayasuriya-Illesinghe, Gunawardena, & Perera, 2015), and 17% of ever-partnered women aged 15-49 years have experienced IPV in the past year (DCS, 2016). This is consistent with 12-month IPV estimates from neighbouring India (22%) and Pakistan (15%) (International Institute for Population Sciences, 2017; National Institute of Population Studies & ICF, 2019).

Although DV disproportionately affects women, men are also affected. A large cross-sectional survey of men in England attending general practice showed that 17% had experienced physical and emotional abuse in their lifetime, with emotional abuse being the most common form of violence experienced (Hester, Jones, Williamson, Fahmy, & Feder, 2017). However, evidence of the extent to which men are affected by DV and how they may be affected differently to women is scarce, especially in LMIC.

DV is defined in the present study as emotional, physical and sexual abuse perpetrated by any household member (e.g. intimate partner, parent, sibling) and fear of any household member in the last 12 months. To our knowledge, this is the first study to examine the level of risk of different forms of DV in the past year and its contribution to the overall burden of suicidal behaviour among men and women in South Asia.

This study draws on data collected as part of a large hospital-based case-control study investigating adverse childhood experiences and self-poisoning in Sri Lanka (Knipe, Bandara, et al., 2019). The specific aims of this study were to assess 1) the association between exposure to at least one type of DV and self-poisoning; 2) the association and differential effects between exposure to specific types of abuse and self-poisoning; 3) if there is a dose-response effect between DV severity (i.e. experiencing multiple types of abuse) and self-poisoning; and 4) examine if these associations differ by sex.

METHODS

Study setting

Data were collected from the Teaching Hospital Peradeniya (THP) and local catchment area of the hospital. The THP is a tertiary referral hospital located in the highland Kandy District, Central Province of Sri Lanka, approximately 115 kilometres east from the capital city, Colombo. Kandy is a key

administrative, commercial, and cultural centre with a total population of 1,375,382, of which 81% live in rural areas, 12% urban and 6% in the plantation sector (DCS, 2012). The majority of people living in Kandy identify as Sinhalese (74%), followed by Moor (14%) and Tamil (11%). Religious adherence is tied to ethnicity in Sri Lanka with the majority of Sinhalese identifying as Buddhist, most Moors as Muslim and Tamils as Hindu (DCS, 2012). The majority of the working population in Kandy (50%) are employed in the services sector, 28% in the industry sector, and 22% employed in the agricultural sector (DCS 2012).

Study design and participants

A hospital-based case-control study design was used. A population-based control series was also recruited to address potential for selection bias within the hospital control series.

Cases

Cases were patients aged 18 years and over admitted to the medical toxicology ward for self-poisoning between July 18, 2018 and December 31, 2018. All patients presenting to the THP for any method of deliberate (defined in this study as an act of non-fatal self-poisoning regardless of suicidal intent) or accidental self-poisoning are transferred to the medical toxicology ward for treatment and management. In total, 291 patients with any method of deliberate self-poisoning (hereafter referred to as self-poisoning) were included in this study.

Controls

Sex and age (± five-year age strata) frequency matched controls (N=490) were recruited from the outpatient department, and nearby specialist clinics of the same hospital over the same time period. Hospital controls were either accompanying visitors or outpatients presenting with conditions unrelated to the outcome of interest, such as a cough, chest infection, or hypertension. Controls with a self-reported previous self-harm episode, regardless of method and whether or not it required hospitalisation, were excluded from the analysis.

To address the potential for selection bias within the hospital control series, a population-based control series (N=450) were also recruited from the local population. Two administrative divisions within the Kandy District (Gangawata Korale Divisional Secretary Division and Yatinuwara Divisional Secretary Division) were identified as the main population catchments for THP, and were also the districts where the largest proportion of cases resided. Twelve villages (*Grama Niladhari* sub-divisions) out of a total 159 were randomly selected from these divisions. Selected villages were compared with 2017 Census data to ensure similar distributions to the source population in terms of sex, age, and ethnicity. Between January 19, 2019 to April 2, 2019, sex and age frequency matched controls were recruited door to door. Due to logistical reasons such as the topography of the region, not every household within the sampling frame could be reached. For every household approached, only one participant matched on sex and age (± five years) was selected for interview. If more than one participant was eligible, the participant with the most recent birthday was selected for interview.

Measures

Self-poisoning

The outcome – self-poisoning – and method of self-poisoning (e.g. medicinal overdose, pesticide, plant poison, or household chemicals) was initially identified through the toxicology ward's patient admission record, and verbally reconfirmed through patient self-report. Suicidal intention and lethality of the attempt were not assessed due to constraints on the length of the questionnaire. Self-harm due to other methods, for example, burning and cutting were not included in the study. Self-poisoning has been previously reported as the most common method of non-fatal self-harm (Eddleston et al., 2005; Rajapakse et al., 2013), and accounted for 98% of hospital presenting self-harm cases in a study covering 13 hospitals in the North Central Province of Sri Lanka (Knipe, Metcalfe, et al., 2019).

Domestic violence

Data on the main exposure of interest, DV, were collected using the Humiliation, Afraid, Rape and Kick (HARK) 4-item questionnaire. A previous study indicated that the HARK questionnaire accurately identifies partner violence with high specificity (95%) and sensitivity (81%) (Sohal, Eldridge, & Feder,

2007). The HARK questions identify women who have experienced four types of abuse – physical, sexual, humiliation/emotional abuse, and fear of an intimate partner in the past 12 months. The questionnaire was broadened to include abuse by any household member, not just by an intimate partner (Supplementary Table 1). It was then translated, back-translated and piloted in the two local languages (Sinhala and Tamil) with individuals at the outpatient ward of THP. No modifications were required after piloting with the local population. Responses to the items were measured on a binary scale where 0 = no abuse and 1 = exposure to abuse. A HARK score ≥1 indicates exposure to at least one type of abuse.

Other study factors

Sociodemographic data were collected using a questionnaire pretested with THP visitors and outpatients. Sociodemographic factors included age, sex, ethnicity, religion, marital status, household composition, and residential area. Socioeconomic status indicators were also collected, and included educational attainment and vehicle ownership. All participants were asked, "Have you ever previously self-harmed in the past?", and prior diagnosis of a mental disorder was also collected through self-report. Finally, participants were asked questions relating to current social support and sense of belonging at the household and community level. These questions relating to support were derived from a large social capital community survey in the North Central Province of Sri Lanka (American Foundation for Suicide Prevention, 2018).

Data collection

Data were collected via face-to-face interview. All interviews were conducted by trained data collectors in the participant's preferred language (Sinhala, Tamil or English) in a private setting to ensure responses would not be influenced by another person and for patient safety. Interviewers were not blinded to the case or control status of the participant and the same interviewers who recruited cases also recruited controls. In order to minimise interviewer bias, the interviewers were given a standard script which they were requested to follow regardless of case status. The supervisor (PB) regularly

shadowed interviewers to ensure adherence to the script. A participant safety and distress protocol was provided to the data collection team and training was provided on how to deal with a distressed participant, described in detail elsewhere (Knipe, Bandara, et al., 2019). In brief, participants who reported experiencing suicidal thoughts daily during the preceding two weeks, were referred to the Psychiatry Clinic, THP for further management and follow up. If DV was disclosed, the participant was discretely provided information about support available locally and if appropriate, the patient was also referred to the psychiatry clinic. The study was ethically approved by the University of Peradeniya, Faculty of Medicine, Ethics Review Committee.

Statistical analysis

Logistic regression models, stratified by sex, were conducted on complete data to estimate the association between study factors and self-poisoning. Analyses were stratified by sex *a priori* given the epidemiology of both DV and self-poisoning differs between the sexes. Multivariable models were conducted to adjust for potential confounders. The main Model 1 adjusted for known confounders unlikely to change as a consequence of DV (age, ethnicity and religion). Model 2 adjusted for potential confounders (marital status, education level, assets – vehicle ownership) in addition to confounders in Model 1. Finally, in addition to Model 2 covariates, Model 3 adjusted for social support, household composition, and diagnosis of a mental disorder, identified in the literature as related factors in the association between DV and suicidal behaviour (Abramsky et al., 2011; Devries et al., 2013; McLaughlin et al., 2012). Interaction terms were created and entered into Model 1 to test effect measure modification by sex. Sensitivity analyses were conducted using the community control series to assess differences in the association between DV and self-poisoning. Furthermore, a secondary analysis was conducted to examine the association between household composition and self-poisoning risk to provide additional insights. Regression modelling was conducted in Stata Version 15.1 (StataCorp, 2017) using the *logistic* function. Adjusted (Model 1) population attributable fractions (PAF%) for DV, using the prevalence of exposure from the control group, were obtained from the *punafcc* post-estimation function in Stata based on the method used by Greenland and Drescher (1993).

Results

Study sample

In total, 298 cases of self-poisoning were recruited with a response rate of 87% (Figure 1). Seven cases were subsequently excluded in the analysis due to missing data, resulting in 291 complete cases for the analysis. No marked differences in sex were observed between total excluded and included patients, however those excluded were older. The most common method of self-poisoning was overdose of medicinal substances (65%), followed by ingestion of pesticides (21%), and plant poisons (5%). A total of 500 hospital controls were recruited with a response rate of 62%, of which 2% (N=10) were subsequently excluded due to missing data, resulting in 490 controls included in the analysis (Figure 1). A similar response rate of 63% was observed for community controls, five of which were excluded due to missing data (N=450; Figure 1). Overall, more female than male controls responded. No further data were collected on non-respondents. Both control groups shared similar study characteristics, however, the hospital control series more closely matched the cases in terms of residential area. Therefore, a decision was made to use the hospital control series in the main analysis and conduct a sensitivity analysis using the community control series.

Prevalence of DV and characteristics of the sample are summarised in Table 1. Among those who had self-poisoned, 50% (95% CI 42-58) of women and 36% (95% CI 28-44) of men had been exposed to at least one type of DV within the previous 12 months, compared to 19% (95% CI 15-24) and 18% (95% CI 13-24) among female and male controls respectively. Emotional abuse showed the highest prevalence among cases and controls with similar estimates across the sexes. Exposure to physical violence and fear was higher among cases compared to controls, with marked differences among women but not men. Eight cases of sexual violence were reported overall, half of which were reported by female cases. Exposure to multiple forms of abuse was higher among female cases (23%) compared to female controls (4%) and male cases (5%). Female cases exposed to DV reported a higher rate of previous self-harm (40%) than cases with no abuse (16%), no marked differences were found for male cases.

Domestic violence and self-poisoning

Exposure to at least one type of DV was strongly associated with self-poisoning compared with no experience of abuse for both females (OR=4·08, 95%CI 2·60-6·41, P<0·001) and males (OR=2·52, 95%CI 1·51-4·21, P<0·001) following adjustment for age, ethnicity and religion (Table 2). Among women, all types of DV examined showed strong associations with self-poisoning, with the largest point estimate for physical violence (OR=14·07, 95%CI 5·87-33·72, P<0·001). Among men, emotional abuse showed the largest point estimate (OR=2·75 95%CI 1·57-4·82, P<0·001), compared to no abuse. A dose-response association was also evident among women for scale of violence, with an increasing risk of self-poisoning for one type of abuse (OR=2·84, 95%CI 1·69-4·78, P<0·001), and multiple types of abuse (OR=8·50, 95%CI 4·12-17·56, P<0·001) (Table 2). There was no statistical evidence that sex modified the associations observed. The strong associations observed were maintained after adjusting for potential confounders and related factors (Model 2 and 3) (Table 2). Social support, and to a lesser extent marital status and a diagnosis of a mental disorder, attenuated the effect sizes among women (Table 2).

PAF% estimates for exposure to at least one type of DV were higher for women (38.0% 95%CI 32.2-43.3) than men (21.6% 95%CI 14.0-28.5). Among women, PAF% estimates were in a similar range for physical violence (28.5% 95%CI 26.5-30.3), fear of an intimate partner/household member (29.9% 95%CI 25.9-33.7), and emotional abuse (28.3% 95%CI 22.6-33.6). Whereas PAF% estimates for men were substantial only for emotional abuse (20.2% 95%CI 13.5-26.4).

Sensitivity analysis based on comparisons with the community control series overall showed similar associations in terms of direction for both sexes, and magnitude for males (Supplementary Table 2). Stronger associations were found among women, especially for exposure to at least one type of abuse (OR=5·14, 95%CI 3·23-8·18), and a stronger dose-response (ORs ranging from 3·98 to 9·42), compared to similar associations based on comparisons with the hospital control series (Supplementary Table 1). Secondary analysis of household composition and self-poisoning risk, adjusting for age, ethnicity, and religion, indicated that among women, the presence of in-laws increased self-poisoning risk (OR=2.49, 95%CI 1.38-4.51) when compared to nuclear household structures. Among men, in

addition to the nuclear household members, the presence of extended family (grandparents/grandchild) showed the largest point estimate (OR=3.41 95% CI 1.24-9.44) (Supplementary Table 2).

Discussion

Exposure to DV was strongly associated with self-poisoning for both men and women. Physical abuse and emotional abuse had the largest point estimates for women and men respectively, and exposure to more than one type of abuse was particularly strongly associated with an increased risk in self-poisoning for women.

Although limited to violence perpetrated by an intimate partner, the WHO study estimate for the association between exposure to at least one type of violence and a suicide attempt (OR 3·8) (Ellsberg, Jansen, Heise, Watts, & Garcia-Moreno, 2008), is similar to the present study (OR 4·1), while estimates in South Asian settings are slightly higher, ranging between OR 6·4 to 7·21 (Chowdhary & Patel, 2008; Paiman et al., 2019). The strong association between physical violence and self-poisoning among women is supported by studies in LMIC settings which have reported physical and sexual violence to be more strongly associated with suicidal behaviour (Chowdhary & Patel, 2008; Hassanian-Moghaddam, Zamani, & Sarjami, 2016; Ishida, Stupp, Melian, Serbanescu, & Goodwin, 2010). There is substantial evidence that physical violence is concomitant with emotional, psychological, and sexual abuse, cumulatively increasing the risk of suicide attempts (Devries et al., 2011; McLaughlin et al., 2012). A dose-response association was found between experiencing multiple types of abuse and self-poisoning among women but not for men. Given any exposure to DV demonstrated a higher risk of self-poisoning, and cases exposed were more likely to report a previous self-harm episode, identification of any exposure and severity of abuse should be part of the routine clinical assessment of self-poisoning patients, and appropriate local services developed or identified to support these individuals to reduce the risk of repetition.

Sexual violence was associated with self-poisoning among women as has been reported elsewhere (Chowdhury, Brahma, Banerjee, & Biswas, 2009; Devries et al., 2013; Devries et al., 2011). The weak statistical evidence is due to the small number of women reporting sexual violence (11 [0.9%] of all

1231 participants). It is likely this was under-reported by participants and is considerably lower than previously reported estimates of 5% to 18% (DCS, 2016; Guruge et al., 2015; Jayatilleke et al., 2011). Socio-cultural factors such as stigma, sensitivity around discussions of sexual activity, and marital rape not being considered a punishable offence in Sri Lanka may have limited disclosure and affected the magnitude of the observed association. Detailed, in-depth interviews may overcome the socio-cultural barriers to disclosing sexual violence in this context.

There are relatively few studies globally, particularly in LMIC, that have measured DV against men and its association with suicidal behaviour, and those that have, are often limited to physical violence (McLaughlin et al., 2012). Emotional abuse showed the highest prevalence among men and women, and largest point estimate among men when compared to other types of abuse. Previous studies from the similarly found that emotional abuse was the most common type of DV experienced by men in the past 12 months (Hester et al., 2017; Office for National Statistics, 2019). Further qualitative research examining DV in men and its relationship with self-harm in LMIC settings is needed to better understand this association.

Psychological abuse, measured by fear of an intimate partner or household member showed a strong association (OR 5.65) with self-poisoning among women. Acute fear concomitant with violent incidents, in addition to chronic fear acquired over time has been shown to increase psychological distress in HIC and LMIC settings (Devries et al., 2013; Richardson, Nandi, Jaswal, & Harper, 2020). The exact mechanism with which the experience of DV (in whatever form) leads to suicidal behaviour in Sri Lanka has not been explored. Theoretical models developed from non-HIC settings are lacking. Given that it has been argued that suicidal behaviour is different in LMIC versus HIC (Akotia, Knizek, Hjelmeland, Kinyanda, & Osafo, 2019; Colucci & Lester, 2012; Knipe, Williams, et al., 2019; Widger, 2015), we have refrained from using traditional theoretical models to explain suicidal behaviour in this instance.

Social support substantially attenuated the observed association between DV and self-poisoning. It has been reported previously that poor social support could be both a precursor and consequence of DV, and could potentially moderate the relationship between DV and self-harm (Coker et al., 2002; Fedina

et al., 2019; McLaughlin et al., 2012). Future qualitative and prospective studies should be undertaken to contribute to a theoretical understanding of the link between DV and suicidal behaviour within the context of LMIC, and to elucidate the role of social support and other potential modifiable/mediating factors in the relationship between DV and self-harm.

This study has a number of key strengths. To the best of our knowledge, this is the first large study to quantify the association between DV and self-poisoning among men and women in South Asia and examine its contribution to the overall burden of suicidal behaviour. The study also addresses key gaps identified in the literature, including the examination of differential effects by type of DV, effects of exposure to multiple types of abuse, and exploration of potential associated factors. Furthermore, there is a dearth of evidence examining DV in men, particularly in LMIC settings, this study presents novel findings of the role of DV in male self-poisoning. Culturally adapted and translated versions of a validated instrument for the assessment of DV and the use of pretested forms for the assessment of other study variables were also key strengths of the study.

Sensitivity analyses using a community control series to address possible selection bias also strengthened the study. These findings suggest that, in this context, hospital controls did not appear to bias the results substantially towards the null as is often the case in hospital-based case-control studies. This has critical implications for future study designs examining self-harm in resource-poor settings. In the absence of primary care infrastructure, 'clinical' controls presenting to hospital or tertiary care services may be more similar to exposure distributions in the source population than in hospital-based case-control studies in high income contexts.

Limitations

There are a number of methodological considerations in interpreting the findings from this study. Interpretation of a causal relationship between DV and self-poisoning is limited due to the retrospective nature of the study design. Furthermore, a key limitation of this study is the potential for selection bias. Despite a high response rate overall, the response rate was lower among the control group (62%) compared to cases (87%), and it is possible that excluded controls may differ in comparison to controls included. Limited information was collected on excluded controls therefore it is not possible to assess

the extent of this potential selection bias. The hospital controls recruited did however broadly match the source population in terms of age, sex, ethnicity and religion.

Additional selection bias may have also been introduced through the inclusion of outpatients in the hospital control group as they may have a different exposure distribution compared to the source population. Notably, the 12-month prevalence of DV in the hospital control group (19%) was consistent with nationally representative 12-month prevalence estimates (17%) and regional estimates (which vary between 19% (Jayatilleke et al., 2011) and 25% (DCS, 2016)). Moreover, sensitivity analyses using the community control group indicated broadly similar findings, although stronger point estimates were evident among women. Possible underreporting of DV in the community control series (16%) may explain the magnified estimates, and could be attributed to interviews being conducted in the home environment, where participants may be more cautious and less inclined to disclose abuse.

Another limitation of the study is the potential for recall bias. Individuals who have self-harmed may be less reticent about acknowledging DV and be more likely to recall DV related to the self-harm episode, than the control group, leading to an overestimation of the association. All participants were asked if they had experienced DV within the last 12 months, this timeframe would minimise the risk of recall bias. It should be acknowledged that the HARK questionnaire used in the present study has not been validated for use in men and within the Sri Lankan population, however, the questionnaire was pre-tested with the local population and as previously discussed, any DV exposure in the last 12 months among female controls in this study was consistent with the Sri Lankan DHS survey and other studies in Sri Lanka. As previously discussed, due to socio-cultural factors associated with the study setting and limited time for in-depth interviewing, some participants may have been reluctant to disclose particularly sensitive issues such as sexual abuse (DCS, 2016; Jayatilleke et al., 2011).

Finally, when interpreting the PAFs, it is important to consider that these estimates assume a causal relationship between exposure and outcome. Given the strong and consistent association previously documented in the international literature between DV and suicidal behaviour, the assumption in the present study is reasonable. An additional assumption of the PAFs is that removing the exposure will not affect other potential risk factors. This assumption is more difficult to uphold given the inter-

relationship between a range of social factors and DV associated self-harm. However, well documented confounders were adjusted for in estimating the PAFs. Furthermore, the underlying DV prevalence used, derived from the control group, was consistent with regional estimates, heightening the sensitivity of the PAFs.

Given the high burden of DV and the strength of the association with self-poisoning, targeting DV prevention may result in substantial reductions in suicidal behaviour and other DV-related adverse health outcomes. At the clinical level, identification of any type of DV and severity of abuse should be part of the routine clinical assessment of patients presenting with self-harm, followed by a referral, as appropriate, to local DV support services. In Sri Lanka, 'Friendly Haven' counselling centres (*Mithuru Piyasa/Natpu Nilayam*) have been established at selected government hospitals to provide first-line support to women experiencing DV, with evidence of increasing uptake (WHO, 2018). Enhanced integration between such centres and psychiatric services may be valuable as psychotherapies for women experiencing DV in LMIC have also been shown to be effective (Keynejad, Hanlon, & Howard, 2020). However, strategies should not be limited to biomedical interventions. Community-based strategies that have involved community ambassadors, capacity building of frontline workers (e.g. police officers, health care workers, teachers), together with dissemination of DV learning materials have shown promising evidence in South Africa (Pronyk et al., 2006) and Uganda (Wagman et al., 2015) in reducing DV and may prove effective in Sri Lanka.

Contributors

DK and TR were responsible for study concept, and design. DK, TR, JK, and LS secured funding for the study. DK and TR wrote the protocol. DK, TR and PB were responsible for piloting the survey. TR and PB were responsible for supervising data collection. PB was responsible for data analysis, manuscript preparation, coordination and revision. DK, AP, DG and GF contributed to analysis and interpretation of data, and critical revisions of the manuscript. All authors provided critical evaluation and revision of the manuscript and have given final approval of the manuscript accepting responsibility for all aspects.

Acknowledgements

The authors would like to thank the senior academics who have acted as advisors for the study: Professor Chris Metcalfe (University of Bristol), Professor Michael Eddleston, (University of Edinburgh), and Professor Flemming Konradsen (University of Copenhagen). The authors would like to thank the staff at SACTRC, in particular Chamil Kumara, Indunil Abeyratne, and Sujani Ekanayake for their support in setting up the study and would like to acknowledge the substantial contribution of the data collection team Azra Aroos, Kasuni Silva, Tharuka Silva and Sandareka Samarakoon, and the staff at the Teaching Hospital Peradeniya for accommodating this research. The authors thank Mr Upali Perera for designing and maintaining the study database. The authors would also like to thank José López-López and Abby Russell for their input on the analysis plan. Finally, the authors would like to acknowledge the Elizabeth Blackwell Institute for Health Research, University of Bristol and the Wellcome Trust Institutional Strategic Support Fund for supporting DK. GF&DG are supported by the NIHR Biomedical Research Centre at University Hospitals Bristol and Weston NHS Foundation Trust and the University of Bristol. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Funding statement: This work was supported by UK Medical Research Council (grant number MC_PC_MR/R019622/1).

Conflicts of Interest: None.

Ethics: The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

References

Abramsky, T., Watts, C. H., Garcia-Moreno, C., Devries, K., Kiss, L., Ellsberg, M., . . . Heise, L. (2011). What factors are associated with recent intimate partner violence? Findings from the WHO multi-country study on women's health and domestic violence. *BMC public health, 11*(1), 109. doi:10.1186/1471-2458-11-109

Akotia, C. S., Knizek, B. L., Hjelmeland, H., Kinyanda, E., & Osafo, J. (2019). Reasons for attempting suicide: An exploratory study in Ghana. *Transcultural psychiatry, 56*(1), 233-249.

American Foundation for Suicide Prevention. (2018). The Association of Social Capital and Self-Harm in Rural Sri Lanka. Retrieved from https://afsp.org/grant/the-association-of-social-capital-and-self-harm-in-rural-sri-lanka

Chowdhary, N., & Patel, V. (2008). The effect of spousal violence on women's health: Findings from the Stree Arogya Shodh in Goa, India. *Journal of postgraduate medicine, 54*(4), 306. doi:10.4103/0022-3859.43514

Chowdhury, A. N., Brahma, A., Banerjee, S., & Biswas, M. (2009). Pattern of domestic violence amongst non-fatal deliberate self-harm attempters: A study from primary care of West Bengal. *Indian journal of psychiatry, 51*(2), 96. doi:10.4103/0019-5545.49448

Coker, A. L., Smith, P. H., Thompson, M. P., McKeown, R. E., Bethea, L., & Davis, K. E. (2002). Social support protects against the negative effects of partner violence on mental health. *Journal of women's health & gender-based medicine, 11*(5), 465-476.

Colucci, E., & Lester, D. (2012). *Suicide and culture: Understanding the context*: Hogrefe Publishing.

DCS. (2012). *Census of Population and Housing - 2012*. Colombo: Department of Census and Statistics Sri Lanka.

DCS. (2016). *Sri Lanka Demographic and Health Survey 2016*. Colombo, Sri Lanka: Department of Census and Statistics (DCS) and Ministry of Health, Nutrition and Indigenous Medicine.

de Silva, V. A., Senanayake, S., Dias, P., & Hanwella, R. (2012). From pesticides to medicinal drugs: time series analyses of methods of self-harm in Sri Lanka. *Bulletin of the World Health Organization, 90*, 40-46. doi:10.2471/BLT.11.091785

Devries, K. M., Mak, J. Y., Bacchus, L. J., Child, J. C., Falder, G., Petzold, M., . . . Watts, C. H. (2013). Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS medicine, 10*(5), e1001439. doi:10.1371/journal.pmed.1001439

Devries, K. M., Watts, C., Yoshihama, M., Kiss, L., Schraiber, L. B., Deyessa, N., . . . Jansen, H. (2011). Violence against women is strongly associated with suicide attempts: evidence from the WHO multi-country study on women's health and domestic violence against women. *Social Science & Medicine, 73*(1), 79-86. doi:10.1016/j.socscimed.2011.05.006

Eddleston, M., Gunnell, D., Karunaratne, A., De Silva, D., Sheriff, M. R., & Buckley, N. A. (2005). Epidemiology of intentional self-poisoning in rural Sri Lanka. *The British Journal of Psychiatry, 187*(6), 583-584. doi:10.1192/bjp.187.6.583

Ellsberg, M., Jansen, H. A., Heise, L., Watts, C. H., & Garcia-Moreno, C. (2008). Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *The lancet, 371*(9619), 1165-1172. doi:10.1016/S0140-6736(08)60522-X

Fedina, L., Mushonga, D. R., Bessaha, M. L., Jun, H.-J., Narita, Z., & DeVylder, J. (2019). Moderating effects of perceived neighborhood factors on intimate partner violence, psychological distress, and suicide risk. *Journal of interpersonal violence*, 0886260519884687.

Greenland, S., & Drescher, K. (1993). Maximum likelihood estimation of the attributable fraction from logistic models. *Biometrics*, 865-872. doi:10.2307/2532206

Guruge, S., Jayasuriya-Illesinghe, V., Gunawardena, N., & Perera, J. (2015). Intimate partner violence in Sri Lanka: a scoping review. *Ceylon medical journal, 60*(4), 133-138. doi:10.4038/cmj.v60i4.8100

Hassanian-Moghaddam, H., Zamani, N., & Sarjami, S. (2016). Violence and abuse against women who have attempted suicide by deliberate self-poisoning: a 2-year follow-up study in Iran. *Journal of interpersonal violence, 31*(7), 1257-1273. doi:10.1177/0886260514564157

Hester, M., Jones, C., Williamson, E., Fahmy, E., & Feder, G. (2017). Is it coercive controlling violence? A cross-sectional domestic violence and abuse survey of men attending general practice in England. *Psychology of violence, 7*(3), 417. doi:10.1037/vio0000107

International Institute for Population Sciences. (2017). National Family Health Survey (NFHS-4), 2015–16: India. Mumbai: International Institute for Population Sciences.

Ishida, K., Stupp, P., Melian, M., Serbanescu, F., & Goodwin, M. (2010). Exploring the associations between intimate partner violence and women's mental health: evidence from a population-based study in Paraguay. *Social Science & Medicine, 71*(9), 1653-1661. doi:10.1016/j.socscimed.2010.08.007

Jayatilleke, A., Poudel, K. C., Sakisaka, K., Yasuoka, J., Jayatilleke, A. U., & Jimba, M. (2011). Wives' attitudes toward gender roles and their experience of intimate partner violence by husbands in Central Province, Sri Lanka. *Journal of interpersonal violence, 26*(3), 414-432. doi:10.1177/0886260510363420

Keynejad, R. C., Hanlon, C., & Howard, L. M. (2020). Psychological interventions for common mental disorders in women experiencing intimate partner violence in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet Psychiatry, 7*(2), 173-190. doi:10.1016/S2215-0366(19)30510-3

Knipe, D. W., Bandara, P., Senarathna, L., Kidger, J., López-López, J., & Rajapakse, T. (2019). Childhood adversity and deliberate self-poisoning in Sri Lanka: a protocol for a hospital-based case–control study. *BMJ open, 9*(8), e027766. doi:10.1136/bmjopen-2018-027766

Knipe, D. W., Gunnell, D., & Eddleston, M. (2017). Preventing deaths from pesticide self-poisoning—learning from Sri Lanka's success. *The Lancet Global Health, 5*(7), e651-e652. doi:10.1016/S2214-109X(17)30208-5

Knipe, D. W., Metcalfe, C., Hawton, K., Pearson, M., Dawson, A., Jayamanne, S., . . . Gunnell, D. (2019). Risk of suicide and repeat self-harm after hospital attendance for non-fatal self-harm in Sri Lanka: a cohort study. *The Lancet Psychiatry, 6*(8), 659-666. doi:10.1016/S2215-0366(19)30214-7

Knipe, D. W., Williams, A. J., Hannam-Swain, S., Upton, S., Brown, K., Bandara, P., . . . Kapur, N. (2019). Psychiatric morbidity and suicidal behaviour in low-and middle-income countries: A systematic review and meta-analysis. *PLoS medicine, 16*(10), e1002905.

Konradsen, F., van der Hoek, W., & Peiris, P. (2006). Reaching for the bottle of pesticide—a cry for help. Self-inflicted poisonings in Sri Lanka. *Social Science & Medicine, 62*(7), 1710-1719. doi:10.1016/j.socscimed.2005.08.020

McLaughlin, J., O'carroll, R., & O'connor, R. (2012). Intimate partner abuse and suicidality: a systematic review. *Clinical psychology review, 32*(8), 677-689. doi:10.1016/j.cpr.2012.08.002

National Institute of Population Studies, & ICF. (2019). Pakistan demographic and health survey 2017-18. Islamabad, Pakistan.

Office for National Statistics. (2019). Domestic abuse: Findings from the crime survey for England and Wales: Year ending March 2018. Retrieved from https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/domesticabusefindingsfromthecrimesurveyforenglandandwales/yearendingmarch2018

Paiman, A., Khan, M., Ali, T., Asad, N., & Azam, I. (2019). Psychosocial factors of deliberate self-harm in Afghanistan: a hospital based, matched case-control study. *Eastern Mediterranean health journal, 25*(11), 798-805. doi:10.26719/emhj.19.021

Parkar, S. R., Dawani, V., & Weiss, M. G. (2006). Clinical diagnostic and sociocultural dimensions of deliberate self-harm in Mumbai, India. *Suicide and Life-Threatening Behavior, 36*(2), 223-238. doi:10.1521/suli.2006.36.2.223

Pronyk, P. M., Hargreaves, J. R., Kim, J. C., Morison, L. A., Phetla, G., Watts, C., . . . Porter, J. D. (2006). Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *The lancet, 368*(9551), 1973-1983. doi:10.1016/S0140-6736(06)69744-4

Rajapakse, T., Griffiths, K. M., & Christensen, H. (2013). Characteristics of non-fatal self-poisoning in Sri Lanka: a systematic review. *BMC public health, 13*(1), 331. doi:10.1186/1471-2458-13-331

Richardson, R., Nandi, A., Jaswal, S., & Harper, S. (2020). The effect of intimate partner violence on women's mental distress: a prospective cohort study of 3010 rural Indian women. *Social psychiatry and psychiatric epidemiology, 55*(1), 71-79. doi:10.1007/s00127-019-01735-5

Senarathna, L., Jayamanna, S. F., Kelly, P. J., Buckley, N. A., Dibley, M. J., & Dawson, A. H. (2012). Changing epidemiologic patterns of deliberate self poisoning in a rural district of Sri Lanka. *BMC public health, 12*(1), 593. doi:10.1186/1471-2458-12-593

Sohal, H., Eldridge, S., & Feder, G. (2007). The sensitivity and specificity of four questions (HARK) to identify intimate partner violence: a diagnostic accuracy study in general practice. *BMC family practice, 8*(1), 49. doi:10.1186/1471-2296-8-49

StataCorp. (2017). *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC.

Syed, E. U., & Khan, M. M. (2008). Pattern of deliberate self-harm in young people in Karachi, Pakistan. *Crisis, 29*(3), 159-163. doi:10.1027/0227-5910.29.3.159

Wagman, J. A., Gray, R. H., Campbell, J. C., Thoma, M., Ndyanabo, A., Ssekasanvu, J., . . . Serwadda, D. (2015). Effectiveness of an integrated intimate partner violence and HIV prevention intervention in Rakai, Uganda: analysis of an intervention in an existing cluster randomised cohort. *The Lancet Global Health, 3*(1), e23-e33. doi:10.1016/S2214-109X(14)70344-4

WHO. (2013). Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva: World Health Organization.

WHO. (2014). *Preventing suicide - a global imperative*. Geneva: World Health Organization.

WHO. (2018). *Country Profile on Gender-Based Violence in Sri Lanka*. Colombo: World Health Organization, Country Office for Sri Lanka.

Widger, T. (2015). *Suicide in Sri Lanka: the anthropology of an epidemic*: Routledge.

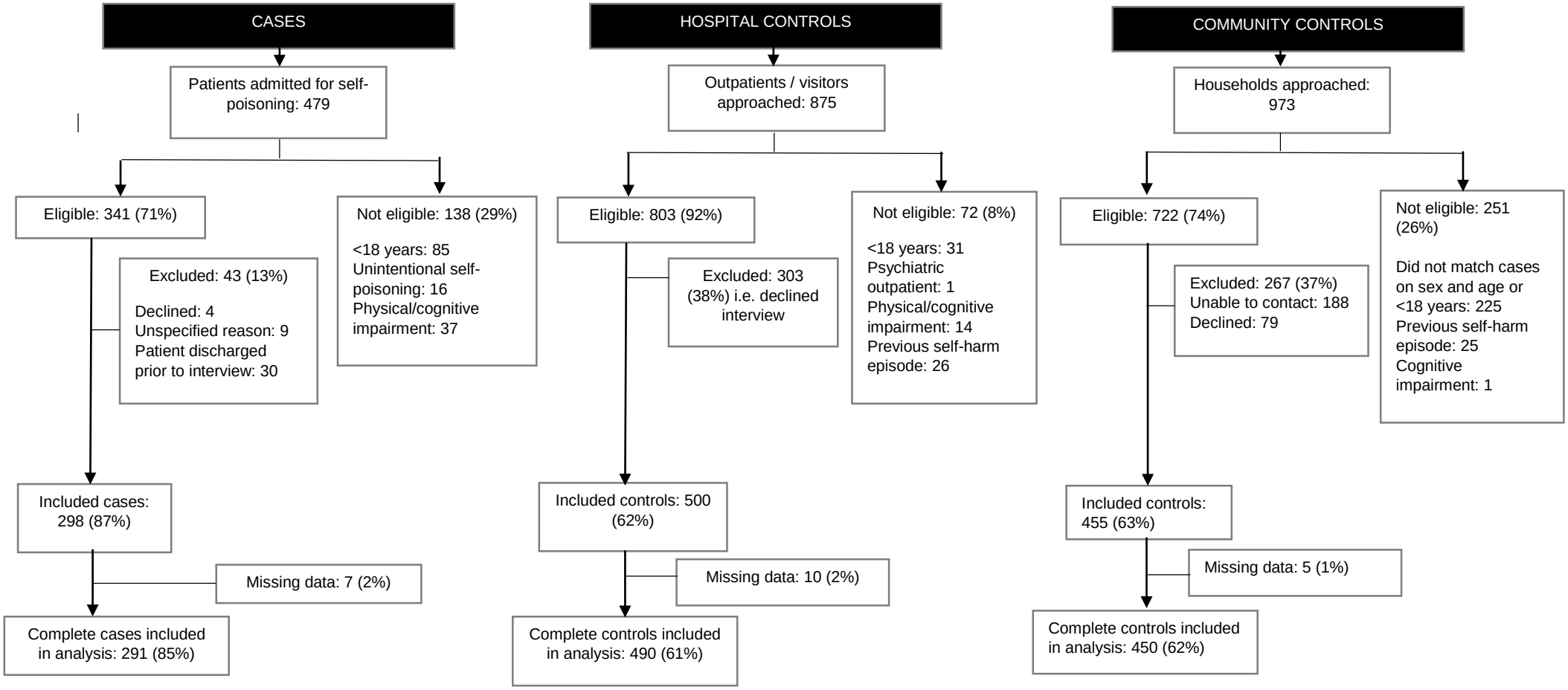

Figure 1. Participant recruitment for cases, hospital controls and community controls.

Table 1. Self-poisoning in adults aged ≥18 years, Kandy, Sri Lanka: distribution by domestic violence and other study factors.

	Females		Males	
	Cases (N=154) N (%)	Controls (N=289) N (%)	Cases (N=137) N (%)	Controls (N=201) N (%)
Domestic violence				
At least one type of abuse (vs. no abuse)	77 (50·0)	55 (19·0)	49 (35·8)	36 (17·9)
Type of abuse				
Afraid of household member (vs. no abuse)	44 (36·4)	21 (8·2)	9 (9·3)	10 (5·7)
Emotional (vs. no abuse)	48 (38·4)	39 (14·3)	41 (31·8)	27 (14·1)
Physical (vs. no abuse)	33 (30·0)	7 (2·9)	5 (5·4)	5 (2·9)
Sexual (vs. no abuse)	4 (4·9)	2 (0·9)	1 (1·1)	1 (0·6)
Scale of abuse				
No abuse	77 (50·0)	234 (81·0)	88 (64·2)	165 (82·1)
Single type of abuse	42 (27·3)	43 (14·9)	42 (30·7)	30 (14·9)
Multiple (2-4) types of abuse	35 (22·7)	12 (4·2)	7 (5·1)	6 (3·0)
Other study factors				
Age				
18-30	111 (72·1)	196 (67·8)	74 (54·0)	110 (54·7)
31-45	32 (20·8)	62 (21·5)	35 (25·6)	49 (24·4)
≥46	11 (7·1)	31 (10·7)	28 (20·4)	42 (20·9)
Ethnicity				
Sinhala	118 (76·6)	278 (96·2)	109 (79·6)	170 (84·6)
Non-Sinhala	36 (23·4)	11 (3·8)	28 (20·4)	31 (15·4)
Religion				
Buddhist	115 (74·7)	272 (94·1)	104 (75·9)	168 (83·6)
Non-Buddhist	39 (25·3)	17 (5·9)	33 (24·1)	33 (16·4)
Marital status				
Married	84 (54·6)	127 (43·9)	69 (50·4)	101 (50·3)
Never married	62 (40·3)	155 (53·6)	60 (43·8)	98 (48·8)
Divorced/separated/ spouse dead	8 (5·2)	7 (2·4)	8 (5·8)	2 (1·0)
Education				
Passed A/L	44 (28·6)	155 (53·6)	20 (14·6)	91 (45·3)
Passed O/L	55 (35·5)	74 (25·6)	37 (27·0)	58 (28·9)
Grades 1-10, or no schooling	55 (35·7)	60 (20·8)	80 (58·4)	52 (25·9)
Assets				
Car, tractor, or bus	27 (17·5)	55 (19·0)	23 (16·8)	51 (25·4)
Motorbike or 3-wheeler	57 (37·0)	122 (42·2)	48 (35·0)	78 (38·8)
No vehicle	70 (45·5)	112 (38·8)	66 (48·2)	72 (35·8)
Social support				
Strong (tertile 1)	30 (19·5)	103 (35·6)	28 (20·4)	64 (31·8)
Medium (tertile 2)	40 (26·0)	107 (37·0)	39 (28·5)	69 (34·3)
Poor (tertile 3)	84 (54·6)	79 (27·3)	70 (51·1)	68 (33·8)
Household composition				
Nuclear (spouse/child/parent/sibling)	103 (66·9)	220 (76·1)	94 (68·6)	159 (79·1)
Extended (nuclear/grandchild/grandparent)	7 (4·6)	20 (6·9)	13 (9·5)	6 (3·0)
Presence of in-laws (parent/child in-law)	29 (18·8)	29 (10·0)	19 (13·9)	17 (8·5)
Other composition	15 (9·7)	20 (6·9)	11 (8·0)	19 (9·5)
Ever diagnosed with mental disorder				
No	134 (87·0)	285 (98·6)	123 (89·8)	197 (98·0)
Yes	20 (13·0)	4 (1·4)	14 (10·2)	4 (2·0)

OR (Odds ratio) = 1·00 (Referent group); A/L = Advanced Level; O/L = Ordinary Level.

Table 2. Multivariable models for association between domestic violence and self-poisoning in adults aged ≥18 years, Kandy Sri Lanka.

	Females			Males		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
	OR (95% CI)	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Domestic violence						
At least one type of abuse (vs. no abuse)	4·08 (2·60-6·41)	3·21 (1·99-5·16)	2·25 (1·34-3·79)	2·52 (1·51-4·21)	3·14 (1·76-5·61)	2·63 (1·42-4·85)
Type of abuse						
Afraid of household member (vs. no abuse)	5·65 (3·09-10·35)	4·30 (2·25-8·19)	2·89 (1·43-5·86)	1·55 (0·58-4·13)	1·25 (0·43-3·69)	1·08 (0·36-3·26)
Emotional (vs. no abuse)	3·67 (2·19-6·15)	3·15 (1·82-5·45)	2·06 (1·11-3·81)	2·75 (1·57-4·82)	3·90 (2·03-7·52)	3·29 (1·64-6·60)
Physical (vs. no abuse)	14·07 (5·87-33·72)	9·93 (3·96-24·88)	6·07 (2·27-16·21)	1·99 (0·56-7·13)	2·03 (0·50-8·26)	1·79 (0·42-7·54)
Sexual (vs. no abuse)	6·03 (1·03-35·38)	6·86 (1·00-47·21)	4·93 (0·63-38·46)	2·31 (0·10-51·39)	4·41 (0·98-1·04)	3·92 (0·11-138·75)
Scale of abuse						
No abuse	1·00	1·00	1·00	1·00	1·00	1·00
Single type of abuse	2·84 (1·69-4·78)	2·35 (1·36-4·10)	1·89 (1·05-3·41)	2·61 (1·52-4·48)	3·40 (1·84-6·29)	2·88 (1·51-5·48)
Multiple (2-4) types of abuse	8·50 (4·12-17·56)	6·23 (2·89-13·42)	3·51 (1·48-8·34)	2·08 (0·65-6·63)	1·95 (0·53-7·26)	1·45 (0·36-5·79)

OR (Odds ratio) = 1·00 (Referent group).
Model 1 adjusted for age, ethnicity, and religion.
Model 2 adjusted for age, ethnicity, religion, marital status, education level, and assets (vehicle ownership).
Model 3 adjusted for Model 2 covariates, and diagnosis of mental disorder, social support, household composition.

Supplementary Table 1. Humiliation, Afraid, Rape, Kick (HARK) questionnaire (English translated version).

Within the last year…	**Yes**	**No**	**Refused**
Have you been afraid of your partner or another family member who lives in your household?	1	0	88
Have you been kicked, hit, slapped or otherwise physically hurt by your partner or another family member who lives in your household?	1	0	88
Have you been raped or forced to have any kind of forced (i.e. against your will) sexual activity by your partner or another family member who lives in your household?	1	0	88
Have you been humiliated or emotionally abused in other ways by your partner or another family member who lives in your household?	1	0	88

Supplementary Table 2. Self-poisoning in adults aged ≥18 years, Kandy Sri Lanka: distribution and adjusted associations with domestic violence – sensitivity analysis using community control series.

	Females			**Males**		
	Cases N (%)	**Controls N (%)**	**OR (95% CI)‡**	**Cases N (%)**	**Controls N (%)**	**OR (95% CI)‡**
Domestic violence						
At least one type of abuse (vs. no abuse)	78 (50·3)	41 (15·8)	5·14 (3·23-8·18)	49 (35·8)	31 (16·1)	2·77 (1·63-4·70)
Type of abuse						
Afraid of partner/household member (vs. no abuse)	44 (36·4)	19 (8·0)	5·91 (3·22-10·84)	9 (9·3)	12 (6·9)	1·28 (0·50-3·24)
Emotional (vs. no abuse)	49 (38·9)	28 (11·3)	4·78 (2·79-8·19)	41 (31·8)	22 (12·0)	3·29 (1·81-5·96)
Physical (vs. no abuse)	34 (30·6)	6 (2·7)	15·77 (6·30-39·50)	5 (5·4)	5 (3·0)	1·77 (0·49-6·41)
Sexual (vs. no abuse)	4 (4·9)	2 (0·9)	6·11 (1·10-35·04)	1 (1·1)	1 (0·6)	2·32 (0·14-38·61)
Scale of abuse						
No abuse	77 (49·7)	219 (84·9)	1·00	88 (64·2)	162 (84·4)	1·00
Single type of abuse	42 (27·1)	29 (11·2)	3·98 (2·30-6·88)	42 (30·7)	21 (10·9)	3·50 (1·93-6·32)
Multiple (2-4) types of abuse	36 (23·2)	10 (3·9)	9·42 (4·44-20·02)	7 (5·1)	9 (4·7)	1·35 (0·48-3·85)

OR (Odds ratio) = 1·00 (Referent group); A/L = Advanced Level; O/L = Ordinary Level.
‡Adjusted for age, ethnicity and religion.

Supplementary Table 3. Household composition type and self-poisoning risk in adults aged ≥18 years, Kandy Sri Lanka.

	Female	**Male**
	OR (95% CI)‡	**OR (95% CI)‡**
Household composition		
Nuclear (spouse/child/parent/sibling)	1.00	1.00
Extended (nuclear/grandchild/grandparent)	0.70 (0.27-1.79)	3.41 (1.24-9.44)
Presence of in-laws (parent/child in-law)	2.49 (1.38-4.51)	1.84 (0.88-3.84)
Other composition	1.45 (0.68-3.10)	0.96 (0.43-2.13)

OR (Odds ratio) = 1·00 (Referent group).
‡Adjusted for age, ethnicity and religion.

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Professor Kenneth S. Sendler
Editor, *Psychological Medicine*

Professor Robin M. Murray
Editor, *Psychological Medicine*

6 July 2020

Dear Professor Sendler and Professor Murray,

RE: Re-submission of PSM-D-20-00664 – Domestic violence and self-poisoning in Sri Lanka.

We would firstly like to take this opportunity to thank the editors and reviewers for taking the time to review our paper. Please find enclosed a manuscript, revised according to reviewer comments. Responses to specific comments are provided below. Changes to text are indicated, with additional text underlined.

Reviewer: 1

1. *"Thank you so much for your good work. I reviewed your Manuscript PSM-D-20-00664 for Psychological Medicine entitled 'Domestic violence and self-poisoning in Sri Lanka'."*

We thank the Reviewer for their comments and for their time in considering this manuscript.

2. *"Authors should be deleted some texts and shorted the Abstract."*
3. *"Authors should be written the used questionnaire (the Humiliation, Afraid, Rape and Kick (HARK) in the abstract."*

We thank the Reviewer for their comments. We note that the current abstract adheres to the Journal's guidelines of a structured abstract of no more than 250 words. However, in light of the Reviewer's comments regarding the addition of the HARK questionnaire, we have revised the methods section of the abstract (249 words):

> Cases (N=291) were patients aged ≥18 years, admitted to a tertiary hospital in Kandy Sri Lanka for self-poisoning. Sex and age frequency matched controls were recruited from the hospital's outpatient department (N=490) and local population (N=450). <u>Exposure to DV was collected through the Humiliation, Afraid, Rape, Kick (HARK) questionnaire.</u> Multivariable logistic regression models were

conducted to estimate the association between DV and self-poisoning, and population attributable fractions (PAF) were estimated.

4. *"Authors should be added about statistics and findings about rate of domestic violence in other Asian countries and also Western countries in the Introduction section."*

We have incorporated an estimate of the prevalence of domestic violence for South Asia and for high-income countries as a comparison as requested by the Reviewer. In addition, estimates from India and Pakistan have been added as a comparison to estimates from Sri Lanka (Introduction, page 4, paragraph 2). The revised text now reads:

> The burden of DV appears to be higher in LMIC, particularly in South Asia where 42% of ever-partnered women have experienced IPV, compared to 23% in high-income countries (WHO 2013). In Sri Lanka, community-based studies estimate up to 35% of women have experienced violence from their intimate-partner in their lifetime (Guruge et al. 2015), and 17% of ever-partnered women aged 15-49 years have experienced IPV in the past year (DHS 2016). This is consistent with 12-month IPV estimates from neighbouring India (22%) and Pakistan (15%) (IIPS 2017; NIPS 2019).

5. *"Authors should be reported some previous studies from other Eastern and Western countries about domestic violence and suicidal behavior in the Introduction section."*

We have revised the manuscript to include the estimate from the WHO multi-country study (cited in the original manuscript) to show the strength of the association, as well as estimates from studies from India and Afghanistan (Introduction, starting page 3, paragraph 2). Due to the considerable variation in estimates from HIC, we do not feel individual estimates from Western countries would add significant value to the manuscript.

> A systematic review of 37 studies (31 of which originated from HIC) showed strong associations between intimate partner violence (IPV) and suicidal behaviour (McLaughlin, O'carroll, & O'connor, 2012). The WHO multi-country study using population-based surveys from mostly LMIC, showed that women exposed to physical or sexual violence were 3.8 times more likely to attempt suicide than non-abused women (Devries et al., 2011). Evidence from studies conducted in Afghanistan (Paiman, Khan, Ali, Asad, & Azam, 2019) and India (Chowdhary & Patel, 2008) similarly demonstrated strong associations between lifetime exposure to DV and self-harm (OR 6.4 and 7.2 respectively).

6. *"Authors should be explained about validity and reliability of the Humiliation, Afraid, Rape and Kick (HARK) 4-item questionnaire in previous studies and internal consistency (Cronbach's a) of the scale in the present study in the Methods section."*

We thank the Reviewer for their comments. We have incorporated further detail regarding the specificity and sensitivity of the HARK questionnaire (Methods, page 8, paragraph 1):

> Data on the main exposure of interest, DV, were collected using the Humiliation, Afraid, Rape and Kick (HARK) 4-item questionnaire. Previous studies have indicated that the HARK questionnaire accurately identifies partner violence with strong specificity (95%) and sensitivity (81%) (Arkins, Begley, & Higgins, 2016; Sohal, Eldridge, & Feder, 2007).

The internal consistency of the HARK questionnaire was not measured for the present study and has not been validated for use in the Sri Lankan population. We have acknowledged this as a limitation of the study in the Discussion section (page 16, paragraph 3).

> Another limitation of the study is the potential for recall bias. Individuals who have self-harmed may be less reticent about acknowledging DV and be more likely to recall DV related to the self-harm episode, than the control group, leading to an overestimation of the association. All participants were asked if they had

experienced DV within the last 12 months, this timeframe would minimise the risk of recall bias. It should also be acknowledged that the HARK questionnaire has not been validated for use in men and within the Sri Lankan population, although the questionnaire was pre-tested with the local population and DV exposure among female controls in the last 12 months in this study is consistent with the DHS survey and other studies in Sri Lanka (DCS, 2016; Jayatilleke et al., 2011). As previously discussed, due to socio-cultural factors associated with the study setting and limited time for in-depth interviewing, some participants may have been reluctant to disclose particularly sensitive issues such as sexual abuse.

7. *"Authors should be written "a typical item" for the Humiliation, Afraid, Rape and Kick (HARK) 4-item questionnaire."*

We have added the English translated version of the HARK questionnaire used in the study as supplementary material (Supplementary Table 1).

8. *"Authors should be written limitations of their study in the Discussion section."*

We thank the Reviewer for their comment. We note that considerable detail was dedicated in the Discussion towards limitations of the study, including discussion of selection bias, recall bias, limits of interpreting causality due to study design, and limitations of interpreting the population attributable fractions. We have added the sub-heading 'Limitations' (page 14) to clearly delineate this section of the Discussion.

9. *"What are suggestions of the study? Authors should be added their suggestions for future studies in the Discussion section."*

We thank the Reviewer for their comment. We note that suggestions for future qualitative and prospective studies was made in the Discussion section of the original manuscript. We have revised the expression to make this clearer (Discussion, page 14, paragraph 3):

Future qualitative and prospective studies should be undertaken to contribute to a theoretical understanding of the link between DV and suicidal behaviour within the context of LMIC, and to elucidate the role of social support and other potential modifiable/mediating factors in the relationship between DV and self-harm.

10. *"Authors should be written clinical implications of their study in the Conclusions section."*

We thank the Reviewer for their comment. We note that clinical implications were described in the concluding paragraph of the original manuscript and can be found starting page 17, paragraph 2 of the revised manuscript:

At the clinical level, identification of any type of domestic violence and severity of abuse should be part of the routine clinical assessment of patients presenting with self-harm, followed by a referral, as appropriate, to local DV support services. In Sri Lanka, 'Friendly Haven' counselling centres (*Mithuru Piyasa/Natpu Nilayam*) have been established in selected government hospitals to provide first-line support to women experiencing DV, with evidence of increasing uptake (WHO, 2018). Enhanced integration between such centres and psychiatric services may be valuable as psychotherapies for women experiencing DV in LMIC have also been shown to be effective (Keynejad, Hanlon, & Howard, 2020).

Reviewer: 2

1. *"This study assessed the relationship between domestic violence and self-harm in patients hospitalized for self-poisoning, using two matched samples for comparison. They found that exposure to DV in the last year was associated with self-poisoning, and*

they also found interesting gender differences. The study addresses and interesting and important topic, however, the presentation of the study needs improvement."

We thank the Reviewer for their time in considering this manuscript and for their comments.

Introduction section:

2. *"Please follow APA style: no need to have "introduction" heading, no need for et al. in italics, etc."*

We thank the Reviewer for their comments. We have revised the manuscript to adhere to APA style. The heading "Introduction" remains in the revised manuscript, in accordance with the Journal's formatting style.

3. *"The first two paragraph's logic, arguing why the topic is important, could be presented in a more straightforward manner."*

We thank the Reviewer for their comments. We have revised the Introduction to convey the topic more clearly (page 3-5).

4. *"Domestic violence is defined in the study as "any act of violence perpetrated by any household member (e.g. intimate partner, parent, sibling) that results in physical, sexual, emotional or psychological harm and suffering." Does it mean the violence needs to be physical, I suppose not necessarily harming the partner physically, like throwing something? It would be important to clarify, I hope later it will be."*

We thank the Reviewer for their comments. We have revised the definition provided in the Introduction section to clarify our definition of domestic violence (page 4, paragraph 4 and below) and have also provided a copy of the HARK questionnaire as supplementary material.

> DV is defined in the present study as emotional, physical and sexual violence perpetrated by any household member (e.g. intimate partner, parent, sibling) and fear of any household member in the last 12 months.

5. *"Please edit for style and clarity, for example this sentence: "This is the first analytic study, to our knowledge, to investigate the relationship between any type of DV and self-poisoning in men and women in South Asia, where 37% of suicide deaths occur (WHO, 2014)."*

   "The wording is sometimes unclear, for example: "Cases were defined as patients".

   We thank the Reviewer for their comments. We have reviewed the manuscript overall and revised statements to convey points more clearly.

6. *"Also, more information about the population would be helpful to understand the context."*

We have added additional detail to the 'Study setting' sub-section of the Methods section (page 5, paragraph 3):

> Data were collected from the Teaching Hospital Peradeniya (THP) and local catchment area of the hospital. The THP is a tertiary referral hospital located in the highland Kandy District, Central Province of Sri Lanka,

approximately 115 kilometres east from the capital city, Colombo. Kandy is a key administrative, commercial, and cultural centre with a total population of 1,375,382, of which 81% live in rural areas, 12% urban and 6% in the plantation sector (DCS 2012). The majority of people living in Kandy identify as Sinhalese (74%), followed by Moor (14%) and Tamil (11%). Religious adherence is tied to ethnicity in Sri Lanka with the majority of Sinhalese identifying as Buddhist, most Moors as Muslim and Tamils as Hindu (DCS 2012). The majority of the working population in Kandy (50%) are employed in the services sector, 28% in the industry sector, and 22% employed in the agricultural sector (DCS 2012).

7. *"I'm not sure what self-poisoning exactly means in this study, does it include overdose with pills as well? It would worth to explain in more detail in order to have a better picture of the patient's condition."*

We thank the Reviewer for their comments. We have incorporated additional detail regarding self-poisoning methods in both the Methods (page 6, paragraph 2) and Results section (page 9, paragraph 1) as requested by the Reviewer:

> Methods
> Self-poisoning
> The outcome – self-poisoning – and method of self-poisoning (e.g. medicinal overdose, pesticide, plant poison, or household chemicals) was initially identified through the toxicology ward's patient admission record, and verbally reconfirmed through patient self-report.
>
> Results
> In total, 298 cases of self-poisoning were recruited with a response rate of 87% (Figure 1). Seven cases were subsequently excluded in the analysis due to missing data, resulting in 291 complete cases for the analysis. No significant differences in sex were observed between total excluded and included patients, however those excluded were older. The most common method of self-poisoning was overdose of medicinal substances (65%), followed by ingestion of pesticides (21%), and plant poisons (5%).

Methods

8. *Well-designed study protocol, but again, please follow APA style requirements for describing measures and process.*

We have revised the manuscript to adhere to APA style and *Psychological Medicine's* structural style for describing methods.

9. *Under Other Study Factors, the authors mention support and sense of belonging questions, but previously they declared that the present study is part of a larger one focusing on ACE, were those questions posed here as well? There is no mention of them.*

We thank the Reviewer for their comments. The 'support and sense of belonging questions' are separate from the ACE questionnaire. Although the ACE questionnaire was administered, consideration of ACE was outside the scope of this paper. The objectives related to more proximal determinants of self-poisoning and domestic violence and other clinically modifiable factors.

10. *The data is analyzed by sex, quoting important sex differences in DV and self-poisoning, these topics should be introduced in the introduction earlier.*

We thank the Reviewer for their comment. We have incorporated additional detail in the Introduction section to highlight the importance of considering sex differences (Introduction, starts page 4, paragraph 3):

> Although DV disproportionately affects women, men are also affected. A large cross-sectional survey of men in England attending general practice showed that 17% had experienced physical and emotional abuse in their lifetime, with emotional abuse being the most common form of violence experienced (Hester et al. 2017). However, evidence of the extent to which men are affected by DV and how they may be affected differently to women is scarce, especially in LMIC.

Results

11. *Please refer to Table 1 for prevalence of various DVs, before presenting the results.*

We thank the Reviewer for their comment. We have added a statement to refer to Table 1 (Results, page 11, paragraph 1) and summarised the distribution of DV, prior to presenting the results for the association between DV and self-poisoning.

> Prevalence of DV and characteristics of the sample are summarised in Table 1. Among those who had self-poisoned, 50% (95% CI 42-58) of women and 36% (95% CI 28-44) of men had been exposed to at least one type of DV within the previous 12 months, compared to 19% (95% CI 15-24) and 18% (95% CI 13-24) among female and male controls respectively. Emotional abuse showed the highest prevalence among cases and controls with similar estimates across the sexes. Exposure to physical violence and fear was higher among cases compared to controls, with marked differences among women but not men. Eight cases of sexual violence were reported overall, half of which were reported by female cases. Exposure to multiple forms of abuse was higher among female cases (23%) compared to female controls (4%) and male cases (5%).

12. *in Table 1, what is "afraid" as type of abuse?*

Afraid: 'Have you been afraid of your partner or another family member who lives in your household?' We have supplied the complete HARK questionnaire as supplementary material in the revised manuscript. Furthermore, we have added additional text to the Tables to convey the meaning of "afraid": 'Afraid of household member (vs. no abuse).'

13. *Overall, the study addresses and important topic and methodologically seems appropriate and thorough. The arguments, style and format of the manuscript could be improved.*

We thank the Reviewer for their time in considering this manuscript and for their comments.

Reviewer: 3

1. *"Associations between domestic violence (DV) and self-poisoning in adults admitted to a medical toxicology hospital ward during a five month period were examined in a case-control (plus population control) study. The study purpose was to estimate the level of risk and its contribution to the overall burden of suicidal behavior among men and women in South Asia. DV was described as emotional, physical and sexual abuse and fear of an intimate partner in the last 12 months; in addition, any one abuse type and scale of abuse (none, one type, multiple types) were investigated.*

This is a well-written statistically sound paper on a very important topic, DV and self-poisoning as a means of suicide attempt, and I enjoyed reading it. Although there may have been some issue with regard to accessibility of certain data, there are two points (actually omissions) that, if added, I feel would strengthen the paper."

We thank the Reviewer for their encouraging comments, and for their time in considering this manuscript.

2. *First, there was no information on what poisonous substances had been ingested. On the one hand, there are studies that note the use of overdosing on prescription or over-the-counter drugs (e.g., analgesics, sedatives, antidepressants and antipsychotic medications), whereas other studies report the ingestion of toxic chemical products that can be found in the household such as pesticides or cleaning agents that contain chlorine. If such information is available, it would enhance the study if a fuller description regarding the means by which suicide was attempted was described.*

We thank the Reviewer for their comments, and agree that this is an important omission. As indicated in our response to a similar comment by Reviewer 2 (comment no. 7), we have incorporated additional detail regarding self-poisoning methods in both the Methods (page 7, paragraph 3) and Results section (page 10, paragraph 2) as requested by the Reviewer:

> Methods
> Self-poisoning
> The outcome – self-poisoning – and method of self-poisoning (e.g. medicinal overdose, pesticide, plant poison, or household chemicals) was initially identified through the toxicology ward's patient admission record, and verbally reconfirmed through patient self-report.
>
> Results
> In total, 298 cases of self-poisoning were recruited with a response rate of 87% (Figure 1). Seven cases were subsequently excluded in the analysis due to missing data, resulting in 291 complete cases for the analysis. No significant differences in sex were observed between total excluded and included patients, however those excluded were older. The most common method of self-poisoning was overdose of medicinal substances (65%), followed by ingestion of pesticides (21%), and plant poisons (5%).

3. *Second, the variable "fear of intimate partner" was hardly discussed, even though investigated and tabled (and found to be significantly related to self-poisoning among women in all three models). This is a very intriguing variable, and considered to be part and parcel of physical, emotional, and sexual abuse when committed in the home by one's intimate partner. Additionally, if there are children in the household, concern for them may be central to those fears. Abuse by an intimate partner engenders both immediate fear during violent incidents, and chronic fear as it is cumulative, that has very adverse effects on health and wellbeing. Such fears also negatively affect help-seeking behaviors, which may make the path leading to suicide attempts a more likely choice. I think it is important that a discussion of this finding be added.*

The reviewer makes an important point. In light of this comment we have now incorporated additional detail regarding psychological abuse in the discussion section (page 14, paragraph 2).

> Psychological abuse, measured by fear of an intimate partner or household member showed a strong association (OR 5.65) with self-poisoning among women. Acute fear concomitant with violent incidents, in addition to chronic fear acquired over time has been shown to increase psychological distress in HIC and LMIC settings (Devries et al., 2013; Richardson, Nandi, Jaswal, & Harper, 2020). The exact

mechanism with which the experience of DV (in whatever form) leads to suicidal behaviour in Sri Lanka has not been explored. Theoretical models developed from non-HIC settings are lacking. Given that it has been argued that suicidal behaviour is different in LMIC versus HIC (Akotia, Knizek, Hjelmeland, Kinyanda, & Osafo, 2019; Colucci & Lester, 2012; D. Knipe et al., 2019; Widger, 2015), we have refrained from using traditional theoretical models to explain suicidal behaviour in this instance.

4. *Finally, a theoretical perspective, one that would explain why victims of abuse would choose to attempt suicide (e.g., Thomas Joiner's Interpersonal theory of Suicide Behavior) would be an important addition to the paper.*

The reviewer raises an interesting point. The use of a theoretical perspective or model to explain suicidal behaviour has value. We have, however, refrained from doing this as most theoretical models (especially psychological models like Joiner's theory) have been based on explaining suicidal behaviour from a high-income country (HIC) perspective. Given the strong associations between psychiatric disorders and suicidal behaviour in HICs, the resulting theories often do not adequately consider the unique social, cultural and contextual factors which have a more prominent role in suicidal behaviour in LMICs than HICs. Psychiatric disorders, whilst important in LMIC, appear to be less strongly associated with suicidal behaviour in LMIC. We hope the reviewer agrees with our approach of wanting to shift away from assuming our understanding and theories of suicidal behaviour from a HIC is applicable to socially and culturally diverse LMIC settings. We have altered the text in our discussion to address this point (page 14, paragraph 2) and have added an additional sentence suggesting further research (page 14, paragraph 3):

The exact mechanism with which the experience of DV (in whatever form) leads to suicidal behaviour in Sri Lanka has not been explored. Theoretical models from non-HIC setting are lacking. Given that it has been argued that suicidal behaviour is different in LMIC versus HIC (Akotia, Knizek, Hjelmeland, Kinyanda, & Osafo, 2019; Colucci & Lester, 2012; Knipe et al., 2019; Widger, 2015), we have refrained from using traditional theoretical models to explain suicidal behaviour in this instance.

Future qualitative and prospective studies should be undertaken to contribute to a theoretical understanding of the link between DV and suicidal behaviour within the context of LMIC, and to elucidate the role of social support and other potential modifiable/mediating factors in the relationship between DV and self-harm.

Overall, we thank the Reviewers for their time in considering this manuscript and for their comments.

Yours sincerely,

Ms. Piumee Bandara (Corresponding Author)

References

Akotia, C. S., Knizek, B. L., Hjelmeland, H., Kinyanda, E., & Osafo, J. (2019). Reasons for attempting suicide: An exploratory study in Ghana. *Transcultural psychiatry, 56*(1), 233-249.

Arkins, B., Begley, C., & Higgins, A. (2016). Measures for screening for intimate partner violence: a systematic review. *Journal of psychiatric and mental health nursing, 23*(3-4), 217-235. doi:10.1111/jpm.12289

Chowdhary, N., & Patel, V. (2008). The effect of spousal violence on women's health: Findings from the Stree Arogya Shodh in Goa, India. *Journal of postgraduate medicine, 54*(4), 306. doi:10.4103/0022-3859.43514

Colucci, E., & Lester, D. (2012). *Suicide and culture: Understanding the context*: Hogrefe Publishing.

DCS. (2016). *Sri Lanka Demographic and Health Survey 2016*. Colombo, Sri Lanka: Department of Census and Statistics (DCS) and Ministry of Health, Nutrition and Indigenous Medicine.

Devries, K. M., Watts, C., Yoshihama, M., Kiss, L., Schraiber, L. B., Deyessa, N., . . . Jansen, H. (2011). Violence against women is strongly associated with suicide attempts: evidence from the WHO multi-country study on women's health and domestic violence against women. *Social Science & Medicine, 73*(1), 79-86. doi:10.1016/j.socscimed.2011.05.006

Jayatilleke, A., Poudel, K. C., Sakisaka, K., Yasuoka, J., Jayatilleke, A. U., & Jimba, M. (2011). Wives' attitudes toward gender roles and their experience of intimate partner violence by husbands in Central Province, Sri Lanka. *Journal of interpersonal violence, 26*(3), 414-432. doi:10.1177/0886260510363420

Keynejad, R. C., Hanlon, C., & Howard, L. M. (2020). Psychological interventions for common mental disorders in women experiencing intimate partner violence in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet Psychiatry, 7*(2), 173-190. doi:10.1016/S2215-0366(19)30510-3

Knipe, D. W., Williams, A. J., Hannam-Swain, S., Upton, S., Brown, K., Bandara, P., . . . Kapur, N. (2019). Psychiatric morbidity and suicidal behaviour in low-and middle-income countries: A systematic review and meta-analysis. *PLoS medicine, 16*(10), e1002905.

Paiman, A., Khan, M., Ali, T., Asad, N., & Azam, I. (2019). Psychosocial factors of deliberate self-harm in Afghanistan: a hospital based, matched case-control study. *Eastern Mediterranean health journal, 25*(11), 798-805. doi:10.26719/emhj.19.021

Sohal, H., Eldridge, S., & Feder, G. (2007). The sensitivity and specificity of four questions (HARK) to identify intimate partner violence: a diagnostic accuracy study in general practice. *BMC family practice, 8*(1), 49. doi:10.1186/1471-2296-8-49

WHO. (2018). *Country Profile on Gender-Based Violence in Sri Lanka*. Colombo: World Health Organization, Country Office for Sri Lanka.

Widger, T. (2015). *Suicide in Sri Lanka: the anthropology of an epidemic*: Routledge.

Domestic violence and self-poisoning in Sri Lanka

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Funding statement: This work was supported by UK Medical Research Council (grant number MC_PC_MR/R019622/1).

Word count: 4480

ABSTRACT

Background

There is increasing evidence that domestic violence (DV) is an important risk factor for suicidal behaviour. The level of risk and its contribution to the overall burden of suicidal behaviour among men and women has not been quantified in South Asia. We carried out a large case-control study to examine the association between ~~physical, sexual and emotional violence~~DV and self-poisoning in Sri Lanka.

Methods

Cases (N=291) were patients aged ≥18 years, admitted to a tertiary hospital in Kandy Sri Lanka for self-poisoning. Sex and age frequency matched controls were recruited from the hospital's outpatient department (N=490) and local population (N=450). Exposure to DV was collected through the Humiliation, Afraid, Rape, Kick (HARK) questionnaire. Multivariable logistic regression models were conducted to estimate the association between DV and self-poisoning, and population attributable fractions (PAF) were estimated.

Results

Exposure to at least one type of DV within the previous 12 months was strongly associated with self-poisoning for women (adjusted OR [AOR] 4·08, 95%CI 1·60-4·78) and men (AOR 2·52, 95%CI 1·51-4·21), compared to those reporting no abuse. Among women, the association was strongest for physical violence (AOR 14·07, 95%CI 5·87-33·72), whereas among men, emotional abuse showed the highest risk (AOR 2·75, 95%CI 1·57-4·82). PAF% for exposure to at least one type of DV was 38% (95%CI 32-43) in women and 22% (95%CI 14-29) in men.

Conclusions

~~A strong association between domestic violence and self-poisoning was observed.~~ Multi-sectoral interventions to address DV including enhanced identification in health care settings, community-based strategies, and integration of DV support and psychological services may substantially reduce suicidal behaviour in Sri Lanka.

INTRODUCTION

~~Suicide and self-harm are major public health problems that have a profound impact on individuals, families, communities, and societies across the world.~~ Globally, approximately two thirds of all suicide deaths annually occur in low- and middle-income countries (LMIC) (WHO, 2014). Sri Lanka, a middle-income country has made significant progress in reducing its overall suicide rate (Knipe, Gunnell, & Eddleston, 2017), however suicide remains a key cause of premature mortality and rates of medicinal self-poisoning have increased in recent years, particularly among young women (de Silva, Senanayake, Dias, & Hanwella, 2012; Knipe et al., 2017; Rajapakse, Griffiths, & Christensen, 2013; Senarathna et al., 2012). Understanding the risk factors for suicidal behaviour is crucial in informing prevention efforts. Psychiatric disorders are important determinants of suicidal behaviour, however evidence of this association in LMIC is less clear, highlighting the need for a wider, non-medical approach (Knipe, Williams, et al., 2019). In Sri Lanka, qualitative and case-series studies have consistently reported conflict and verbal disputes with an intimate partner or family member as the most common precipitating factor associated with suicidal behaviour (Konradsen, van der Hoek, & Peiris, 2006; Rajapakse et al., 2013). This is consistent with findings from Pakistan and India where interpersonal conflict, including family arguments and relationship breakdowns, have been identified as an acute trigger in up to 68% of self-harm cases (Parkar, Dawani, & Weiss, 2006; Syed & Khan, 2008).

A systematic review of 37 studies (31 of which originated from HIC) showed strong associations between intimate partner violence (IPV) and suicidal behaviour (McLaughlin, O'carroll, & O'connor, 2012). ~~The reasons for suicide and self-harm are complex and multi-faceted., highlighting the need for a wider, non-medical approach to suicide prevention in these settings. There is increasing evidence, largely originating from high-income countries (HIC), that domestic violence is an important risk factor for suicidal behaviour (Devries et al., 2013; McLaughlin et al., 2012).~~ The WHO multi-country study using population-based surveys from mostly LMIC, showed that women exposed to physical or sexual violence were 3.8 times more likely to attempt suicide than non-abused women (Devries et al., 2011). Evidence from studies conducted in Afghanistan (Paiman, Khan, Ali, Asad, & Azam, 2019) and India

(Chowdhary & Patel, 2008) likewise demonstrated strong associations between lifetime exposure to domestic violence (DV) and self-harm (OR 6.4 and 7.2 respectively). ~~Furthermore, qualitative studies in Sri Lanka have consistently reported conflict with an intimate partner or family member as the most common precipitating factor associated with suicidal behaviour (Konradsen et al., 2006; Rajapakse et al., 2013).~~

~~According to estimates by the World Health Organization (WHO), one in three women worldwide have experienced violence by an intimate partner at some point in their lifetime~~ (WHO, 2013)~~.~~ The burden of DV appears to be higher in LMIC, particularly in South Asia where ~~nearly~~ 4~~2~~0% of ever-partnered women have experienced ~~intimate partner violence~~IPV, compared to 23% in high-income countries (WHO, 2013). In Sri Lanka, community-based studies estimate up to 35% of women have experienced violence from their intimate-partner in their lifetime (Guruge, Jayasuriya-Illesinghe, Gunawardena, & Perera, 2015), and 17% of ever-partnered women aged 15-49 years have experienced IPV in the past year (DCS, 2016). This is consistent with 12-month IPV estimates from neighbouring India (22%) and Pakistan (15%) (International Institute for Population Sciences, 2017; National Institute of Population Studies & ICF, 2019).

Although DV disproportionately affects women, men are also affected. A large cross-sectional survey of men in England attending general practice showed that 17% had experienced physical and emotional abuse in their lifetime, with emotional abuse being the most common form of violence experienced (Hester, Jones, Williamson, Fahmy, & Feder, 2017). However, evidence of the extent to which men are affected by DV and how they may be affected differently to women is scarce, especially in LMIC. ~~According to the 2016 Sri Lanka Demographic and Health Survey, 17% of ever-married women had experienced intimate-partner violence within the last 12 months preceding the survey. Community-based studies in Sri Lanka have reported lifetime prevalence estimates of up to 35%~~

~~Despite the high burden of intimate partner violence in the country and wider region, there is limited evidence examining DV and its association with suicidal behaviour.~~ DV ~~,~~ is defined in the present study as emotional, physical and sexual abuse perpetrated by any household member (e.g. intimate partner, parent, sibling) and fear of any household member in the last 12 months. ~~as defined in this study, refers~~

~~to any act of violence perpetrated by any household member (e.g. intimate partner, parent, sibling) that results in physical, sexual, emotional or psychological harm and suffering. This is the first analytic study, to our knowledge, to investigate the relationship between any type of DV and self-poisoning in men and women in South Asia, where 37% of suicide deaths occur~~ (WHO, 2014)~~.~~ ~~To~~ To our knowledge, this is the first study to examine the level of risk of different forms of DV in the past year and its contribution to the overall burden of suicidal behaviour among men and women in South Asia.

This study draws on data collected as part of a large hospital-based case-control study investigating adverse childhood experiences and self-poisoning in Sri Lanka (Knipe, Bandara, et al., 2019). The specific aims of this study were to assess 1) the association between exposure to at least one type of DV and self-poisoning; 2) the association and differential effects between exposure to specific types of abuse and self-poisoning; 3) if there is a dose-response effect between DV severity (i.e. experiencing multiple types of abuse) and self-poisoning; and 4) examine if these associations differ by sex.

METHODS

Study setting

~~This study draws on data collected as part of a broader case-control study investigating adverse childhood experiences and self-poisoning in Sri Lanka~~ (Knipe, Bandara, et al., 2019)~~.~~ ~~Data~~ Data were collected from the Teaching Hospital Peradeniya (THP) and local catchment area of the hospital. The THP is a tertiary referral hospital located in the highland Kandy District, Central Province of Sri Lanka, approximately 115 kilometres east from the capital city, Colombo. Kandy is a key administrative, commercial, and cultural centre ~~Kandy has a high population density~~ with a total population of 1,375,382, of which 81% live in rural areas, 12% urban and 6% in the plantation sector (DCS, 2012)~~.~~ The majority of people living in Kandy identify as Sinhalese (74%), followed by Moor (14%) and Tamil (11%). Religious adherence is tied to ethnicity in Sri Lanka with the majority of Sinhalese identifying as Buddhist, most Moors as Muslim and Tamils as Hindu ~~ethnic and religious distribution of Kandy mirrors the national distribution, with 74% and 73% of Sri Lankans living in Kandy identifying as Sinhalese and Buddhist respectively~~ (DCS, 2012). The majority of the working population in Kandy

(50%) are employed in the services sector, 28% in the industry sector, and 22% employed in the agricultural sector (DCS 2012).

Study design and participants

A hospital-based case-control study design was used. A population-based control series was also recruited to address potential for selection bias within the hospital control series.

Cases

Cases ~~were defined as~~were patients aged 18 years and over admitted to the medical toxicology ward for self-poisoning between July 18, 2018 and December 31, 2018. All patients presenting to the THP for any method of deliberate (defined in this study as an act of non-fatal self-poisoning regardless of suicidal intent) or accidental self-poisoning are transferred to the medical toxicology ward for treatment and management. ~~Accidental and deliberate self-poisoning (the latter defined in this study as an act of non-fatal self-poisoning regardless of suicidal intent) and type of poison ingested was initially identified through the patient admission record, and verbally reconfirmed through patient self-report.~~ In total, 291 patients with any method of deliberate self-poisoning (hereafter referred to as self-poisoning) were included in this study. ~~Suicidal intention and lethality of the attempt were not assessed due to constraints on the length of the questionnaire. Self-harm due to other methods, for example, burning and cutting were not included in the study. Self-poisoning has been previously reported as the most common method of non-fatal self-harm~~ (Eddleston et al., 2005; Rajapakse et al., 2013)~~, and accounted for 98% of hospital presenting self-harm cases in a study covering 13 hospitals in the North Central Province of Sri Lanka~~ (Knipe, Metcalfe, et al., 2019)~~.~~

Controls

Sex and age (± five-year age strata) frequency matched controls (N=490) were recruited from the outpatient department, and nearby specialist clinics of the same hospital over the same time period. Hospital controls were either accompanying visitors or outpatients presenting with conditions unrelated to the outcome of interest, such as a cough, chest infection, or hypertension. Controls with a self-

reported previous self-harm episode, regardless of method and whether or not it required hospitalisation, were excluded from the analysis.

To address the potential for selection bias within the hospital control series, a population-based control series (N=450) were also recruited from the local population. Two administrative divisions within the Kandy District (Gangawata Korale Divisional Secretary Division and Yatinuwara Divisional Secretary Division) were identified as the main population catchments for THP, and were also the districts where the largest proportion of cases resided. Twelve villages (*Grama Niladhari* sub-divisions) out of a total 159 were randomly selected from these divisions. Selected villages were compared with 2017 Census data to ensure similar distributions to the source population in terms of sex, age, and ethnicity. Between January 19, 2019 to April 2, 2019, sex and age frequency matched controls were recruited door to door. Due to logistical reasons such as the topography of the region, not every household within the sampling frame could be reached. For every household approached, only one participant matched on sex and age (± five years) was selected for interview. If more than one participant was eligible, the participant with the most recent birthday was selected for interview.

Measures

Self-poisoning

The outcome – self-poisoning – and method of self-poisoning (e.g. medicinal overdose, pesticide, plant poison, or household chemicals) was initially identified through the toxicology ward's patient admission record, and verbally reconfirmed through patient self-report. Suicidal intention and lethality of the attempt were not assessed due to constraints on the length of the questionnaire. Self-harm due to other methods, for example, burning and cutting were not included in the study. Self-poisoning has been previously reported as the most common method of non-fatal self-harm (Eddleston et al., 2005; Rajapakse et al., 2013), and accounted for 98% of hospital presenting self-harm cases in a study covering 13 hospitals in the North Central Province of Sri Lanka (Knipe, Metcalfe, et al., 2019).

Domestic violence

Data on the main exposure of interest, DV, were collected using the Humiliation, Afraid, Rape and Kick (HARK) 4-item questionnaire. (Sohal, Eldridge, & Feder, 2007). A previous study indicated that the HARK questionnaire accurately identifies partner violence with high specificity (95%) and sensitivity (81%) (Sohal et al., 2007). The HARK questions identify women who have experienced four types of abuse – physical, sexual, and humiliation/emotional abuse, and fear of an intimate partner in the past 12 months. ~~The HARK questions identify women who have experienced four types of abuse – physical, sexual and humiliation/emotional abuse, and fear of an intimate partner in the past 12 months. Responses to the items were measured on a binary scale where 0 = no abuse and 1 = exposure to abuse. A HARK score ≥1 indicates exposure to at least one type of abuse.~~ The questionnaire was broadened to include abuse by any household member, not just by an intimate partner (Supplementary Table 1). It was then translated, back-translated and piloted in the two local languages (Sinhala and Tamil) with individuals at the outpatient ward of THP. No modifications were required after piloting with the local population. Responses to the items were measured on a binary scale where 0 = no abuse and 1 = exposure to abuse. A HARK score ≥1 indicates exposure to at least one type of abuse.

Other study factors

Sociodemographic data were collected using a questionnaire pretested with THP visitors and outpatients. Sociodemographic factors included age, sex, ethnicity, religion, marital status, household composition, and residential area. Socioeconomic status indicators were also collected, and included educational attainment and vehicle ownership. All participants were asked, "Have you ever previously self-harmed in the past?", and prior diagnosis of a mental disorder was also collected through self-report. Finally, participants were asked questions relating to current social support and sense of belonging at the household and community level. These questions relating to support were derived from a large social capital community survey in the North Central Province of Sri Lanka (American Foundation for Suicide Prevention, 2018).

Data collection

~~Exposure and outcome information~~Data were collected via face-to-face interview. All interviews were conducted by trained data collectors in the participant's preferred language (Sinhala, Tamil or English) in a private setting to ensure responses would not be influenced by another person and for patient safety. Interviewers were not blinded to the case or control status of the participant and the same interviewers who recruited cases also recruited controls. In order to minimise interviewer bias, the interviewers were given a standard script which they were requested to follow regardless of case status. The supervisor (PB) regularly shadowed interviewers to ensure adherence to the script. A participant safety and distress protocol was provided to the data collection team and training was provided on how to deal with a distressed participant, described in detail elsewhere (Knipe, Bandara, et al., 2019). In brief, participants who reported experiencing suicidal thoughts daily during the preceding two weeks, were referred to the Psychiatry Clinic, THP for further management and follow up. If DV was disclosed, the participant was discretely provided information about support available locally and if appropriate, the patient was also referred to the psychiatry clinic. The study was ethically approved by the University of Peradeniya, Faculty of Medicine, Ethics Review Committee.

Statistical analysis

Logistic regression models, stratified by sex, were conducted on complete data to estimate the association between study factors and self-poisoning. Analyses were stratified by sex *a priori* given the epidemiology of both DV and self-poisoning differs between the sexes. Multivariable models were conducted to adjust for potential confounders. The main Model 1 adjusted for known confounders unlikely to change as a consequence of DV (age, ethnicity and religion). Model 2 adjusted for potential confounders (marital status, education level, assets – vehicle ownership) in addition to confounders in Model 1. Finally, in addition to Model 2 covariates, Model 3 adjusted for social support, household composition, and diagnosis of a mental disorder, identified in the literature as related factors in the association between DV and suicidal behaviour (Abramsky et al., 2011; Devries et al., 2013; McLaughlin et al., 2012). Interaction terms were created and entered into Model 1 to test effect measure modification by sex. Sensitivity analyses were conducted using the community control series to assess differences in the association between DV and self-poisoning. Furthermore, a secondary analysis was

conducted to examine the association between household composition and self-poisoning risk to provide additional insights. Regression modelling was conducted in Stata Version 15.1 (StataCorp, 2017) using the *logistic* function. Adjusted (Model 1) population attributable fractions (PAF%) for DV, using the prevalence of exposure from the control group, were obtained from the *punafcc* post-estimation function in Stata based on the method used by Greenland and Drescher (1993).

Results

Study sample

In total, 298 cases of self-poisoning were recruited with a response rate of 87% (Figure 1). Seven cases were subsequently excluded in the analysis due to missing data, resulting in 291 complete cases for the analysis. No marked differences in sex were observed between total excluded and included patients, however those excluded were older. The most common method of self-poisoning was overdose of medicinal substances (65%), followed by ingestion of pesticides (21%), and plant poisons (5%). A total of 500 hospital controls were recruited with a response rate of 62%, of which 2% (N=10) were subsequently excluded due to missing data, resulting in 490 controls included in the analysis (Figure 1). A similar response rate of 63% was observed for community controls, five of which were excluded due to missing data (N=450; Figure 1). Overall, more female than male controls responded. No further data were collected on non-respondents. Both control groups shared similar study characteristics, however, the hospital control series more closely matched the cases in terms of residential area. Therefore, a decision was made to use the hospital control series in the main analysis and conduct a sensitivity analysis using the community control series.

Prevalence of DV and characteristics of the sample are summarised in Table 1. Among those who had self-poisoned, 50% (95% CI 42-58) of women and 36% (95% CI 28-44) of men had been exposed to at least one type of DV within the previous 12 months, compared to 19% (95% CI 15-24) and 18% (95% CI 13-24) among female and male controls respectively. Emotional abuse showed the highest prevalence among cases and controls with similar estimates across the sexes. Exposure to physical

violence and fear was higher among cases compared to controls, with marked differences among women but not men.

~~Estimates for physical abuse among female cases (30%) were significantly higher than female controls (3%) and male cases (5%). Emotional abuse showed the highest estimates among cases and controls with similar estimates across both sexes.~~ Eight cases of sexual violence were reported overall, half of which were reported by female cases. Exposure to multiple forms of abuse was higher among female cases (23%) compared to female controls (4%) and male cases (5%).

~~A higher proportion of f~~Female ~~self-poisoning~~ cases exposed to DV reported a higher rate of previous self-harm ~~episode~~ (40%) than cases with no abuse (16%), no marked differences were found for male cases.

Domestic violence and self-poisoning

~~Among those who had self-poisoned, 50% of women and 36% of men had been exposed to at least one type of DV (HARK score ≥1) within the previous 12 months, compared to 19% and 18% among female and male controls respectively. A higher proportion of female self-poisoning cases exposed to DV reported a previous self-harm episode (40%) than cases with no abuse (16%), no significant differences were found for male cases.~~ Exposure to at least one type of DV was strongly associated with self-poisoning compared with no experience of abuse for both females (OR=4·08, 95%CI 2·60-6·41, P<0·001) and males (OR=2·52, 95%CI 1·51-4·21, P<0·001) following adjustment for age, ethnicity and religion (Table 2). Among women, all types of DV examined showed strong associations with self-poisoning, with the largest point estimate for physical violence (OR=14·07, 95%CI 5·87-33·72, P<0·001). Among men, emotional abuse showed the largest point estimate (OR=2·75 95%CI 1·57-4·82, P<0·001), compared to no abuse. A dose-response association was also evident among women for scale of violence, with an increasing risk of self-poisoning for one type of abuse (OR=2·84, 95%CI 1·69-4·78, P<0·001), and multiple types of abuse (OR=8·50, 95%CI 4·12-17·56, P<0·001) (Table 2). There was no statistical evidence that sex modified the associations observed. The strong associations observed were maintained after adjusting for potential confounders and related factors (Model 2 and 3)

(Table 2). Social support, and to a lesser extent marital status and a diagnosis of a mental disorder, attenuated the effect sizes among women (Table 2).

PAF% estimates for exposure to at least one type of DV were higher for women (38.0% 95%CI 32.2-43.3) than men (21.6% 95%CI 14.0-28.5). Among women, PAF% estimates were in a similar range for physical violence (28.5% 95%CI 26.5-30.3), fear of an intimate partner/household member (29.9% 95%CI 25.9-33.7), and emotional abuse (28.3% 95%CI 22.6-33.6). Whereas PAF% estimates for men were substantial only for emotional abuse (20.2% 95%CI 13.5-26.4).

Sensitivity analysis based on comparisons with the community control series overall showed similar associations in terms of direction for both sexes, and magnitude for males (Supplementary Table 2). Stronger associations were found among women, especially for exposure to at least one type of abuse (OR=5·14, 95%CI 3·23-8·18), and a stronger dose-response (ORs ranging from 3·98 to 9·42), compared to similar associations based on comparisons with the hospital control series (Supplementary Table 1). Secondary analysis of household composition and self-poisoning risk, adjusting for age, ethnicity, and religion, indicated that among women, the presence of in-laws increased self-poisoning risk (OR=2.49, 95%CI 1.38-4.51) when compared to nuclear household structures. Among men, in addition to the nuclear household members, the presence of extended family (grandparents/grandchild) showed the largest point estimate (OR=3.41 95% CI 1.24-9.44) (Supplementary Table 2).

Discussion

Exposure to DV was strongly associated with self-poisoning for both men and women. Physical abuse and emotional abuse had the largest point estimates for women and men respectively, and exposure to more than one type of abuse was particularly strongly associated with an increased risk in self-poisoning for women.

Although limited to violence perpetrated by an intimate partner, the WHO study estimate for the association between exposure to at least one type of violence and a suicide attempt (OR 3·8) (Ellsberg,

Jansen, Heise, Watts, & Garcia-Moreno, 2008), is similar to the present study (OR 4·1), while estimates in South Asian settings are slightly higher, ranging between OR 6·4 to 7·21 (Chowdhary & Patel, 2008; Paiman et al., 2019). The strong association between physical violence and self-poisoning among women is supported by studies in LMIC settings which have reported physical and sexual violence to be more strongly associated with suicidal behaviour (Chowdhary & Patel, 2008; Hassanian-Moghaddam, Zamani, & Sarjami, 2016; Ishida, Stupp, Melian, Serbanescu, & Goodwin, 2010). There is substantial evidence that physical violence is concomitant with emotional, psychological, and sexual abuse, cumulatively increasing the risk of suicide attempts (Devries et al., 2011; McLaughlin et al., 2012). A dose-response association was found between experiencing multiple types of abuse and self-poisoning among women but not for men. Given any exposure to DV demonstrated a higher risk of self-poisoning, and cases exposed were more likely to report a previous self-harm episode, identification of any exposure and severity of abuse should be part of the routine clinical assessment of self-poisoning patients, and appropriate local services developed or identified to support these individuals to reduce the risk of repetition.

Sexual violence was associated with self-poisoning among women as has been reported elsewhere (Chowdhury, Brahma, Banerjee, & Biswas, 2009; Devries et al., 2013; Devries et al., 2011). The weak statistical evidence ~~however may be~~ is due to the small number of women reporting sexual violence (11 [0.9%] of all 1231 participants). It is likely this was under-reported by participants and is considerably lower than ~~attributed to the under-reporting of sexual violence (11 [0.9%] of all 1231 participants), which was below~~ previously reported estimates of 5% to 18% (DCS, 2016; Guruge et al., 2015; Jayatilleke et al., 2011). Socio-cultural factors such as stigma, sensitivity around discussions of sexual activity, and marital rape not being considered a punishable offence in Sri Lanka may have limited disclosure and affected the magnitude of the observed association. Detailed, in-depth interviews may overcome the socio-cultural barriers to disclosing sexual violence in this context.

There are relatively few studies globally, particularly in LMIC, that have measured DV against men and its association with suicidal behaviour, and those that have, are often limited to physical violence (McLaughlin et al., 2012). Emotional abuse showed the highest prevalence among men and women,

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and largest point estimate among men when compared to other types of abuse. ~~was explored in~~Previous studies from the similarly found that emotional abuse was the most common type of DV experienced by men in the past 12 months (Hester et al., 2017; Office for National Statistics, 2019). Further qualitative research examining DV in men and its relationship with self-harm in LMIC settings is needed to better understand this association.

Psychological abuse, measured by fear of an intimate partner or household member showed a strong association (OR 5.65) with self-poisoning among women. Acute fear concomitant with violent incidents, in addition to chronic fear acquired over time has been shown to increase psychological distress in HIC and LMIC settings ~~,~~(Devries et al., 2013; Richardson, Nandi, Jaswal, & Harper, 2020). The exact mechanism with which the experience of DV (in whatever form) leads to suicidal behaviour in Sri Lanka has not been explored. Theoretical models developed from non-HIC settings are lacking. Given that it has been argued that suicidal behaviour is different in LMIC versus HIC (Akotia, Knizek, Hjelmeland, Kinyanda, & Osafo, 2019; Colucci & Lester, 2012; Knipe, Williams, et al., 2019; Widger, 2015), we have refrained from using traditional theoretical models to explain suicidal behaviour in this instance.

Social support substantially attenuated the observed association between DV and self-poisoning. It has been reported previously that poor social support could be both a precursor and consequence of DV, and could potentially moderate the relationship between DV and self-harm (Coker et al., 2002; Fedina et al., 2019; McLaughlin et al., 2012). ~~A more detailed understanding of the role of social support in the relationship between DV and self-harm through prospective studies and qualitative research is required.~~Future qualitative and prospective studies should be undertaken to contribute to a theoretical understanding of the link between DV and suicidal behaviour within the context of LMIC, and to elucidate the role of social support and other potential modifiable/mediating factors in the relationship between DV and self-harm.

~~There are relatively few studies globally, particularly in LMIC, that have measured domestic violence against men, and those that have, are often limited to physical violence~~ (McLaughlin et al., 2012)~~.~~

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~~Emotional abuse, which showed the highest prevalence and largest point estimate in the present study among men when compared to other types of abuse, was explored in a UK report on DV and similarly found that emotional abuse was the most common type of DV experienced by men in the past 12 months~~ (Office for National Statistics, 2019)~~. Further research examining DV in men and its relationship with self-harm in LMIC settings is needed to better understand this association.~~

This study has a number of key strengths. To the best of our knowledge, ~~T~~this is the first large study to quantify the association between DV and self-poisoning among men and women in South Asia and examine its contribution to the overall burden of suicidal behaviour. The study also addresses key gaps identified in the literature, including the examination of differential effects by type of DV, effects of exposure to multiple types of abuse, and exploration of potential associated factors. Furthermore, there is a dearth of evidence examining DV in men, particularly in LMIC settings, this study presents novel findings of the role of DV in male self-poisoning. Culturally adapted and translated versions of a validated instrument for the assessment of DV and the use of pretested forms for the assessment of other study variables were also key strengths of the study.

Sensitivity analyses using a community control series to address possible selection bias also strengthened the study. These findings suggest that, in this context, hospital controls did not appear to bias the results substantially towards the null as is often the case in hospital-based case-control studies. This has critical implications for future study designs examining self-harm in resource-poor settings. In the absence of primary care infrastructure, 'clinical' controls presenting to hospital or tertiary care services may be more similar to exposure distributions in the source population than in hospital-based case-control studies in high income contexts.

Limitations

There are a number of methodological considerations in interpreting the findings from this study. Interpretation of a causal relationship between DV and self-poisoning is limited due to the retrospective nature of the study design. Furthermore, a key limitation of this study is the potential for selection bias. Despite a high response rate overall, the response rate was lower among the control group (62%) compared to cases (87%), and it is possible that excluded controls may differ in comparison to controls

included. Limited information was collected on excluded controls therefore it is not possible to assess the extent of this potential selection bias. The hospital controls recruited did however broadly match the source population in terms of age, sex, ethnicity and religion.

Additional selection bias may have also been introduced through the inclusion of outpatients in the hospital control group as they may have a different exposure distribution compared to the source population. Notably, the 12-month prevalence of DV in the hospital control group (19%) was consistent with nationally representative 12-month prevalence estimates (17%) and regional estimates (which vary between 19% (Jayatilleke et al., 2011) and 25% (DCS, 2016)). Moreover, sensitivity analyses using the community control group indicated broadly similar findings, although stronger point estimates were evident among women. Possible underreporting of DV in the community control series (16%) may explain the magnified estimates, and could be attributed to interviews being conducted in the home environment, where participants may be more cautious and less inclined to disclose abuse.

Another limitation of the study is the potential for recall bias. Individuals who have self-harmed may be less reticent about acknowledging DV and be more likely to recall DV related to the self-harm episode, than the control group, leading to an overestimation of the association. All participants were asked if they had experienced DV within the last 12 months, this timeframe would minimise the risk of recall bias. It should be acknowledged that the HARK questionnaire used in the present study has not been validated for use in men and within the Sri Lankan population, however, the questionnaire was pre-tested with the local population and as previously discussed, any DV exposure in the last 12 months among female controls in this study was consistent with the Sri Lankan DHS survey and other studies in Sri Lanka. As previously discussed, due to socio-cultural factors associated with the study setting and limited time for in-depth interviewing, some participants may have been reluctant to disclose particularly sensitive issues such as sexual abuse (DCS, 2016; Jayatilleke et al., 2011).

Finally, when interpreting the PAFs, it is important to consider that these estimates assume a causal relationship between exposure and outcome. Given the strong and consistent association previously documented in the international literature between DV and suicidal behaviour, the assumption in the present study is reasonable. An additional assumption of the PAFs is that removing the exposure will

not affect other potential risk factors. This assumption is more difficult to uphold given the inter-relationship between a range of social factors and DV associated self-harm. However, well documented confounders were adjusted for in estimating the PAFs. Furthermore, the underlying DV prevalence used, derived from the control group, was consistent with regional estimates, heightening the sensitivity of the PAFs.

Given the high burden of DV and the strength of the association with self-poisoning, targeting DV prevention may result in substantial reductions in suicidal behaviour and other DV-related adverse health outcomes. At the clinical level, identification of any type of DV and severity of abuse should be part of the routine clinical assessment of patients presenting with self-harm, followed by a referral, as appropriate, to local DV support services. In Sri Lanka, 'Friendly Haven' counselling centres (*Mithuru Piyasa/Natpu Nilayam*) have been established at selected government hospitals to provide first-line support to women experiencing DV, with evidence of increasing uptake (WHO, 2018). Enhanced integration between such centres and psychiatric services may be valuable as psychotherapies for women experiencing DV in LMIC have also been shown to be effective (Keynejad, Hanlon, & Howard, 2020). However, strategies should not be limited to biomedical interventions. Community-based strategies that have involved community ambassadors, capacity building of frontline workers (e.g. police officers, health care workers, teachers), together with dissemination of DV learning materials have shown promising evidence in South Africa (Pronyk et al., 2006) and Uganda (Wagman et al., 2015) in reducing DV and may prove effective in Sri Lanka.

Contributors

DK and TR were responsible for study concept, and design. DK, TR, JK, and LS secured funding for the study. DK and TR wrote the protocol. DK, TR and PB were responsible for piloting the survey. TR and PB were responsible for supervising data collection. PB was responsible for data analysis, manuscript preparation, coordination and revision. DK, AP, DG and GF contributed to analysis and interpretation of data, and critical revisions of the manuscript. All authors provided critical evaluation and revision of the manuscript and have given final approval of the manuscript accepting responsibility for all aspects.

Acknowledgements

The authors would like to thank the senior academics who have acted as advisors for the study: Professor Chris Metcalfe (University of Bristol), Professor Michael Eddleston, (University of Edinburgh), and Professor Flemming Konradsen (University of Copenhagen). The authors would like to thank the staff at SACTRC, in particular Chamil Kumara, Indunil Abeyratne, and Sujani Ekanayake for their support in setting up the study and would like to acknowledge the substantial contribution of the data collection team Azra Aroos, Kasuni Silva, Tharuka Silva and Sandareka Samarakoon, and the staff at the Teaching Hospital Peradeniya for accommodating this research. The authors thank Mr Upali Perera for designing and maintaining the study database. The authors would also like to thank José López-López and Abby Russell for their input on the analysis plan.~~,~~ ~~and f~~Finally, the authors ~~would like to~~ acknowledge the Elizabeth Blackwell Institute for Health Research, University of Bristol and the Wellcome Trust Institutional Strategic Support Fund for supporting DK. GF&DG are supported by the NIHR Biomedical Research Centre at University Hospitals Bristol and Weston NHS Foundation Trust and the University of Bristol. The views expressed are those of the author(s) and not necessarily those of the NIHR or the Department of Health and Social Care.

Funding statement: This work was supported by UK Medical Research Council (grant number MC_PC_MR/R019622/1).

Conflicts of Interest: None.

Ethics: The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

References

Abramsky, T., Watts, C. H., Garcia-Moreno, C., Devries, K., Kiss, L., Ellsberg, M., . . . Heise, L. (2011). What factors are associated with recent intimate partner violence? Findings from the WHO multi-country study on women's health and domestic violence. *BMC public health, 11*(1), 109. doi:10.1186/1471-2458-11-109

Akotia, C. S., Knizek, B. L., Hjelmeland, H., Kinyanda, E., & Osafo, J. (2019). Reasons for attempting suicide: An exploratory study in Ghana. *Transcultural psychiatry, 56*(1), 233-249.

American Foundation for Suicide Prevention. (2018). The Association of Social Capital and Self-Harm in Rural Sri Lanka. Retrieved from https://afsp.org/grant/the-association-of-social-capital-and-self-harm-in-rural-sri-lanka

Chowdhary, N., & Patel, V. (2008). The effect of spousal violence on women's health: Findings from the Stree Arogya Shodh in Goa, India. *Journal of postgraduate medicine, 54*(4), 306. doi:10.4103/0022-3859.43514

Chowdhury, A. N., Brahma, A., Banerjee, S., & Biswas, M. (2009). Pattern of domestic violence amongst non-fatal deliberate self-harm attempters: A study from primary care of West Bengal. *Indian journal of psychiatry, 51*(2), 96. doi:10.4103/0019-5545.49448

Coker, A. L., Smith, P. H., Thompson, M. P., McKeown, R. E., Bethea, L., & Davis, K. E. (2002). Social support protects against the negative effects of partner violence on mental health. *Journal of women's health & gender-based medicine, 11*(5), 465-476.

Colucci, E., & Lester, D. (2012). *Suicide and culture: Understanding the context*: Hogrefe Publishing.

DCS. (2012). *Census of Population and Housing - 2012*. Colombo: Department of Census and Statistics Sri Lanka.

DCS. (2016). *Sri Lanka Demographic and Health Survey 2016*. Colombo, Sri Lanka: Department of Census and Statistics (DCS) and Ministry of Health, Nutrition and Indigenous Medicine.

de Silva, V. A., Senanayake, S., Dias, P., & Hanwella, R. (2012). From pesticides to medicinal drugs: time series analyses of methods of self-harm in Sri Lanka. *Bulletin of the World Health Organization, 90*, 40-46. doi:10.2471/BLT.11.091785

Devries, K. M., Mak, J. Y., Bacchus, L. J., Child, J. C., Falder, G., Petzold, M., . . . Watts, C. H. (2013). Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS medicine, 10*(5), e1001439. doi:10.1371/journal.pmed.1001439

Devries, K. M., Watts, C., Yoshihama, M., Kiss, L., Schraiber, L. B., Deyessa, N., . . . Jansen, H. (2011). Violence against women is strongly associated with suicide attempts: evidence from the WHO multi-country study on women's health and domestic violence against women. *Social Science & Medicine, 73*(1), 79-86. doi:10.1016/j.socscimed.2011.05.006

Eddleston, M., Gunnell, D., Karunaratne, A., De Silva, D., Sheriff, M. R., & Buckley, N. A. (2005). Epidemiology of intentional self-poisoning in rural Sri Lanka. *The British Journal of Psychiatry, 187*(6), 583-584. doi:10.1192/bjp.187.6.583

Ellsberg, M., Jansen, H. A., Heise, L., Watts, C. H., & Garcia-Moreno, C. (2008). Intimate partner violence and women's physical and mental health in the WHO multi-country study on women's health and domestic violence: an observational study. *The lancet, 371*(9619), 1165-1172. doi:10.1016/S0140-6736(08)60522-X

Fedina, L., Mushonga, D. R., Bessaha, M. L., Jun, H.-J., Narita, Z., & DeVylder, J. (2019). Moderating effects of perceived neighborhood factors on intimate partner violence, psychological distress, and suicide risk. *Journal of interpersonal violence*, 0886260519884687.

Greenland, S., & Drescher, K. (1993). Maximum likelihood estimation of the attributable fraction from logistic models. *Biometrics*, 865-872. doi:10.2307/2532206

Guruge, S., Jayasuriya-Illesinghe, V., Gunawardena, N., & Perera, J. (2015). Intimate partner violence in Sri Lanka: a scoping review. *Ceylon medical journal, 60*(4), 133-138. doi:10.4038/cmj.v60i4.8100

Hassanian-Moghaddam, H., Zamani, N., & Sarjami, S. (2016). Violence and abuse against women who have attempted suicide by deliberate self-poisoning: a 2-year follow-up study in Iran. *Journal of interpersonal violence, 31*(7), 1257-1273. doi:10.1177/0886260514564157

Hester, M., Jones, C., Williamson, E., Fahmy, E., & Feder, G. (2017). Is it coercive controlling violence? A cross-sectional domestic violence and abuse survey of men attending general practice in England. *Psychology of violence, 7*(3), 417. doi:10.1037/vio0000107

International Institute for Population Sciences. (2017). National Family Health Survey (NFHS-4), 2015–16: India. Mumbai: International Institute for Population Sciences.

Ishida, K., Stupp, P., Melian, M., Serbanescu, F., & Goodwin, M. (2010). Exploring the associations between intimate partner violence and women's mental health: evidence from a population-based study in Paraguay. *Social Science & Medicine, 71*(9), 1653-1661. doi:10.1016/j.socscimed.2010.08.007

Jayatilleke, A., Poudel, K. C., Sakisaka, K., Yasuoka, J., Jayatilleke, A. U., & Jimba, M. (2011). Wives' attitudes toward gender roles and their experience of intimate partner violence by husbands in Central Province, Sri Lanka. *Journal of interpersonal violence, 26*(3), 414-432. doi:10.1177/0886260510363420

Keynejad, R. C., Hanlon, C., & Howard, L. M. (2020). Psychological interventions for common mental disorders in women experiencing intimate partner violence in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet Psychiatry, 7*(2), 173-190. doi:10.1016/S2215-0366(19)30510-3

Knipe, D. W., Bandara, P., Senarathna, L., Kidger, J., López-López, J., & Rajapakse, T. (2019). Childhood adversity and deliberate self-poisoning in Sri Lanka: a protocol for a hospital-based case–control study. *BMJ open, 9*(8), e027766. doi:10.1136/bmjopen-2018-027766

Knipe, D. W., Gunnell, D., & Eddleston, M. (2017). Preventing deaths from pesticide self-poisoning—learning from Sri Lanka's success. *The Lancet Global Health, 5*(7), e651-e652. doi:10.1016/S2214-109X(17)30208-5

Knipe, D. W., Metcalfe, C., Hawton, K., Pearson, M., Dawson, A., Jayamanne, S., . . . Gunnell, D. (2019). Risk of suicide and repeat self-harm after hospital attendance for non-fatal self-harm in Sri Lanka: a cohort study. *The Lancet Psychiatry, 6*(8), 659-666. doi:10.1016/S2215-0366(19)30214-7

Knipe, D. W., Williams, A. J., Hannam-Swain, S., Upton, S., Brown, K., Bandara, P., . . . Kapur, N. (2019). Psychiatric morbidity and suicidal behaviour in low-and middle-income countries: A systematic review and meta-analysis. *PLoS medicine, 16*(10), e1002905.

Konradsen, F., van der Hoek, W., & Peiris, P. (2006). Reaching for the bottle of pesticide—a cry for help. Self-inflicted poisonings in Sri Lanka. *Social Science & Medicine, 62*(7), 1710-1719. doi:10.1016/j.socscimed.2005.08.020

McLaughlin, J., O'carroll, R., & O'connor, R. (2012). Intimate partner abuse and suicidality: a systematic review. *Clinical psychology review, 32*(8), 677-689. doi:10.1016/j.cpr.2012.08.002

National Institute of Population Studies, & ICF. (2019). Pakistan demographic and health survey 2017-18. Islamabad, Pakistan.

Office for National Statistics. (2019). Domestic abuse: Findings from the crime survey for England and Wales: Year ending March 2018. Retrieved from https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/domesticabusefindingsfromthecrimesurveyforenglandandwales/yearendingmarch2018

Paiman, A., Khan, M., Ali, T., Asad, N., & Azam, I. (2019). Psychosocial factors of deliberate self-harm in Afghanistan: a hospital based, matched case-control study. *Eastern Mediterranean health journal, 25*(11), 798-805. doi:10.26719/emhj.19.021

Parkar, S. R., Dawani, V., & Weiss, M. G. (2006). Clinical diagnostic and sociocultural dimensions of deliberate self-harm in Mumbai, India. *Suicide and Life-Threatening Behavior, 36*(2), 223-238. doi:10.1521/suli.2006.36.2.223

Pronyk, P. M., Hargreaves, J. R., Kim, J. C., Morison, L. A., Phetla, G., Watts, C., . . . Porter, J. D. (2006). Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *The lancet, 368*(9551), 1973-1983. doi:10.1016/S0140-6736(06)69744-4

Rajapakse, T., Griffiths, K. M., & Christensen, H. (2013). Characteristics of non-fatal self-poisoning in Sri Lanka: a systematic review. *BMC public health, 13*(1), 331. doi:10.1186/1471-2458-13-331

Richardson, R., Nandi, A., Jaswal, S., & Harper, S. (2020). The effect of intimate partner violence on women's mental distress: a prospective cohort study of 3010 rural Indian women. *Social psychiatry and psychiatric epidemiology, 55*(1), 71-79. doi:10.1007/s00127-019-01735-5

Senarathna, L., Jayamanna, S. F., Kelly, P. J., Buckley, N. A., Dibley, M. J., & Dawson, A. H. (2012). Changing epidemiologic patterns of deliberate self poisoning in a rural district of Sri Lanka. *BMC public health, 12*(1), 593. doi:10.1186/1471-2458-12-593

Sohal, H., Eldridge, S., & Feder, G. (2007). The sensitivity and specificity of four questions (HARK) to identify intimate partner violence: a diagnostic accuracy study in general practice. *BMC family practice, 8*(1), 49. doi:10.1186/1471-2296-8-49

StataCorp. (2017). *Stata Statistical Software: Release 15*. College Station, TX: StataCorp LLC.

Syed, E. U., & Khan, M. M. (2008). Pattern of deliberate self-harm in young people in Karachi, Pakistan. *Crisis, 29*(3), 159-163. doi:10.1027/0227-5910.29.3.159

Wagman, J. A., Gray, R. H., Campbell, J. C., Thoma, M., Ndyanabo, A., Ssekasanvu, J., . . . Serwadda, D. (2015). Effectiveness of an integrated intimate partner violence and HIV prevention intervention in Rakai, Uganda: analysis of an intervention in an existing cluster randomised cohort. *The Lancet Global Health, 3*(1), e23-e33. doi:10.1016/S2214-109X(14)70344-4

WHO. (2013). Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva: World Health Organization.

WHO. (2014). *Preventing suicide - a global imperative*. Geneva: World Health Organization.

WHO. (2018). *Country Profile on Gender-Based Violence in Sri Lanka*. Colombo: World Health Organization, Country Office for Sri Lanka.

Widger, T. (2015). *Suicide in Sri Lanka: the anthropology of an epidemic*: Routledge.

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Prof. Kenneth S. Sendler
Editor, *Psychological Medicine*

Prof. Robin M. Murray
Editor, *Psychological Medicine*

21/07/2020

Dear Prof. Sendler and Prof. Murray,

We are pleased to re-submit our revised manuscript entitled **"Domestic violence and self-poisoning in Sri Lanka"** to be considered for publication in *Psychological Medicine*. We have carefully considered each comment provided by the Reviewers and revised the manuscript accordingly.

We feel that this manuscript is appropriate for publication by *Psychological Medicine* because it has the potential to inform clinical practice and bolster the prioritisation of domestic violence in suicide prevention policy and research in low- and middle-income countries (LMICs), where 76% of suicides occur. Sri Lanka and the wider region of South Asia has a high burden of both domestic violence and self-harm, with rates of self-poisoning rising, particularly among young women. Despite this, the level of risk for individuals exposed to domestic violence, and its contribution to the overall burden of suicidal behaviour among men and women has not been quantified in South Asia, where 37% of the world's suicide deaths occur. We carried out a large case-control study to examine the association between physical, sexual and emotional violence and self-poisoning in Sri Lanka. In this manuscript, we show domestic violence is a significant risk factor for self-harm. We conclude with highlighting the importance of prioritising domestic violence prevention and support in order to reduce rates of self-harm.

This manuscript is original and has not been published elsewhere nor is it under consideration for publication elsewhere. We have no conflicts of interest to disclose. All authors have approved the manuscript and agree with its submission to *Psychological Medicine*.

Thank you for your consideration. We look forward to hearing from you at your earliest convenience.

Sincerely,

Piumee Bandara

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