Validity of the ACTS Intimate Partner Violence Screen in Antenatal Care: A Cross Sectional Study

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Research Article

Keywords: Intimate partner violence, domestic violence, routine screening, screening tool, antenatal care, pregnancy

DOI: https://doi.org/10.21203/rs.3.rs-264487/v1

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Abstract

**Background:** Intimate partner violence (IPV) is a major public health problem with harmful consequences. In Australia, there is no national standard screening tool and screening practice is variable across states. The objectives of this study were to assess in the antenatal healthcare setting: i) the validity of a new IPV brief screening tool and ii) women's preference for screening response format, screening frequency and comfort level.

**Methods:** 1,067 antenatal patients in a major metropolitan Victorian hospital in Australia completed a paper-based, self-administered survey. The survey included four screening items about whether they were Afraid/Controlled/Threatened/Slapped or physically hurt (ACTS) by a partner or ex-partner in the last 12 months; and the Composite Abuse Scale (reference standard). The ACTS screen was presented firstly with a binary yes/no response format and then with a five-point ordinal frequency format from 'never' (0) to 'very frequently' (4). The main outcome measures were test statistics of the four-item ACTS screening tool (sensitivity, specificity, predictive values, and area under the curve) against the reference standard and women's screening preferences.

**Results:** Twelve-month IPV prevalence varied depending on the ACTS response format with 8% (83) positive on ACTS yes/no format, 12.8% (133) positive on ACTS ordinal frequency format and 10.5% (108) on the reference Composite Abuse Scale. Overall, the ACTS screening tool demonstrated clinical utility for the ordinal frequency format (AUC, 0.80; 95% CI = 0.76 to 0.85) and the binary yes/no format (AUC, 0.74, 95% CI = 0.69 to 0.79). The frequency scale (66%) had greater sensitivity than the yes/no scale (51%). The positive and negative predictive values were 56% and 96% for the frequency scale and 68% and 95% for the yes/no scale. Specificity was high regardless of screening question response options. Half (53%) of the women categorised as abused preferred the yes/no scale. Around half of the women (48%, 472) thought health care providers should ask pregnant women about IPV at every visit.

**Conclusions:** The four-item ACTS tool (using the frequency scale and a cut-off of one on any item) is recommended for written self-administered screening of women to identify those experiencing IPV to enable first-line response and follow-up.

**Background**

Intimate partner violence (IPV) is a major public health problem with harmful consequences on the health of women, (1) and their unborn babies and children. (2, 3) Globally, it is estimated that about 1 in 3 women have experienced physical and/or sexual violence by an intimate partner. (4) IPV is common during pregnancy, with estimates varying from 3–29% depending on the measure used, and for many women, violence begins or escalates during pregnancy and the postpartum period. (5–7) Women experiencing IPV have higher risk for adverse maternal and perinatal health outcomes including postnatal depression, perceived stress; (8) unintended pregnancies, abortions; (9) low birth weight and preterm births. (10)

Given the increased contact with healthcare providers during pregnancy, antenatal care presents a unique opportunity to enquire routinely about IPV. (11) A Cochrane systematic review (12) suggests that IPV screening and initial response by a health professional increases identification with no increase in referrals or changes in women's experience of violence or wellbeing. However, in antenatal care there may be sufficient evidence to recommend screening all women attending, with two antenatal studies (13, 14) showing improvement in some outcomes for women. (12) Despite increased efforts to reduce IPV and its negative health consequences, it is not consistently screened for in antenatal care across the
world. (15, 16) Although there are many barriers to effective identification and response for women experiencing IPV, (16) one factor increasing a health professional’s likelihood of screening for IPV is having a set of scripted questions. (17–20) The use of a validated tool suitable to antenatal settings may facilitate consistent screening but also allow comparisons across health facilities and changes over time for quality improvement purposes. (17)

Testing the validity of a brief screening tool against a gold standard helps to ascertain whether the tool can correctly identify those experiencing IPV (sensitivity), while eliminating those not experiencing it (specificity). (21) However, there are several analysis issues including that there is no agreed upon gold standard for IPV measurement and pre-test prevalence will alter the positive predictive value of the screening tool. There are also interpretation issues, such as the reductionist approach of IPV screening tools in which women are dichotomised into abused or non-abused categories. Among any group of women who do not report IPV on a particular tool, will be some who have experienced abusive behaviours but do not wish to label themselves as abused. This should be respected and understood. In evaluating IPV screening tools, the balancing act between the true positive rate (sensitivity) and true negative rate (specificity) is difficult when dealing with a social problem rather than a biomedical disease with a straight-forward diagnostic gold standard. With IPV it is important to maximise reach to those who have been abused by a partner so that support can be offered, that is, there is a need to maximise the true positive rate. An ‘over-inclusive’ IPV screen, however, will mean that some women will be identified as experiencing abuse when the behaviours they experience are not consistent with the current understanding of the coercive controlling dynamics of IPV. For these women (returning a false positive IPV screen), there is a risk of being labelled as someone who is experiencing IPV with unnecessary use of intervention resources. Thus, there are implications of false-negatives (missing cases of IPV) and false positives (overidentifying cases of IPV). Where the prevalence of the condition of interest is very low, as it often is with screening for IPV, a test has to be highly specific to reduce the number of false-positive results to an acceptable level. (22)

Although there is an extensive body of knowledge on the prevalence and health impacts of IPV, gaps remain on the most effective ways of screening those affected. (23) A 2009 systematic review showed that the psychometric properties varied across IPV screening tools and settings. (24) This review reported that the most studied screening tools were the Hurt, Insult, Threaten, and Scream (HITS, sensitivity 30–100%, specificity 86–99%); the Woman Abuse Screening Tool (WAST, sensitivity 47%, specificity 96%); the Partner Violence Screen (PVS, sensitivity 35–71%, specificity 80–94%); and the Abuse Assessment Screen (AAS, sensitivity 93–94%, specificity 55–99%). Internal reliability (HITS, WAST); test–retest reliability (AAS); concurrent validity (HITS, WAST); discriminant validity (WAST); and predictive validity (PVS) were also assessed, however the authors concluded that no single IPV screening tool had well-established psychometric properties. A 2016 systematic review (23) found ten IPV screening tools and recommended three as having stronger psychometric values, assessing all areas of IPV and having been validated against a reference standard: Women Abuse Screen Tool (WAST), Abuse Assessment Screen (AAS) and Humiliation, Afraid, Rape and Kick (HARK).

However, the eight item tool WAST, (25) though comprehensive, is longer than most tools. This is a consideration in light of findings about the importance of tool brevity e.g., HARK four-item tool. (20, 26) A strength of the WAST and HARK tools is inclusion of questions about fear, which has the potential to identify the majority of women experiencing IPV. (27) Both tools also include items about sexual violence, which is common in abusive relationships, yet in the context of an initial screen, may be difficult for health providers to ask about and a particularly challenging form of abuse for women to name. (28, 29) The AAS has a simple scoring system and has been validated in perinatal settings. (30–36) It is a five item questionnaire that has demonstrated a large range of prevalence from 2.8% (34) to 35.5% (35) for IPV during the antenatal period and up to 41% (31) for any history of
IPV among a sample of pregnant women. Further, all three of these scales (i.e., WAST, AAS, HARK) do not capture coercive control which is seen as an important part of the pattern of IPV. (37)

Systematic reviews have shown that women find screening tools acceptable; (38, 39) however, an additional characteristic of IPV screening tools that is understudied is the format of item responses. Women are generally asked to report the occurrence of abusive behaviours in the past 12 months in either a binary response format (yes or no) or an ordinal frequency format. While HARK, (26) AAS, (40) and PVS (41) response choices are yes or no, the WAST has three options (‘often’, ‘sometimes’ and ‘never’) (42) and HITS has five options (‘never’, ‘rarely’, ‘sometimes’, ‘fairly often’, ‘frequently’). (43) It is not known whether response format effects IPV screening tool validity. It is also not known whether women prefer to respond to screening questions with a binary yes/no or have a range of frequency options. IPV screen length, response options and scoring may all impact on both validity and ease of use for health practitioners and women clients.

Recognising the shortcomings of current IPV screening tools for use in antenatal care, we developed the brief ACTS tool through reviewing items on existing tools and a consensus discussion amongst the authors. (17) In this paper, we introduce the ACTS tool and present our findings of initial tool testing.

Our aim was to test in antenatal care i) the accuracy of the new IPV screening tool and ii) how women prefer to be asked about IPV.

We present test statistics (sensitivity, specificity, negative and positive predictive values and area under the receiver operating curve [AUC]) against the reference standard Composite Abuse Scale (CAS) (44) and the utility of the ACTS tool with two alternative response formats. We also assess women's preference for IPV screen response format and frequency of asking, along with their comfort level in being screened.

**Methods**

This analysis was part of the larger study - Sustainability of identification and response to domestic violence in antenatal care (the SUSTAIN study), funded by the Australian Research Organisation for Women's Safety. Detailed methods for the SUSTAIN study are reported elsewhere. (17) Briefly, participants were antenatal patients in a major metropolitan Victorian hospital who completed a paper-based, self-administered survey while they waited for their antenatal clinic appointments.

**Data collection and recruitment**

Patients were approached in the antenatal waiting room between May and July 2018 and asked if they were accompanied by a partner, family member or other person(s). Those who responded ‘yes’ were thanked and not invited to participate to minimize potential risks to the safety of women from possible perpetrator awareness. Women presenting unaccompanied who were at least 16 years of age and were proficient in either written English, Arabic, Mandarin or Cantonese (three most common languages spoken at the hospital) were offered information about the SUSTAIN study. Based on the average number of midwifery appointments at the hospital, we estimated recruiting up to 1046 women during the three months.

The SUSTAIN survey included six sections: pregnancy and pregnancy care; health and well-being; relationships and safety; supports; personal and household details; and views about the survey (17). Within the relationships and safety section were the IPV screening four items relating to partner or ex-partner behaviours: Afraid, Controlled, Threatened to physically hurt, Hit, Slapped, or physically hurt (ACTS) (see Table 2). These four items were presented
twice consecutively within the survey, with two response formats. We advised women that there would be repetition of questions and encouraged them to answer all formats. The first format presented a binary ‘yes’ (coded 1) or ‘no’ (coded 0) response to each of the four items. The second format presented a five-point ordered response based on frequency of the behaviours (never = 0, rarely = 1, sometimes = 2, frequently = 3, very frequently = 4). An additional question asked which of these response formats women preferred when being asked about IPV (Thinking about question 2a and 2b, which way would you prefer to be asked? 2a [answering with yes or no], 2b [answering how often]).

Another question asked how often they would prefer to be asked ACTS during pregnancy (When do you think is the best time during pregnancy for health care providers to ask about domestic violence? [at the first visit only; at some visits i.e., first, 28 weeks and 36 weeks; at every visit; I don’t think they should ask]). The SUSTAIN survey then included the Composite Abuse Scale (CAS) (44) as an IPV reference standard. The CAS is a comprehensive, multidimensional measure of IPV covering physical, sexual, and psychological abuse. Women self-report their experience of 30 abuse acts in the past 12 months on a six-point frequency scale from ‘never’ (0) to ‘daily’. (5) It has four dimensions: Severe Combined Abuse, Emotional Abuse, Physical Abuse, and Harassment that provide four categories of abuse for an individual women’s experience of IPV. (44)

Analysis

A ‘yes’ response to one or more of the four binary format ACTS questions was considered a positive screen for IPV. A response of ‘rarely’ or higher for one or more of the four frequency format ACTS questions was considered a positive screen for IPV. For the reference standard CAS, scoring on one or more of the four abuse categories was considered positive for experiencing IPV. (17) A small number of participants were unable to be classified due to missing screening and/or CAS items. Sensitivity, specificity, and predictive values of the ACTS screening tools were assessed against the CAS. Receiver operating characteristic (ROC) curve analysis was conducted to assess the overall accuracy of the ACTS screening questions using CAS as the reference. For each ROC curve, the AUC is reported when plotting sensitivity against 1-specificity. AUC of greater than 0.75 is generally considered clinically useful. (45)

Participants were assured participation was voluntary and choosing not to participate would not impact their care. A distress protocol and information resources were available for both women and researchers involved in the study. Where women screened positive for IPV, they were prompted to speak to their midwife or social worker, or IPV service.

Results

The survey was completed by 1067 pregnancy care patients aged between 18 and 48 years, representing a response rate of 76.2%. Approximately half (49%, 515) of participants were pregnant with their first child and nearly all (97%; 1008) had a current partner.

The study sample was ethnically diverse with about 27% (273) of participants having a first language other than English and 1% (10) identified as Aboriginal or Torres Strait Islander women. Over 90% (931) had completed at least Year 12 education (Table 1).
Table 1
Demographic characteristics of participants (N = 1067)

| Category                                         | Mean | SD  |
|--------------------------------------------------|------|-----|
| Age in years (n = 942, min = 18, max = 48)      | 33.2 | 4.5 |
| Weeks pregnant (n = 991, min = 6, max = 41)     | 27.0 | 7.6 |
| First baby                                      | 515  | 49.2|
| Has current partner                             | 1008 | 96.6|
| Married                                         | 707  | 69.8|
| Defacto (living with partner)                   | 263  | 26.0|
| Type of care received                           |      |     |
| Hospital care                                   | 462  | 54.7|
| Shared care                                     | 204  | 24.2|
| Midwifery care                                  | 154  | 18.3|
| Medical care                                    | 43   | 5.0 |
| Specialist clinic                               | 63   | 7.0 |
| Community clinic                                | 2    | 0.2 |
| Attending first appointment                     | 218  | 21.0|
| Aboriginal or Torres Strait Islander            | 10   | 1.0 |
| Born outside Australia                          | 455  | 45.0|
| English not first language                      | 273  | 27.1|
| Finished school to Year 12                      | 931  | 92.4|
| Completed at least a university degree           | 729  | 72.2|
| Has a Health Care Card                          | 289  | 28.6|
| Ease of managing on current income              |      |     |
| Easily                                          | 411  | 40.3|
| Not too bad                                     | 404  | 39.7|
| Difficult some of the time                      | 175  | 17.2|
| Difficult all the time                          | 26   | 2.6 |
| Impossible                                      | 3    | 0.3 |

*Note.* Denominators vary due to missing data.
Rates of IPV and abusive behaviours experienced by participants

The proportion of women screening positive for IPV was 8% (n = 83) based on the four-item binary (yes/no) response format ACTS and 12.8% (n = 133) for the ordinal frequency response format (Table 2). These rates compare to 10.5% (n = 108) of women categorised as positive for IPV experience using the CAS reference standard. While both ACTS IPV screen prevalence estimates approximated the referent standard (overlapping confidence intervals), the estimated prevalence of the dichotomous response format tool was lower than for the frequency response format.
Table 2
Abusive behaviours experienced by participants in past 12 months

|                      | IPV Positive |   | 95% CI          |
|----------------------|--------------|---|-----------------|
|                      | N            | % |                 |
| ACTS Screening Tool – Binary Yes/No format\(^a\) (n = 1042) |              |   |                 |
| Has partner or ex-partner... |              |   |                 |
| Done something that made you feel afraid? | 55 | 5.3 |                 |
| Controlled your day-to-day activities or put you down? | 44 | 4.2 |                 |
| Threatened to hurt you in any way? | 17 | 1.6 |                 |
| Hit, slapped, kicked, or otherwise physically hurt you? | 13 | 1.2 |                 |
| Any of the above\(^b\) | 83 | 8.0 | 6.3, 9.6       |
| ACTS Screening Tool – Ordinal Frequency format\(^c\) (n = 1042) |              |   |                 |
| Has partner or ex-partner... |              |   |                 |
| Done something that made you feel afraid? | 94 | 9.0 |                 |
| Controlled your day-to-day activities or put you down? | 81 | 7.8 |                 |
| Threatened to hurt you in any way? | 26 | 2.5 |                 |
| Hit, slapped, kicked, or otherwise physically hurt you? | 31 | 3.0 |                 |
| Any of the above\(^d\) | 133 | 12.8 | 10.7, 14.8 |
| Composite Abuse Scale (n = 1029) |              |   |                 |
| Scored positive for the following category of abuse... |              |   |                 |
| Severe Combined Abuse | 28 | 2.7 |                 |
| Emotional Abuse /Harassment alone | 57 | 5.5 |                 |
| Physical Abuse alone | 5  | 0.5 |                 |
| Physical and Emotional Abuse/Harassment | 18 | 1.7 |                 |
| Any category of abuse on CAS | 108 | 10.5 | 8.6, 12.4 |
Note. Denominators vary due to missing data. ACTS = Afraid/Controlled/Threatened/Slapped or otherwise physically hurt. CI = confidence intervals

a‘Yes’ in response to question, “In the last year, has a partner or ex-partner…”, where response options for each item were Yes (scored 1) or No (scored 0).

bScore of 1 (Yes) on one or more of the ACTS Screening Tool items

c‘Rarely’ or above in response to question, “In the last year, how often has a partner or ex-partner…”, where response options for each item were on a five-point Likert scale (Never = 0, Rarely = 1, Sometimes = 2, Frequently = 3, Very frequently = 4).

dScore ≥ 1 (Rarely) on one or more of the ACTS Screening Tool items

Accuracy of ACTS IPV screen

The test performance of the four individual ACTS screen items and the overall screen, judged against the referent CAS, by response format, followed a consistent pattern (see Table 3). The sensitivity was higher with the ordinal frequency response format while the specificity was higher for the binary response format. Given the more stringent binary response (resulting in fewer women categorised as abused) compared to the ordinal frequency format, it is not surprising that the positive predictive value was higher for the binary format (0.68) compared to the ordinal (0.56). This is due to the yes/no response format being associated with fewer false positives. Each of the ACTS’ four items and overall, regardless of response format, performed well in identifying women who did not experience IPV based on the CAS, with negative predictive values of .95 (binary response) and .96 (ordinal frequency response).

The ACTS screening tool demonstrated good overall accuracy demonstrated by an area under the ROC curve of 0.80 (95% CI = 0.76 to 0.85) for the ordinal frequency response and 0.74, (95% CI = 0.69 to 0.79) for the binary response (see Table 3 and Fig. 1).
### Table 3
ACTS IPV screening test characteristics in predicting cases positive for any category of abuse on the Composite Abuse Scale (total N = 1011, number of participants meeting reference criteria = 104<sup>a</sup>)

| Predictor (screening item) | Response type<sup>b</sup> | PPV | NPV | Sensitivity | Specificity | Area under curve |
|---------------------------|---------------------------|-----|-----|-------------|-------------|-----------------|
|                           |                           |     |     |             |             | Area 95% CI<sup>c</sup> | Chi²<sup>d</sup> | P |
| Individual items:         |                           |     |     |             |             |                 |               |   |
| Done something that made you feel afraid? | Yes/No | 0.65 | 0.93 | 0.32 | 0.98 | 0.65 (0.60 to 0.69) |
| Frequency                 | 0.56 | 0.94 | 0.47 | 0.96 | 0.71 | 0.67 (0.67 to 0.76) | 10.25 | .0014 |
| Controlled your day to day activities … or put you down? | Yes/No | 0.79 | 0.93 | 0.32 | 0.99 | 0.65 (0.61 to 0.70) |
| Frequency                 | 0.63 | 0.94 | 0.46 | 0.97 | 0.72 | 0.67 (0.67 to 0.76) | 12.45 | .0004 |
| Threatened to hurt you in any way? | Yes/No | 0.81 | 0.91 | 0.13 | >0.99 | 0.56 (0.53 to 0.59) |
| Frequency                 | 0.83 | 0.92 | 0.23 | 0.99 | 0.61 | 0.57 (0.65 to 0.67) | 9.69 | .0019 |
| Hit, slapped, kicked or otherwise physically hurt you? | Yes/No | 0.92 | 0.91 | 0.12 | >0.99 | 0.56 (0.53 to 0.59) |
| Frequency                 | 0.81 | 0.92 | 0.20 | 0.99 | 0.60 | 0.56 (0.64 to 0.67) | 8.73 | .0031 |

**Note.** CI = confidence interval; PPV = positive predictive value, i.e. proportion of positively screened participants who met criteria for any abuse category on Composite Abuse Scale; NPV = negative predictive value, i.e. proportion of negatively screened participants who did not meet criteria for any abuse category on Composite Abuse Scale; Sensitivity = proportion of abused participants who screened positive on the predictor; Specificity = proportion of non-abused participants who screened negative on the predictor. <sup>a</sup>Missing cases were excluded listwise. <sup>b</sup>Items were presented to all participants in two formats: Yes/No format - Participants were asked, “In the last year, has a partner or ex-partner…”, and response options for each item were yes (scored 1) or no (scored 0); Frequency format - Participants were asked, “In the last year, how often has a partner or ex-partner…”, and responses for each item were on a five point scale (Never = 0, Rarely = 1, Sometimes = 2, Frequently = 3, Very frequently = 4); in both formats a participant screened positive if they had a score of at least 1. <sup>c</sup>Asymptotic 95% confidence interval. <sup>d</sup>Chi² for difference between area under curve when using binary versus frequency response format. <sup>e</sup>Screened positive (score of at least 1) on any of the four screening items. <sup>f</sup>Screened positive (score of at least 1) on “Done something that made you feel afraid?” or “Controlled your day-to-day activities (e.g. who you see, where you go) or put you down?"
| Predictor (screening item)          | Response type<sup>b</sup> | PPV  | NPV  | Sensitivity | Specificity | Area under curve |
|-----------------------------------|---------------------------|------|------|-------------|-------------|------------------|
| Overall ACTS screen:              |                            |      |      |             |             |                  |
| Positive screen (one or more positive items)<sup>e</sup> | Yes/No                     | 0.68 | 0.95 | 0.51        | 0.97        | 0.74 (0.69 to 0.79) |
| Frequency                         |                           | 0.56 | 0.96 | 0.66        | 0.94        | 0.80 (0.76 to 0.85) | 11.18 | .0008 |

Note. CI = confidence interval; PPV = positive predictive value, i.e. proportion of positively screened participants who met criteria for any abuse category on Composite Abuse Scale; NPV = negative predictive value, i.e. proportion of negatively screened participants who did not meet criteria for any abuse category on Composite Abuse Scale; Sensitivity = proportion of abused participants who screened positive on the predictor; Specificity = proportion of non-abused participants who screened negative on the predictor. <sup>a</sup>Missing cases were excluded listwise. <sup>b</sup>Items were presented to all participants in two formats: Yes/No format - Participants were asked, “In the last year, has a partner or ex-partner…”, and response options for each item were yes (scored 1) or no (scored 0); Frequency format - Participants were asked, “In the last year, how often has a partner or ex-partner…”, and responses for each item were on a five point scale (Never = 0, Rarely = 1, Sometimes = 2, Frequently = 3, Very frequently = 4); in both formats a participant screened positive if they had a score of at least 1. <sup>c</sup>Asymptotic 95% confidence interval. <sup>d</sup>Chi<sup>2</sup> for difference between area under curve when using binary versus frequency response format. <sup>e</sup>Screened positive (score of at least 1) on any of the four screening items. <sup>f</sup>Screened positive (score of at least 1) on “Done something that made you feel afraid?” or “Controlled your day-to-day activities (e.g. who you see, where you go) or put you down?”

Women’s preferences for IPV screening response format, frequency of enquiry and comfort to be asked
A small majority (60%) of participants indicated a preference for the ACTS screening tool option with the binary yes/no response format over the ordinal frequency format (Table 4). While not statistically significant, among the 100 women exposed to IPV (CAS positive), 53% (95% CI = .43, .62) preferred the binary yes/no response format compared to 61% (95% CI = 0.58, 0.62) among the 802 women not exposed to IPV.

The majority of participants (82%) supported health care providers asking about IPV screening more than once (‘at some visits’ or ‘at every visit’) during antenatal care, compared to at only the first visit (14%), or not at all (3%) (Table 4). While most women were comfortable talking about IPV, one out of every three women (31%) exposed to IPV (CAS positive) indicated they were uncomfortable or very uncomfortable talking with health providers about experiencing fear of a current or ex-partner (Table 4).

### Table 4
Participant preferences regarding IPV screening

| IPV Positive (CAS) | IPV Negative (CAS) | TOTAL |
|--------------------|--------------------|-------|
| x                  | %                  | x     | %                  | x     | %                  |
| IPV screen response format preference | n = 100 | n = 802 | n = 902 |
| Binary yes/no format<sup>a</sup> | 53 | 53 | 491 | 61 | 544 | 60.3 |
| When should provider ask about IPV | n = 104 | n = 873 | n = 977 |
| At first visit only | 12 | 12 | 129 | 15 | 141 | 14 |
| At some visits | 37 | 36 | 301 | 34 | 338 | 35 |
| At every visit | 48 | 46 | 417 | 48 | 465 | 48 |
| Don't think they should ask | 7 | 7 | 26 | 3 | 33 | 3 |
| Level of comfort talking about IPV<sup>b</sup> | n = 54 | n = 238 | n = 292 |
| Very comfortable | 7 | 13 | 78 | 33 | 85 | 29 |
| Comfortable | 19 | 35 | 80 | 34 | 99 | 34 |
| Neutral | 11 | 20 | 36 | 15 | 47 | 16 |
| Uncomfortable | 10 | 19 | 35 | 15 | 45 | 15 |
| Very uncomfortable | 7 | 13 | 9 | 4 | 16 | 5 |

Note. <sup>a</sup> Preferred binary yes/no response format rather than ordinal frequency response. <sup>b</sup> Only includes participants who responded to this item by selecting a comfort-level response option; An additional 722 participants instead selected the option, "I have not experienced this issue".

### Discussion

This study assessed the validity of a new four-item ACTS IPV screening tool developed for use in antenatal healthcare settings and the findings are promising. In this sample of 1,067 women, the ACTS screening tool with an ordinal frequency response format, provided a balance of sensitivity and specificity, correctly identifying 66% of women with IPV and 94% of women without IPV. The ACTS screening tool also demonstrated clinical utility, with
56% of women with a positive screen and 96% of women with a negative screen correctly classified based on the referent Composite Abuse Scale (predictive values). These predictive values are dependent on the pre-test prevalence, which in this sample was around one in ten women attending the antenatal care setting. Similar trends were observed for the binary response format (51% sensitivity and 97% specificity with 68% of true IPV-positive cases and 95% of true IPV-negative cases). These figures are higher than with other tools including the WAST (sensitivity 47%, specificity 96%) and PVS (sensitivity 35–71%, specificity 80–94%) (24).

The ACTS screening tool was efficient at ruling out women who were not experiencing IPV but less accurate for detecting women experiencing IPV. Decisions regarding optimal use of the tool in healthcare settings should be informed by the general objectives of screening. In fact, the high NPV offers clinicians the confidence that women who are not experiencing IPV are more likely to be ruled out during screening than those experiencing IPV. This is a strength of the tool, as it allows clinicians to differentiate between these two groups of women and direct more attention and resources to those who did not screen negative through secondary assessment and follow-up.

With respect to how screening questions should be framed or asked at antenatal visits, participants categorised as abused were split on which format of response they preferred, while more participants in the non-abused category preferred the binary format. This may be partly attributable to the fact that women in the non-abused category might find yes/ no questions less demanding. On the other hand, women who experience abuse may appreciate being able to disclose in steps, for example, replying “sometimes” rather than committing to the ‘all or nothing’ approach that yes or no requires. This is consistent with the conclusion of an analysis of women's perspectives on IPV screening questions showing that answers to questions were rarely “yes” or “no” and thus midwives were often unclear whether women’s responses constituted IPV. (46) With regard to frequency of assessing for IPV, over three quarters of women indicated that screening questions should be asked more than once throughout the antenatal period (including 48% of respondents who preferred being asked at every visit). This is consistent with the knowledge that for IPV screening tools to be effective, they need to be repeated during the antenatal period and postnataally, with an ability to document clearly previous answers so women are not repeatedly asked for the same information. (47) Indeed, screening metrics aside, it is vital that screening tools do not dominate, decision making but rather complement professional judgement of clinicians. (48) Addressing the sensitive topic of IPV requires clinicians knowledgeable about dynamics of IPV, structural entrapment, impacts on family and available specialist resources.

**Strengths and limitations**

This study included more than one thousand pregnant women, providing the opportunity for robust analysis of the ACTS tool. There are, however, study limitations to consider. While the sample was large and somewhat diverse, the majority of women in this urban setting were well-educated and financially secure. It is important that policy addressing the health response to IPV address the needs of those experiencing IPV along with a multitude of structural social and economic disadvantages. While we were able to consider women's preferences for response formats by abuse status, there are likely subgroups of women who require bespoke IPV assessment and response. Research drawing on traditional ways of knowing would be needed to explore a safe and effective assessment and response for Aboriginal and Torres Strait Islander women. (49) In addition, for safety reasons, only women presenting to their antenatal care visit unaccompanied were eligible to participate. The IPV prevalence estimates, therefore, may not be representative of the general antenatal population. In addition, in the SUSTAIN survey, the binary response ACTS tool preceded the tool with ordinal frequency (static order rather than randomised), which
was then followed by the Composite Abuse Scale. While women were informed that they would be presented questions in several different ways, the results may be influenced by a testing effect.

Finally, further research would be warranted testing the ACTS tool across clinical settings with diverse samples and using different modes of delivery (verbal, written, electronic).

**Conclusions**

The ACTS tool provides a new clinically useful resource to identify women in the antenatal health setting most likely to be experiencing IPV and potentially benefit from a health system response. (11) The introduction of this new brief IPV screening tool, that includes controlling behaviour, offers the opportunity for evidence informed practice and policy to address this important determinant of health.

**Abbreviations**

- AAS: Abuse Assessment Screen
- ACTS: Afraid/Controlled/Threatened/ Slapped or physically hurt
- AUC: Area under the curve
- CAS: Composite Abuse Scale
- HARK: Humiliation, Afraid, Rape and Kick
- HITS: Hurt, Insult, Threaten, and Scream
- IPV: Intimate partner violence
- PVS: Partner Violence Screen
- ROC: Receiver operating characteristic
- SUSTAIN: Sustainability of identification and response to domestic violence in antenatal care
- WAST: Woman Abuse Screening Tool

**Declarations**

**Ethics approval and consent to participate**

Ethics approval was provided by The Royal Women's Hospital Human Research Ethics Committee (Reference: Project 17/35). Informed consent was obtained from all participants. The study was guided by the National Health and Medical Research Council guidelines, as updated in 2018 (50). All the study methods were performed in accordance with relevant regulations and guidelines as approved by the Ethics Committee.

**Consent for publication**
Availability of data and materials

The data that support the findings of this study are available from the corresponding author, but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

The authors gratefully acknowledge the funding provided by Australia's National Research Organisation for Women's Safety (ANROWS).

Authors' contributions

KH designed and led the study conduct and analyses and wrote the first draft with MKO. JKM and JS contributed to design and analyses and write up of paper. JV undertook data analyses and wrote the results section. JW and JC assisted with the design, conduct and analyses of the study. All authors read and approved the final manuscript.

Acknowledgements

We gratefully acknowledge contributions made by all the women who so generously participated in this study by sharing their experiences with us. We appreciate contributions made by Jacqueline Kuruppu, Rhiannon McArthur, India Jones, Tanya Hoad and Karyn Smith who assisted with survey data collection at the Victorian study sites.

References

1. Garcia-Moreno C, Hegarty K, d'Oliveira A, Koziol-McLain J, Colombini M, Feder G. The health-systems response to violence against women. The Lancet. 2015;385:1567-79.

2. Martin-de-las-Heras S, Velasco C, Luna-del-Castillo JdD, Khan KS. Maternal outcomes associated to psychological and physical intimate partner violence during pregnancy: A cohort study and multivariate analysis. PLOS ONE. 2019;14(6):e0218255.

3. Murray AL, Kaiser D, Valdebenito S, Hughes C, Baban A, Fernando AD, et al. The intergenerational effects of intimate partner violence in pregnancy: mediating pathways and implications for prevention. Trauma, Violence, & Abuse. 2020;21(5):964-76.

4. WHO. Global and regional estimates of violence against women; Prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva, Switzerland: WHO; 2013.
5. Phillips J, Vandenbroek P. Domestic, family and sexual violence in Australia: an overview of the issues: Department of Parliamentary Services, Parliamentary Library; 2014.

6. Gazmararian JA, Lazorick S, Spitz AM. Prevalence of Violence Against Pregnant Women. JAMA. 1996;275(24):1915-20.

7. Gartland D, Hemphill SA, Hegarty K, Brown S. Intimate partner violence during pregnancy and the first year postpartum in an Australian pregnancy cohort study. Maternal And Child Health Journal. 2011;15(5):570-8.

8. Velonis AJ, O’Campo P, Kaufman-Shriqui V, Kenny K, Schafer P, Vance M, et al. The impact of prenatal and postpartum partner violence on maternal mental health: Results from the community child health network multisite study. Journal of Women's Health. 2017;26(10):1053-61.

9. Pallitto CC, García-Moreno C, Jansen HA, Heise L, Ellsberg M, Watts C, et al. Intimate partner violence, abortion, and unintended pregnancy: Results from the WHO Multi-country Study on Women's Health and Domestic Violence. International Journal of Gynecology & Obstetrics. 2013;120(1):3-9.

10. Hill A, Pallitto C, McCleary-Sills J, Garcia-Moreno C. A systematic review and meta-analysis of intimate partner violence during pregnancy and selected birth outcomes. International Journal of Gynecology & Obstetrics. 2016;133(3):269-76.

11. WHO. Responding to intimate partner violence and sexual violence against women: WHO clinical and policy guidelines: World Health Organization; 2013.

12. O’Doherty L, Hegarty K, Ramsay J, Davidson L, Feder G, Taft A. Screening women for intimate partner violence in healthcare settings. Cochrane Database of Systematic Reviews. 2015(7 Art No CD007007).

13. Kiely M, El-Mohandes A, El-Khorazaty M, Blake S, Gantz M. An integrated intervention to reduce intimate partner violence in pregnancy: a randomized controlled trial. Obstetrics and gynecology. 2010;115(2 Pt 1):273-83.

14. Tiwari A, Leung W, Leung T, Humphreys J, Parker B, Ho P. A randomised controlled trial of empowerment training for Chinese abused pregnant women in Hong Kong. BJOG : an international journal of obstetrics and gynaecology. 2005;112(9):1249-56.

15. Australian Institute of Health and Welfare. Screening for domestic violence during pregnancy: options for future reporting in the National Data Collection. Canberra; 2015.

16. Sprague S, Madden K, Simunovic N, Godin K, Pham NK, Bhandari M, et al. Barriers to screening for intimate partner violence. Women & health. 2012;52(6):587-605.

17. Hegarty K, Spangaro J, Koziol-McLain J, Walsh J, Lee A, Kyei-Onanjiri M, et al. Sustainability of identification and response to domestic violence in antenatal care: The SUSTAIN Study. 2020.

18. Department of Health. Clinical Practice Guidelines: Pregnancy Care. Canberra: Australian Government Department of Health; 2018.

19. Spangaro J. What is the role of health systems in responding to domestic violence? An evidence review. Australian Health Review. 2017;41:639–45.

20. Spangaro J, Poulos R, Zwi A. Pandora doesn't live here any more: Normalization of screening for intimate partner violence in Australian antenatal, mental health and substance abuse services. Violence and Victims. 2011;26(1):130-44.

21. Trevethan R. Sensitivity, specificity, and predictive values: foundations, pliabilities, and pitfalls in research and practice. Frontiers in public health. 2017;5:307.

22. Power M, Fell G, Wright M. Principles for high-quality, high-value testing. Evidence Based Medicine. 2013;18(1):5-10.
23. Arkins B, Begley C, Higgins A. Measures for screening for intimate partner violence: a systematic review. Journal of Psychiatric & Mental Health Nursing. 2016;23(3/4):217-35.

24. Rabin R, Jennings J, Campbell J, Bair-Merritt M. Intimate partner violence screening tools: A systematic review. American Journal of Preventive Medicine. 2009;36(5).

25. Wathen N, Jamieson E, Macmillan H. Who is identified by screening for intimate partner violence? Women's Health Issues. 2008;18(6):423-32.

26. Sohal H, Eldridge S, Feder G. The sensitivity and specificity of four questions (HARK) to identify intimate partner violence: a diagnostic accuracy study in general practice. BMC Family Practice; 2007;8 (49).

27. Signorelli M, Taft A, Gartland D, Hooker L, McKee C, MacMillan H, et al. How valid is the question of fear of a partner in identifying intimate partner abuse? A cross-sectional analysis of four studies. Journal of Interpersonal Violence. 2020:1-22.

28. Spangaro J, Koziol-McLain J, Zwi A, Rutherford A, Frail M, Ruane J. Deciding to tell: Qualitative configurational analysis of decisions to disclose experience of intimate partner violence in antenatal care. Social Science & Medicine. 2016;154:45-53.

29. Bagwell-Gray M, E,, Messing J, Baldwin-White A. Intimate Partner Sexual Violence: A Review of Terms, Definitions, and Prevalence. Trauma, Violence & Abuse. 2015;16(3):316-35.

30. McFarlane J, Parker B, Soeken K, Bullock L. Assessing for abuse during pregnancy: severity and frequency of injuries and associated entry into prenatal care. Jama. 1992;267(23):3176-8.

31. Norton LB, Peipert JF, Zierler S, Lima B, Hume L. Battering in pregnancy: an assessment of two screening methods. Obstetrics & Gynecology. 1995;85(3):321-5.

32. Anderson BA, Marshak HH, Hebbeler DL. Identifying intimate partner violence at entry to prenatal care: clustering routine clinical information. Journal of midwifery & women's health. 2002;47(5):353-9.

33. Keeling J, Mason T. Postnatal disclosure of domestic violence: comparison with disclosure in the first trimester of pregnancy. Journal of Clinical Nursing. 2011;20(1-2):103-10.

34. Lutgendorf M, Thagard A, Rockswold P, Busch J, Magann E. Domestic violence screening of obstetric triage patients in a military population. Journal of Perinatology. 2012;32(10):763-9.

35. Gashaw BT, Magnus JH, Schei B. Intimate partner violence and late entry into antenatal care in Ethiopia. Women and birth. 2019;32(6):e530-e7.

36. Reichenheim ME, Moraes CL. Comparison between the abuse assessment screen and the revised conflict tactics scales for measuring physical violence during pregnancy. Journal of Epidemiology & Community Health. 2004;58(6):523-7.

37. Hamberger LK, Larsen SE, Lehrner A. Coercive control in intimate partner violence. Aggression and Violent Behavior. 2017;37:1-11.

38. Anderson EJ, Krause KC, Meyer Krause C, Welter A, McClelland DJ, Garcia DO, et al. Web-based and mHealth interventions for intimate partner violence victimization prevention: a systematic review. Trauma, Violence, & Abuse. 2019:1524838019888889.

39. Todahl J, Walters E. Universal screening for intimate partner violence: a systematic review. Journal of marital and family therapy. 2011;37(3):355-69.

40. Parker B, McFarlane J. Identifying and helping battered pregnant women. MCN: The American Journal of Maternal/Child Nursing. 1991;16(3):161-4.
41. Feldhaus KM, Koziol-McLain J, Amsbury HL, Lowenstein SR, Abbott JT. Accuracy of 3 brief screening questions for detecting partner violence in the emergency department. Jama. 1997;277(17):1357-61.

42. MacMillan HL, Wathen CN, Jamieson E, Boyle M, McNutt L-A, Worster A, et al. Approaches to screening for intimate partner violence in health care settings: a randomized trial. Jama. 2006;296(5):530-6.

43. Sherin KM, Sinacore JM, Li X-Q, Zitter RE, Shakil A. HITS: a short domestic violence screening tool for use in a family practice setting. FAMILY MEDICINE-KANSAS CITY-. 1998;30:508-12.

44. Hegarty K, Bush R, Sheehan M. The composite abuse scale: further development and assessment of reliability and validity of a multidimensional partner abuse measure in clinical settings. Violence and victims. 2005;20(5):529.

45. Fan J, Upadhye S, Worster A. Understanding receiver operating characteristic (ROC) curves. Canadian Journal of Emergency Medicine. 2006;8(1):19-20.

46. Spangaro J, Koziol-McLain J, Rutherford A, Zwi A. Is it yes?: Making sense of responses to routine screening for domestic violence. Psychology of Violence. in press.

47. Deshpande NA, Lewis-O’Connor A. Screening for intimate partner violence during pregnancy. Reviews in obstetrics and gynecology. 2013;6(3-4):141.

48. Trevethan R. Screening, Sensitivity, Specificity, and So Forth: A Second, Somewhat Skeptical, Sequel. Modern Health Science. 2019;2(1):p60-p.

49. Fiolet R, Tarzia L, Hameed M, Hegarty K. Indigenous peoples’ help-seeking behaviors for family violence: A scoping review. Trauma, Violence, & Abuse. 2019:1524838019852638.

50. National Health Medical Research Council. National Statement on Ethical Conduct in Human Research 2007 (Updated 2018). Commonwealth of Australia Canberra, Australia; 2007.