



# Trajectories to Suicide Following Intimate Partner Violence Victimization: Using Structural Equation Modelling to Examine Suicide and PTSD in Female Emergency Department Users

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## Abstract

**Purpose** Intimate partner violence (IPV) is known to increase the risk of suicidal thoughts and behaviors. Despite the urgent need to increase women's safety and wellbeing, trajectories to suicide are not well understood and few studies have tested potentially important mediators, such as post-traumatic stress disorder (PTSD), that could help to improve risk stratification and clinical responses.

**Methods** This study used baseline data from a prospective cohort study (2019–2020) to examine differential effects of psychological, physical, sexual, and multiple IPV on suicidal ideation and suicide attempt and test whether pathways are mediated by PTSD. Simple random sampling – online/in-person in Australian emergency departments (EDs) – was used to survey consenting women with a recent suicide-related ED presentation. Structural equation modelling was used to test the pathways between recent and lifetime IPV, PTSD, and suicidal ideation and attempt.

**Results** Of the 1,715 women ( $M = 30.24$ ,  $SD = 11.91$  years) who participated, 1,012 (59%) reported lifetime IPV exposure, with 608 (35%) reporting recent victimization (< 18 months). Presence of PTSD wholly mediated the effects of psychological, physical, and sexual IPV on ideation ( $p < .05$ ). Multiple IPV was unique in its direct effects on ideation and attempt and these pathways were most consistent for recent IPV, compared with lifetime exposure ( $p < .05$ ).

**Conclusions** Pathway analysis identified two high-risk patient-populations: Women with recent multiple IPV and those with a diagnosis of PTSD following lifetime IPV exposure. Findings can be used to improve risk prediction and clinical intervention for patients living with mortality risk from partner- and self-directed violence.

**Keywords** Intimate partner violence · Domestic violence · Suicide · Suicide attempt · Suicidal ideation · Emergency department

Intimate partner violence (IPV) is a significant public health problem, affecting approximately one third of women globally

(World Health Organization, 2021). Pervasive and escalating use of control in intimate relationships foreshadows the development of major types of IPV including psychological, physical, sexual, and financial abuse (Lum On et al., 2016). In Australia, one in four women aged 15 or older has experienced IPV perpetrated by a previous or current (predominately male) partner (Australian Bureau of Statistics, 2023).

Exposure to IPV reflects one of the most prevalent preventable health risks for Australian women aged 25–44 years (Ayre et al., 2016). Victimization is associated with injury, central nervous system damages and chronic disease including, cardiovascular disease and hypertension, cancer, diabetes, and elevated cortisol (Campbell et al., 2018; Stubbs & Szoeki, 2022). Abuse can have debilitating impacts on women's mental health resulting in depression, anxiety, and post-traumatic stress disorder (PTSD). A growing body of

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research suggests that experiencing abuse also increases the risk of self-directed violence, such as suicide (Brown & Seals, 2019; Jiwatram-Negrón et al., 2021; Wolford-Clevenger et al., 2019). Population-based research conducted by the World Health Organization identified IPV victimization as among the most consistent risk factors for lifetime suicidal thoughts and attempts in 20,967 women from nine countries (low-income  $n=2$ ; low/middle-income  $n=3$ ; upper middle/high-income  $n=4$ ) (Devries et al., 2011).

The New South Wales (NSW) Domestic Violence Death Review Team (DVDRT) examined consecutive female suicides in NSW over a 6-month period through a review of police, health, and coronial records ( $n=85$ ) (Domestic Violence Death Review Team, 2017). Evidence of IPV or family violence victimization was identified in half of all suicides reviewed. Seventy-eight percent of this subgroup were known to the police as victims and 36% had contacted the police in the year preceding their deaths (Domestic Violence Death Review Team, 2017). Within Australia, on average, there are 14 female suicides each week (Australian Institute of Health & Welfare, 2019). The DVDRT's findings suggest that IPV may contribute to an average of seven female suicides in Australia each week. It is critical that suicide risk prediction and stratification are developed from empirical research in this vulnerable population. Targeted prevention strategies are urgently needed to offer women safe and appropriate types of support and reduce the risk of partner- and self-directed violence.

It is already known that there are strong associations between IPV and suicidal thoughts and behaviors. This body of research has been summarized in six systematic reviews and one meta-analysis that have investigated the association between IPV and suicidal outcomes (Bacchus et al., 2018; Devries et al., 2013; Dillon et al., 2013; Golding, 1999; Grose et al., 2019; McLaughlin et al., 2012; Pill et al., 2017). Conducted over twenty years ago, the only prior meta-analysis of studies reporting an association between IPV and suicidality (e.g., thoughts/attempts) ( $n=8$ ) reported a weighted mean odds ratio of 3.55 (95% CI: 2.73, 4.60) (Golding, 1999). Subsequent meta-analysis attempts have failed to identify a minimum number of IPV-suicide studies meeting their inclusion criteria and quality standards (Bacchus et al., 2018; Devries et al., 2013). Despite this, the review findings demonstrate a consistent association between IPV exposure (individual and multiple types) and suicidal thoughts and behaviors in female samples ascertained from psychiatric, emergency department (ED), women's shelter/services, HIV clinic, and community settings. However, key criticisms of the IPV-suicide evidence base pertain to poorly explained sources of heterogeneity in study design, measurement, and research setting (Ayre et al., 2016). Furthermore, few studies have included potentially important mediators of the IPV-suicide relationship in analyses, such as PTSD

(Gibbs et al., 2018; Jiwatram-Negrón et al., 2022). These methodological and analytic limitations may underlie inconsistent findings and affect identification of subpopulations at increased risk of suicide (Leiner et al., 2008).

Previous IPV-suicide studies have varied on type of IPV examined (e.g., physical, psychology, sexual, financial, and multiple/combined) with most studies lacking the sensitivity to detect differential effects of specific types on suicidal ideation and attempt (Leiner et al., 2008). As a result, the evidence base is largely limited to tests of association between IPV exposure and various suicidal outcomes with no determination of how severity and type of violence affect women's risk of suicide (McLaughlin et al., 2012). The small number of IPV typology studies in suicide-populations suggest that recent advancements in IPV measurement and the use of sophisticated statistical tests of differential effects can address prevailing unknowns by delineating the pathways to suicide (Gibbs et al., 2018; Houry et al., 2006; Jiwatram-Negrón et al., 2022; Pico-Alfonso et al., 2006).

Gibbs and colleagues (2018) examined the association between recent psychological, physical, sexual, and financial IPV on suicidal ideation in 680 women enrolled in an IPV and HIV intervention trial. The authors observed that suicidal ideation was most prevalent among women who experienced all types of IPV, indicative of cumulative effects of IPV victimization, shown to erode women's mental health. Similarly, Houry and colleagues (2006) found that concurrently experiencing more than one type of IPV generated significantly higher relative risk ratios for suicidal ideation in female ED patients. Furthermore, Pico-Alfonso and colleagues (2006) reported a significantly higher lifetime incidence of suicide attempts among women with a history of psychological and physical abuse (35%), compared with only psychological (13%) or no IPV history (2%). In their study, the concomitant experience of sexual violence significantly increased the incidence of suicide attempts in women with psychological and physical IPV exposure, though not psychological IPV alone.

Conversely, Jiwatram-Negrón and colleagues (2022) reported no associations between multiple IPV and suicidality or PTSD among 183 women using specialized IPV services. Rather, differential effects were detected for psychological vulnerability/abuse and suicidality and PTSD. No significant effects on suicidality were found for physical abuse, harassment, technology-facilitated abuse, reproductive coercion, and psychological vulnerability/abuse. This is consistent with Gibbs and colleagues' (2018) finding that, among women who experienced only one type of abuse, suicidal ideation was highest for women exposed to psychological IPV. While an earlier study reported more severe suicidal ideation and PTSD symptoms among women with a history of sexual IPV, compared with physical and psychological IPV (Houry et al., 2006). However, in this study,

physical IPV was the only type of violence found to be significantly associated with suicidal ideation in multivariate analyses.

Inconsistencies observed in the IPV-suicide evidence base may be attributed to sources of heterogeneity related to IPV measurement and categorisation, timing of exposure, choice of analyses, mediators included, and suicidal outcomes assessed. In particular, the weaker effects observed for sexual IPV, independent of other types, is unexpected given that sexual abuse is a form of physical violence that is inherently traumatic. These results, however, may be tied to the smaller number of women who experience sexual IPV, independent of its psychological and physical counterparts. This is supported by Pico-Alfonso and colleagues' (2006) findings that among participants who experienced physical and/or sexual IPV, psychological IPV was present in all cases, and as such, individual effects of IPV type on mental health outcomes could not be separated. Claims that physical and sexual types of IPV are inextricably intertwined with psychological abuse fit with the dynamics of IPV and typical escalation trajectories from discrete psychological forms to threats of overt violence and/or perpetration (Boxall & Lawler, 2021).

To reduce sources of heterogeneity and increase the validity of IPV research, the differential effects of psychological IPV should be tested alone versus in combination with physical, sexual, and financial forms. Further, to increase the comparability of findings across IPV-suicide studies, the reporting of differential and multiple IPV effects is important (i.e., reporting which types of IPV and combinations are associated with more severe suicide outcomes rather than reporting the frequency of IPV incidents). The use of IPV type measurement is supported by findings from the wider trauma literature, which have demonstrated that assessment of trauma event type is a reliable and valid predictor of PTSD (Wilker et al., 2015).

Additionally, the absence of PTSD as a mediator in previous analyses may contribute to the inconsistent results in the literature (Gibbs et al., 2018; Jiwatram-Negrón et al., 2022). Post-traumatic stress disorder is strongly associated with suicide and has been described as one of the most clinically significant mental health problems reported by IPV survivors, with international prevalence rates ranging between 31–84% among IPV-populations (Dutton, 2009; Spencer et al., 2019). Preliminary research exploring the mechanisms by which PTSD increases suicide risk has drawn on two conceptual models: the fluid vulnerability theory (FVT; Rudd, 2006) and the interpersonal theory of suicide (IPTS; Joiner, 2005). In the FVT model, PTSD is theorized to increase suicide risk by acting on key processes related to individual's baseline risk (i.e., predisposing factors that are stable and constant), thresholds for activation

(i.e., suicidal crises are more easily triggered for some than others) and capacity to recover from acute episodes (i.e., variation in individual's ability to stabilise after a crisis) (Bryan et al., 2017; Rugo-Cook et al., 2021). Whereas in the IPTS, cognitive-affective states commonly identified in PTSD symptomology (e.g., guilt, shame, and self-deprecation) overlap with its two major interpersonal constructs – thwarted belongingness and perceived burdensomeness – to increase suicide risk (Davis et al., 2014). Despite these theoretical underpinnings, and the high prevalence of PTSD in IPV-populations, few studies have examined the mediating role of PTSD on women's risk of suicide following IPV exposure (Vasconcelos Neto et al., 2020).

Studies that do not account for the mediating role of PTSD on relationships between IPV and suicide may identify incomplete pathways from victimization to suicide risk (Gibbs et al., 2018; Jiwatram-Negrón et al., 2022). The use of sophisticated statistical analyses, such as structural equation modelling (SEM), offers opportunities to bridge knowledge gaps by testing the pathways between IPV, PTSD, and suicidal ideation and suicide attempt while controlling for potential confounders (Leiner et al., 2008). Understanding traumatic responses to IPV and uncovering pathways to suicide are critical to the development of targeted intervention strategies in alignment with risk profiles, as not all women exposed to IPV will experience suicidal thoughts and fewer still will attempt suicide.

To strengthen the IPV-suicide evidence base, the current study aims to examine the differential effects of psychological, physical, sexual, and multiple IPV on suicidal ideation and suicide attempt using SEM. A secondary aim is to test whether IPV-suicide pathways are mediated by PTSD.

## Method

### Participants

This study draws on baseline responses from the RESTORE Study, a longitudinal cohort study of individuals who had recently presented to the ED for a suicidal crisis (Rosebrock et al., 2020). RESTORE is a study within the LifeSpan Integrated Suicide Prevention Trial—the first multi-level approach to suicide prevention to be tested in Australia (Shand et al., 2020).

The baseline sample is comprised of 1,715 women aged 16 to 76 years ( $M = 30.24$ ,  $SD = 11.91$ ) who presented to an ED for intentional self-harm within the past 18 months in one of three LifeSpan implementation sites (Illawarra Shoalhaven, Central Coast, Murrumbidgee), or in one of three control sites (Nepean Blue Mountains, South Western Sydney and South Eastern NSW). (See Appendix A for

relevant site characteristics; and Rosebrock et al., 2020 for study methodology, including site selection processes). No incentives or reimbursements were offered to participants.

The majority (90%) of participants were born in Australia and New Zealand ( $n = 1,548$ ) with 7% of the total sample identifying as Aboriginal or Torres Strait Islander ( $n = 118$ ). Over half were currently in an intimate relationship ( $n = 954$ ) with 60% identifying as heterosexual ( $n = 996$ ) and 40% as members of the Lesbian, Gay, Bisexual, Transgender, Gender Diverse, Intersex, Queer, Asexual and Questioning (LGBTQIA+) community ( $n = 677$ ). Completion of secondary school was the highest level of education reached by 39% of participants ( $n = 667$ ), followed by apprenticeship or diploma ( $n = 551$ , 32%) and tertiary education ( $n = 468$ , 27%). Thirty-eight percent of participants were not in paid employment ( $n = 657$ ) with 28% residing in disadvantaged areas ( $n = 488$ ). Among this sample of women who presented in suicidal crisis, almost 60% reported a history of IPV by a current or former partner ( $n = 1,012$ ) and were grouped based on the experience of one or multiple types of lifetime IPV (categorisation reported under Data Analysis).

## Procedure

Eligible participants were aged 16 years and over, residing in Australia and had presented to an ED located within a LifeSpan site in the past 18 months following suicidal crisis. We aimed to recruit participants in-person by asking ED staff to hand out flyers during referrals to support services. However, low participation rates ( $n = 6$ ) led to the addition of an online social media recruitment approach, advertising the study on Facebook. The advertisements were targeted to the eligible age range and geographical location (See Appendix B for advert targeting specifications and text/imagery) and  $n = 1,709$  participants were recruited via this means. See Rosebrock et al. (2020) or the full study methodology. Eligible participants accessed the study consent, screening and registration procedures using the URL listed on the recruitment flyer or embedded in the Facebook advertisement. Individuals were presented with the online participant information sheet and provided informed consent before commencing the survey. To determine eligibility, respondents were asked to identify which hospital they most recently presented to for support following suicidal crisis and the date of presentation. Ineligible respondents either self-excluded by exiting the survey or their responses were removed prior to analysis ( $n = 11$ ). Recruitment was conducted in two waves and lasted for one month at each site during February–September 2019 and February–September 2020. The study was approved by Hunter New England Local Health District Ethics Committee (HREC/17/HNE/144).

## Measures

Variables assessed were demographic and clinical characteristics, IPV exposure, and suicide risk. Demographic information included participants' age, sexual identity, Australian indigeneity, country of birth, relationship status, employment status, highest level of education achieved, and level of area deprivation of current residency. Area deprivation categories were generated by matching participants' postcodes with the Australian Bureau of Statistics' (ABS) Socio-Economic Indexes for Areas (SEIFA; Australian Bureau of Statistics, 2018). Dichotomous questions (yes/no) were used to identify whether participants had received a clinical PTSD diagnosis from a mental health professional and determine whether recent presentation to the ED was for a suicide attempt or other suicidal behaviors and/or thoughts.

Two evidence-based screening items based on relational fear and control, were used to identify potential IPV risk (Myhill & Hohl, 2019; NSW Department of Health & Human Services, 2006). Partner-related fearfulness was assessed using a matrix with current and previous feelings of fear aligned with current and previous partners (see Appendix C, Table 1). This increased the question's sensitivity to capture indicators of recent and lifetime IPV exposure. Experience of controlling behaviors in relationships was assessed using the item; *'In the past 18 months, how frequently have you experienced controlling behaviors in your current and/or past relationships?'* For this item, response options were provided on a 5-point Likert scale [0] 'never' to [5] 'frequently' (see Appendix C, Table 2). Responses greater than 'rarely', for both fear and control-related screening items, were flagged as potential IPV exposure and administered the Composite Abuse Scale (Revised)—Short Form (CAS<sub>R</sub>-SF; Ford-Gilboe et al., 2016), which is a brief self-report measure of IPV (Cronbach's alpha = 0.88). This 15-item scale captures four abuse domains: physical, psychological, sexual, and financial with questions used to assess lifetime events and the frequency of recent experiences (e.g. *'Has this ever happened to you?'*; *'IF YES, how often did it happen in the past 18 months?'*). Psychological abuse is defined as the systematic dismantling of a person's self-esteem and sense of safety using threats of harm or abandonment, humiliation, deprivation of contact, isolation, and other behaviors that involve abuse of power and control in relationships (Doherty & Berglund, 2008). Endorsed items were rated on a 6-point scale from [0] 'not in the past 18 months' to [6] 'daily/almost daily'. The CAS<sub>R</sub>-SF has shown good internal consistency (Cronbach's alpha = 0.94) and has demonstrated initial reliability and validity for use in population-based studies (Ford-Gilboe et al., 2016).



**Table 1** Demographic characteristics of women with a recent suicide-related presentation to the ED ( $n = 1,715$ )

Characteristic	ALL ( $n = 1,715$ )	No IPV history ( $n = 703$ )	Psychological ( $n = 165$ )	Physical ( $n = 220$ )	Sexual ( $n = 156$ )	Multiple* ( $n = 471$ )
Age (years), median (range; IQR)	27 (16–76; 21–37)	26 (16–76; 21–36)	28 (16–63; 23–41)	29 (17–76; 23–41)	23 (16–75; 19–30)	27 (16–69; 21–37)
Heterosexual, $n$ (%)	996 (60)	417 (61)	105 (65)	154 (73)	67 (44)	253 (55)
Australian Indigeneity, $n$ (%)†	118 (7)	50 (7)	11 (7)	20 (9)	6 (4)	31 (7)
Born in Australia/ New Zealand, $n$ (%)	1548 (90)	634 (90)	146 (88)	201 (91)	143 (92)	424 (90)
Intimate relationship, $n$ (%)‡	954 (56)	445 (63)	96 (58)	115 (52)	77 (49)	221 (47)
Paid employment, $n$ (%)	1058 (62)	466 (66)	96 (58)	133 (60)	102 (65)	261 (55)
Education, $n$ (%)						
Secondary school	667 (39)	277 (39)	60 (36)	88 (40)	60 (38)	182 (39)
Apprenticeship/ diploma	551 (32)	199 (28)	55 (33)	76 (35)	47 (30)	174 (37)
Bachelor/Post- graduate	468 (27)	212 (30)	46 (28)	55 (25)	46 (29)	109 (23)
Area deprivation, $n$ (%)§						
Most disadvantaged	187 (11)	68 (10)	19 (12)	31 (14)	10 (7)	59 (13)
Very disadvantaged	301 (18)	135 (19)	29 (18)	37 (17)	20 (13)	80 (17)
Middle	382 (22)	158 (22)	23 (14)	49 (22)	43 (29)	109 (24)
Less disadvantaged	299 (17)	113 (16)	34 (21)	41 (19)	18 (12)	93 (20)
Least disadvan- taged	501 (29)	210 (30)	52 (32)	60 (28)	58 (39)	121 (26)

\*Multiple IPV combines measures of psychological, physical, and sexual abuse ( $n = 464$ ) with physical and sexual ( $n = 7$ ). †Indigeneity represents Indigenous Australians and Torres Strait Islanders. ‡Intimate relationship encompasses marriage, de facto, and other romantic partnerships. §Area deprivation categories based on Australian Bureau of Statistics (ABS) Socio-Economic Indexes for Areas (SEIFA). IPV, Intimate partner violence; IQR, Interquartile range

**Table 2** C-SSRS suicidal ideation subscale mean scores, frequency of suicide attempts, and prevalence of PTSD diagnoses within lifetime IPV exposure categories ( $n = 1,715$ )†‡

Lifetime IPV category, $n$	Ideation (C-SSRS), M (SD)	Attempt, $n$ (%) §	PTSD, $n$ (%)
No history, 703	3.12 (1.81)	64 (9)	221 (31)
Psychological, 165	3.15 (1.76)	22 (13)	62 (38)
Physical, 220	2.98 (1.87)	20 (9)	90 (41)*
Sexual, 156	3.44 (1.65)	15 (10)	77 (49)*
Multiple, 471	3.4 (1.75)*	60 (13)**	291 (62)**

\* $p < 0.05$ . \*\* $p < 0.001$ . †Comparisons made by multiple linear regression and binary logistic regression analyses. ‡Columbia-Suicide Self Report Scale (C-SSRS) §Percentage of IPV category

The *Columbia-Suicide Severity Rating Scale (C-SSRS)* modified, self-report; (Posner et al., 2010) is a semi-structured, rater-based interview designed to assess the degree of suicidal ideation and to predict future suicidal behavior. This study used the suicide ideation subscale of the C-SSRS, which is shown to have strong convergent validity with established ideation measures and strong divergent validity with items not expected to

overlap with suicidal ideation (e.g., somatic depression symptoms such as fatigue) (Posner et al., 2011). The ideation subscale was administered via computer-automated, self-report survey containing five standardized clinical questions to assess the severity of suicidal ideation over the past 6 months (e.g., ‘*In the past 6 months, have you wished you were dead or wished you could go to sleep and not wake up?*’). Akin to the method of King et al. (2021), participants’ responses were ordinally ranked based on endorsement of items related to thoughts/wishes of suicide (low; score = 0–2), method of suicide (moderate; score = 3), and intention/plan (high; score = 4–5). Suicide attempt was assessed with a single C-SSRS item: ‘*During the past 6 months, how many times did you actually attempt suicide?*’ The frequency-based response options (0–6+ attempts) were dichotomized (no = 0; yes =  $\geq 1$ ). The C-SSRS questions involved branching logic based on clinical conventions akin to an existing modified, electronic version of the C-SSRS, the *Electronic Columbia-Suicide Severity Rating Scale (eC-SSRS)*; Mundt et al., 2010). The eC-SSRS has been shown to be an accessible means of suicide-risk assessment with reduced burden to clinicians and comparable reliability and validity to the C-SSRS (Greist et al., 2014; Mundt et al., 2013).

## Data Analysis

To create mutually exclusive IPV-status groups, women's CAS<sub>R</sub>-SF responses were categorized in two steps: Firstly, women were identified as experiencing one of seven potential combinations of recent and lifetime IPV exposure (Fig. 1). Three women who reported experiencing financial IPV only were included in a broad 'psychological abuse' group reflecting aspects of coercive control and intimidation. Table 1 shows the second step categorisation of the sample into one of five orthogonal groups: 1. No history of IPV; 2. Psychological IPV only; 3. Physical and psychological IPV; 4. Sexual and psychological IPV and; 5. Multiple IPV (psychological, physical and sexual). Categorisation was completed for both recent and lifetime IPV groups though due to space constraints, demographic characteristics are presented for lifetime IPV; the largest grouping of women affected by IPV.

In preliminary analyses, multiple linear regression (MLR) analysis was used to test independent associations between IPV group and degree of suicidal ideation (C-SSRS range = 0–5) when age, sexual identity, area deprivation, and Indignity were held constant. Binary logistic regression (BLR) analysis was used to identify independent associations between IPV exposure and demographic variables on recent suicide attempt (yes/no) and PTSD diagnosis (yes/no). Results are presented using unstandardized coefficients and odds ratios (ORs) with 95% confidence intervals (CIs) and *p*-values.

Path analysis was used to examine the relationships between IPV type, PTSD, and suicidal ideation and suicide attempt within STATA IC (v13). Suicide attempt(s) in the past 6 months (yes/no) and PTSD were modeled as

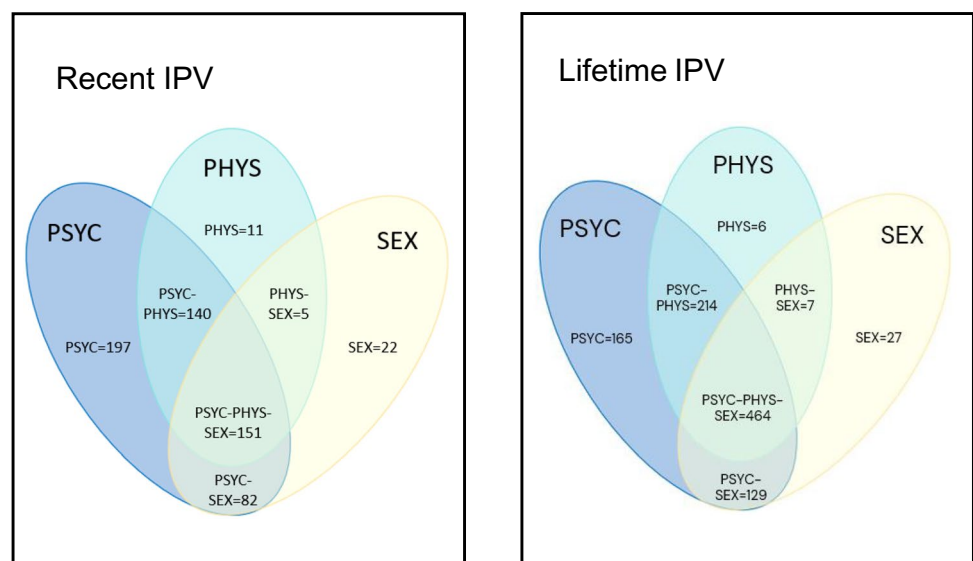
dichotomous variables. Total scores for the ideation subscale of the modified, self-report C-SSRS exhibited a moderate positive skew with a relatively low frequency of zero scores. The data satisfied the assumptions of path analysis, which requires normally distributed and similarly scaled inputs. To test the mediational models, path analyses were conducted using SEM for continuous outcome variable: suicidal ideation, and generalized structural equation modelling (GSEM) for dichotomized outcome variable: suicide attempt. Root mean square error of approximation with 90% CIs and goodness-of-fit index were used to assess the fit of each suicidal ideation model to the data. The fit of each suicide attempt model to the data was assessed using the Akaike information criterion (AIC) and Bayesian information criterion (BIC). These tests were chosen in lieu of goodness-of-fit indices, that are currently unavailable when conducting path analysis with multilevel generalized outcomes (e.g., binary, ordered, etc.) in STATA IC. Results are presented using standardized (ideation models) and unstandardized (attempt models) coefficients and *p*-values. Across analytic models, a *p*-value of < 0.05 was used to define statistical significance.

## Results

### Exposure to IPV

In total, 1,161 women (68%) reported feeling currently or previously fearful of-, or controlled by, a past or present partner and were administered the CAS<sub>R</sub>-SF. Of the total sample, 1,012 women (59%) reported experiencing at least one form of IPV in their lifetime (i.e., endorsed at least one item on the CAS<sub>R</sub>-SF) with 608 (35%) reporting victimization in the past

**Fig. 1** Prevalence of major forms of recent ( $n = 608$ ) and lifetime IPV ( $n = 1,012$ )



18 months (recent IPV). Psychological abuse was the most common form of IPV experienced both recently ( $n=565$ , 93% of 608) and historically ( $n=966$ , 95% of 1,012). Figure 1 shows the concomitance of psychological abuse across all forms of IPV and the frequency of independent occurrence in recent ( $n=171$ , 28%) and lifetime groups ( $n=260$ , 26%). Recent and lifetime physical ( $n=307$ – $692$ , 51–68%) and sexual IPV ( $n=261$ – $626$ , 26–62%) were also prevalent among women with a history of IPV. The distribution of IPV groups were as follows: 1. No history of IPV ( $n=703$ , 41%); 2. Psychological IPV only: recent ( $n=197$ , 11%), lifetime ( $n=165$ , 10%); 3. Physical and psychological IPV: recent ( $n=151$ , 9%), lifetime ( $n=220$ , 13%); 4. Sexual and psychological IPV: recent ( $n=104$ , 6%), lifetime ( $n=156$ , 9%) and; 5. Multiple IPV (psychological, physical, and sexual): recent ( $n=156$ , 9%), lifetime ( $n=471$ , 27%).

### Suicide Risk & PTSD Prevalence

Of the total sample, 181 women (11%) had attempted suicide at least once in the 6 months prior. The C-SSRS mean score on the suicidal ideation subscale for all participants was 3.21 ( $SD=1.79$ ; scale range=0–5). Among the 1,522 participants (89%) reporting current suicidal ideation, 354 (23%) were low risk, 231 (15%) were moderate risk, and 937 (62%) were high risk. Observed levels of suicidal ideation were higher than those detected within a previous ED study ( $n=3,348$ ) reporting 54% severe suicidal ideation in patients presenting for suicidal crisis and screening positive for ideation using the C-SSRS (Simpson et al., 2021).

Table 2 shows the C-SSRS mean scores and suicide attempt frequencies for each lifetime IPV group. The highest C-SSRS scores were observed for sexual IPV ( $M=3.44$ ,  $SD=1.65$ ), followed by multiple IPV ( $M=3.4$ ,  $SD=1.75$ ). Multiple IPV was found to have a statistically significant positive effect on suicidal ideation within MLR analyses, adjusting for demographic variables ( $\beta=0.07$ ,  $p=0.02$ ) (see Appendix D, Table 1 for MLR results). In this model, no other IPV groups were significantly associated with suicidal ideation ( $p>0.05$ ).

Recent suicide attempts were most frequently reported by women in the psychological (14%) and multiple IPV groups (13%), while the prevalence of suicide attempt was comparable among women in no history, psychological, and physical IPV groups. Binary logistic regression analyses revealed that the odds of reporting a recent suicide attempt were 1.78 times more likely for women in the multiple IPV group than for women with no history of IPV (95% CI: 1.16–2.72;  $p=0.01$ ) while no other IPV groups were significantly associated with suicide attempt ( $p>0.05$ ) (see Appendix D, Table 2 for BLR results).

Across the total sample, 743 women (41%) had a diagnosis of PTSD. Prevalence rates reached 62% among women in the multiple IPV group ( $n=291$ ) and 49% in the sexual IPV group ( $n=77$ ), while the lowest rates of PTSD were reported among women with no history of IPV (31%) (Table 2). Compared with women without a history of IPV, the odds of having a diagnosis of PTSD were 3.5 times more likely for women in the multiple IPV group (95% CI: 2.72–4.52;  $p<0.001$ ), twice as likely for the sexual IPV group (OR: 2.12, 95% CI: 1.46–3.08;  $p<0.001$ ) and 1.45 times more likely for the physical IPV group (95% CI: 1.05–2;  $p=0.03$ ) within BLR analyses. Psychological IPV was not significantly associated with PTSD ( $p=0.12$ ) (see Appendix D, Table 3 for BLR results).

### Structural Equation Modelling

To examine the relationships between IPV type, PTSD, and risk of suicidal ideation and attempt a series of SEM and GSEM were tested within STATA IC.

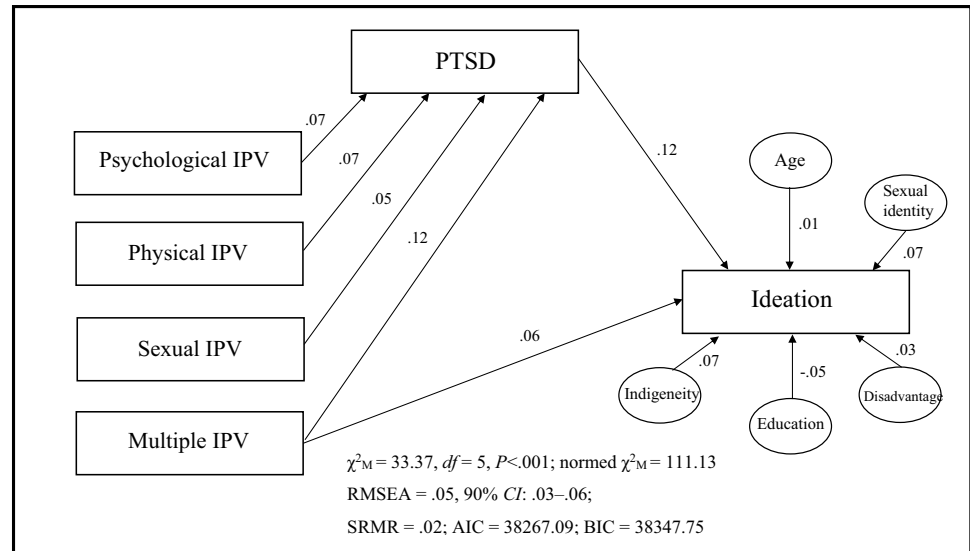
Figure 2 and Table 3 depicts the SEM examining the direct and indirect effects of recent IPV type (IPV that was reported as occurring within the last 18 months) on PTSD and suicidal ideation. Non-significant paths between recent IPV type and suicidal ideation were removed from the final model. The trimmed model demonstrated good fit, root square mean error of approximation (RMSEA)=0.05 (90% CI: 0.03–0.06), and standardized root square mean error of residual (SRMR)=0.02.

**Table 3** Summary of coefficients for significant direct, indirect, and total effects of recent and lifetime IPV type on suicidal ideation (standardized) and attempt (unstandardized)

Type of IPV	Direct		Indirect		Total	
	Recent	Lifetime	Recent	Lifetime	Recent	Lifetime
Suicidal ideation						
Psychological			0.04*			
Physical			0.05*	0.04*		
Sexual				0.07*		
Multiple	0.40*		0.08*	0.12**	0.48*	0.26*
Suicide attempt						
Multiple	0.75*	0.45*	0.32*		1.07**	0.93**

\* $p<0.05$ , \*\* $p<0.001$

**Fig. 2** Path model of the impact of recent IPV on PTSD and suicidal ideation (standardized path coefficients are shown)



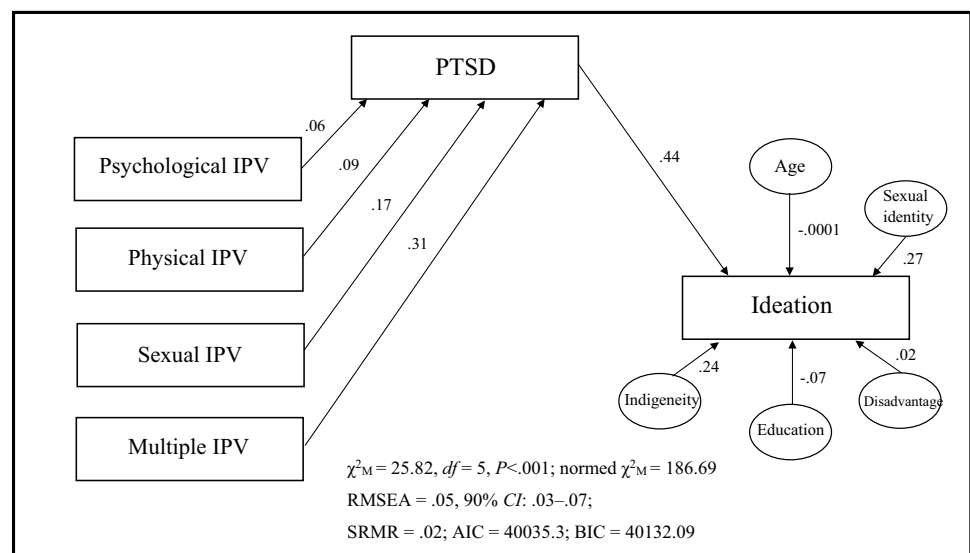
Women who reported multiple forms of IPV exposure over the last 18 months had a significant direct association with increased suicidal ideation ( $\beta = 0.06, p = 0.01$ ). Psychological, physical, and multiple IPV all displayed additional significant indirect effects on suicidal ideation over this same period, that were mediated by PTSD ( $p < 0.05$ ). There were no significant direct or indirect effects identified in this sample that were specifically related to being in the recent sexual IPV group ( $p > 0.05$ ).

In the second SEM (Table 3 and Fig. 3), the longer-term effects of lifetime IPV exposure type on PTSD and suicidal ideation were examined. Non-significant direct paths between lifetime IPV type and suicidal ideation removed from the final model, which demonstrated good fit, RMSEA = 0.05 (90% CI: 0.03-0.07), SRMR = 0.02. Path

analyses did not identify significant direct associations for women experiencing one of two types of IPV but did reveal significant indirect effects of lifetime physical, sexual, and multiple IPV exposure groups on suicidal ideation for those women who had a PTSD diagnosis ( $p < 0.05$ ). No significant direct or indirect effects of lifetime psychological IPV on suicidal ideation were observed ( $p > 0.05$ ).

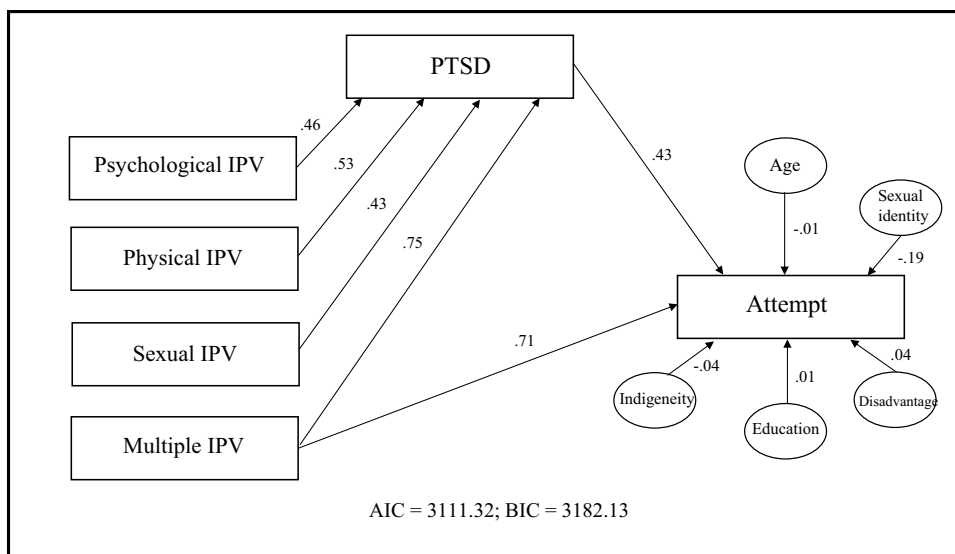
Table 3 and Fig. 4 depict the reduced GSEM examining the direct and indirect effects of IPV exposure types occurring within the last 18 months and PTSD diagnosis on the likelihood of a recent suicide attempt. Path analyses revealed significant direct ( $B = 0.75, p = 0.01$ ) and indirect effects ( $B = 0.32, p = 0.04$ ) of recent multiple IPV on suicide attempt. No significant direct or indirect effects were detected for recent psychological, physical, and sexual IPV ( $p > 0.05$ ).

**Fig. 3** Path model of the impact of lifetime IPV on PTSD and suicidal ideation (standardized path coefficients are shown)





**Fig. 4** Path model of the impact of recent IPV on PTSD and suicide attempt (unstandardized path coefficients are shown)



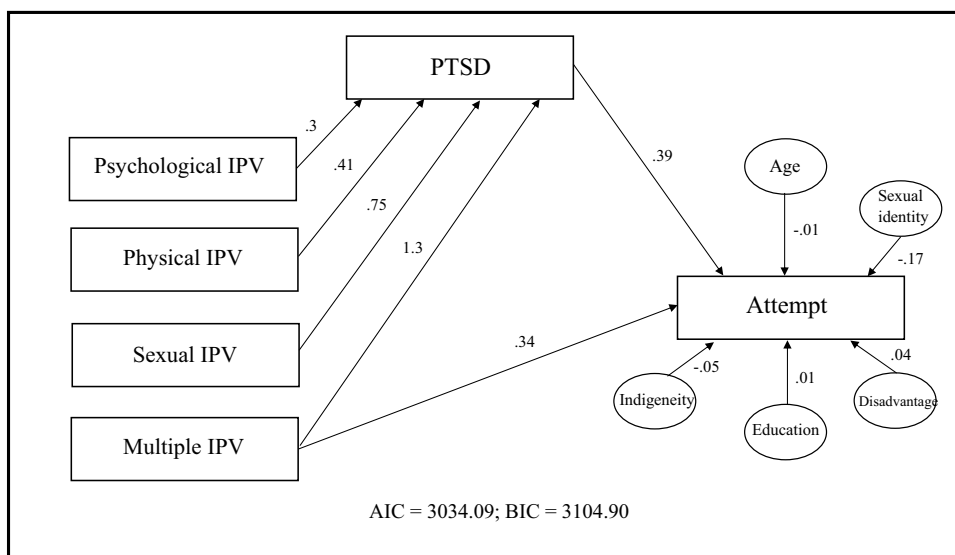
The final GSEM (Table 3 and Fig. 5) examining the direct and indirect effects of lifetime IPV and PTSD on suicide attempt revealed significant direct ( $B=0.45, p=0.04$ ) and indirect effects ( $B=0.47, p=0.04$ ) of recent multiple IPV on suicide attempt. No significant direct or indirect effects were detected for recent psychological, physical, and sexual IPV ( $p>0.05$ ).

Table 3 reports the coefficients for significant IPV effects on suicidal ideation and suicide attempt detected using SEM and GSEM, respectively. For suicidal ideation, direct (recent only), indirect, and total effects were detected for multiple IPV ( $p<0.05$ ). Pathways between suicidal ideation and recent psychological, recent, and lifetime physical and lifetime sexual were mediated by PTSD, revealing indirect effects ( $p<0.05$ ).

### Discussion

This study examined the pathways between IPV type, PTSD, suicidal ideation, and suicide attempt in a sample of women with a recent suicide-related ED presentation. Across analytic models, pathways were consistently identified between experience of multiple IPV typologies and suicidal outcomes, and of note, it was the only direct predictor of suicide attempt. These findings support the cumulative effects of IPV victimization on diminishing women’s mental wellbeing and increasing suicide risk. Among women who experienced one or two types of IPV, evidence was found for the pivotal role of PTSD in the development of suicidal thoughts and behaviors. Differential effects were detected

**Fig. 5** Path model of the impact of lifetime IPV on PTSD and suicide attempt (unstandardized path coefficients are shown)



for psychological, physical/psychological, and sexual/psychological types of IPV and were found to be impacted by temporal factors (i.e., recency of victimization) and wholly mediated by presence of PTSD. The effects of psychological IPV appeared to be less than when combined with physical or sexual IPV; both combinations had prevailing/lifetime impacts on risk of suicidal ideation. The unique pathways to suicide uncovered among women with differing IPV profiles highlight the complex relationship between victimization and women's mental health.

The cumulative effects detected in the present study strengthen the limited IPV typology research base by confirming an association between experiencing multiple types of abuse and increased suicidal ideation (Gibbs et al., 2018; Houry et al., 2006) and suicide attempts (Pico-Alfonso et al., 2006). However, the present findings were not supported by a recent study, which reported no association between multiple IPV types and suicidality in 183 women using specialized IPV services (Jiwatram-Negrón et al., 2022). In Jiwatram-Negrón and colleagues' (2022) study, there was a substantial amount of missing data meaning that the study may have been underpowered to detect an association. Importantly, women's suicide risk was assessed with a single question that conflated suicidal ideation and attempt ("Have you ever threatened or tried to commit suicide?" Jiwatram-Negrón et al., 2022, p. 4), despite evidence that there are distinguishing factors that predict suicidal ideation from those that predict attempt (Klonsky et al., 2016; May & Klonsky, 2016). The suicide measure may have lacked sensitivity to detect a relationship between multiple IPV and suicidal ideation (over suicide attempt), given that ideation is reported to be most strongly associated with PTSD in the literature (Davis et al., 2014).

The present findings suggest that multiple IPV is a severe form of IPV due to its association with more severe suicidal ideation and greater likelihood of suicide attempt. However, there is a lack of consensus on what constitutes 'severe IPV' in the literature. Results from the wider IPV-literature highlight the complex relationship between severity and IPV typology on a diverse range of health outcomes. Within this body of research, severity has been operationalized as experiencing multiple types of abuse, frequent incidents of abuse, specific types of abuse over others (e.g., sexual vs financial) or specific behaviours (e.g., use of a weapon) (Cole et al., 2008; Dutton et al., 2005; Hegarty et al., 2013; Rancher et al., 2021; Wuest et al., 2010). Furthermore, IPV perpetration is a product of culture and as such, its expression, including severe forms, looks different across cultural contexts (e.g., Jiwatram-Negrón et al., 2021). The variation in operationalized definitions of 'severe IPV' speaks to the inherent challenges associated with measuring the impacts of traumatic experiences. Accurate measurement may be affected by individual and environmental factors such as age, coping mechanisms, sense of safety to report, previous

traumatic experiences, mental health status, world views (e.g., relationship expectations), and cultural norms (Bright & Bowland, 2008; Wilker et al., 2015). The approach taken within the present study – to report IPV type (yes/no) over frequency of incidents – is consistent with previous IPV-suicide research (Gibbs et al., 2018; Jiwatram-Negrón et al., 2022). This approach is supported by the wider trauma literature, wherein the use of event type assessment over event frequency is theorized to offer practical and ethical value (Wilker et al., 2015). Specifically, fewer time and emotional resources are involved in dichotomized reporting of a traumatic event compared with recalling each incident to provide a frequency estimate (Wilker et al., 2015).

Compared with multiple IPV, direct effects were not observed for psychological, physical, and sexual IPV on suicidal ideation and suicide attempt in this study. Previous research has identified physical IPV as significantly associated with suicidal ideation (Houry et al., 2006) and combined physical and psychological IPV with suicide attempt (Pico-Alfonso et al., 2006). The absence of direct effects for independent types of lifetime IPV may be attributed to the smaller number of women in these categories ( $n = 156\text{--}220$ ; 9–13%) compared with multiple IPV ( $n = 471$ ; 27%). Results may be further explained by the inclusion of PTSD diagnosis in analytic models, which revealed pathways between IPV exposure and suicidal ideation were wholly mediated by PTSD-status. These insights highlight the importance of examining potential mediators in future research to better understand the complex relationship between IPV and suicidal outcomes.

The pivotal role of PTSD within IPV-suicide relationships is supported by a previous pathway analysis study, which tested the relationships between IPV, depressive symptoms, PTSD, and suicidal ideation in female ED service users with a history of IPV (Leiner et al., 2008). Across pathway models, multiple IPV victimization led to elevated suicidal ideation and this relationship was mediated by depressive- and PTSD symptoms. However, among women traumatized by IPV victimization, the authors found no evidence of a *direct* link between PTSD and suicidal ideation. Leiner and colleagues (2008) interpreted the models as suggesting that depression is more powerful than trauma for shaping suicide risk. The results may be explained by methodological differences pertaining to use of the Women's Experience with Battering (WEB) scale, which assesses partner-related fearfulness, sense of being controlled and feelings of shame in the relationship (Smith et al., 1995). That is, partner behaviors and IPV typologies were not assessed. Advancements in IPV measurement facilitate the identification of women's IPV profiles, based on type and multiple exposures (Ford-Gilboe et al., 2016). This development allows for the testing of pathways between IPV, PTSD, and suicide. It is a strength of our study design that we used a validated

measure assessing multiple types of recent and lifetime IPV (CAS<sub>R</sub>-SF) and included PTSD as a mediator of the relationship between IPV-suicide in statistical models.

The observed pathways between IPV and suicide, and the mediating role of PTSD, are consistent with prominent theoretical frameworks in suicidology, which conceptualise risk as resulting from an interplay of environmental stressors and predisposing factors (FVT; Rudd, 2006) or individual's cognitions (IPTs; Joiner, 2005). Post-traumatic stress disorder and IPV may have complementary roles on increasing suicide risk such as keeping women in a high-risk state of arousal and reducing their capacity to stabilise after a crisis (Lammers et al., 2005; Rugo-Cook et al., 2021; Thomas et al., 2008).

Post-traumatic stress disorder is theorized to affect all key processes of the FVT including individual's capacity to recover from acute episodes. Specifically, PTSD is associated with a ruminative cognitive style and difficulties mounting an effective parasympathetic response when highly emotionally aroused (Bryan et al., 2017; Michael et al., 2007). This can lead to prolonged periods of distress and perceptions of incompetence and hopelessness at the perceived inability to move through the feelings and return to a baseline state (e.g., *"I am unable to solve my problems"*, *"I am a failure"*) (Byran et al., 2017, p.13). Suicide risk is increased among individuals with PTSD due to its association with extended periods in a high-risk state (e.g., cognitive, affective, and physiological arousal).

Among women experiencing IPV and PTSD, ruminating thoughts may interact with- and internalise the perpetrator voice, which systematically attacks women's sense of self-efficacy and consistently frames adversity as their fault (e.g., *"What's wrong with you"*, *"You never do anything right"*) (Lammers et al., 2005, pp. 54 & 56). Perpetrators' strategies to erode women's sense of autonomy and beliefs that they can cope on their own are frequently accompanied by restricting access to financial or practical resources, isolating women from professional, social, and familial support and may involve threats to harm or kill partners and their loved ones (Stark, 2007; Thomas et al., 2008). The sense of hopelessness that ensues from entrapment within a chronically abusive situation may underlie women's views of suicide as a viable out (Cerulli et al., 2012; Lammers et al., 2005). The association between hopelessness and suicide in women affected by IPV is supported by preliminary tests of the IPTs among women seeking shelter from IPV ( $n = 134$ ), which reported that high levels of hopelessness and burdensomeness were associated with suicidal ideation (Wolford-Clevenger et al., 2019). Further research is needed in this area to develop a theoretically grounded understanding of suicide risk in women affected by IPV and PTSD to improve assessment and management of suicide risk in this population.

Overall, our findings fit within the wider suicide literature wherein PTSD is a well-established risk factor for suicide (Bryan et al., 2017; Davis et al., 2014). Post-traumatic stress disorder is demonstrated to increase cognitive-affective vulnerabilities to self-harm (e.g., self-deprecation, rumination, guilt) and weaken individual and environmental protective factors such as emotional regulation, cognitive reappraisal, and social support leading to thwarted belongingness (Bryan et al., 2017; Davis et al., 2014). Recognition of the impact of PTSD on women's mental health is mirrored within IPV research—PTSD has been described as the "linchpin" in the relationship between violence victimization and negative health outcomes (Dutton et al., 2006, p.959). However, few studies have tested the relationships between IPV, PTSD, and suicide.

As a result of novel IPV-suicide pathway testing, two high-risk mortality groups were identified in this study: Women with recent multiple IPV and those with a PTSD diagnosis following lifetime exposure to IPV. Identifying patient-populations with the greatest mortality risk – both from partner- and self-directed violence – is important for decision-making regarding hospital resource allocation, risk assessment tools, and intervention strategies. Incorporating interpersonal violence as distal risk factors (e.g., child/lifetime abuse) or acute stressors (e.g., recent victimization) in suicide risk assessment tools were proven successful in longitudinal research predicting repeat suicide attempts (Haglund et al., 2016; Jokinen et al., 2010). One study linked degree of reported interpersonal violence with elevated risk of repeat attempt within six months of prior attempt (Haglund et al., 2016), while another demonstrated that exposure to violence as a child was strongly associated with suicide (Jokinen et al., 2010). Our findings support integrating IPV exposure profiles into suicide risk assessments and using information regarding type and multiple exposures to stratify risk and identify women with the greatest need for suicide prevention, IPV crisis referrals, and safety planning. Emphasis must be placed on the debilitating effects of recent multiple IPV to increase suicide risk, regardless of identified clinical characteristics. Risk stratification should not compromise clinician's understanding that IPV is important to screen for, and respond to, regardless of type (e.g., psychological abuse has been shown to have devastating effects on women's mental health) (Lammers et al., 2005; Thomas et al., 2008).

Clinician's capacity to effectively use IPV information in suicide and safety risk assessments and reduce mortality rates could be greatly enhanced by routine implementation of IPV screening and response in EDs. In NSW, IPV screening is mandated in antenatal, early childhood, mental health, and substance abuse settings (NSW Department of Health & Human Services, 2006). The ED is increasingly recognized as an important setting for IPV intervention, offering

unique opportunities to identify victimization and support women in a safe and confidential environment (Rasmussen et al., 2021). In particular, the ED offers uncommon access to highly vulnerable women—A previous study found that 44% of women killed by their partners had visited an ED in the two years prior (Wadman & Muelleman, 1999). Missed opportunities to support women are underscored by a lack of relevant clinical policy to guide IPV identification and response and support health care providers to manage disclosures (Ahmad et al., 2017). Australia falls behind the USA and New Zealand in the implementation of national policies for IPV screening in EDs, in accordance with World Health Organization recommendations for a systems-based approach to IPV prevention (World Health Organization, 2012). In NSW EDs, IPV screening is currently at pilot phase with an initial feasibility study reporting low rates of screening among eligible women (Spangaro et al., 2020). Subsequent qualitative research with ED clinical staff revealed support for the acceptability and appropriateness of IPV screening, emphasising the importance of offering affected women an immediate psychosocial response (Spangaro et al., 2022). The present findings support addressing uptake barriers and implementing routine IPV screening in Australian EDs with a view to funnel information into suicide risk assessments. Such changes to hospital policy regarding psychosocial and clinical assessments stand to reduce IPV-mortality and better reflect the disproportionate suicide burden carried by women with a history of IPV.

## Limitations

A limitation of this study was the use of cross-sectional data, which despite the use of advanced statistical tests, limits the inferences drawn from the findings to correlational, rather than causal, relationships. Future research could be strengthened through the use of longitudinal analyses involving SEM and latent variable growth curve modelling to examine the direction and causality in the relationship between IPV, PTSD, and health outcomes (Woods, 2005). Furthermore, LGBTQIA + community members (39%) were highly prevalent in the sample. Research has shown that sexual minority groups are at increased risk of suicidal thoughts, behaviors, and attempts (Hottes et al., 2016). In Australia, data on sexual orientation is not routinely captured at ED presentation and therefore, we cannot know if there was an overrepresentation of this minority group. In our study, the LGBTQIA + group was composed of 70% bisexual women with a mean age nine years below the heterosexual group. Sample composition may reflect the sampling strategy's (Facebook advertisement) appeal to younger women influenced by educational/cultural factors associated with

rising support for gender fluidity and the breakdown of rigid gender norms surrounding sex. Future research could increase the clarity of identifying gender-based violence by asking participants to identify the gender of their abuser. Lastly, other potential influencers of IPV-suicide relationship were not included in analysis such as, childhood trauma, depression, and being the primary carer of children. In particular, previous research has shown that childhood sexual and physical abuse are prevalent among women with a history of IPV (Hegarty et al., 2013) and increase affected women's risk of suicidal ideation (Renner & Markward, 2009). Exposure to gender-based violence in childhood (e.g., sexual violence) also increases the risk of re-exposure, or of experiencing other types of concurrent gender-based violence (poly-victimisation), across social contexts (Townsend et al., 2022). Additionally, only those women who screened positively for potential IPV risk ( $n = 1,161$ ; 68%) were presented with the CAS<sub>R</sub>-SF. Therefore, it is possible that missed positives were included in the IPV negative group within analyses. Of note, 9% of the total sample ( $n = 149$ ) screened positively and did not report a history of IPV suggesting that the screening tool was useful for detecting low levels of IPV risk and the likelihood of missed positive cases was reduced. Lastly, despite the use of eligibility screening questions, it is possible that ineligible participants from the LifeSpan sites took part in the study (e.g., individuals without a recent ED presentation for suicide). The likelihood of this scenario was reduced by the absence of participation incentives in the study.

## Conclusion

The findings suggest that, compared with lifetime victimization, recent multiple IPV has the highest cumulative trauma load and bypasses PTSD in its effect on suicidal ideation and attempt, demonstrating the acute aftermath of severe abuse. In contrast, PTSD was evidenced to play a pivotal role in the development of suicidal ideation for women experiencing fewer types of IPV. Taken together, these results can be used to inform suicide risk stratification within targeted intervention strategies in women with recent multiple IPV and lifetime IPV exposure resulting in PTSD. Above all, the results demonstrate the impact of cumulative abuse to erode women's psychological wellbeing and identify a highly vulnerable patient-population, living with mortality risk from partner- and self-directed violence.

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**Data Availability** The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

## Declarations

**Ethics approval statement** This study was approved by the Hunter New England Local Health District Ethics Committee (HREC/17/HNE/144).

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