# Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden

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# Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden

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**Keywords**

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## ABSTRACT

**Objective:** To explore psychometric properties of the Violence Against Women instrument in a randomly selected national sample of women (*N*=573) aged 18-65 years and residing in Sweden. **Design:** Cross-sectional survey study. **Setting:** Sweden. **Participants:** A postal survey was sent to 1006 women between January and March 2009, during which 624 women (62.0%) returned the questionnaire. Fifty-one women who did not answer any of the violence items were excluded from the analyses, resulting in a final sample of 573 women. **Primary and secondary outcome measures:** Self-reported exposure to psychological, physical and sexual intimate partner violence. **Results:** Cronbach's alphas were 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). A pre-determined three-component solution largely replicated the explored three component conceptual model of the Violence Against Women instrument. The instrument was able to discriminate between groups known from previous studies to differ in exposure to physical and/or sexual violence, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Past-year prevalence of physical (8.1%; 95% CI 5.9 – 10.3) and sexual (3.0%; 1.6 – 4.4) violence was similar to that reported in other Nordic studies; however, earlier-in-life prevalence was lower in the current study (14.3%; 95% CI 11.4 – 17.2 and 9.2%; 95% CI 6.8 – 11.6 respectively). Reported exposure rates were higher than those obtained from a concurrently administered instrument (NorVold Abuse Questionnaire). **Conclusion:** The Violence Against Women instrument demonstrated good construct validity and internal reliability in an adult female population in Sweden. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## ARTICLE SUMMARY

### Article focus

- The World Health Organization's Violence Against Women instrument (VAWI) has been used in several countries around the world in order to investigate violence against women by their intimate male partners, but aspects of reliability and validity have seldom been investigated.
- The aim of the current study was to explore selected psychometric properties of the VAWI in a randomly selected national population (*n*=573) of women.

### Key messages

- The current study provides preliminary support for the VAWI subscales of psychological, physical and sexual violence in a Swedish, adult female population.
- This adds to the knowledge of the instrument's cross-cultural validity and reliability, which is of significance when comparing intimate partner violence prevalence rates between countries.

### Strengths and limitations

- Randomly selected national sample with good socio-demographic representation
- Lower response rates were found among those 18-29 years old, unmarried, foreign born and with low yearly income

### Keywords

Intimate partner violence * Sweden * Validation * WHO VAW instrument * Psychometric properties * Women

## INTRODUCTION

While prevalence studies investigating violence against women perpetrated by intimate male partners have become more frequent,(1-4) sizeable differences in reported exposure occur both between and within study sites. These differences may in part be explained by differences in questionnaire administration methods (e.g. personal interviews vs. self-administration), questionnaire content, target populations, or definitions and severity of the violence assessed; however, such differences may also reflect true variation and cultural differences in violence perpetration.(1, 4) Standardized methodologies for assessing intimate partner violence (IPV) may help to enhance the reliability of results obtained from such studies and aid in comparing prevalence rates from diverse settings.

With this in mind, the World Health Organization (WHO) constructed a questionnaire for the WHO Multi-country Study on Women's Health and Domestic Violence against Women.(5) The study questionnaire includes the Violence Against Women instrument (henceforth referred to as "VAWI") assessing exposure to psychological, physical and sexual IPV. The VAWI was developed in collaboration with several networks and expert groups and was based partly on the original(6) and revised Conflict Tactics Scales,(7) as well as on work that originated from its critics.(8) Extensive pre-testing and back-translations of the questionnaire were conducted. The prevalence rates from the ten countries included in the multi-country study vary greatly, with life-time estimates ranging between 20-75% for psychological violence, 13-61% for physical violence and 6-59% for sexual violence.(5) Since the Multi-country Study was performed, the VAWI has been used in several more countries.(9-14)

Despite the VAWI's relatively wide use, few peer-reviewed studies have evaluated its psychometric properties. Internal reliability (Cronbach's α) was assessed and confirmed in the

Multi-Country Study;(15) however, only one study, conducted in Brazil, has explored aspects of validity.(16) In that study, analyses of data from two female populations, one urban (São Paulo; *n*=940) and one combined urban and rural area (Zona da Mata; *n*=1,188) supported the construct validity and internal reliability of the instrument.

The aim of this study was to explore psychometric properties of the VAWI in a randomly selected national population (*n*=573) of women aged 18-65 years residing in Sweden. Sweden provides an interesting comparative context due to its linguistic, cultural and socio-economic differences to Brazil.

## METHODS

### Procedure, study population and response rate

A sample of 1006 women, aged 18-65 years and residing in Sweden, was randomly selected by Statistics Sweden from the national population register. Data collection took place between January and March 2009. The response rate was 62.0% (*n*=624). Women who did not respond to any of the violence items (*n*=51) were excluded from the analyses, resulting in a total sample of 573 women.

Criterion validity was explored by comparing prevalence reported in the VAWI versus the NorVold Abuse Questionnaire (NorAQ).[16] A second data collection was performed for this purpose. Statistics Sweden sent out the VAWI and NorAQ to 20% (*n*=125) of the respondents from the initial data collection between November 2009 and January 2010. NorAQ was chosen since it is the only questionnaire measuring violence that has been validated in Sweden in both a female and male (see companion article) population-based sample. The response rate was 65.6% (*n*=82*)* for the VAWI and 63.2% (*n*=79) for NorAQ.

**Drop-out analysis**

A two-proportion z-test was used to assess statistical significance between the drop-out and the final sample regarding age, country of birth, civil status and the respondents' yearly income before tax. A Bonferroni adjustment to the alpha level was applied.

Comparing those who did not return the questionnaire (*n*=382) with the final sample of analysis (*n*=573) revealed that significantly lower response rates were found among non-respondents who were 18-29 years old, unmarried, foreign born and had low yearly income of 0 – 159,999 Swedish Kronor (SEK) before tax. Internal drop-out rates, that is respondents who did not endorse any violence item (*n*=51), were significantly higher among men who were 18-29 years old, unmarried and had a low yearly income in comparison to the final sample of analysis.

Of those who did not return the questionnaire during the second data collection (*n*=46), significantly lower response rates were found for women who were unmarried, widowed or divorced.

**Assessment instruments: VAWI and NorAQ**

The VAWI consists of behaviour-specific items related to psychological (four items), physical (six items) and sexual violence (three items). The physical violence items are further divided into "moderate" (the two first items) and "severe" (the following four items) violence based on the likelihood of physical injury.(5) For each question, respondents were asked whether they had experienced the specific act during the *past year* and *earlier in life*. The VAWI's items were translated and adapted to Swedish by an expert panel in IPV.

NorAQ has been validated in a Swedish context(17) and measures emotional (three items), physical (three items) and sexual (four items) abuse, including different perpetrators, as well as abuse in the health care system. The NorAQ violence items applicable to an intimate partnership (Figure 1) were included with the intention to compare prevalence rates with those obtained by use of the VAWI. The second sexual violence item was adapted for use in both a male and female population, as the questionnaire constructed for this study was sent to a male population as well (see companion).

**Statistical analyses**

Principal components analysis (PCA) was conducted to explore the internal construct validity of the violence items. A promax rotation was chosen due to high inter-component correlations (e.g. r=0.49-0.61 for the three dimensions). Decisions on the number of components to extract were based on parallel analysis, Kaiser's eigenvalue-greater-than-one rule, total proportion of variance explained and Cattell's scree plot. This was followed by a pre-determined solution with three components as conceptualized in the VAWI.

The internal reliability of the VAWI was assessed with the Cronbach's alpha for each subscale and for the total violence scale. An alpha of 0.70 or higher was considered satisfactory.(18)

Known-groups comparisons were performed to investigate the VAWI's external construct validity. The aim was to see if the instrument was able to differentiate between groups known to differ in exposure to IPV.(19) The following hypotheses were postulated: women who are exposed to physical and/or sexual IPV (life-time exposure, "yes/no") would have poorer self-

perceived health(2, 20-24) and have grown up in a home where they witnessed physical violence between their parents.(9, 25-27) The Mantel-Haenszel test was used controlling for age, income, civil status, education and country of birth.

*Self-perceived health* was assessed by "How would you say that your general health has been during the past year?". Response options were dichotomized into "very good/good" and "neither good nor bad/bad/very bad". *Childhood exposure to violence* was assessed with the question: When you were growing up, did you see your parents (or equivalent) regularly physically hurt one another? ("no" and "yes/unsure").

Prevalence of psychological, physical and sexual violence was calculated for the past year and for earlier in life, for comparisons with prevalence rates presented in other studies.

In addition, life-time prevalence of IPV was compared between the VAWI and the NorAQ and Fisher's exact test was used to test for statistically significant differences at the 95% CI level. Only those respondents who had answered both the VAWI and NorAQ were included ($n$=77) in this analysis.

**Ethical considerations**

The Regional Ethics Review Board located in Gothenburg gave approval for this study (Dnr: 527-08) and the WHO ethical and safety recommendations for research on domestic violence against women were followed.(28)

**RESULTS**

**Study population**

Nearly half of the women had at least three years of university education (*n* =270; 47.2%) and the mean age was 43 years (*SD*=13). Of the total sample, 85.1% (*n*=484) were currently in a relationship (i.e. boyfriend or girlfriend, married, registered partnership or cohabiting), of which the majority were heterosexual relationships (*n* =566; 98.8%). The rest of the sample was single, widowed or divorced, but had previously been in a relationship (see Table 1).

Table 1. *Socio-demographic and psychosocial factors of the total sample. N=573*

| | *N* (%) |
|---|---|
| **Age groups** | |
| 18-29 | *107* (18.7) |
| 30-39 | *138* (24.1) |
| 40-49 | *125* (21.8) |
| 50-59 | *136* (23.7) |
| 60-65 | *67* (11.7) |
| **Partner status** | |
| Single/widowed/divorced | *85* (14.9) |
| Boyfriend/girlfriend | *64* (11.2) |
| Married/cohabitant/registered partnership | *420* (73.8) |
| Heterosexual relationship | *566* (98.8) |
| Same-sex relationship | *7* (1.2) |
| **Educational level (highest)** | |
| University | *270* (47.2) |
| High school (10-12 yrs) | *211* (36.9) |
| Compulsory (≤9 yrs) | *91* (15.9) |
| **Annual income (before tax, SEK)** | |
| 0 – 159,999 | *168* (29.3) |
| 160,000 - 234,999 | *175* (30.5) |
| 235,000 - 309,999 | *143* (25.0) |
| 310,000 or more | *87* (15.2) |
| **Employment status** | |
| Employed | *396* (69.7) |
| Student | *35* (6.2) |
| Retired | *47* (8.3) |
| Sick leave (more than 3 months) | *8* (1.4) |
| Parental leave or leave of absence | *35* (6.2) |
| Unemployed | *23* (4.0) |
| Other | *24* (4.2) |

| | |
|---|---|
| **Country of Birth** | |
| Sweden | *519* (90.6) |
| Other Nordic country | *15* (2.6) |
| Other European country | *18* (3.1) |
| Country outside Europe | *21* (3.7) |
| **Self-rated health** | |
| Very good/good | *511* (90.0) |
| Neither good nor bad/bad/very bad | *57* (10.0) |
| **Grown up in a home where there occurred physical violence** | |
| No | *542* (94.6) |
| Yes/Unsure | *31* (5.4) |

**Internal validity**

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89 and Bartlett's test of sphericity was significant ($p < 0.05$), verifying a good fit of the data to the PCA. Parallel analysis, Kaiser's criterion and Cattell's scree test suggested two components (not in Table), explaining 57.4% of the total variance. The first component consisted of all physical and sexual violence items in the VAWI conceptual model, except the two items representing the least severe forms of physical and sexual violence. In addition, the component included the psychological violence item referring to threat of injury. The second component comprised the remaining three psychological violence items as well as the first physical and sexual violence items.

A three-component solution (Table 2) explained 64.4% of the total variance. The third component had an initial eigenvalue close to one (0.9) and comprised two of the three sexual violence items; otherwise the structure was identical to the two component solution and largely mirrored the VAWI's physical, psychological and sexual violence subscales.

Table 2. *Three-component solution for the VAWI psychological, physical and sexual violence items.* N=*534*

| | Three-component solution | | |
|---|---|---|---|
| **Conceptual model** | **C1** | **C2** | **C3** |
| Psychological Violence | | | |
| 1 | | **.89** | |
| 2 | | **.74** | |
| 3 | | **.64** | |
| 4 | **.43** | .33 | |
| Physical Violence | | | |
| 1 | | **.71** | |
| 2 | **.38** | | .31 |
| 3 | **.80** | | |
| 4 | **.85** | | |
| 5 | **.67** | | |
| 6 | **.88** | | |
| Sexual Violence | | | |
| 1 | | | **.81** |
| 2 | **.56** | | .55 |
| 3 | | | **.88** |
| *Accumulated variance %* | *46.1* | *57.4* | *64.4* |
| *Eigenvalues* | *6.0* | *1.5* | *0.9* |

[a] Loadings greater 0.30 are shown and highest loadings are boldfaced. List-wise deletion was used.

**Internal reliability**

The Cronbach's alpha coefficient (Table 3) was satisfactory for all subscales in the VAWI conceptual model: 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). Alpha for the sexual violence scale increased from 0.72 to 0.77 after deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)".

Table 3. *Cronbach's α of the VAWI psychological, physical and sexual violence scales and total scale, life-time.* N=*573*

| Scales | Alpha if Item Deleted |
|---|---|
| **Psychological violence** | |

| | |
|---|---|
| Insulted me in a way that made me feel bad about myself | .75 |
| Belittled and humiliated me in front of other people | .71 |
| Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | .72 |
| Threatened to hurt me or someone I care about | .76 |
| **Total** | **.79** |
| | |
| **Physical violence** | |
| Pushed or shoved me | .81 |
| Thrown something at me that could have hurt me | .75 |
| Hit me with his/her fist or with some other object that could have hurt me | .73 |
| Kicked and dragged me and beat me up | .75 |
| Choked me or burnt me on purpose | .76 |
| Hurt me with a knife, a gun or some other weapon | .80 |
| **Total** | **.80** |
| | |
| **Sexual violence** | |
| Demanded to have sex with me even though I did not want to (but did not use physical force) | .77 |
| Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | .64 |
| Forced me to perform sexual acts that I experienced as degrading and/or humiliating | .54 |
| **Total** | **.72** |
| | |
| **Violence scale, total** | **.88** |

**External validity**

Known-groups comparison

As hypothesized, VAWI scores were significantly associated with self-rated health and having witnessed parental (or equivalent) physical violence. Specifically, those who reported exposure to violence also reported worse health and having witnessed parental physical violence to a higher extent.

Comparison of prevalence rates to other studies

As assessed with the VAWI, 23.6% (*n*=123) of the respondents reported exposure to psychological violence, 8.4% (*n*=43) to physical violence and 3.0% (*n*=16) to sexual violence

during the past year. Corresponding percentages for exposure to violence earlier in life were 23.6% (*n*=135), 14.3% (*n*=82) and 9.2% (*n*=53; Table 4). Similar 12-month violence exposure rates for physical and sexual violence have been reported in two population-based studies – one in Finland (*n*=4,464) and one in Sweden (*n*=4,771) – using comparable methodologies and definitions.(29, 30) However, the present study found lower prevalence for physical and sexual violence experienced earlier in life. The aforementioned studies did not report psychological violence.

Table 4. *Past-year and earlier-in-life exposure to IPV as assessed with the VAWI.* N=*573*

| | **Past year** | | | **Earlier in life** | | |
|---|---|---|---|---|---|---|
| | *N* | % | 95 % CI | *N* | % | 95 % CI |
| Psychological violence | *123* | 23.6 [a] | 20.1 – 27.1 | *135* | 23.6 | 20.1 – 27.1 |
| Physical violence | *43* | 8.1 | 5.9 – 10.3 | *82* | 14.3 | 11.4 – 17.2 |
| Sexual violence | *16* | 3.0 | 1.6 – 4.4 | *53* | 9.2 | 6.8 – 11.6 |

[a] Percentage is given in valid percent.

VAWI and NorAQ

Higher prevalence was found by the VAWI compared to NorAQ (see Table 5). However, only the difference for psychological IPV was statistically significant (17.1% vs. 2.6%; $p<0.05$). This difference owed principally to the VAWI items "Insulted me in a way that made me feel bad about myself" (16.9%), for which NorAQ has no corresponding item, and "Belittled and humiliated me in front of other people" (6.5%). Prevalence rates for the two other items on this scale were similar to corresponding items in the NorAQ (see Figure 1).

Table 5. *Life-time prevalence of exposure to IPV as assessed with the VAWI versus NorAQ.* N=*77*

| | **VAWI** | | **NorAQ** | |
|---|---|---|---|---|
| | *N* | % [a] | *N* | % [a] |
| Psychological violence | *13* | 17.1 | *2* | 2.6 |
| Physical violence | *5* | 6.8 | *3* | 3.9 |
| Sexual violence | *7* | 9.3 | *5* | 6.5 |

[a] Percentage is given in valid percent.

## DISCUSSION

The VAWI subscales of psychological, physical and sexual violence showed good internal consistency. Principal components analysis yielded a two-component solution and a three-component solution largely reflected the VAWI's conceptual model. External validity was supported in that the VAWI was able to discriminate between groups known to differ in exposure to physical and/or sexual IPV, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Similar past-year prevalence to other Nordic studies was found. Differences in exposure rates of psychological IPV reported in the VAWI and NorAQ exemplify the need for standardized instruments when comparing prevalence of IPV between and within countries.

### Internal validity

A two-component solution was suggested by the parallel analysis and the Kaiser and Cattell's scree criterion (one psychological and one combined physical and sexual component). This solution is understandable in that physical and sexual violence are more likely to occur in conjunction. In contrast, psychological violence may occur in isolation of physical and/or sexual violence.(22)

Despite cultural and linguistic differences between Sweden and Brazil, results from the three-component solution in the current study were similar to those derived in the study conducted in Brazil, where a pre-determined three component solution was investigated.(16) In the Brazilian study, the question "Threatened to hurt me or someone I care about" did not load on any component in Zona da Mata, although it loaded in its explored psychological violence component in São Paulo. In the current study the item loaded both in the physical and

psychological violence components. These findings indicate that threat of physical violence might not belong as clearly as expected to the psychological violence component, which has in fact been a point of debate among researchers.(29) Threats of violence may both precede and follow violent acts themselves, either escalating into a violent act or, especially if the victim has been exposed to physical violence prior to the threat, the threat of violence might frighten the victim just as much as the violent act itself.(29) This could explain the finding that threat of violence belonged to both psychological and physical violence. Moreover, both in Zona da Mata and in the present study, the item "Has your partner pushed or shoved you?" loaded on the psychological violence component rather than the physical violence scale in the WHO conceptual model. The observed cross-loadings of individual items as well as items that belonged to other domains than in the conceptual model may reflect that female victims often are not exposed to one form of violence in isolation of the other.(31) For example, the sexual violence item "Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)" which loaded in both the physical and sexual IPV components is hard to divide into one or the other category.

**Internal reliability**

The Cronbach's alpha coefficients reported for the subscales in this study are very similar to those found in other studies.(15, 16) For example, for all sites combined in the WHO multi-country study, the reliability coefficient was 0.81 for physical and 0.66 for sexual IPV,(15) compared to 0.80 and 0.72 respectively in the current study. These similarities indicate a consistency in the internal reliability of the VAWI across countries despite cultural and socio-economic differences between the countries.

In the current study, deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)" would increase alpha for the sexual violence scale from 0.72 to 0.77. However, given that the current study is explorative and hypothesis-generating, further studies are needed to determine whether this item needs to be revised or not.

**External validity**

Known-groups comparison

Of the two known-groups used in the comparison, the strongest relationship found in the literature regards exposure to physical and/or sexual IPV and poorer self-rated health.(2, 20-24) There is also strong evidence that those who are exposed to physical and/or sexual IPV have witnessed their father use physical violence against the mother during childhood.(9, 25-27) We found support that the combined VAWI subscales of physical and/or sexual violence could discriminate between respondents who had poor vs. good self-rated health and between those who had witnessed vs. not witnessed their parents engaged in physical violence. There is only scant knowledge about how these variables relate to psychological violence, hence these analyses were not deemed appropriate for the purpose of assessing validity.

Comparison of prevalence rates to other studies

Comparisons of our prevalence rates with those in other studies are challenged by differences between methodologies, definitions and reporting styles. Nevertheless, our 12-month violence exposure rates for physical and sexual violence were similar to those reported previously in population-based studies in Finland and Sweden(29, 30) using similar definitions and methodologies. However, we found lower rates for earlier-in-life estimates of physical and sexual IPV. The Swedish study found that 28% of women were exposed to physical and 16%

to sexual violence by a former partner, compared to 14.3% for physical and 9.2% for sexual IPV during the earlier-in-life timeframe in the current study. The figures for the Finnish study were 29% for severe physical and 16% for sexual IPV. These differences are likely due to some minor differences in the definitions between the studies as well as to changes in prevalence rates over time and actual differences between countries. However, they may also owe to an oversight in the questionnaire layout, where the box for ticking violence experienced earlier in life was somewhat unclearly placed. Studies assessing psychological violence in a Nordic context using similar definitions as in the current study could not be found.

VAWI and NorAQ

As the type and number of acts assessed in the VAWI and the NorAQ varied at the outset, some differences in the results from the two instruments were expected. The two questionnaires have also been developed with different aims in mind. NorAQ was developed for investigations in health care settings and for comparisons in the Nordic countries of various forms of violence, not specifically IPV. On the other hand, the VAWI was developed for global comparisons on IPV specifically. For example, the NorAQ psychological violence items reflect a more systematic form of violence experienced during a longer time-period or under fear or threat. Although these seem to capture similar levels of exposure as the more severe psychological violence items of the VAWI, milder forms of psychological violence are also represented in the VAWI and thus the instrument captures a broader range of psychologically violent acts. The sample size used in this comparison prohibits any strong conclusions; however, it further illustrates the importance of using standardized questionnaires when comparing prevalence, as results may vary to a large extent depending on the instrument used.

### Methodological considerations

As under-reporting is common in surveys assessing IPV,(3, 32) estimates of IPV in the current study are probably rather under- than over-estimated. Reasons for under-reporting IPV include forgetting violent acts that took place further back in life,(33) normalizing the violence, blaming the violence on oneself(34) and being fearful of a violent and controlling partner.(35) Moreover, non-responders were over-represented by young and unmarried women, women with lower income and by those born outside of Sweden. Exposure rates to IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study.

## CONCLUSION

Our analysis indicated that the VAWI has good construct validity and internal reliability in a Swedish context. The results obtained were similar to those reported in the Brazilian study, which implies that the VAWI has good cross-cultural construct validity and internal reliability in an adult female population. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## CONTRIBUTORSHIP STATEMENT

LN conducted all analyses, wrote the first draft of the manuscript and rewrote new drafts based on input from co-authors. CT planned the analyses, gave input on manuscript drafts.

GK designed the project, planned the analyses, gave input on manuscript drafts. All authors read and approved the final manuscript.

**FUNDING**

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**DATA SHARING STATEMENT**

The dataset is available form the corresponding author at lotta.nybergh@socmed.gu.se. Consent for sharing the dataset was not obtained but the presented data are anonymised and risk of identification is low.

Figure 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, trashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

**Sexual Violence**

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?

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Figure 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, trashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

**Sexual Violence**

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

| | Item No | Recommendation |
|---|---|---|
| **Title and abstract** | 1 | (*a*) Indicate the study's design with a commonly used term in the title or the abstract |
| | | (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found |
| **Introduction** | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses |
| **Methods** | | |
| Study design | 4 | Present key elements of study design early in the paper |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection |
| Participants | 6 | (*a*) Give the eligibility criteria, and the sources and methods of selection of participants |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group |
| Bias | 9 | Describe any efforts to address potential sources of bias |
| Study size | 10 | Explain how the study size was arrived at |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding |
| | | (*b*) Describe any methods used to examine subgroups and interactions |
| | | (*c*) Explain how missing data were addressed |
| | | (*d*) If applicable, describe analytical methods taking account of sampling strategy |
| | | (*e*) Describe any sensitivity analyses |
| **Results** | | |
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed |
| | | (b) Give reasons for non-participation at each stage |
| | | (c) Consider use of a flow diagram |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders |
| | | (b) Indicate number of participants with missing data for each variable of interest |
| Outcome data | 15* | Report numbers of outcome events or summary measures |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included |
| | | (*b*) Report category boundaries when continuous variables were categorized |
| | | (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses |

| | | |
|---|---|---|
| **Discussion** | | |
| Key results | 18 | Summarise key results with reference to study objectives |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results |
| **Other information** | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based |

*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

# Psychometric properties of the WHO Violence Against Women instrument in a male population-based sample in Sweden

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**Keywords**

Intimate Partner Violence * Sweden * WHO VAW instrument * Psychometric properties * Men

**Word count**
2,986

## ABSTRACT

**Objectives:** To explore the psychometric properties of the World Health Organization's Violence Against Women instrument (VAWI) in a randomly selected national sample of Swedish men. **Design:** Cross-sectional survey study. **Setting:** Sweden. **Participants:** A postal survey was sent to 1009 men between January and March 2009, during which 458 men (45.4%) returned the questionnaire. Fifty-nine men who did not answer any of the violence items were excluded from the analyses, resulting in a final sample of 399 men. **Primary and secondary outcome measures:** Self-reported exposure to psychological, physical and sexual intimate partner violence. **Results:** Cronbach's alphas were 0.74 (psychological scale), 0.86 (physical scale), 0.82 (sexual scale) and 0.88 (total scale). Principal components analysis did not corroborate the conceptual three-dimensional model of the VAWI and other constructs were found. Past-year prevalence of physical (7.6%; 95% CI 5.0 – 10.2) and sexual (2.3%; 95% CI 0.8 – 3.8) violence was higher than in other Nordic studies; earlier-in-life prevalence of physical violence (6.8%; CI 95% 4.3 – 9.3) was lower and sexual violence (2.5%; 95% CI 1.0 – 4.0) was higher. Reported exposure rates were generally higher than those obtained from a concurrently administered instrument (NorVold Abuse Questionnaire). **Conclusion:** The VAWI conceptual model was only partially replicated and boundaries between psychological, physical and sexual acts of violence were indistinct among men exposed to intimate partnership violence. This finding suggests that there is need for research instruments assessing intimate partner violence to be validated separately in male and female samples in order to ensure their suitability for the respective groups. Furthermore, theoretical frameworks for understanding men's exposure to intimate partner violence need to be advanced and should serve to guide in the development and evaluation of gender-specific IPV assessment instruments.

## ARTICLE SUMMARY

### Article focus

- Differences in self-reported exposure to intimate partner violence among women and men have often been found regarding motives for using violence, the context in which the violence occurs and its consequences; however, psychometric properties of instruments assessing intimate partner violence among women and men are seldom investigated in male populations.
- The aim of this study was therefore to examine aspects of the validity and reliability of the Violence Against Women instrument (VAWI) in a randomly selected national population of men

### Key messages

- The VAWI conceptual model was only partially replicated and boundaries between psychological, physical and sexual acts of violence were indistinct. This could indicate that different conceptual models, and possibly different assessment instruments, are needed in order to accurately assess men's experiences of IPV in heterosexual relationships.
- Research instruments assessing intimate partner violence need to be validated separately in male and female samples in order to ensure their suitability for the respective groups.
- Theoretical models for understanding men's experiences of violence in heterosexual relationships need to be advanced and should serve to guide in the development and evaluation of gender-specific IPV assessment instruments.

### Strengths and limitations

- Randomly selected national male sample with good socio-demographic representation

- Lower response rates were found among those 18-29 years old, unmarried, foreign born and with low yearly income

## INTRODUCTION

Most prevalence surveys on intimate partner violence (IPV) have focused on violence perpetrated against women by men. However, a burgeoning literature in mainly high-income countries has begun to assess IPV victimization also among men.(1-5) While such studies often use instruments that have primarily been developed for IPV perpetrated against women, few studies have evaluated their psychometric properties in male populations.

Although research findings on prevalence are inconclusive, they generally find that women and men report similar levels of violence when the contexts, motives, and consequences are not considered.(6) When they are considered, studies assessing IPV perpetrated by men compared to women often report gender differences regarding the types of violence, reasons for the violence, context in which the violence occurs and consequences of the violence.(6, 7) For example, studies assessing differences in IPV find men's violence against women to be more severe, threatening and controlling(8-10) and involve longer lasting victimization, fear of bodily injury or death, more injuries and more adverse health effects.(5, 11, 12) It has also been found that women tend to use physical violence out of anger, not being able to get the partner's attention or in self-defense and retaliation,(11) whereas men often use it as a means to exercise coercive control.(13, 14)

Given that studies find women's and men's IPV exposure to differ in certain aspects, it seems important to investigate whether the instruments that have been developed to assess IPV against women by men in heterosexual relationships are as suitable for assessing women's use

of violence against men. It has been proposed that if violence etiologies differ for women compared to men, it may be that research instruments need to be adjusted as well.(15)

Most studies evaluating the psychometric properties of violence assessment instruments for use in men have focused on instruments assessing men's perpetration,(16) recidivism(17) or attitudes to violence.(18) Focusing specifically on instruments assessing exposure to violence, studies have been conducted with regards to screening IPV in emergency department settings,(19, 20) assessing childhood experiences of abuse or neglect(21, 22) or violence by several perpetrators.(23, 24) Additionally, many of these instruments were validated in specific populations, such as patients in emergency clinics,(19) psychiatric clinics,(22) alcohol treatment programs(24) or health care settings,(23) or they combined women and men in the same sample instead of conducting these analyses separately.(22, 25) There is a scarcity of instruments assessing specifically IPV exposure and that have been validated for use in male general population studies.

The World Health Organization (WHO) developed a questionnaire to assess violence victimization in population-based samples in the Multi-Country Study on Women's Health and Domestic Violence Against Women.(26) Included in this questionnaire is the Violence Against Women instrument (henceforth "VAWI") assessing psychological, physical and sexual IPV. Although the VAWI was developed to assess violence primarily against women, WHO originally also planned to use it in a sub-population of men to assess their experiences of IPV exposure. To date, the VAWI has been used in one male population of the ten countries in the Multi-Country Study, i.e. in Samoa.(26) More recently, a study conducted in Brazil assessed sexual IPV using the VAWI among men.(27)

To our knowledge, the psychometric properties of the VAWI have not previously been evaluated in a male population. The aim of this study was therefore to examine aspects of the validity and reliability of the VAWI in a randomly selected national population of men aged 18-65 residing in Sweden.

## METHODS

Data collection procedures, questionnaires and statistical analyses were the same as those used in the companion paper and are described in greater detail there. A brief description of the statistical analyses specific to the male sample is presented below.

### Procedure, study population and response rate

Statistics Sweden randomly selected 1009 men, aged 18-65 years and residing in Sweden, from the national population register. Data collection took place between January and March 2009, during which 45.4% (*n*=458) returned the questionnaire. However, those who did not answer any of the violence items (*n*=59) were excluded from the analyses, resulting in a final sample of 399 men.

A second data collection was performed to examine the criterion validity of the VAWI against the NorVold Abuse Questionnaire (NorAQ).(23, 28) Statistics Sweden sent out the VAWI and NorAQ between November 2009 and January 2010 to 20% (*n*=92) of the respondents from the initial data collection. The response rate was 69.6% (*n*=64) for the VAWI and 59.8% (*n*=54) for NorAQ.

### Drop-out analysis

Differences between non-responders and respondents regarding age, country of birth, civil status and the respondents' yearly income before tax were tested with the two-proportion z-test with Bonferroni adjustment.

Comparing those who did not return the questionnaire (*n*=551) with the final sample of analysis (*n*=399) revealed that non-respondents were 18-29 years old, unmarried, foreign born and had low yearly income of 0 – 159,999 Swedish Kronor (SEK) before tax. Internal drop-out rates, that is, respondents who did not endorse any violence item (*n*=59), differed in a similar pattern from the final sample of analysis: they were 18-29 years old, unmarried and had a low yearly income in comparison to the final sample of analysis.

In the second data collection (*n*=92), response rates were lowest among men who were unmarried, divorced or widowed.

**Assessment instruments: VAWI and NorAQ**

The VAWI consists of behavior-specific items related to psychological (four items), physical (six items) and sexual IPV (three items). The physical violence items are further divided into "moderate" (the two first items) and "severe" (the following four items) violence based on the likelihood of physical injury.(26) NorAQ was developed to measure abuse in the health care system as well as emotional (three items), physical (three items) and sexual (four items) abuse by different perpetrators (see Figure 1). NorAQ has been shown to have good validity and reliability in a Swedish context.(23, 28)

**Statistical analyses**

Principal components analysis (PCA) with a promax rotation was conducted to explore the internal construct validity of the violence items. Two component solutions were examined: 1) component extraction based on a parallel analysis, proportion of variance explained, Kaiser's eigenvalue-greater-than-one rule and on the examination of Cattell's scree plot and; 2) a three-component solution as originally conceptualized in the VAWI.

The internal reliability of the VAWI was assessed with the Cronbach's alpha for each subscale (psychological, physical and sexual violence) and for the total violence scale.

Prevalence of psychological, physical and sexual violence was calculated for the past year and for earlier in life, for comparisons with prevalence rates presented in other studies.

Furthermore, life-time prevalence of IPV was compared between the VAWI and the NorAQ. Only those respondents who had answered both the VAWI and NorAQ were included (*n*=50) in this analysis. Fisher's exact test (95% CI level) was used to test for differences in prevalence found between the two instruments.

**Ethical Considerations**

The Regional Ethics Review Board located in Gothenburg gave approval for this study (Dnr: 527-08) and the WHO ethical and safety recommendations for research on domestic violence against women were followed.(29)

**RESULTS**

**Study population**

Nearly half of the men had completed high-school (*n*=173; 43.7%) and the mean age was 45 years (*SD*=13). Of the total sample, 87.9% (*n*=349) were currently in a relationship (i.e. boyfriend or girlfriend, married, registered partnership or cohabiting), of which the majority were heterosexual (*n*=394; 98.7%). The rest of the sample was single, widowed or divorced. These and other socio-demographic characteristics of the sample are described in Table 1.

Table 1. *Socio-demographic and psychosocial factors of the total sample.* N=*399*

| | *N* (%) |
|---|---|
| **Age groups** | |
| 18-29 | *57* (14.3) |
| 30-39 | *77* (19.3) |
| 40-49 | *96* (24.1) |
| 50-59 | *98* (24.6) |
| 60-65 | *71* (17.8) |
| **Partner status** | |
| Single/widowed/divorced | *48* (12.1) |
| Boyfriend/girlfriend | *53* (13.4) |
| Married/cohabitant/registered partnership | *296* (74.6) |
| Heterosexual relationship | *394* (98.7) |
| Same-sex relationship | *5* (1.3) |
| **Educational level (highest)** | |
| University | *156* (39.4) |
| High school (10-12 yrs) | *173* (43.7) |
| Compulsory (≤9 yrs) | *67* (16.9) |
| **Annual income (before tax, SEK)** | |
| 0 - 159,999 | 77 (19.3) |
| 160,000 - 234,999 | *52* (13.0) |
| 235,000 - 309,999 | *107* (26.8) |
| 310,000 or more | *163* (40.9) |
| **Employment status** | |
| Employed | *329* (83.3) |
| Student | *20* (5.1) |
| Retired | *23* (5.8) |
| Sick leave (more than 3 months) | *5* (1.3) |
| Parental leave or leave of absence | *2* (0.5) |
| Unemployed | *11* (2.8) |
| Other | *5* (1.3) |

| Country of Birth | |
|---|---|
| Sweden | *356* (89.2) |
| Other Nordic country | *7* (1.8) |
| Other European country | *10* (2.5) |
| Country outside Europe | *26* (6.5) |

**Internal validity**

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89 and Bartlett's test of Sphericity was significant ($p < 0.05$), verifying a good fit of the data to the PCA. The parallel analysis and Kaiser's criterion suggested two components; however, the third component had an eigenvalue equal to one after decimal rounding and Cattell's scree test suggested three components.

The two component solution (not in Table) explained 68.6% of the total variance: the first component contained the item assessing threat of physical violence ("Threatened to hurt me or someone I care about"), the last three physical violence items and all sexual violence items. This component predominantly included items describing acts that presumably would lead to physical injury. The second component consisted of the three first psychological and the three first physical violence items.

A three-component solution (Table 2) explained 76.0% of the total variance. The first component (C1), explaining 55.4% of the variance, consisted of all the VAWI's sexual violence items as well as the three (out of four) physical violence items conceptualized to reflect severe forms of violence likely to produce physical injury.[11] This component was labeled "Injury inducing violence". The second component (C2) was called "Intimidation and moderate violence" and consisted of the remaining three physical violence items mainly reflecting milder forms of violence and the last two psychological violence items ("Tried to scare and intimidate me on purpose" and "Threatened to hurt me or someone I care about").

The last component (C3) was named "Humiliation" and comprised the two first psychological violence items "Insulted me in a way that made me feel bad about myself" and "Belittled and humiliated me in front of other people". The question assessing threat of psychological violence loaded on both the first (0.51) and the second (0.49) components. All other items loaded higher on their main components than on other components and main component loadings were all above 0.60.

Table 2. *The two- and three-component solutions for the VAWI psychological, physical and sexual violence items.* N=*386*

| | Three-component solution | | |
|---|---|---|---|
| **Conceptual model** | **C1** | **C2** | **C3** |
| Psychological Violence | | | |
| 1 | | .32 | **.73**[a] |
| 2 | | | **.87** |
| 3 | | **.80** | |
| 4 | .49 | **.51** | |
| Physical Violence | | | |
| 1 | | **.77** | |
| 2 | | **.61** | |
| 3 | | **.85** | |
| 4 | **.85** | | |
| 5 | **.91** | | |
| 6 | **.83** | | |
| Sexual Violence | | | |
| 1 | **.69** | | .43 |
| 2 | **.97** | | |
| 3 | **.94** | | |
| *Accumulated variance %* | *55.4* | *68.6* | *76.0* |
| *Eigenvalues* | *7.2* | *1.7* | *1.0* |

[a] Loadings > 0.30 are shown and highest loadings are boldfaced. List-wise deletion was used.

**Internal reliability**

Cronbach's alpha coefficients (Table 3) showed satisfactory internal reliability for all conceptualized VAWI scales: 0.74 for psychological violence, 0.86 for physical violence and

0.82 for sexual violence. Alpha for the sexual violence scale would augment from 0.82 to 0.92 by deletion of the first item ("Demanded to have sex with me even though I did not want to (but did not use physical force)"). Cronbach's alpha for the total scale was 0.88.

Table 3. *Cronbach's α of the VAWI psychological, physical and sexual violence scales and total scale, life-time.* N=*399*

| Scales | Alpha if Item Deleted |
|---|---|
| **Psychological violence** | |
| 1 Insulted me in a way that made me feel bad about myself | .66 |
| 2 Belittled and humiliated me in front of other people | .64 |
| 3 Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | .64 |
| 4 Threatened to hurt me or someone I care about | .64 |
| **Total** | **.74** |
| **Physical violence** | |
| 1 Pushed or shoved me | .87 |
| 2 Thrown something at me that could have hurt me | .82 |
| 3 Hit me with his/her fist or with some other object that could have hurt me | .81 |
| 4 Kicked and dragged me and beat me up | .82 |
| 5 Choked me or burnt me on purpose | .83 |
| 6 Hurt me with a knife, a gun or some other weapon | .85 |
| **Total** | **.86** |
| **Sexual violence** | |
| 1 Demanded to have sex with me even though I did not want to (but did not use physical force) | .92 |
| 2 Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | .71 |
| 3 Forced me to perform sexual acts that I experienced as degrading and/or humiliating | .68 |
| **Total** | **.82** |
| **Violence scale, total** | **.88** |

**External validity**

Comparison of prevalence rates to other studies

As assessed with the VAWI, 24.0% (*n*=92) of the respondents reported exposure to psychological violence, 7.6% (*n*=29) to physical violence and 2.3% (*n*=9) to sexual violence during the past twelve months. Earlier-in-life exposure was 13.8% (*n*=55) for psychological, 6.8% (*n*=27) for physical and 2.5% (*n*=10) for sexual violence (Table 4).

Table 4. *Past-year and earlier-in-life exposure to IPV as assessed with the VAWI.* N=*399*

| | **Past year** | | | **Earlier in life** | | |
|---|---|---|---|---|---|---|
| | *N* | % [a] | CI % | *N* | % [a] | CI % |
| Psychological violence | *92* | 24.0 [a] | 19.8 – 28.2[b] | *55* | 13.8 | 10.4 - 17.2 |
| Physical violence | *29* | 7.6 | 5.0 – 10.2 | *27* | 6.8 | 4.3 – 9.3 |
| Sexual violence | *9* | 2.3 | 0.8 – 3.8 | *10* | 2.5 | 1.0 – 4.0 |

[a] Percentage is given in valid percent.
[b] The confidence interval was set at 95%.

VAWI and NorAQ

A comparison between VAWI and NorAQ was conducted to assess criterion validity (*N*=50; see Table 5). NorAQ was chosen as it is the only questionnaire measuring violence that has been validated in Sweden in both a male and female (see companion article) population-based sample. The VAWI yielded higher prevalence rates than the NorAQ in relation to all three violence scales. However, only the difference in psychological IPV was statistically significant (30.6% vs. 10.2%; p<0.05). This difference owed principally to the VAWI items "Insulted me in a way that made me feel bad about myself" (24%) and "Belittled and humiliated me in front of other people" (16%). Prevalence rates for the other items on this scale were similar to corresponding items in the NorAQ (see Figure 1).

Table 5. *Life-time prevalence of exposure to IPV as assessed with the VAWI versus NorAQ.* N=*50*

| | **VAW** | | **NorAQ** | |
|---|---|---|---|---|
| | *N* | % [a] | *N* | % [a] |
| Psychological violence | *15* | 30.6 | *5* | 10.2 |
| Physical violence | *7* | 14.3 | *6* | 12.5 |
| Sexual violence | *4* | 8.2 | *3* | 6.1 |

[a] Percentage is given in valid percent.

## DISCUSSION

The VAWI conceptual model was only partially replicated and boundaries between psychological, physical and sexual acts of violence were indistinct. This finding underlines the importance of investigating psychometric properties of instruments assessing IPV separately for male and female populations. Although the dimensionality of the VAWI was not supported, items composing the three sub-scales, i.e. psychological, physical and sexual violence, showed good internal consistency. Higher prevalence rates for past-year physical and sexual violence were found than those reported in the literature, and than those yielded by a concurrently administered violence questionnaire (NorAQ).

### Internal validity

Extraction criteria suggested both a two- and a three-component solution; however, a three-component solution was chosen for comparison with the VAWI conceptual model. In general, the VAWI model was not replicated by PCA in the three-component model and other constructs were found which reflected more the severity rather than the types (psychological, physical and sexual) of violence. Although the three-component structure obtained in the female sample (companion article) also reflected the severity of the acts of violence to a certain extent, the PCA structure in that sample conformed better to the VAWI conceptual model of psychological, physical and sexual violence. Another study that conducted exploratory factor analysis on a different instrument assessing psychological and physical IPV among high school students, also found that the boundaries of psychological and physical IPV were indistinct for men whereas they were generally distinct for women.(30)

Our finding that the underlying constructs differ for women versus men needs to be investigated further. Several researchers have hypothesized that men's experiences of partner violence are qualitatively different from those of women,(12, 31) although few qualitative studies exist that would have investigated this in depth. Previous research has argued that violent acts are not as fearsome or injury inducing to men as they are to women, and it is indeed possible that men and women are both exposed to and experience IPV in different, gendered ways.(31) This could indicate that different conceptual models, and possibly different assessment instruments, are needed in order to accurately assess men's experiences of IPV in heterosexual relationships.(19) However, further studies, especially qualitative ones, are needed in order to explore this further.

**Internal reliability**

All three subscales showed acceptable internal reliability. Alpha of the sexual violence scale would augment from .82 to .92 by deletion of the first item ("Demanded to have sex with me even though I did not want to (but did not use physical force)"). However, given that the current study is explorative and hypothesis generating, further studies are needed to assess whether the scale would need to be revised or not.

**External validity**

Comparison of prevalence rates to other studies

Comparisons of our prevalence rates with those from previous studies are hampered by the fact that there exist few Nordic, population-based studies focusing on men's self-reported exposure to IPV. A recent population-based study conducted in Finland ($n$=1,119), which used similar definitions to the VAWI found lower prevalence for physical (4.4% versus 7.6%) and sexual (0.3% versus 2.3%) IPV experienced during the past year.[9] For earlier in life

(*n*=1,423), the same study found a higher prevalence for physical IPV (19.5% versus 6.8%) than the current study, but a lower prevalence for sexual IPV (1.6% versus 2.5%). The study did not measure psychological violence.

Although it was expected that IPV reported for the past year would be less than for earlier in life, similar levels of physical and sexual violence were reported for both periods in the current study. Furthermore, psychological violence was also reported to a considerably lesser extent for earlier in life than for the past year. These results are likely due to a pattern observed in other studies where men report significantly lower prevalence for IPV experienced earlier in life when compared to women.(1, 5, 10) One possibility is that if men experience less severe and threatening violence, it may not be salient enough for them to recall later in life. However, the results may also be due to an oversight in the questionnaire layout, where the box for ticking violence experienced earlier in life was somewhat unclearly placed.

VAWI and NorAQ

The items comprising the VAWI seem to capture a broader spectrum of violent acts, especially psychological violence, than the more systematic types of abuse reflected in the NorAQ. Given the small sample used in this analysis, we cannot draw any conclusions as to which questionnaire is more useful for assessing IPV; however, since they tap a different range of such experiences, the choice of instrument should be made in accordance with the researcher's aim.

**Methodological considerations**

The overall non-response rate was high (54.6%) and response rates were lower among young men, unmarried men, men with a lower annual income and men born outside Sweden, which compromises the generalizability of our results. Little is known about men's response patterns in surveys on violence exposure perpetrated by their intimate partners. A recent review of gender differences in self-reported IPV cites some studies in which men underreport their experiences of IPV,(6) whereas another review found studies pointing to the contrary.(7) Future research investigating men's patterns and reasons for responding or not responding to a postal survey on IPV, especially in a Nordic context, would shed more light on these matters.

Studies on validity assess the extent to which an instrument measures what it is intended to measure.(32) Future research should consider concerns raised by researchers as to the validity of instruments assessing IPV among men in view of the lack of a common definition for what constitutes male victimization of partner violence in intimate heterosexual relationships.(19) Although there exist official and widely used definitions of violence against women by their intimate partners, such as the United Nation's definition of violence against women,(33) there is little consensus about what constitutes violence against men in an intimate relationship.(31, 34) Even when the same act of violence is assessed, the experiences of these acts can be different due to various cultural definitions of femininity and masculinity and to how they are informed by gender hierarchy and power.(7) Definitions need to be clarified so that they adequately capture men's experiences of being abused in an intimate relationship.(34)

## CONCLUSION

The VAWI conceptual model was only partially replicated and boundaries between psychological, physical and sexual acts of violence were indistinct among men exposed to IPV. This finding suggests that research instruments assessing intimate partner violence need

to be validated separately in male and female samples in order to ensure their suitability for the respective groups. However, more and larger studies with better response rates are needed in order to verify the results. Furthermore, theoretical frameworks for understanding men's exposure to intimate partner violence need to be advanced and should serve to guide in the development and evaluation of gender-specific IPV assessment instruments.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## CONTRIBUTORSHIP STATEMENT

LN conducted all analyses, wrote the first draft of the manuscript and rewrote new drafts based on input from co-authors. CT planned the analyses amd gave input on manuscript drafts. GK designed the project, planned the analyses and gave input on manuscript drafts. All authors read and approved the final manuscript.

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## DATA SHARING STATEMENT

The dataset is available form the corresponding author at lotta.nybergh@socmed.gu.se. Consent for sharing the dataset was not obtained but the presented data are anonymised and risk of identification is low.

Figure 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?

| | |
|---|---|
| | Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?<br>Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do? |
| **Physical Violence** | |
| | Has your partner hit you, smacked your face or held you firmly against your will?<br>Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, trashed you or done anything similar to you?<br>Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act? |
| **Sexual Violence** | |
| | Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?<br>Has your partner against your will forced intercourse on you?<br>Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?<br>Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked? |



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# Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden



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# Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden

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## ABSTRACT

**Objective:** To explore psychometric properties of the Violence Against Women instrument in a randomly selected national sample of women (*N*=573) aged 18-65 years and residing in Sweden. **Design:** Cross-sectional survey study. **Setting:** Sweden. **Participants:** A postal survey was sent to 1006 women between January and March 2009, during which 624 women (62.0%) returned the questionnaire. Fifty-one women who did not answer any of the violence items were excluded from the analyses, resulting in a final sample of 573 women. **Primary and secondary outcome measures:** Self-reported exposure to psychological, physical and sexual intimate partner violence. **Results:** Cronbach's alphas were 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). A pre-determined three-component solution largely replicated the explored three component conceptual model of the Violence Against Women instrument. The instrument was able to discriminate between groups known from previous studies to differ in exposure to physical and/or sexual violence, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Past-year prevalence of physical (8.1%; 95% CI 5.9 – 10.3) and sexual (3.0%; 1.6 – 4.4) violence was similar to that reported in other Nordic studies; however, earlier-in-life prevalence was lower in the current study (14.3%; 95% CI 11.4 – 17.2 and 9.2%; 95% CI 6.8 – 11.6 respectively). Reported exposure rates were higher than those obtained from a concurrently administered instrument (NorVold Abuse Questionnaire). **Conclusion:** The Violence Against Women instrument demonstrated good construct validity and internal reliability in an adult female population in Sweden. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## ARTICLE SUMMARY

### Article focus

- The World Health Organization's Violence Against Women instrument (VAWI) has been used in several countries around the world in order to investigate violence against women by their intimate male partners, but aspects of reliability and validity have seldom been investigated.
- The aim of the current study was to explore selected psychometric properties of the VAWI in a randomly selected national sample (*n*=573) of women.

### Key messages

- The current study provides preliminary support for the VAWI subscales of psychological, physical and sexual violence in a Swedish, adult female population.
- This adds to the knowledge of the instrument's cross-cultural validity and reliability, which is of significance when comparing intimate partner violence prevalence rates between countries.

### Strengths and limitations

- Cross-sectional study design.
- Further aspects of validity and reliability need to be explored and studies from a diverse range of countries are needed for further cross-cultural assessment.

### Keywords

Intimate partner violence * Sweden * Validation * WHO VAW instrument * Psychometric properties * Women

## INTRODUCTION

While prevalence studies investigating violence against women perpetrated by intimate male partners have become more frequent,(1-4) sizeable differences in reported exposure occur both between and within study sites. These differences may in part be explained by differences in questionnaire administration methods (e.g. personal interviews vs. self-administration), questionnaire content, target populations, or definitions and severity of the violence assessed; however, such differences may also reflect true variation and cultural differences in violence perpetration.(1, 4) Standardized methodologies for assessing intimate partner violence (IPV) may help to enhance the reliability of results obtained from such studies and aid in comparing prevalence rates from diverse settings.

With this in mind, the World Health Organization (WHO) constructed a questionnaire for the WHO Multi-country Study on Women's Health and Domestic Violence against Women.(5) The study questionnaire includes the Violence Against Women instrument (henceforth referred to as "VAWI") assessing exposure to psychological, physical and sexual IPV. The VAWI was developed in collaboration with several networks and expert groups and was based partly on the original(6) and revised Conflict Tactics Scales,(7) as well as on work that originated from its critics.(8) Extensive pre-testing, independent back-translations and piloting of the questionnaire were conducted.(9) The prevalence rates from the ten countries included in the multi-country study vary greatly, with life-time estimates ranging between 20-75% for psychological violence, 13-61% for physical violence and 6-59% for sexual violence.(5) Since the Multi-country Study was performed, the VAWI has been used in several more countries.(10-15)

Despite the VAWI's relatively wide use, few peer-reviewed studies have evaluated its psychometric properties. Internal reliability (Cronbach's α) was assessed and confirmed in the Multi-Country Study;(9) however, only one study, conducted in Brazil, has explored aspects of validity.(16) In that study, analyses of data from two female populations, one urban (São Paulo; *n*=940) and one combined urban and rural area (Zona da Mata; *n*=1,188) supported the construct validity and internal reliability of the instrument.

The aim of this study was to explore psychometric properties of the VAWI in a randomly selected national sample (*n*=573) of women aged 18-65 years residing in Sweden. Sweden provides an interesting comparative context due to its linguistic, cultural and socio-economic differences to Brazil.

## METHODS

### Procedure, study population and response rate

A sample of 1006 women, aged 18-65 years and residing in Sweden, was randomly selected by Statistics Sweden from the national population register. Data was collected by means of a postal survey between January and March 2009. A requirement for the sample selection was that the respondent was currently or had previously been in an intimate relationship. The response rate was 62.0% (*n*=624). Women who did not respond to any of the violence items (*n*=51) were excluded from the analyses, resulting in a total sample of 573 women.

Criterion validity was explored by comparing prevalence reported in the VAWI versus the NorVold Abuse Questionnaire (NorAQ).[16] A second data collection was performed for this purpose. Statistics Sweden sent out the VAWI and NorAQ to 20% (*n*=125) of the respondents from the initial data collection between November 2009 and January 2010. NorAQ was

chosen since it is the only questionnaire measuring violence that has been validated in Sweden in both a female and male (see companion article) population-based sample. The response rate was 65.6% (*n*=82*)* for the VAWI and 63.2% (*n*=79) for NorAQ.

**Drop-out analysis**

A two-proportion z-test was used to assess statistical significance between the drop-out and the final sample regarding age, country of birth, civil status and the respondents' yearly income before tax. A Bonferroni adjustment to the alpha level was applied.

Comparing those who did not return the questionnaire (*n*=382) with the final sample of analysis (*n*=573) revealed that significantly lower response rates were found among non-respondents who were 18-29 years old, unmarried, foreign born and had low yearly income of 0 – 159,999 Swedish Kronor (SEK) before tax. Internal drop-out rates, that is respondents who did not endorse any violence item (*n*=51), were significantly higher among women who were 18-29 years old, unmarried and had a low yearly income in comparison to the final sample of analysis.

Of those who did not return the questionnaire during the second data collection (*n*=46), significantly lower response rates were found for women who were unmarried, widowed or divorced.

**Assessment instruments: VAWI and NorAQ**

The VAWI consists of behaviour-specific items related to psychological (four items), physical (six items) and sexual violence (three items). The physical violence items are further divided into "moderate" (the two first items) and "severe" (the following four items) violence based

on the likelihood of physical injury.(5) For each question, respondents were asked whether they had experienced the specific act during the *past year* and *earlier in life*. The VAWI items were translated and adapted to a Swedish context by a senior researcher (third author) with extensive knowledge about intimate partner violence

NorAQ has been validated in a Swedish context(17) and measures emotional (three items), physical (three items) and sexual (four items) abuse, including different perpetrators, as well as abuse in the health care system. The NorAQ violence items applicable to an intimate partnership (Appendix 1) were included with the intention to compare prevalence rates with those obtained by use of the VAWI. The second sexual violence item was adapted for use in both a male and female population, as the questionnaire constructed for this study was sent to a male population as well (see companion paper entitled 'Psychometric properties of the WHO Violence Against Women instrument in a male population-based sample in Sweden').

**Statistical analyses**

Principal components analysis (PCA) was conducted to explore the internal construct validity of the violence items. A promax rotation was chosen due to high inter-component correlations (e.g. r=0.49-0.61 for the three dimensions). Decisions on the number of components to extract were based on parallel analysis, Kaiser's eigenvalue-greater-than-one rule, total proportion of variance explained and Cattell's scree plot. This was followed by a pre-determined solution with three components as conceptualized in the VAWI.

The internal reliability of the VAWI was assessed with the Cronbach's alpha for each subscale and for the total violence scale. An alpha of 0.70 or higher was considered satisfactory.(18)

Known-groups comparisons were performed to investigate the VAWI's external construct validity. The aim was to see if the instrument was able to differentiate between groups known to differ in exposure to IPV.(19) The following hypotheses were postulated: women who are exposed to physical and/or sexual IPV (life-time exposure, "yes/no") would have poorer self-perceived health(2, 20-24) and have grown up in a home where they witnessed physical violence between their parents(10, 25-27). The Mantel-Haenszel test was used controlling for age, income, civil status, education and country of birth. Statistical significance was set at $p<0.05$.

*Self-perceived health* was assessed by "How would you say that your general health has been during the past year?". Response options were dichotomized into "very good/good" and "neither good nor bad/bad/very bad". *Childhood exposure to violence* was assessed with the question: When you were growing up, did you see your parents (or equivalent) regularly physically hurt one another? ("no" and "yes/unsure").

Prevalence of psychological, physical and sexual violence was calculated for the past year and for earlier in life, for comparisons with prevalence rates presented in other studies.

In addition, life-time prevalence of IPV was compared between the VAWI and the NorAQ and Fisher's exact test was used to test for statistically significant differences at the 95% CI level. Only those respondents who had answered both the VAWI and NorAQ were included ($n$=77) in this analysis.

**Ethical considerations**

The Regional Ethics Review Board located in Gothenburg gave approval for this study (Dnr: 527-08) and the WHO ethical and safety recommendations for research on domestic violence against women as applicable to a postal survey were followed.(28) For example, a letter was sent to prospective respondents in advance to inform them about the upcoming survey; this provided them with the opportunity to decline the survey before receiving it. Also, although the sampling frame was based on registered individuals, only one survey per household was sent for ethical and safety reasons. Additionally, full anonymity and confidentiality were guaranteed and contact information to a general practitioner (third author on this study), a psychologist and a contact person at Statistics Sweden was provided for additional information and/or referral. The survey was entitled "A study on conflicts, relationships and health". The study description that followed the title stated that the study assesses IPV.

## RESULTS

### Study population

Nearly half of the women had at least three years of university education (*n* =270; 47.2%) and the mean age was 43 years (*SD*=13). Of the total sample, 85.1% (*n*=484) were currently in a relationship (i.e. boyfriend or girlfriend, married, registered partnership or cohabiting), of which the majority were heterosexual relationships (*n* =566; 98.8%). The rest of the sample was single, widowed or divorced, but had previously been in a relationship (see Table 1).

Table 1. *Socio-demographic and psychosocial factors of the total sample. N=573*

| | *N* (%) |
|---|---|
| **Age groups** | |
| 18-29 | *107* (18.7) |
| 30-39 | *138* (24.1) |
| 40-49 | *125* (21.8) |
| 50-59 | *136* (23.7) |
| 60-65 | *67* (11.7) |

| | |
|---|---|
| **Partner status** | |
| Single/widowed/divorced | *85* (14.9) |
| Boyfriend/girlfriend | *64* (11.2) |
| Married/cohabitant/registered partnership | *420* (73.8) |
| Heterosexual relationship | *477* (83.2) |
| Same-sex relationship | *7* (1.2) |
| **Educational level (highest)** | |
| University | *270* (47.2) |
| High school (10-12 yrs) | *211* (36.9) |
| Compulsory (≤9 yrs) | *91* (15.9) |
| **Annual income (before tax, SEK)** | |
| 0 – 159,999 | *168* (29.3) |
| 160,000 - 234,999 | *175* (30.5) |
| 235,000 - 309,999 | *143* (25.0) |
| 310,000 or more | *87* (15.2) |
| **Employment status** | |
| Employed | *396* (69.7) |
| Student | *35* (6.2) |
| Retired | *47* (8.3) |
| Sick leave (more than 3 months) | *8* (1.4) |
| Parental leave or leave of absence | *35* (6.2) |
| Unemployed | *23* (4.0) |
| Other | *24* (4.2) |
| **Country of Birth** | |
| Sweden | *519* (90.6) |
| Other Nordic country | *15* (2.6) |
| Other European country | *18* (3.1) |
| Country outside Europe | *21* (3.7) |
| **Self-rated health** | |
| Very good/good | *511* (90.0) |
| Neither good nor bad/bad/very bad | *57* (10.0) |
| **Grown up in a home where there occurred physical violence** | |
| No | *542* (94.6) |
| Yes/Unsure | *31* (5.4) |

**Internal validity**

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89 and Bartlett's test of sphericity was significant ($p < 0.05$), verifying a good fit of the data to the PCA. Parallel analysis, Kaiser's criterion and Cattell's scree test suggested two components (not in Table), explaining 57.4% of the total variance. The first component consisted of all physical and sexual violence items in the VAWI conceptual model, except the two items representing the least severe forms of physical and sexual violence. In addition, the component included the psychological violence item referring to threat of injury. The second component comprised the remaining three psychological violence items as well as the first physical and sexual violence items.

A three-component solution (Table 2) explained 64.4% of the total variance. The third component had an initial eigenvalue close to one (0.9) and comprised two of the three sexual violence items; otherwise the structure was identical to the two component solution and largely mirrored the VAWI's physical, psychological and sexual violence subscales.

Table 2. *Three-component solution for the VAWI psychological, physical and sexual violence items.* N=*534*

| | Three-component solution | | |
|---|---|---|---|
| **Conceptual model** | **C1** | **C2** | **C3** |
| Psychological Violence | | | |
| 1 Insulted me in a way that made me feel bad about myself | | **.89** | |
| 2 Belittled and humiliated me in front of other people | | **.74** | |
| 3 Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | | **.64** | |
| 4 Threatened to hurt me or someone I care about | **.43** | .33 | |
| Physical Violence | | | |
| 1 Pushed or shoved me | | **.71** | |
| 2 Thrown something at me that could have hurt me | **.38** | | .31 |
| 3 Hit me with his/her fist or with some other object that could have hurt me | **.80** | | |
| 4 Kicked and dragged me and beat me up | **.85** | | |
| 5 Choked me or burnt me on purpose | **.67** | | |
| 6 Hurt me with a knife, a gun or some other weapon | **.88** | | |
| Sexual Violence | | | |

| | | | |
|---|---|---|---|
| 1 Demanded to have sex with me even though I did not want to (but did not use physical force) | | | **.81** |
| 2 Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | **.56** | | .55 |
| 3 Forced me to perform sexual acts that I experienced as degrading and/or humiliating | | | **.88** |
| *Accumulated variance %* | *46.1* | *57.4* | *64.4* |
| *Eigenvalues* | *6.0* | *1.5* | *0.9* |

[a] Loadings > 0.30 are shown and highest loadings are boldfaced. List-wise deletion was used.

**Internal reliability**

The Cronbach's alpha coefficient (Table 3) was satisfactory for all subscales in the VAWI conceptual model: 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). Alpha for the sexual violence scale increased from 0.72 to 0.77 after deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)".

Table 3. *Cronbach's α of the VAWI psychological, physical and sexual violence scales and total scale, life-time.* N=*573*

| Scales | Alpha if Item Deleted |
|---|---|
| **Psychological violence** | |
| Insulted me in a way that made me feel bad about myself | .75 |
| Belittled and humiliated me in front of other people | .71 |
| Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | .72 |
| Threatened to hurt me or someone I care about | .76 |
| **Total** | **.79** |
| | |
| **Physical violence** | |
| Pushed or shoved me | .81 |
| Thrown something at me that could have hurt me | .75 |
| Hit me with his/her fist or with some other object that could have hurt me | .73 |
| Kicked and dragged me and beat me up | .75 |
| Choked me or burnt me on purpose | .76 |
| Hurt me with a knife, a gun or some other weapon | .80 |
| **Total** | **.80** |

| | |
|---|---|
| **Sexual violence** | |
| Demanded to have sex with me even though I did not want to (but did not use physical force) | .77 |
| Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | .64 |
| Forced me to perform sexual acts that I experienced as degrading and/or humiliating | .54 |
| **Total** | **.72** |
| **Violence scale, total** | **.88** |

**External validity**

Known-groups comparison

As hypothesized, exposure to violence as assessed by VAWI was significantly associated with self-rated health and having witnessed parental (or equivalent) physical violence when growing up. Specifically, a significantly larger proportion of respondents who reported exposure to violence also reported worse health (Chi-Square (1, N=573) = 26.1, $p<0.05$) and having witnessed parental physical violence (Chi-Square (1, N=573) = 11.5, $p<0.05$) than did those not reporting exposure.

Comparison of prevalence rates to other studies

As assessed with the VAWI, 23.6% (*n*=123) of the respondents reported exposure to psychological violence, 8.4% (*n*=43) to physical violence and 3.0% (*n*=16) to sexual violence during the past year. Corresponding percentages for exposure to violence earlier in life were 23.6% (*n*=135), 14.3% (*n*=82) and 9.2% (*n*=53; Table 4). Similar 12-month violence exposure rates for physical and sexual violence have been reported in two population-based studies – one in Finland (*n*=4,464) and one in Sweden (*n*=4,771) – using comparable methodologies and definitions.(29, 30) However, the present study found lower prevalence for physical and sexual violence experienced earlier in life. The aforementioned studies did not report psychological violence.

Table 4. *Past-year and earlier-in-life exposure to IPV as assessed with the VAWI.* N=*573*

| | Past year | | | Earlier in life | | |
|---|---|---|---|---|---|---|
| | *N* | % | 95 % CI | *N* | % | 95 % CI |
| Psychological violence | *123* | 23.6 [a] | 20.1 – 27.1 | *135* | 23.6 | 20.1 – 27.1 |
| Physical violence | *43* | 8.1 | 5.9 – 10.3 | *82* | 14.3 | 11.4 – 17.2 |
| Sexual violence | *16* | 3.0 | 1.6 – 4.4 | *53* | 9.2 | 6.8 – 11.6 |

[a] Percentage is given in valid percent.

VAWI and NorAQ

Higher prevalence was found by the VAWI compared to NorAQ (see Table 5). However, only the difference for psychological IPV was statistically significant (17.1% vs. 2.6%; $p<0.05$). This difference owed principally to the VAWI items "Insulted me in a way that made me feel bad about myself" (16.9%), for which NorAQ has no corresponding item, and "Belittled and humiliated me in front of other people" (6.5%). Prevalence rates for the two other items on this scale were similar to corresponding items in the NorAQ (see Appendix 1).

Table 5. *Life-time prevalence of exposure to IPV as assessed with the VAWI versus NorAQ.* N=*77*

| | VAWI | | NorAQ | |
|---|---|---|---|---|
| | *N* | % [a] | *N* | % [a] |
| Psychological violence | *13* | 17.1 | *2* | 2.6 |
| Physical violence | *5* | 6.8 | *3* | 3.9 |
| Sexual violence | *7* | 9.3 | *5* | 6.5 |

[a] Percentage is given in valid percent.

## DISCUSSION

The VAWI subscales of psychological, physical and sexual violence showed good internal consistency. Principal components analysis yielded a two-component solution and a three-component solution largely reflected the VAWI's conceptual model. External validity was supported in that the VAWI was able to discriminate between groups known to differ in exposure to physical and/or sexual IPV, that is, respondents with poor vs. good self-rated

health and witnessed vs. not witnessed physical violence at home when growing up. Similar past-year prevalence to other Nordic studies was found. Differences in exposure rates of psychological IPV reported in the VAWI and NorAQ exemplify the need for standardized instruments when comparing prevalence of IPV between and within countries.

**Internal validity**

A two-component solution was suggested by the parallel analysis and the Kaiser and Cattell's scree criterion (one psychological and one combined physical and sexual component). This solution is understandable in that physical and sexual violence occur to a lesser extent in comparison with psychological violence, which generally is the most prevalent form of IPV .(22, 31)

Despite cultural and linguistic differences between Sweden and Brazil, results from the three-component solution in the current study were similar to those derived in the study conducted in Brazil, where a pre-determined three component solution was investigated.(16) In the Brazilian study, the question "Threatened to hurt me or someone I care about" did not load on any component in Zona da Mata, although it loaded in its explored psychological violence component in São Paulo. In the current study the item loaded both in the physical and psychological violence components. These findings indicate that threat of physical violence might not belong as clearly as expected to the psychological violence component, which has in fact been a point of debate among researchers.(29) Threats of violence may both precede and follow violent acts themselves, either escalating into a violent act or, especially if the victim has been exposed to physical violence prior to the threat, the threat of violence might frighten the victim just as much as the violent act itself.(29) This could explain the finding that threat of violence belonged to both psychological and physical violence. Moreover, both

in Zona da Mata and in the present study, the item "Has your partner pushed or shoved you?" loaded on the psychological violence component rather than the physical violence scale in the WHO conceptual model. The observed cross-loadings of individual items as well as items that belonged to other domains than in the conceptual model may reflect that female victims often are not exposed to one form of violence in isolation of the other.(32) For example, the sexual violence item "Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)" which loaded in both the physical and sexual IPV components is hard to divide into one or the other category.

**Internal reliability**

The Cronbach's alpha coefficients reported for the subscales in this study are very similar to those found in other studies.(9, 16) For example, for all sites combined in the WHO multi-country study, the reliability coefficient was 0.81 for physical and 0.66 for sexual IPV,(9) compared to 0.80 and 0.72 respectively in the current study. These similarities indicate a consistency in the internal reliability of the VAWI across countries despite cultural and socio-economic differences between the countries.

In the current study, deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)" would increase alpha for the sexual violence scale from 0.72 to 0.77. However, given that the current study is explorative and hypothesis-generating, further studies are needed to determine whether this item needs to be revised.

**External validity**

Known-groups comparison

Of the two known-groups used in the comparison, the strongest relationship found in the literature regards exposure to physical and/or sexual IPV and poorer self-rated health.(2, 20-24) There is also strong evidence that those who are exposed to physical and/or sexual IPV have witnessed their father use physical violence against the mother during childhood.(10, 25-27) We found support that the combined VAWI subscales of physical and/or sexual violence could discriminate between respondents who had poor vs. good self-rated health and between those who had witnessed vs. not witnessed their parents engage in physical violence. There is only scant knowledge about how these variables relate to psychological violence, hence these analyses were not deemed appropriate for the purpose of assessing validity.

Comparison of prevalence rates to other studies

Comparisons of our prevalence rates with those in other studies are challenged by differences between methodologies, definitions and reporting styles. Nevertheless, our 12-month violence exposure rates for physical and sexual violence were similar to those reported previously in population-based studies in Finland and Sweden(29, 30) using similar definitions and methodologies. However, we found lower rates for earlier-in-life estimates of physical and sexual IPV. The Swedish study found that 28% of women were exposed to physical and 16% to sexual violence by a former partner, compared to 14.3% for physical and 9.2% for sexual IPV during the earlier-in-life timeframe in the current study. The figures for the Finnish study were 29% for severe physical and 16% for sexual IPV. These differences are likely due to some minor differences in the definitions between the studies as well as to changes in prevalence rates over time and actual differences between countries. However, they may also owe to an oversight in the questionnaire layout, where the box for ticking violence experienced earlier in life was somewhat unclearly placed. Studies assessing psychological

violence in a Nordic context using similar definitions as in the current study could not be found.

VAWI and NorAQ

As the type and number of acts assessed in the VAWI and the NorAQ varied at the outset, some differences in the results from the two instruments were expected. The two questionnaires have also been developed with different aims in mind. NorAQ was developed for investigations in health care settings and for comparisons in the Nordic countries of various forms of violence, not specifically IPV. On the other hand, the VAWI was developed for global comparisons on IPV specifically. For example, the NorAQ psychological violence items reflect a more systematic form of violence experienced during a longer time-period or under fear or threat. Although these seem to capture similar levels of exposure as the more severe psychological violence items of the VAWI, milder forms of psychological violence are also represented in the VAWI and thus the instrument captures a broader range of psychologically violent acts. The sample size used in this comparison prohibits any strong conclusions; however, it further illustrates the importance of using standardized questionnaires when comparing prevalence, as results may vary to a large extent depending on the instrument used.

**Methodological considerations**

The VAWI was designed for and is primarily used in face-to-face interviews(5), whereas the current study administered the VAWI via a postal survey. The implications of different modes of data collection are difficult to assess due to multiple influencing factors, including the method of initial contact with the respondents, visual versus oral presentation of response choices, method of sampling as well as differing cultural and social contexts.(33) Previous

studies have found disclosure of sensitive topics to be higher in self-administered modes compared to face-to-face interviews,(33) also when assessing IPV(34). However, there is a scarcity of experimental or randomized study designs comparing different modes of data collection.(33)

Nonetheless, the main known limitation of postal surveys is lowered response rates.(34) The current study included two reminders in an effort to minimize drop-out rates. Non-responders were over-represented by young and unmarried women, women with low annual income and by those born outside of Sweden. Exposure rates of IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study. Furthermore, the earlier-in-life estimates may have been underestimated due to a minor detail on the questionnaire lay-out. In addition, the under-reporting common in surveys assessing IPV(3, 35) has probably contributed to further underestimation of IPV prevalence rates. Reasons for under-reporting IPV include forgetting violent acts that took place further back in life,(36) normalizing the violence, blaming the violence on oneself(37) and being fearful of a violent and controlling partner.(38) Finally, the sub-sample of respondents who answered both the VAWI and the NorAQ is small, which limits our ability to draw conclusions or generalize to the target population.

## CONCLUSION

Our analysis indicated that the VAWI has good construct validity and internal reliability in a Swedish context. The results obtained were similar to those reported in the Brazilian study, which implies that the VAWI has good cross-cultural construct validity and internal reliability in an adult female population. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## CONTRIBUTORSHIP STATEMENT

LN conducted all analyses, wrote the first draft of the manuscript and rewrote new drafts based on input from co-authors. CT planned the analyses and gave input on manuscript drafts. GK designed the project, planned the analyses and gave input on manuscript drafts. All authors read and approved the final manuscript.

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## DATA SHARING STATEMENT

The dataset is available form the corresponding author at lotta.nybergh@socmed.gu.se. Consent for sharing the dataset was not obtained but the presented data are anonymised and risk of identification is low.

Appendix 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, thrashed you or done anything similar to you?

| | |
|---|---|
| | Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act? |
| **Sexual Violence** | Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?<br>Has your partner against your will forced intercourse on you?<br>Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?<br>Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked? |

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**Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden**

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**Keywords**

Intimate Partner Violence * Sweden * WHO VAW instrument * Psychometric properties * Women

**Word count**
3,449~~109~~

## ABSTRACT

**Objective:** To explore psychometric properties of the Violence Against Women instrument in a randomly selected national sample of women (*N*=573) aged 18-65 years and residing in Sweden. **Design:** Cross-sectional survey study. **Setting:** Sweden. **Participants:** A postal survey was sent to 1006 women between January and March 2009, during which 624 women (62.0%) returned the questionnaire. Fifty-one women who did not answer any of the violence items were excluded from the analyses, resulting in a final sample of 573 women. **Primary and secondary outcome measures:** Self-reported exposure to psychological, physical and sexual intimate partner violence. **Results:** Cronbach's alphas were 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). A pre-determined three-component solution largely replicated the explored three component conceptual model of the Violence Against Women instrument. The instrument was able to discriminate between groups known from previous studies to differ in exposure to physical and/or sexual violence, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Past-year prevalence of physical (8.1%; 95% CI 5.9 – 10.3) and sexual (3.0%; 1.6 – 4.4) violence was similar to that reported in other Nordic studies; however, earlier-in-life prevalence was lower in the current study (14.3%; 95% CI 11.4 – 17.2 and 9.2%; 95% CI 6.8 – 11.6 respectively). Reported exposure rates were higher than those obtained from a concurrently administered instrument (NorVold Abuse Questionnaire). **Conclusion:** The Violence Against Women instrument demonstrated good construct validity and internal reliability in an adult female population in Sweden. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## ARTICLE SUMMARY

### Article focus

- The World Health Organization's Violence Against Women instrument (VAWI) has been used in several countries around the world in order to investigate violence against women by their intimate male partners, but aspects of reliability and validity have seldom been investigated.
- The aim of the current study was to explore selected psychometric properties of the VAWI in a randomly selected national ~~population~~ sample (*n*=573) of women.

### Key messages

- The current study provides preliminary support for the VAWI subscales of psychological, physical and sexual violence in a Swedish, adult female population.
- This adds to the knowledge of the instrument's cross-cultural validity and reliability, which is of significance when comparing intimate partner violence prevalence rates between countries.

### Strengths and limitations

- Cross-sectional study design.
- Further aspects of validity and reliability need to be explored and studies from a diverse range of countries are needed for further cross-cultural assessment.

**Keywords**
Intimate partner violence * Sweden * Validation * WHO VAW instrument * Psychometric properties * Women

## INTRODUCTION

While prevalence studies investigating violence against women perpetrated by intimate male partners have become more frequent,(1-4) sizeable differences in reported exposure occur both between and within study sites. These differences may in part be explained by differences in questionnaire administration methods (e.g. personal interviews vs. self-administration), questionnaire content, target populations, or definitions and severity of the violence assessed; however, such differences may also reflect true variation and cultural differences in violence perpetration.(1, 4) Standardized methodologies for assessing intimate partner violence (IPV) may help to enhance the reliability of results obtained from such studies and aid in comparing prevalence rates from diverse settings.

With this in mind, the World Health Organization (WHO) constructed a questionnaire for the WHO Multi-country Study on Women's Health and Domestic Violence against Women.(5) The study questionnaire includes the Violence Against Women instrument (henceforth referred to as "VAWI") assessing exposure to psychological, physical and sexual IPV. The VAWI was developed in collaboration with several networks and expert groups and was based partly on the original(6) and revised Conflict Tactics Scales,(7) as well as on work that originated from its critics.(8) Extensive pre-testing ~~and,~~ independent back-translations and piloting of the questionnaire were conducted.(9) The prevalence rates from the ten countries included in the multi-country study vary greatly, with life-time estimates ranging between 20-75% for psychological violence, 13-61% for physical violence and 6-59% for sexual violence.(5) Since the Multi-country Study was performed, the VAWI has been used in several more countries.(10-15)~~(9-14)~~

Despite the VAWI's relatively wide use, few peer-reviewed studies have evaluated its psychometric properties. Internal reliability (Cronbach's α) was assessed and confirmed in the Multi-Country Study;(9)~~(15)~~ however, only one study, conducted in Brazil, has explored aspects of validity.(16) In that study, analyses of data from two female populations, one urban (São Paulo; *n*=940) and one combined urban and rural area (Zona da Mata; *n*=1,188) supported the construct validity and internal reliability of the instrument.

The aim of this study was to explore psychometric properties of the VAWI in a randomly selected national ~~population~~ sample (*n*=573) of women aged 18-65 years residing in Sweden. Sweden provides an interesting comparative context due to its linguistic, cultural and socio-economic differences to Brazil.

## METHODS

### Procedure, study population and response rate

A sample of 1006 women, aged 18-65 years and residing in Sweden, was randomly selected by Statistics Sweden from the national population register. Data was collected by means of a postal survey between January and March 2009~~Data collection took place between January and March 2009~~. A requirement for the sample selection was that the respondent was currently or had previously been in an intimate relationship. The response rate was 62.0% (*n*=624). Women who did not respond to any of the violence items (*n*=51) were excluded from the analyses, resulting in a total sample of 573 women.

Criterion validity was explored by comparing prevalence reported in the VAWI versus the NorVold Abuse Questionnaire (NorAQ).[16] A second data collection was performed for this purpose. Statistics Sweden sent out the VAWI and NorAQ to 20% (*n*=125) of the respondents

from the initial data collection between November 2009 and January 2010. NorAQ was chosen since it is the only questionnaire measuring violence that has been validated in Sweden in both a female and male (see companion article) population-based sample. The response rate was 65.6% (*n*=82*)* for the VAWI and 63.2% (*n*=79) for NorAQ.

**Drop-out analysis**

A two-proportion z-test was used to assess statistical significance between the drop-out and the final sample regarding age, country of birth, civil status and the respondents' yearly income before tax. A Bonferroni adjustment to the alpha level was applied.

Comparing those who did not return the questionnaire (*n*=382) with the final sample of analysis (*n*=573) revealed that significantly lower response rates were found among non-respondents who were 18-29 years old, unmarried, foreign born and had low yearly income of 0 – 159,999 Swedish Kronor (SEK) before tax. Internal drop-out rates, that is respondents who did not endorse any violence item (*n*=51), were significantly higher among ~~men~~ women who were 18-29 years old, unmarried and had a low yearly income in comparison to the final sample of analysis.

Of those who did not return the questionnaire during the second data collection (*n*=46), significantly lower response rates were found for women who were unmarried, widowed or divorced.

**Assessment instruments: VAWI and NorAQ**

The VAWI consists of behaviour-specific items related to psychological (four items), physical (six items) and sexual violence (three items). The physical violence items are further divided

into “moderate” (the two first items) and “severe” (the following four items) violence based on the likelihood of physical injury.(5) For each question, respondents were asked whether they had experienced the specific act during the *past year* and *earlier in life*. The VAWI items were translated and adapted to a Swedish context by a senior researcher (third author) with extensive knowledge about intimate partner violence~~The VAWI's items were translated and adapted to Swedish by an expert panel in IPV.~~

NorAQ has been validated in a Swedish context(17) and measures emotional (three items), physical (three items) and sexual (four items) abuse, including different perpetrators, as well as abuse in the health care system. The NorAQ violence items applicable to an intimate partnership (Appendix 1) were included with the intention to compare prevalence rates with those obtained by use of the VAWI. The second sexual violence item was adapted for use in both a male and female population, as the questionnaire constructed for this study was sent to a male population as well (see companion paper entitled ‘Psychometric properties of the WHO Violence Against Women instrument in a male population-based sample in Sweden’).

**Statistical analyses**

Principal components analysis (PCA) was conducted to explore the internal construct validity of the violence items. A promax rotation was chosen due to high inter-component correlations (e.g. r=0.49-0.61 for the three dimensions). Decisions on the number of components to extract were based on parallel analysis, Kaiser’s eigenvalue-greater-than-one rule, total proportion of variance explained and Cattell’s scree plot. This was followed by a pre-determined solution with three components as conceptualized in the VAWI.

The internal reliability of the VAWI was assessed with the Cronbach's alpha for each subscale and for the total violence scale. An alpha of 0.70 or higher was considered satisfactory.(18)

Known-groups comparisons were performed to investigate the VAWI's external construct validity. The aim was to see if the instrument was able to differentiate between groups known to differ in exposure to IPV.(19) The following hypotheses were postulated: women who are exposed to physical and/or sexual IPV (life-time exposure, "yes/no") would have poorer self-perceived health(2, 20-24) and have grown up in a home where they witnessed physical violence between their parents(10, 25-27)~~(9, 25-27)~~. The Mantel-Haenszel test was used controlling for age, income, civil status, education and country of birth. Statistical significance was set at $p<0.05$.

*Self-perceived health* was assessed by "How would you say that your general health has been during the past year?". Response options were dichotomized into "very good/good" and "neither good nor bad/bad/very bad". *Childhood exposure to violence* was assessed with the question: When you were growing up, did you see your parents (or equivalent) regularly physically hurt one another? ("no" and "yes/unsure").

Prevalence of psychological, physical and sexual violence was calculated for the past year and for earlier in life, for comparisons with prevalence rates presented in other studies.

In addition, life-time prevalence of IPV was compared between the VAWI and the NorAQ and Fisher's exact test was used to test for statistically significant differences at the 95% CI

level. Only those respondents who had answered both the VAWI and NorAQ were included (*n*=77) in this analysis.

**Ethical considerations**

The Regional Ethics Review Board located in Gothenburg gave approval for this study (Dnr: 527-08) and the WHO ethical and safety recommendations for research on domestic violence against women as applicable to a postal survey were followed.(28) For example, a letter was sent to prospective respondents in advance to inform them about the upcoming survey; this provided them with the opportunity to decline the survey before receiving it. Also, although the sampling frame was based on registered individuals, only one survey per household was sent for ethical and safety reasons. Additionally, full anonymity and confidentiality were guaranteed and contact information to a general practitioner (third author on this study), a psychologist and a contact person at Statistics Sweden was provided for additional information and/or referral. The survey was entitled "A study on conflicts, relationships and health". The study description that followed the title stated that the study assesses IPV.

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**RESULTS**

**Study population**

Nearly half of the women had at least three years of university education (*n* =270; 47.2%) and the mean age was 43 years (*SD*=13). Of the total sample, 85.1% (*n*=484) were currently in a relationship (i.e. boyfriend or girlfriend, married, registered partnership or cohabiting), of which the majority were heterosexual relationships (*n* =566; 98.8%). The rest of the sample was single, widowed or divorced, but had previously been in a relationship (see Table 1).

Table 1. *Socio-demographic and psychosocial factors of the total sample. N=573*

| | *N* (%) |
|---|---|
| **Age groups** | |
| 18-29 | *107* (18.7) |
| 30-39 | *138* (24.1) |
| 40-49 | *125* (21.8) |
| 50-59 | *136* (23.7) |
| 60-65 | *67* (11.7) |
| **Partner status** | |
| Single/widowed/divorced | *85* (14.9) |
| Boyfriend/girlfriend | *64* (11.2) |
| Married/cohabitant/registered partnership | *420* (73.8) |
| Heterosexual relationship | ~~*566*~~ *477* (~~98.8~~83.2) |
| Same-sex relationship | *7* (1.2) |
| **Educational level (highest)** | |
| University | *270* (47.2) |
| High school (10-12 yrs) | *211* (36.9) |
| Compulsory (≤9 yrs) | *91* (15.9) |
| **Annual income (before tax, SEK)** | |
| 0 – 159,999 | *168* (29.3) |
| 160,000 - 234,999 | *175* (30.5) |
| 235,000 - 309,999 | *143* (25.0) |
| 310,000 or more | *87* (15.2) |
| **Employment status** | |
| Employed | *396* (69.7) |
| Student | *35* (6.2) |
| Retired | *47* (8.3) |
| Sick leave (more than 3 months) | *8* (1.4) |
| Parental leave or leave of absence | *35* (6.2) |
| Unemployed | *23* (4.0) |
| Other | *24* (4.2) |
| **Country of Birth** | |
| Sweden | *519* (90.6) |
| Other Nordic country | *15* (2.6) |
| Other European country | *18* (3.1) |
| Country outside Europe | *21* (3.7) |
| **Self-rated health** | |
| Very good/good | *511* (90.0) |
| Neither good nor bad/bad/very bad | *57* (10.0) |

| **Grown up in a home where there occurred physical violence** | |
|---|---|
| No | *542* (94.6) |
| Yes/Unsure | *31* (5.4) |

**Internal validity**

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89 and Bartlett's test of sphericity was significant ($p < 0.05$), verifying a good fit of the data to the PCA. Parallel analysis, Kaiser's criterion and Cattell's scree test suggested two components (not in Table), explaining 57.4% of the total variance. The first component consisted of all physical and sexual violence items in the VAWI conceptual model, except the two items representing the least severe forms of physical and sexual violence. In addition, the component included the psychological violence item referring to threat of injury. The second component comprised the remaining three psychological violence items as well as the first physical and sexual violence items.

A three-component solution (Table 2) explained 64.4% of the total variance. The third component had an initial eigenvalue close to one (0.9) and comprised two of the three sexual violence items; otherwise the structure was identical to the two component solution and largely mirrored the VAWI's physical, psychological and sexual violence subscales.

Table 2. *Three-component solution for the VAWI psychological, physical and sexual violence items.* N=*534*

| | Three-component solution | | |
|---|---|---|---|
| **Conceptual model** | **C1** | **C2** | **C3** |
| Psychological Violence | | | |
| 1 Insulted me in a way that made me feel bad about myself~~1~~ | | **.89** | |
| 2 Belittled and humiliated me in front of other people~~2~~ | | **.74** | |
| 3 Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things)~~3~~ | | **.64** | |
| 4 Threatened to hurt me or someone I care about~~4~~ | **.43** | .33 | |

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| | | | |
|---|---|---|---|
| Physical Violence | | | |
| 1 Pushed or shoved me~~1~~ | | **.71** | |
| 2 Thrown something at me that could have hurt me~~2~~ | **.38** | | |
| 3 Hit me with his/her fist or with some other object that could have hurt me~~3~~ | **.80** | | |
| 4 Kicked and dragged me and beat me up~~4~~ | **.85** | | |
| 5 Choked me or burnt me on purpose~~5~~ | **.67** | | |
| 6 Hurt me with a knife, a gun or some other weapon~~6~~ | **.88** | | |
| Sexual Violence | | | |
| 1 Demanded to have sex with me even though I did not want to (but did not use physical force)~~1~~ | | | |
| 2 Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)~~2~~ | **.56** | | |
| 3 Forced me to perform sexual acts that I experienced as degrading and/or humiliating~~3~~ | | | |
| *Accumulated variance %* | *46.1* | *57.4* | *64.4* |
| *Eigenvalues* | *6.0* | *1.5* | *0.9* |

[a] Loadings >~~greater~~ 0.30 are shown and highest loadings are boldfaced. List-wise deletion was used.

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**Internal reliability**

The Cronbach's alpha coefficient (Table 3) was satisfactory for all subscales in the VAWI conceptual model: 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). Alpha for the sexual violence scale increased from 0.72 to 0.77 after deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)".

Table 3. *Cronbach's α of the VAWI psychological, physical and sexual violence scales and total scale, life-time.* N=*573*

| Scales | Alpha if Item Deleted |
|---|---|
| **Psychological violence** | |
| Insulted me in a way that made me feel bad about myself | .75 |
| Belittled and humiliated me in front of other people | .71 |
| Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | .72 |
| Threatened to hurt me or someone I care about | .76 |
| **Total** | **.79** |

**Physical violence**

| | |
|---|---|
| Pushed or shoved me | .81 |
| Thrown something at me that could have hurt me | .75 |
| Hit me with his/her fist or with some other object that could have hurt me | .73 |
| Kicked and dragged me and beat me up | .75 |
| Choked me or burnt me on purpose | .76 |
| Hurt me with a knife, a gun or some other weapon | .80 |
| **Total** | **.80** |
| | |
| **Sexual violence** | |
| Demanded to have sex with me even though I did not want to (but did not use physical force) | .77 |
| Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | .64 |
| Forced me to perform sexual acts that I experienced as degrading and/or humiliating | .54 |
| **Total** | **.72** |
| | |
| **Violence scale, total** | **.88** |

**External validity**

Known-groups comparison

As hypothesized, exposure to violence as assessed by VAWI was significantly associated with self-rated health and having witnessed parental (or equivalent) physical violence when growing up. Specifically, a significantly larger proportion of respondents who reported exposure to violence also reported worse health (Chi-Square (1, N=573) = 26.1, p<0.05) and having witnessed parental physical violence (Chi-Square (1, N=573) = 11.5, p<0.05) than did those not reporting exposure. ~~VAWI scores were significantly associated with self rated health and having witnessed parental (or equivalent) physical violence. Specifically, those who reported exposure to violence also reported worse health and having witnessed parental physical violence to a higher extent.~~

Comparison of prevalence rates to other studies

As assessed with the VAWI, 23.6% (*n*=123) of the respondents reported exposure to psychological violence, 8.4% (*n*=43) to physical violence and 3.0% (*n*=16) to sexual violence

during the past year. Corresponding percentages for exposure to violence earlier in life were 23.6% (*n*=135), 14.3% (*n*=82) and 9.2% (*n*=53; Table 4). Similar 12-month violence exposure rates for physical and sexual violence have been reported in two population-based studies – one in Finland (*n*=4,464) and one in Sweden (*n*=4,771) – using comparable methodologies and definitions.(29, 30) However, the present study found lower prevalence for physical and sexual violence experienced earlier in life. The aforementioned studies did not report psychological violence.

Table 4. *Past-year and earlier-in-life exposure to IPV as assessed with the VAWI.* N=*573*

| | **Past year** | | | **Earlier in life** | | |
|---|---|---|---|---|---|---|
| | *N* | % | 95 % CI | *N* | % | 95 % CI |
| Psychological violence | *123* | 23.6 [a] | 20.1 – 27.1 | *135* | 23.6 | 20.1 – 27.1 |
| Physical violence | *43* | 8.1 | 5.9 – 10.3 | *82* | 14.3 | 11.4 – 17.2 |
| Sexual violence | *16* | 3.0 | 1.6 – 4.4 | *53* | 9.2 | 6.8 – 11.6 |

[a] Percentage is given in valid percent.

VAWI and NorAQ

Higher prevalence was found by the VAWI compared to NorAQ (see Table 5). However, only the difference for psychological IPV was statistically significant (17.1% vs. 2.6%; $p<0.05$). This difference owed principally to the VAWI items "Insulted me in a way that made me feel bad about myself" (16.9%), for which NorAQ has no corresponding item, and "Belittled and humiliated me in front of other people" (6.5%). Prevalence rates for the two other items on this scale were similar to corresponding items in the NorAQ (see Appendix 1).

Table 5. *Life-time prevalence of exposure to IPV as assessed with the VAWI versus NorAQ.* N=*77*

| | **VAWI** | | **NorAQ** | |
|---|---|---|---|---|
| | *N* | % [a] | *N* | % [a] |
| Psychological violence | *13* | 17.1 | *2* | 2.6 |
| Physical violence | *5* | 6.8 | *3* | 3.9 |
| Sexual violence | *7* | 9.3 | *5* | 6.5 |

[a] Percentage is given in valid percent.

## DISCUSSION

The VAWI subscales of psychological, physical and sexual violence showed good internal consistency. Principal components analysis yielded a two-component solution and a three-component solution largely reflected the VAWI's conceptual model. External validity was supported in that the VAWI was able to discriminate between groups known to differ in exposure to physical and/or sexual IPV, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Similar past-year prevalence to other Nordic studies was found. Differences in exposure rates of psychological IPV reported in the VAWI and NorAQ exemplify the need for standardized instruments when comparing prevalence of IPV between and within countries.

### Internal validity

A two-component solution was suggested by the parallel analysis and the Kaiser and Cattell's scree criterion (one psychological and one combined physical and sexual component). This solution is understandable in that physical and sexual violence occur to a lesser extent in comparison with psychological violence, which generally is the most prevalent form of IPV ~~are more likely to occur in conjunction. In contrast, psychological violence may occur in isolation of physical and/or sexual violence~~.(22, 31)~~(22)~~

Despite cultural and linguistic differences between Sweden and Brazil, results from the three-component solution in the current study were similar to those derived in the study conducted in Brazil, where a pre-determined three component solution was investigated.(16) In the Brazilian study, the question "Threatened to hurt me or someone I care about" did not load on any component in Zona da Mata, although it loaded in its explored psychological violence

component in São Paulo. In the current study the item loaded both in the physical and psychological violence components. These findings indicate that threat of physical violence might not belong as clearly as expected to the psychological violence component, which has in fact been a point of debate among researchers.(29) Threats of violence may both precede and follow violent acts themselves, either escalating into a violent act or, especially if the victim has been exposed to physical violence prior to the threat, the threat of violence might frighten the victim just as much as the violent act itself.(29) This could explain the finding that threat of violence belonged to both psychological and physical violence. Moreover, both in Zona da Mata and in the present study, the item "Has your partner pushed or shoved you?" loaded on the psychological violence component rather than the physical violence scale in the WHO conceptual model. The observed cross-loadings of individual items as well as items that belonged to other domains than in the conceptual model may reflect that female victims often are not exposed to one form of violence in isolation of the other.(32)~~(31)~~ For example, the sexual violence item "Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)" which loaded in both the physical and sexual IPV components is hard to divide into one or the other category.

**Internal reliability**

The Cronbach's alpha coefficients reported for the subscales in this study are very similar to those found in other studies.(9, 16)~~(15, 16)~~ For example, for all sites combined in the WHO multi-country study, the reliability coefficient was 0.81 for physical and 0.66 for sexual IPV,(9)~~(15)~~ compared to 0.80 and 0.72 respectively in the current study. These similarities indicate a consistency in the internal reliability of the VAWI across countries despite cultural and socio-economic differences between the countries.

In the current study, deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)" would increase alpha for the sexual violence scale from 0.72 to 0.77. However, given that the current study is explorative and hypothesis-generating, further studies are needed to determine whether this item needs to be revised ~~or not~~.

**External validity**

Known-groups comparison

Of the two known-groups used in the comparison, the strongest relationship found in the literature regards exposure to physical and/or sexual IPV and poorer self-rated health.(2, 20-24) There is also strong evidence that those who are exposed to physical and/or sexual IPV have witnessed their father use physical violence against the mother during childhood.(10, 25-27)~~(9, 25-27)~~ We found support that the combined VAWI subscales of physical and/or sexual violence could discriminate between respondents who had poor vs. good self-rated health and between those who had witnessed vs. not witnessed their parents engage~~d~~ in physical violence. There is only scant knowledge about how these variables relate to psychological violence, hence these analyses were not deemed appropriate for the purpose of assessing validity.

Comparison of prevalence rates to other studies

Comparisons of our prevalence rates with those in other studies are challenged by differences between methodologies, definitions and reporting styles. Nevertheless, our 12-month violence exposure rates for physical and sexual violence were similar to those reported previously in population-based studies in Finland and Sweden(29, 30) using similar definitions and methodologies. However, we found lower rates for earlier-in-life estimates of physical and

sexual IPV. The Swedish study found that 28% of women were exposed to physical and 16% to sexual violence by a former partner, compared to 14.3% for physical and 9.2% for sexual IPV during the earlier-in-life timeframe in the current study. The figures for the Finnish study were 29% for severe physical and 16% for sexual IPV. These differences are likely due to some minor differences in the definitions between the studies as well as to changes in prevalence rates over time and actual differences between countries. However, they may also owe to an oversight in the questionnaire layout, where the box for ticking violence experienced earlier in life was somewhat unclearly placed. Studies assessing psychological violence in a Nordic context using similar definitions as in the current study could not be found.

VAWI and NorAQ

As the type and number of acts assessed in the VAWI and the NorAQ varied at the outset, some differences in the results from the two instruments were expected. The two questionnaires have also been developed with different aims in mind. NorAQ was developed for investigations in health care settings and for comparisons in the Nordic countries of various forms of violence, not specifically IPV. On the other hand, the VAWI was developed for global comparisons on IPV specifically. For example, the NorAQ psychological violence items reflect a more systematic form of violence experienced during a longer time-period or under fear or threat. Although these seem to capture similar levels of exposure as the more severe psychological violence items of the VAWI, milder forms of psychological violence are also represented in the VAWI and thus the instrument captures a broader range of psychologically violent acts. The sample size used in this comparison prohibits any strong conclusions; however, it further illustrates the importance of using standardized

questionnaires when comparing prevalence, as results may vary to a large extent depending on the instrument used.

**Methodological considerations**

The VAWI was designed for and is primarily used in face-to-face interviews(5), whereas the current study administered the VAWI via a postal survey. The implications of different modes of data collection are difficult to assess due to multiple influencing factors, including the method of initial contact with the respondents, visual versus oral presentation of response choices, method of sampling as well as differing cultural and social contexts.(33) Previous studies have found disclosure of sensitive topics to be higher in self-administered modes compared to face-to-face interviews,(33) also when assessing IPV(34). However, there is a scarcity of experimental or randomized study designs comparing different modes of data collection.(33)

Nonetheless, the main known limitation of postal surveys is lowered response rates.(34) The current study included two reminders in an effort to minimize drop-out rates. Non-responders were over-represented by young and unmarried women, women with low annual income and by those born outside of Sweden. Exposure rates of IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study. Furthermore, the earlier-in-life estimates may have been underestimated due to a minor detail on the questionnaire lay-out. In addition, the~~As~~ under-reporting ~~is~~ common in surveys assessing IPV~~.~~(3, 35)~~(3, 32)~~ has probably contributed to ~~estimates of IPV in the current study are probably~~ further ~~rather~~ under~~ than over estimated~~estimation of IPV prevalence rates. Reasons for under-reporting IPV include forgetting violent acts that took place further back in life,(36)~~(33)~~ normalizing the violence,

blaming the violence on oneself(37)~~(34)~~ and being fearful of a violent and controlling partner.(38)~~(35)~~ Finally, the sub-sample of respondents who answered both the VAWI and the NorAQ is small, which limits our ability to draw conclusions or generalize to the target population. ~~Moreover, non-responders were over-represented by young and unmarried women, women with lower income and by those born outside of Sweden. Exposure rates to IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study.~~

## CONCLUSION

Our analysis indicated that the VAWI has good construct validity and internal reliability in a Swedish context. The results obtained were similar to those reported in the Brazilian study, which implies that the VAWI has good cross-cultural construct validity and internal reliability in an adult female population. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## CONTRIBUTORSHIP STATEMENT

LN conducted all analyses, wrote the first draft of the manuscript and rewrote new drafts based on input from co-authors. CT planned the analyses and ~~,~~ gave input on manuscript drafts. GK designed the project, planned the analyses and~~,~~ gave input on manuscript drafts. All authors read and approved the final manuscript.

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**DATA SHARING STATEMENT**

The dataset is available form the corresponding author at lotta.nybergh@socmed.gu.se. Consent for sharing the dataset was not obtained but the presented data are anonymised and risk of identification is low.

Appendix 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, thrashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

**Sexual Violence**

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?

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Figure 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, trashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

**Sexual Violence**

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

| | Item No | Recommendation |
|---|---|---|
| **Title and abstract** | 1 | (*a*) Indicate the study's design with a commonly used term in the title or the abstract |
| | | (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found |
| **Introduction** | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses |
| **Methods** | | |
| Study design | 4 | Present key elements of study design early in the paper |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection |
| Participants | 6 | (*a*) Give the eligibility criteria, and the sources and methods of selection of participants |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group |
| Bias | 9 | Describe any efforts to address potential sources of bias |
| Study size | 10 | Explain how the study size was arrived at |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding |
| | | (*b*) Describe any methods used to examine subgroups and interactions |
| | | (*c*) Explain how missing data were addressed |
| | | (*d*) If applicable, describe analytical methods taking account of sampling strategy |
| | | (*e*) Describe any sensitivity analyses |
| **Results** | | |
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed |
| | | (b) Give reasons for non-participation at each stage |
| | | (c) Consider use of a flow diagram |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders |
| | | (b) Indicate number of participants with missing data for each variable of interest |
| Outcome data | 15* | Report numbers of outcome events or summary measures |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included |
| | | (*b*) Report category boundaries when continuous variables were categorized |
| | | (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses |

| | | |
|---|---|---|
| **Discussion** | | |
| Key results | 18 | Summarise key results with reference to study objectives |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results |
| **Other information** | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based |

*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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# Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden



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# Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden

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**Keywords**

Intimate Partner Violence * Sweden * WHO VAW instrument * Psychometric properties * Women

**Word count**
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## ABSTRACT

**Objective:** To explore psychometric properties of the Violence Against Women instrument in a randomly selected national sample of women (*N*=573) aged 18-65 years and residing in Sweden.

**Design:** Cross-sectional survey study.

**Setting:** Sweden.

**Participants:** A postal survey was sent to 1006 women between January and March 2009, during which 624 women (62.0%) returned the questionnaire. Fifty-one women who did not answer any of the violence items were excluded from the analyses, resulting in a final sample of 573 women.

**Primary and secondary outcome measures:** Self-reported exposure to psychological, physical and sexual intimate partner violence.

**Results:** Cronbach's alphas were 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). A pre-determined three-component solution largely replicated the explored three component conceptual model of the Violence Against Women instrument. The instrument was able to discriminate between groups known from previous studies to differ in exposure to physical and/or sexual violence, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Past-year prevalence of physical (8.1%; 95% CI 5.9 – 10.3) and sexual (3.0%; 1.6 – 4.4) violence was similar to that reported in other Nordic studies; however, earlier-in-life prevalence was lower in the current study (14.3%; 95% CI 11.4 – 17.2 and 9.2%; 95% CI 6.8 – 11.6 respectively). Reported exposure rates were higher than those obtained from a concurrently administered instrument (NorVold Abuse Questionnaire).

**Conclusion:** The Violence Against Women instrument demonstrated good construct validity and internal reliability in an adult female population in Sweden. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## ARTICLE SUMMARY

### Article focus

- The World Health Organization's Violence Against Women instrument (VAWI) has been used in several countries around the world in order to investigate violence against women by their intimate male partners, but aspects of reliability and validity have seldom been investigated.
- The aim of the current study was to explore selected psychometric properties of the VAWI in a randomly selected national sample (*n*=573) of women.

### Key messages

- The current study provides preliminary support for the VAWI subscales of psychological, physical and sexual violence in a Swedish, adult female population.
- This adds to the knowledge of the instrument's cross-cultural validity and reliability, which is of significance when comparing intimate partner violence prevalence rates between countries.

### Strengths and limitations

- Cross-sectional study design.
- Further aspects of validity and reliability need to be explored and studies from a diverse range of countries are needed for further cross-cultural assessment.

**Keywords**

Intimate partner violence * Sweden * Validation * WHO VAW instrument * Psychometric properties * Women

## INTRODUCTION

While prevalence studies investigating violence against women perpetrated by intimate male partners have become more frequent,(1-4) sizeable differences in reported exposure occur both between and within study sites. These differences may in part be explained by differences in questionnaire administration methods (e.g. personal interviews vs. self-administration), questionnaire content, target populations, or definitions and severity of the violence assessed; however, such differences may also reflect true variation and cultural differences in violence perpetration.(1, 4) Standardized methodologies for assessing intimate partner violence (IPV) may help to enhance the reliability of results obtained from such studies and aid in comparing prevalence rates from diverse settings.

With this in mind, the World Health Organization (WHO) constructed a questionnaire for the WHO Multi-country Study on Women's Health and Domestic Violence against Women.(5) The study questionnaire includes the Violence Against Women instrument (henceforth referred to as "VAWI") assessing exposure to psychological, physical and sexual IPV. The VAWI was developed in collaboration with several networks and expert groups and was based partly on the original(6) and revised Conflict Tactics Scales,(7) as well as on work that originated from its critics.(8) Extensive pre-testing, independent back-translations and piloting of the questionnaire were conducted.(9) The prevalence rates from the ten countries included in the multi-country study vary greatly, with life-time estimates ranging between 20-75% for psychological violence, 13-61% for physical violence and 6-59% for sexual violence.(5) Since the Multi-country Study was performed, the VAWI has been used in several more countries.(10-15)

Despite the VAWI's relatively wide use, few peer-reviewed studies have evaluated its psychometric properties. Internal reliability (Cronbach's α) was assessed and confirmed in the Multi-Country Study;(9) however, only one study, conducted in Brazil, has explored aspects of validity.(16) In that study, analyses of data from two female populations, one urban (São Paulo; *n*=940) and one combined urban and rural area (Zona da Mata; *n*=1,188) supported the construct validity and internal reliability of the instrument.

The aim of this study was to explore psychometric properties of the VAWI in a randomly selected national sample (*n*=573) of women aged 18-65 years residing in Sweden. Sweden provides an interesting comparative context due to its linguistic, cultural and socio-economic differences to Brazil.

## METHODS

### Procedure, study population and response rate

A sample of 1006 women, aged 18-65 years and residing in Sweden, was randomly selected by Statistics Sweden from the national population register. Data was collected by means of a postal survey between January and March 2009. A requirement for the sample selection was that the respondent was currently or had previously been in an intimate relationship. The response rate was 62.0% (*n*=624). Women who did not respond to any of the violence items (*n*=51) were excluded from the analyses, resulting in a total sample of 573 women.

Criterion validity was explored by comparing prevalence reported in the VAWI versus the NorVold Abuse Questionnaire (NorAQ).[16] A second data collection was performed for this purpose. Statistics Sweden sent out the VAWI and NorAQ to 20% (*n*=125) of the respondents from the initial data collection between November 2009 and January 2010. NorAQ was

chosen since it is the only questionnaire measuring violence that has been validated in Sweden in both a female and male (see companion article) population-based sample. The response rate was 65.6% (*n*=82*)* for the VAWI and 63.2% (*n*=79) for NorAQ.

**Drop-out analysis**

A two-proportion z-test was used to assess statistical significance between the drop-out and the final sample regarding age, country of birth, civil status and the respondents' yearly income before tax. A Bonferroni adjustment to the alpha level was applied.

Comparing those who did not return the questionnaire (*n*=382) with the final sample of analysis (*n*=573) revealed that significantly lower response rates were found among non-respondents who were 18-29 years old, unmarried, foreign born and had low yearly income of 0 – 159,999 Swedish Kronor (SEK) before tax. Internal drop-out rates, that is respondents who did not endorse any violence item (*n*=51), were significantly higher among women who were 18-29 years old, unmarried and had a low yearly income in comparison to the final sample of analysis.

Of those who did not return the questionnaire during the second data collection (*n*=46), significantly lower response rates were found for women who were unmarried, widowed or divorced.

**Assessment instruments: VAWI and NorAQ**

The VAWI consists of behaviour-specific items related to psychological (four items), physical (six items) and sexual violence (three items). The physical violence items are further divided into "moderate" (the two first items) and "severe" (the following four items) violence based

on the likelihood of physical injury.(5) For each question, respondents were asked whether they had experienced the specific act during the *past year* and *earlier in life*. The VAWI items were translated and adapted to a Swedish context by a senior researcher (third author) with extensive knowledge about intimate partner violence

NorAQ has been validated in a Swedish context(17) and measures emotional (three items), physical (three items) and sexual (four items) abuse, including different perpetrators, as well as abuse in the health care system. The NorAQ violence items applicable to an intimate partnership (Appendix 1) were included with the intention to compare prevalence rates with those obtained by use of the VAWI. The second sexual violence item was adapted for use in both a male and female population, as the questionnaire constructed for this study was sent to a male population as well (see companion paper entitled 'Psychometric properties of the WHO Violence Against Women instrument in a male population-based sample in Sweden').

**Statistical analyses**

Principal components analysis (PCA) was conducted to explore the internal construct validity of the violence items. A promax rotation was chosen due to high inter-component correlations (e.g. r=0.49-0.61 for the three dimensions). Decisions on the number of components to extract were based on parallel analysis, Kaiser's eigenvalue-greater-than-one rule, total proportion of variance explained and Cattell's scree plot. This was followed by a pre-determined solution with three components as conceptualized in the VAWI.

The internal reliability of the VAWI was assessed with the Cronbach's alpha for each subscale and for the total violence scale. An alpha of 0.70 or higher was considered satisfactory.(18)

Known-groups comparisons were performed to investigate the VAWI's external construct validity. The aim was to see if the instrument was able to differentiate between groups known to differ in exposure to IPV.(19) The following hypotheses were postulated: women who are exposed to physical and/or sexual IPV (life-time exposure, "yes/no") would have poorer self-perceived health(2, 20-24) and have grown up in a home where they witnessed physical violence between their parents(10, 25-27). The Mantel-Haenszel test was used controlling for age, income, civil status, education and country of birth. Statistical significance was set at $p<0.05$.

*Self-perceived health* was assessed by "How would you say that your general health has been during the past year?". Response options were dichotomized into "very good/good" and "neither good nor bad/bad/very bad". *Childhood exposure to violence* was assessed with the question: When you were growing up, did you see your parents (or equivalent) regularly physically hurt one another? ("no" and "yes/unsure").

Prevalence of psychological, physical and sexual violence was calculated for the past year and for earlier in life, for comparisons with prevalence rates presented in other studies.

In addition, life-time prevalence of IPV was compared between the VAWI and the NorAQ and Fisher's exact test was used to test for statistically significant differences at the 95% CI level. Only those respondents who had answered both the VAWI and NorAQ were included ($n$=77) in this analysis.

**Ethical considerations**

The Regional Ethics Review Board located in Gothenburg gave approval for this study (Dnr: 527-08) and the WHO ethical and safety recommendations for research on domestic violence against women as applicable to a postal survey were followed.(28) For example, a letter was sent to prospective respondents in advance to inform them about the upcoming survey; this provided them with the opportunity to decline the survey before receiving it. Also, although the sampling frame was based on registered individuals, only one survey per household was sent for ethical and safety reasons. Additionally, full anonymity and confidentiality were guaranteed and contact information to a general practitioner (third author on this study), a psychologist and a contact person at Statistics Sweden was provided for additional information and/or referral. The survey was entitled "A study on conflicts, relationships and health". The study description that followed the title stated that the study assesses IPV.

## RESULTS

### Study population

Nearly half of the women had at least three years of university education (*n* =270; 47.2%) and the mean age was 43 years (*SD*=13). Of the total sample, 85.1% (*n*=484) were currently in a relationship (i.e. boyfriend or girlfriend, married, registered partnership or cohabiting), of which the majority were heterosexual relationships (*n* =566; 98.8%). The rest of the sample was single, widowed or divorced, but had previously been in a relationship (see Table 1).

Table 1. *Socio-demographic and psychosocial factors of the total sample. N=573*

| | *N* (%) |
|---|---|
| **Age groups** | |
| 18-29 | *107* (18.7) |
| 30-39 | *138* (24.1) |
| 40-49 | *125* (21.8) |
| 50-59 | *136* (23.7) |
| 60-65 | *67* (11.7) |

| | |
|---|---|
| **Partner status** | |
| Single/widowed/divorced | *85* (14.9) |
| Boyfriend/girlfriend | *64* (11.2) |
| Married/cohabitant/registered partnership | *420* (73.8) |
| Heterosexual relationship | *477* (83.2) |
| Same-sex relationship | *7* (1.2) |
| **Educational level (highest)** | |
| University | *270* (47.2) |
| High school (10-12 yrs) | *211* (36.9) |
| Compulsory (≤9 yrs) | *91* (15.9) |
| **Annual income (before tax, SEK)** | |
| 0 – 159,999 | *168* (29.3) |
| 160,000 - 234,999 | *175* (30.5) |
| 235,000 - 309,999 | *143* (25.0) |
| 310,000 or more | *87* (15.2) |
| **Employment status** | |
| Employed | *396* (69.7) |
| Student | *35* (6.2) |
| Retired | *47* (8.3) |
| Sick leave (more than 3 months) | *8* (1.4) |
| Parental leave or leave of absence | *35* (6.2) |
| Unemployed | *23* (4.0) |
| Other | *24* (4.2) |
| **Country of Birth** | |
| Sweden | *519* (90.6) |
| Other Nordic country | *15* (2.6) |
| Other European country | *18* (3.1) |
| Country outside Europe | *21* (3.7) |
| **Self-rated health** | |
| Very good/good | *511* (90.0) |
| Neither good nor bad/bad/very bad | *57* (10.0) |
| **Grown up in a home where there occurred physical violence** | |
| No | *542* (94.6) |
| Yes/Unsure | *31* (5.4) |

**Internal validity**

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89 and Bartlett's test of sphericity was significant ($p < 0.05$), verifying a good fit of the data to the PCA. Parallel analysis, Kaiser's criterion and Cattell's scree test suggested two components (not in Table), explaining 57.4% of the total variance. The first component consisted of all physical and sexual violence items in the VAWI conceptual model, except the two items representing the least severe forms of physical and sexual violence. In addition, the component included the psychological violence item referring to threat of injury. The second component comprised the remaining three psychological violence items as well as the first physical and sexual violence items.

A three-component solution (Table 2) explained 64.4% of the total variance. The third component had an initial eigenvalue close to one (0.9) and comprised two of the three sexual violence items; otherwise the structure was identical to the two component solution and largely mirrored the VAWI's physical, psychological and sexual violence subscales.

Table 2. *Three-component solution for the VAWI psychological, physical and sexual violence items.* N=*534*

| | Three-component solution | | |
|---|---|---|---|
| **Conceptual model** | **C1** | **C2** | **C3** |
| Psychological Violence | | | |
| 1 Insulted me in a way that made me feel bad about myself | | **.89** | |
| 2 Belittled and humiliated me in front of other people | | **.74** | |
| 3 Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | | **.64** | |
| 4 Threatened to hurt me or someone I care about | **.43** | .33 | |
| Physical Violence | | | |
| 1 Pushed or shoved me | | **.71** | |
| 2 Thrown something at me that could have hurt me | **.38** | | .31 |
| 3 Hit me with his/her fist or with some other object that could have hurt me | **.80** | | |
| 4 Kicked and dragged me and beat me up | **.85** | | |
| 5 Choked me or burnt me on purpose | **.67** | | |
| 6 Hurt me with a knife, a gun or some other weapon | **.88** | | |
| Sexual Violence | | | |

| | | | |
|---|---|---|---|
| 1 Demanded to have sex with me even though I did not want to (but did not use physical force) | | | **.81** |
| 2 Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | **.56** | | .55 |
| 3 Forced me to perform sexual acts that I experienced as degrading and/or humiliating | | | **.88** |
| *Accumulated variance %* | *46.1* | *57.4* | *64.4* |
| *Eigenvalues* | *6.0* | *1.5* | *0.9* |

[a] Loadings > 0.30 are shown and highest loadings are boldfaced. List-wise deletion was used.

**Internal reliability**

The Cronbach's alpha coefficient (Table 3) was satisfactory for all subscales in the VAWI conceptual model: 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). Alpha for the sexual violence scale increased from 0.72 to 0.77 after deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)".

Table 3. *Cronbach's α of the VAWI psychological, physical and sexual violence scales and total scale, life-time.* N=*573*

| Scales | Alpha if Item Deleted |
|---|---|
| **Psychological violence** | |
| Insulted me in a way that made me feel bad about myself | .75 |
| Belittled and humiliated me in front of other people | .71 |
| Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | .72 |
| Threatened to hurt me or someone I care about | .76 |
| **Total** | **.79** |
| | |
| **Physical violence** | |
| Pushed or shoved me | .81 |
| Thrown something at me that could have hurt me | .75 |
| Hit me with his/her fist or with some other object that could have hurt me | .73 |
| Kicked and dragged me and beat me up | .75 |
| Choked me or burnt me on purpose | .76 |
| Hurt me with a knife, a gun or some other weapon | .80 |
| **Total** | **.80** |

| | |
|---|---|
| **Sexual violence** | |
| Demanded to have sex with me even though I did not want to (but did not use physical force) | .77 |
| Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | .64 |
| Forced me to perform sexual acts that I experienced as degrading and/or humiliating | .54 |
| **Total** | **.72** |
| **Violence scale, total** | **.88** |

**External validity**

Known-groups comparison

As hypothesized, exposure to violence as assessed by VAWI was significantly associated with self-rated health and having witnessed parental (or equivalent) physical violence when growing up. Specifically, a significantly larger proportion of respondents who reported exposure to violence also reported worse health (Chi-Square (1, N=573) = 26.1, $p<0.05$) and having witnessed parental physical violence (Chi-Square (1, N=573) = 11.5, $p<0.05$) than did those not reporting exposure.

Comparison of prevalence rates to other studies

As assessed with the VAWI, 23.6% (*n*=123) of the respondents reported exposure to psychological violence, 8.4% (*n*=43) to physical violence and 3.0% (*n*=16) to sexual violence during the past year. Corresponding percentages for exposure to violence earlier in life were 23.6% (*n*=135), 14.3% (*n*=82) and 9.2% (*n*=53; Table 4). Similar 12-month violence exposure rates for physical and sexual violence have been reported in two population-based studies – one in Finland (*n*=4,464) and one in Sweden (*n*=4,771) – using comparable methodologies and definitions.(29, 30) However, the present study found lower prevalence for physical and sexual violence experienced earlier in life. The aforementioned studies did not report psychological violence.

Table 4. *Past-year and earlier-in-life exposure to IPV as assessed with the VAWI.* N=*573*

| | Past year | | | Earlier in life | | |
|---|---|---|---|---|---|---|
| | *N* | % | 95 % CI | *N* | % | 95 % CI |
| Psychological violence | *123* | 23.6 [a] | 20.1 – 27.1 | *135* | 23.6 | 20.1 – 27.1 |
| Physical violence | *43* | 8.1 | 5.9 – 10.3 | *82* | 14.3 | 11.4 – 17.2 |
| Sexual violence | *16* | 3.0 | 1.6 – 4.4 | *53* | 9.2 | 6.8 – 11.6 |

[a] Percentage is given in valid percent.

VAWI and NorAQ

Higher prevalence was found by the VAWI compared to NorAQ (see Table 5). However, only the difference for psychological IPV was statistically significant (17.1% vs. 2.6%; $p<0.05$). This difference owed principally to the VAWI items "Insulted me in a way that made me feel bad about myself" (16.9%), for which NorAQ has no corresponding item, and "Belittled and humiliated me in front of other people" (6.5%). Prevalence rates for the two other items on this scale were similar to corresponding items in the NorAQ (see Appendix 1).

Table 5. *Life-time prevalence of exposure to IPV as assessed with the VAWI versus NorAQ.* N=*77*

| | VAWI | | NorAQ | |
|---|---|---|---|---|
| | *N* | % [a] | *N* | % [a] |
| Psychological violence | *13* | 17.1 | *2* | 2.6 |
| Physical violence | *5* | 6.8 | *3* | 3.9 |
| Sexual violence | *7* | 9.3 | *5* | 6.5 |

[a] Percentage is given in valid percent.

## DISCUSSION

The VAWI subscales of psychological, physical and sexual violence showed good internal consistency. Principal components analysis yielded a two-component solution and a three-component solution largely reflected the VAWI's conceptual model. External validity was supported in that the VAWI was able to discriminate between groups known to differ in exposure to physical and/or sexual IPV, that is, respondents with poor vs. good self-rated

health and witnessed vs. not witnessed physical violence at home when growing up. Similar past-year prevalence to other Nordic studies was found. Differences in exposure rates of psychological IPV reported in the VAWI and NorAQ exemplify the need for standardized instruments when comparing prevalence of IPV between and within countries.

**Internal validity**

A two-component solution was suggested by the parallel analysis and the Kaiser and Cattell's scree criterion (one psychological and one combined physical and sexual component). This solution is understandable in that physical and sexual violence occur to a lesser extent in comparison with psychological violence, which generally is the most prevalent form of IPV .(22, 31)

Despite cultural and linguistic differences between Sweden and Brazil, results from the three-component solution in the current study were similar to those derived in the study conducted in Brazil, where a pre-determined three component solution was investigated.(16) In the Brazilian study, the question "Threatened to hurt me or someone I care about" did not load on any component in Zona da Mata, although it loaded in its explored psychological violence component in São Paulo. In the current study the item loaded both in the physical and psychological violence components. These findings indicate that threat of physical violence might not belong as clearly as expected to the psychological violence component, which has in fact been a point of debate among researchers.(29) Threats of violence may both precede and follow violent acts themselves, either escalating into a violent act or, especially if the victim has been exposed to physical violence prior to the threat, the threat of violence might frighten the victim just as much as the violent act itself.(29) This could explain the finding that threat of violence belonged to both psychological and physical violence. Moreover, both

in Zona da Mata and in the present study, the item "Has your partner pushed or shoved you?" loaded on the psychological violence component rather than the physical violence scale in the WHO conceptual model. The observed cross-loadings of individual items as well as items that belonged to other domains than in the conceptual model may reflect that female victims often are not exposed to one form of violence in isolation of the other.(32) For example, the sexual violence item "Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)" which loaded in both the physical and sexual IPV components is hard to divide into one or the other category.

**Internal reliability**

The Cronbach's alpha coefficients reported for the subscales in this study are very similar to those found in other studies.(9, 16) For example, for all sites combined in the WHO multi-country study, the reliability coefficient was 0.81 for physical and 0.66 for sexual IPV,(9) compared to 0.80 and 0.72 respectively in the current study. These similarities indicate a consistency in the internal reliability of the VAWI across countries despite cultural and socio-economic differences between the countries.

In the current study, deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)" would increase alpha for the sexual violence scale from 0.72 to 0.77. However, given that the current study is explorative and hypothesis-generating, further studies are needed to determine whether this item needs to be revised.

**External validity**

Known-groups comparison

Of the two known-groups used in the comparison, the strongest relationship found in the literature regards exposure to physical and/or sexual IPV and poorer self-rated health.(2, 20-24) There is also strong evidence that those who are exposed to physical and/or sexual IPV have witnessed their father use physical violence against the mother during childhood.(10, 25-27) We found support that the combined VAWI subscales of physical and/or sexual violence could discriminate between respondents who had poor vs. good self-rated health and between those who had witnessed vs. not witnessed their parents engage in physical violence. There is only scant knowledge about how these variables relate to psychological violence, hence these analyses were not deemed appropriate for the purpose of assessing validity.

Comparison of prevalence rates to other studies

Comparisons of our prevalence rates with those in other studies are challenged by differences between methodologies, definitions and reporting styles. Nevertheless, our 12-month violence exposure rates for physical and sexual violence were similar to those reported previously in population-based studies in Finland and Sweden(29, 30) using similar definitions and methodologies. However, we found lower rates for earlier-in-life estimates of physical and sexual IPV. The Swedish study found that 28% of women were exposed to physical and 16% to sexual violence by a former partner, compared to 14.3% for physical and 9.2% for sexual IPV during the earlier-in-life timeframe in the current study. The figures for the Finnish study were 29% for severe physical and 16% for sexual IPV. These differences are likely due to some minor differences in the definitions between the studies as well as to changes in prevalence rates over time and actual differences between countries. However, they may also owe to an oversight in the questionnaire layout, where the box for ticking violence experienced earlier in life was somewhat unclearly placed. Studies assessing psychological

violence in a Nordic context using similar definitions as in the current study could not be found.

VAWI and NorAQ

As the type and number of acts assessed in the VAWI and the NorAQ varied at the outset, some differences in the results from the two instruments were expected. The two questionnaires have also been developed with different aims in mind. NorAQ was developed for investigations in health care settings and for comparisons in the Nordic countries of various forms of violence, not specifically IPV. On the other hand, the VAWI was developed for global comparisons on IPV specifically. For example, the NorAQ psychological violence items reflect a more systematic form of violence experienced during a longer time-period or under fear or threat. Although these seem to capture similar levels of exposure as the more severe psychological violence items of the VAWI, milder forms of psychological violence are also represented in the VAWI and thus the instrument captures a broader range of psychologically violent acts. The sample size used in this comparison prohibits any strong conclusions; however, it further illustrates the importance of using standardized questionnaires when comparing prevalence, as results may vary to a large extent depending on the instrument used.

**Methodological considerations**

The VAWI was designed for and is primarily used in face-to-face interviews(5), whereas the current study administered the VAWI via a postal survey. The implications of different modes of data collection are difficult to assess due to multiple influencing factors, including the method of initial contact with the respondents, visual versus oral presentation of response choices, method of sampling as well as differing cultural and social contexts.(33) Previous

studies have found disclosure of sensitive topics to be higher in self-administered modes compared to face-to-face interviews,(33) also when assessing IPV(34). However, there is a scarcity of experimental or randomized study designs comparing different modes of data collection.(33)

Nonetheless, the main known limitation of postal surveys is lowered response rates.(34) The current study included two reminders in an effort to minimize drop-out rates. Non-responders were over-represented by young and unmarried women, women with low annual income and by those born outside of Sweden. Exposure rates of IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study. Furthermore, the earlier-in-life estimates may have been underestimated due to a minor detail on the questionnaire lay-out. In addition, the under-reporting common in surveys assessing IPV(3, 35) has probably contributed to further underestimation of IPV prevalence rates. Reasons for under-reporting IPV include forgetting violent acts that took place further back in life,(36) normalizing the violence, blaming the violence on oneself(37) and being fearful of a violent and controlling partner.(38) Finally, the sub-sample of respondents who answered both the VAWI and the NorAQ is small, which limits our ability to draw conclusions or generalize to the target population.

## CONCLUSION

Our analysis indicated that the VAWI has good construct validity and internal reliability in a Swedish context. The results obtained were similar to those reported in the Brazilian study, which implies that the VAWI has good cross-cultural construct validity and internal reliability in an adult female population. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## CONTRIBUTORSHIP STATEMENT

LN conducted all analyses, wrote the first draft of the manuscript and rewrote new drafts based on input from co-authors. CT planned the analyses and gave input on manuscript drafts. GK designed the project, planned the analyses and gave input on manuscript drafts. All authors read and approved the final manuscript.

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## DATA SHARING STATEMENT

The dataset is available form the corresponding author at lotta.nybergh@socmed.gu.se. Consent for sharing the dataset was not obtained but the presented data are anonymised and risk of identification is low.

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**Psychometric properties of the WHO Violence Against Women instrument in a female population-based sample in Sweden**

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**Keywords**

Intimate Partner Violence * Sweden * WHO VAW instrument * Psychometric properties * Women

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## ABSTRACT

**Objective:** To explore psychometric properties of the Violence Against Women instrument in a randomly selected national sample of women (*N*=573) aged 18-65 years and residing in Sweden. **Design:** Cross-sectional survey study. **Setting:** Sweden. **Participants:** A postal survey was sent to 1006 women between January and March 2009, during which 624 women (62.0%) returned the questionnaire. Fifty-one women who did not answer any of the violence items were excluded from the analyses, resulting in a final sample of 573 women. **Primary and secondary outcome measures:** Self-reported exposure to psychological, physical and sexual intimate partner violence. **Results:** Cronbach's alphas were 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). A pre-determined three-component solution largely replicated the explored three component conceptual model of the Violence Against Women instrument. The instrument was able to discriminate between groups known from previous studies to differ in exposure to physical and/or sexual violence, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Past-year prevalence of physical (8.1%; 95% CI 5.9 – 10.3) and sexual (3.0%; 1.6 – 4.4) violence was similar to that reported in other Nordic studies; however, earlier-in-life prevalence was lower in the current study (14.3%; 95% CI 11.4 – 17.2 and 9.2%; 95% CI 6.8 – 11.6 respectively). Reported exposure rates were higher than those obtained from a concurrently administered instrument (NorVold Abuse Questionnaire). **Conclusion:** The Violence Against Women instrument demonstrated good construct validity and internal reliability in an adult female population in Sweden. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## ARTICLE SUMMARY

### Article focus

- The World Health Organization's Violence Against Women instrument (VAWI) has been used in several countries around the world in order to investigate violence against women by their intimate male partners, but aspects of reliability and validity have seldom been investigated.
- The aim of the current study was to explore selected psychometric properties of the VAWI in a randomly selected national ~~population~~ sample (*n*=573) of women.

### Key messages

- The current study provides preliminary support for the VAWI subscales of psychological, physical and sexual violence in a Swedish, adult female population.
- This adds to the knowledge of the instrument's cross-cultural validity and reliability, which is of significance when comparing intimate partner violence prevalence rates between countries.

### Strengths and limitations

- Cross-sectional study design.
- Further aspects of validity and reliability need to be explored and studies from a diverse range of countries are needed for further cross-cultural assessment.

**Keywords**
Intimate partner violence * Sweden * Validation * WHO VAW instrument * Psychometric properties * Women

## INTRODUCTION

While prevalence studies investigating violence against women perpetrated by intimate male partners have become more frequent,(1-4) sizeable differences in reported exposure occur both between and within study sites. These differences may in part be explained by differences in questionnaire administration methods (e.g. personal interviews vs. self-administration), questionnaire content, target populations, or definitions and severity of the violence assessed; however, such differences may also reflect true variation and cultural differences in violence perpetration.(1, 4) Standardized methodologies for assessing intimate partner violence (IPV) may help to enhance the reliability of results obtained from such studies and aid in comparing prevalence rates from diverse settings.

With this in mind, the World Health Organization (WHO) constructed a questionnaire for the WHO Multi-country Study on Women's Health and Domestic Violence against Women.(5) The study questionnaire includes the Violence Against Women instrument (henceforth referred to as "VAWI") assessing exposure to psychological, physical and sexual IPV. The VAWI was developed in collaboration with several networks and expert groups and was based partly on the original(6) and revised Conflict Tactics Scales,(7) as well as on work that originated from its critics.(8) Extensive pre-testing ~~and,~~ independent back-translations and piloting of the questionnaire were conducted.(9) The prevalence rates from the ten countries included in the multi-country study vary greatly, with life-time estimates ranging between 20-75% for psychological violence, 13-61% for physical violence and 6-59% for sexual violence.(5) Since the Multi-country Study was performed, the VAWI has been used in several more countries.(10-15)~~(9-14)~~

Despite the VAWI's relatively wide use, few peer-reviewed studies have evaluated its psychometric properties. Internal reliability (Cronbach's α) was assessed and confirmed in the Multi-Country Study;(9)~~(15)~~ however, only one study, conducted in Brazil, has explored aspects of validity.(16) In that study, analyses of data from two female populations, one urban (São Paulo; *n*=940) and one combined urban and rural area (Zona da Mata; *n*=1,188) supported the construct validity and internal reliability of the instrument.

The aim of this study was to explore psychometric properties of the VAWI in a randomly selected national ~~population~~ sample (*n*=573) of women aged 18-65 years residing in Sweden. Sweden provides an interesting comparative context due to its linguistic, cultural and socio-economic differences to Brazil.

## METHODS

### Procedure, study population and response rate

A sample of 1006 women, aged 18-65 years and residing in Sweden, was randomly selected by Statistics Sweden from the national population register. Data was collected by means of a postal survey between January and March 2009~~Data collection took place between January and March 2009~~. A requirement for the sample selection was that the respondent was currently or had previously been in an intimate relationship. The response rate was 62.0% (*n*=624). Women who did not respond to any of the violence items (*n*=51) were excluded from the analyses, resulting in a total sample of 573 women.

Criterion validity was explored by comparing prevalence reported in the VAWI versus the NorVold Abuse Questionnaire (NorAQ).[16] A second data collection was performed for this purpose. Statistics Sweden sent out the VAWI and NorAQ to 20% (*n*=125) of the respondents

from the initial data collection between November 2009 and January 2010. NorAQ was chosen since it is the only questionnaire measuring violence that has been validated in Sweden in both a female and male (see companion article) population-based sample. The response rate was 65.6% (*n*=82*)* for the VAWI and 63.2% (*n*=79) for NorAQ.

**Drop-out analysis**

A two-proportion z-test was used to assess statistical significance between the drop-out and the final sample regarding age, country of birth, civil status and the respondents' yearly income before tax. A Bonferroni adjustment to the alpha level was applied.

Comparing those who did not return the questionnaire (*n*=382) with the final sample of analysis (*n*=573) revealed that significantly lower response rates were found among non-respondents who were 18-29 years old, unmarried, foreign born and had low yearly income of 0 – 159,999 Swedish Kronor (SEK) before tax. Internal drop-out rates, that is respondents who did not endorse any violence item (*n*=51), were significantly higher among ~~men~~ women who were 18-29 years old, unmarried and had a low yearly income in comparison to the final sample of analysis.

Of those who did not return the questionnaire during the second data collection (*n*=46), significantly lower response rates were found for women who were unmarried, widowed or divorced.

**Assessment instruments: VAWI and NorAQ**

The VAWI consists of behaviour-specific items related to psychological (four items), physical (six items) and sexual violence (three items). The physical violence items are further divided

into “moderate” (the two first items) and “severe” (the following four items) violence based on the likelihood of physical injury.(5) For each question, respondents were asked whether they had experienced the specific act during the *past year* and *earlier in life*. The VAWI items were translated and adapted to a Swedish context by a senior researcher (third author) with extensive knowledge about intimate partner violence~~The VAWI's items were translated and adapted to Swedish by an expert panel in IPV.~~

NorAQ has been validated in a Swedish context(17) and measures emotional (three items), physical (three items) and sexual (four items) abuse, including different perpetrators, as well as abuse in the health care system. The NorAQ violence items applicable to an intimate partnership (Appendix 1) were included with the intention to compare prevalence rates with those obtained by use of the VAWI. The second sexual violence item was adapted for use in both a male and female population, as the questionnaire constructed for this study was sent to a male population as well (see companion paper entitled ‘Psychometric properties of the WHO Violence Against Women instrument in a male population-based sample in Sweden’).

**Statistical analyses**

Principal components analysis (PCA) was conducted to explore the internal construct validity of the violence items. A promax rotation was chosen due to high inter-component correlations (e.g. r=0.49-0.61 for the three dimensions). Decisions on the number of components to extract were based on parallel analysis, Kaiser’s eigenvalue-greater-than-one rule, total proportion of variance explained and Cattell’s scree plot. This was followed by a pre-determined solution with three components as conceptualized in the VAWI.

The internal reliability of the VAWI was assessed with the Cronbach's alpha for each subscale and for the total violence scale. An alpha of 0.70 or higher was considered satisfactory.(18)

Known-groups comparisons were performed to investigate the VAWI's external construct validity. The aim was to see if the instrument was able to differentiate between groups known to differ in exposure to IPV.(19) The following hypotheses were postulated: women who are exposed to physical and/or sexual IPV (life-time exposure, "yes/no") would have poorer self-perceived health(2, 20-24) and have grown up in a home where they witnessed physical violence between their parents(10, 25-27)~~(9, 25-27)~~. The Mantel-Haenszel test was used controlling for age, income, civil status, education and country of birth. Statistical significance was set at $p<0.05$.

*Self-perceived health* was assessed by "How would you say that your general health has been during the past year?". Response options were dichotomized into "very good/good" and "neither good nor bad/bad/very bad". *Childhood exposure to violence* was assessed with the question: When you were growing up, did you see your parents (or equivalent) regularly physically hurt one another? ("no" and "yes/unsure").

Prevalence of psychological, physical and sexual violence was calculated for the past year and for earlier in life, for comparisons with prevalence rates presented in other studies.

In addition, life-time prevalence of IPV was compared between the VAWI and the NorAQ and Fisher's exact test was used to test for statistically significant differences at the 95% CI

level. Only those respondents who had answered both the VAWI and NorAQ were included (*n*=77) in this analysis.

**Ethical considerations**

The Regional Ethics Review Board located in Gothenburg gave approval for this study (Dnr: 527-08) and the WHO ethical and safety recommendations for research on domestic violence against women as applicable to a postal survey were followed.(28) For example, a letter was sent to prospective respondents in advance to inform them about the upcoming survey; this provided them with the opportunity to decline the survey before receiving it. Also, although the sampling frame was based on registered individuals, only one survey per household was sent for ethical and safety reasons. Additionally, full anonymity and confidentiality were guaranteed and contact information to a general practitioner (third author on this study), a psychologist and a contact person at Statistics Sweden was provided for additional information and/or referral. The survey was entitled "A study on conflicts, relationships and health". The study description that followed the title stated that the study assesses IPV.

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**RESULTS**

**Study population**

Nearly half of the women had at least three years of university education (*n* =270; 47.2%) and the mean age was 43 years (*SD*=13). Of the total sample, 85.1% (*n*=484) were currently in a relationship (i.e. boyfriend or girlfriend, married, registered partnership or cohabiting), of which the majority were heterosexual relationships (*n* =566; 98.8%). The rest of the sample was single, widowed or divorced, but had previously been in a relationship (see Table 1).

Table 1. *Socio-demographic and psychosocial factors of the total sample. N=573*

| | *N* (%) |
|---|---|
| **Age groups** | |
| 18-29 | *107* (18.7) |
| 30-39 | *138* (24.1) |
| 40-49 | *125* (21.8) |
| 50-59 | *136* (23.7) |
| 60-65 | *67* (11.7) |
| **Partner status** | |
| Single/widowed/divorced | *85* (14.9) |
| Boyfriend/girlfriend | *64* (11.2) |
| Married/cohabitant/registered partnership | *420* (73.8) |
| Heterosexual relationship | ~~*566*~~ *477* (~~98.8~~83.2) |
| Same-sex relationship | *7* (1.2) |
| **Educational level (highest)** | |
| University | *270* (47.2) |
| High school (10-12 yrs) | *211* (36.9) |
| Compulsory (≤9 yrs) | *91* (15.9) |
| **Annual income (before tax, SEK)** | |
| 0 – 159,999 | *168* (29.3) |
| 160,000 - 234,999 | *175* (30.5) |
| 235,000 - 309,999 | *143* (25.0) |
| 310,000 or more | *87* (15.2) |
| **Employment status** | |
| Employed | *396* (69.7) |
| Student | *35* (6.2) |
| Retired | *47* (8.3) |
| Sick leave (more than 3 months) | *8* (1.4) |
| Parental leave or leave of absence | *35* (6.2) |
| Unemployed | *23* (4.0) |
| Other | *24* (4.2) |
| **Country of Birth** | |
| Sweden | *519* (90.6) |
| Other Nordic country | *15* (2.6) |
| Other European country | *18* (3.1) |
| Country outside Europe | *21* (3.7) |
| **Self-rated health** | |
| Very good/good | *511* (90.0) |
| Neither good nor bad/bad/very bad | *57* (10.0) |

| Grown up in a home where there occurred physical violence | |
|---|---|
| No | *542* (94.6) |
| Yes/Unsure | *31* (5.4) |

**Internal validity**

The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.89 and Bartlett's test of sphericity was significant ($p < 0.05$), verifying a good fit of the data to the PCA. Parallel analysis, Kaiser's criterion and Cattell's scree test suggested two components (not in Table), explaining 57.4% of the total variance. The first component consisted of all physical and sexual violence items in the VAWI conceptual model, except the two items representing the least severe forms of physical and sexual violence. In addition, the component included the psychological violence item referring to threat of injury. The second component comprised the remaining three psychological violence items as well as the first physical and sexual violence items.

A three-component solution (Table 2) explained 64.4% of the total variance. The third component had an initial eigenvalue close to one (0.9) and comprised two of the three sexual violence items; otherwise the structure was identical to the two component solution and largely mirrored the VAWI's physical, psychological and sexual violence subscales.

Table 2. *Three-component solution for the VAWI psychological, physical and sexual violence items.* N=*534*

| | Three-component solution | | |
|---|---|---|---|
| **Conceptual model** | **C1** | **C2** | **C3** |
| Psychological Violence | | | |
| 1 Insulted me in a way that made me feel bad about myself~~1~~ | | **.89** | |
| 2 Belittled and humiliated me in front of other people~~2~~ | | **.74** | |
| 3 Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things)~~3~~ | | **.64** | |
| 4 Threatened to hurt me or someone I care about~~4~~ | **.43** | .33 | |

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| | | | |
|---|---|---|---|
| Physical Violence | | | |
| 1 Pushed or shoved me~~1~~ | | **.71** | |
| 2 Thrown something at me that could have hurt me~~2~~ | **.38** | | |
| 3 Hit me with his/her fist or with some other object that could have hurt me~~3~~ | **.80** | | |
| 4 Kicked and dragged me and beat me up~~4~~ | **.85** | | |
| 5 Choked me or burnt me on purpose~~5~~ | **.67** | | |
| 6 Hurt me with a knife, a gun or some other weapon~~6~~ | **.88** | | |
| Sexual Violence | | | |
| 1 Demanded to have sex with me even though I did not want to (but did not use physical force)~~1~~ | | | |
| 2 Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)~~2~~ | **.56** | | |
| 3 Forced me to perform sexual acts that I experienced as degrading and/or humiliating~~3~~ | | | |
| *Accumulated variance %* | *46.1* | *57.4* | *64.4* |
| *Eigenvalues* | *6.0* | *1.5* | *0.9* |

[a] Loadings >~~greater~~ 0.30 are shown and highest loadings are boldfaced. List-wise deletion was used.

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**Internal reliability**

The Cronbach's alpha coefficient (Table 3) was satisfactory for all subscales in the VAWI conceptual model: 0.79 (psychological scale), 0.80 (physical scale), 0.72 (sexual scale) and 0.88 (total scale). Alpha for the sexual violence scale increased from 0.72 to 0.77 after deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)".

Table 3. *Cronbach's α of the VAWI psychological, physical and sexual violence scales and total scale, life-time.* N=*573*

| Scales | Alpha if Item Deleted |
|---|---|
| **Psychological violence** | |
| Insulted me in a way that made me feel bad about myself | .75 |
| Belittled and humiliated me in front of other people | .71 |
| Tried to scare and intimidate me on purpose (e.g. by the way he/she looked at you, by yelling or smashing things) | .72 |
| Threatened to hurt me or someone I care about | .76 |
| **Total** | **.79** |

**Physical violence**

| | |
|---|---|
| Pushed or shoved me | .81 |
| Thrown something at me that could have hurt me | .75 |
| Hit me with his/her fist or with some other object that could have hurt me | .73 |
| Kicked and dragged me and beat me up | .75 |
| Choked me or burnt me on purpose | .76 |
| Hurt me with a knife, a gun or some other weapon | .80 |
| **Total** | **.80** |
| | |
| **Sexual violence** | |
| Demanded to have sex with me even though I did not want to (but did not use physical force) | .77 |
| Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon) | .64 |
| Forced me to perform sexual acts that I experienced as degrading and/or humiliating | .54 |
| **Total** | **.72** |
| | |
| **Violence scale, total** | **.88** |

**External validity**

Known-groups comparison

As hypothesized, exposure to violence as assessed by VAWI was significantly associated with self-rated health and having witnessed parental (or equivalent) physical violence when growing up. Specifically, a significantly larger proportion of respondents who reported exposure to violence also reported worse health (Chi-Square (1, N=573) = 26.1, $p<0.05$) and having witnessed parental physical violence (Chi-Square (1, N=573) = 11.5, $p<0.05$) than did those not reporting exposure. ~~VAWI scores were significantly associated with self rated health and having witnessed parental (or equivalent) physical violence. Specifically, those who reported exposure to violence also reported worse health and having witnessed parental physical violence to a higher extent.~~

Comparison of prevalence rates to other studies

As assessed with the VAWI, 23.6% (*n*=123) of the respondents reported exposure to psychological violence, 8.4% (*n*=43) to physical violence and 3.0% (*n*=16) to sexual violence

during the past year. Corresponding percentages for exposure to violence earlier in life were 23.6% (*n*=135), 14.3% (*n*=82) and 9.2% (*n*=53; Table 4). Similar 12-month violence exposure rates for physical and sexual violence have been reported in two population-based studies – one in Finland (*n*=4,464) and one in Sweden (*n*=4,771) – using comparable methodologies and definitions.(29, 30) However, the present study found lower prevalence for physical and sexual violence experienced earlier in life. The aforementioned studies did not report psychological violence.

Table 4. *Past-year and earlier-in-life exposure to IPV as assessed with the VAWI.* N=*573*

| | **Past year** | | | **Earlier in life** | | |
|---|---|---|---|---|---|---|
| | *N* | % | 95 % CI | *N* | % | 95 % CI |
| Psychological violence | *123* | 23.6 [a] | 20.1 – 27.1 | *135* | 23.6 | 20.1 – 27.1 |
| Physical violence | *43* | 8.1 | 5.9 – 10.3 | *82* | 14.3 | 11.4 – 17.2 |
| Sexual violence | *16* | 3.0 | 1.6 – 4.4 | *53* | 9.2 | 6.8 – 11.6 |

[a] Percentage is given in valid percent.

VAWI and NorAQ

Higher prevalence was found by the VAWI compared to NorAQ (see Table 5). However, only the difference for psychological IPV was statistically significant (17.1% vs. 2.6%; $p<0.05$). This difference owed principally to the VAWI items "Insulted me in a way that made me feel bad about myself" (16.9%), for which NorAQ has no corresponding item, and "Belittled and humiliated me in front of other people" (6.5%). Prevalence rates for the two other items on this scale were similar to corresponding items in the NorAQ (see Appendix 1).

Table 5. *Life-time prevalence of exposure to IPV as assessed with the VAWI versus NorAQ.* N=*77*

| | **VAWI** | | **NorAQ** | |
|---|---|---|---|---|
| | *N* | % [a] | *N* | % [a] |
| Psychological violence | *13* | 17.1 | *2* | 2.6 |
| Physical violence | *5* | 6.8 | *3* | 3.9 |
| Sexual violence | *7* | 9.3 | *5* | 6.5 |

[a] Percentage is given in valid percent.

## DISCUSSION

The VAWI subscales of psychological, physical and sexual violence showed good internal consistency. Principal components analysis yielded a two-component solution and a three-component solution largely reflected the VAWI's conceptual model. External validity was supported in that the VAWI was able to discriminate between groups known to differ in exposure to physical and/or sexual IPV, that is, respondents with poor vs. good self-rated health and witnessed vs. not witnessed physical violence at home when growing up. Similar past-year prevalence to other Nordic studies was found. Differences in exposure rates of psychological IPV reported in the VAWI and NorAQ exemplify the need for standardized instruments when comparing prevalence of IPV between and within countries.

### Internal validity

A two-component solution was suggested by the parallel analysis and the Kaiser and Cattell's scree criterion (one psychological and one combined physical and sexual component). This solution is understandable in that physical and sexual violence occur to a lesser extent in comparison with psychological violence, which generally is the most prevalent form of IPV ~~are more likely to occur in conjunction. In contrast, psychological violence may occur in isolation of physical and/or sexual violence~~.(22, 31)~~(22)~~

Despite cultural and linguistic differences between Sweden and Brazil, results from the three-component solution in the current study were similar to those derived in the study conducted in Brazil, where a pre-determined three component solution was investigated.(16) In the Brazilian study, the question "Threatened to hurt me or someone I care about" did not load on any component in Zona da Mata, although it loaded in its explored psychological violence

component in São Paulo. In the current study the item loaded both in the physical and psychological violence components. These findings indicate that threat of physical violence might not belong as clearly as expected to the psychological violence component, which has in fact been a point of debate among researchers.(29) Threats of violence may both precede and follow violent acts themselves, either escalating into a violent act or, especially if the victim has been exposed to physical violence prior to the threat, the threat of violence might frighten the victim just as much as the violent act itself.(29) This could explain the finding that threat of violence belonged to both psychological and physical violence. Moreover, both in Zona da Mata and in the present study, the item "Has your partner pushed or shoved you?" loaded on the psychological violence component rather than the physical violence scale in the WHO conceptual model. The observed cross-loadings of individual items as well as items that belonged to other domains than in the conceptual model may reflect that female victims often are not exposed to one form of violence in isolation of the other.(32)~~(31)~~ For example, the sexual violence item "Forced me to have sex against my will by using his/her physical strength (by hitting, holding me firmly or threatening me with a weapon)" which loaded in both the physical and sexual IPV components is hard to divide into one or the other category.

**Internal reliability**

The Cronbach's alpha coefficients reported for the subscales in this study are very similar to those found in other studies.(9, 16)~~(15, 16)~~ For example, for all sites combined in the WHO multi-country study, the reliability coefficient was 0.81 for physical and 0.66 for sexual IPV,(9)~~(15)~~ compared to 0.80 and 0.72 respectively in the current study. These similarities indicate a consistency in the internal reliability of the VAWI across countries despite cultural and socio-economic differences between the countries.

In the current study, deleting the item "Demanded to have sex with me even though I did not want to (but did not use physical force)" would increase alpha for the sexual violence scale from 0.72 to 0.77. However, given that the current study is explorative and hypothesis-generating, further studies are needed to determine whether this item needs to be revised ~~or not~~.

**External validity**

Known-groups comparison

Of the two known-groups used in the comparison, the strongest relationship found in the literature regards exposure to physical and/or sexual IPV and poorer self-rated health.(2, 20-24) There is also strong evidence that those who are exposed to physical and/or sexual IPV have witnessed their father use physical violence against the mother during childhood.(10, 25-27)~~(9, 25-27)~~ We found support that the combined VAWI subscales of physical and/or sexual violence could discriminate between respondents who had poor vs. good self-rated health and between those who had witnessed vs. not witnessed their parents engage~~d~~ in physical violence. There is only scant knowledge about how these variables relate to psychological violence, hence these analyses were not deemed appropriate for the purpose of assessing validity.

Comparison of prevalence rates to other studies

Comparisons of our prevalence rates with those in other studies are challenged by differences between methodologies, definitions and reporting styles. Nevertheless, our 12-month violence exposure rates for physical and sexual violence were similar to those reported previously in population-based studies in Finland and Sweden(29, 30) using similar definitions and methodologies. However, we found lower rates for earlier-in-life estimates of physical and

sexual IPV. The Swedish study found that 28% of women were exposed to physical and 16% to sexual violence by a former partner, compared to 14.3% for physical and 9.2% for sexual IPV during the earlier-in-life timeframe in the current study. The figures for the Finnish study were 29% for severe physical and 16% for sexual IPV. These differences are likely due to some minor differences in the definitions between the studies as well as to changes in prevalence rates over time and actual differences between countries. However, they may also owe to an oversight in the questionnaire layout, where the box for ticking violence experienced earlier in life was somewhat unclearly placed. Studies assessing psychological violence in a Nordic context using similar definitions as in the current study could not be found.

VAWI and NorAQ

As the type and number of acts assessed in the VAWI and the NorAQ varied at the outset, some differences in the results from the two instruments were expected. The two questionnaires have also been developed with different aims in mind. NorAQ was developed for investigations in health care settings and for comparisons in the Nordic countries of various forms of violence, not specifically IPV. On the other hand, the VAWI was developed for global comparisons on IPV specifically. For example, the NorAQ psychological violence items reflect a more systematic form of violence experienced during a longer time-period or under fear or threat. Although these seem to capture similar levels of exposure as the more severe psychological violence items of the VAWI, milder forms of psychological violence are also represented in the VAWI and thus the instrument captures a broader range of psychologically violent acts. The sample size used in this comparison prohibits any strong conclusions; however, it further illustrates the importance of using standardized

questionnaires when comparing prevalence, as results may vary to a large extent depending on the instrument used.

**Methodological considerations**

The VAWI was designed for and is primarily used in face-to-face interviews(5), whereas the current study administered the VAWI via a postal survey. The implications of different modes of data collection are difficult to assess due to multiple influencing factors, including the method of initial contact with the respondents, visual versus oral presentation of response choices, method of sampling as well as differing cultural and social contexts.(33) Previous studies have found disclosure of sensitive topics to be higher in self-administered modes compared to face-to-face interviews,(33) also when assessing IPV(34). However, there is a scarcity of experimental or randomized study designs comparing different modes of data collection.(33)

Nonetheless, the main known limitation of postal surveys is lowered response rates.(34) The current study included two reminders in an effort to minimize drop-out rates. Non-responders were over-represented by young and unmarried women, women with low annual income and by those born outside of Sweden. Exposure rates of IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study. Furthermore, the earlier-in-life estimates may have been underestimated due to a minor detail on the questionnaire lay-out. In addition, the~~As~~ under-reporting ~~is~~ common in surveys assessing IPV~~,~~(3, 35)~~(3, 32)~~ has probably contributed to ~~estimates of IPV in the current study are probably~~ further ~~rather~~ under~~- than over-estimated~~estimation of IPV prevalence rates. Reasons for under-reporting IPV include forgetting violent acts that took place further back in life,(36)~~(33)~~ normalizing the violence,

blaming the violence on oneself(37)~~(34)~~ and being fearful of a violent and controlling partner.(38)~~(35)~~ Finally, the sub-sample of respondents who answered both the VAWI and the NorAQ is small, which limits our ability to draw conclusions or generalize to the target population. ~~Moreover, non-responders were over-represented by young and unmarried women, women with lower income and by those born outside of Sweden. Exposure rates to IPV have been found to be especially high in these groups,(21, 25) which may further contribute to under-estimated prevalence rates and less robust component solutions in our study.~~

## CONCLUSION

Our analysis indicated that the VAWI has good construct validity and internal reliability in a Swedish context. The results obtained were similar to those reported in the Brazilian study, which implies that the VAWI has good cross-cultural construct validity and internal reliability in an adult female population. However, further studies examining these and other psychometric properties need to be conducted in other countries.

## COMPETING INTERESTS

The authors declare that they have no competing interests.

## CONTRIBUTORSHIP STATEMENT

LN conducted all analyses, wrote the first draft of the manuscript and rewrote new drafts based on input from co-authors. CT planned the analyses and ~~,~~ gave input on manuscript drafts. GK designed the project, planned the analyses and~~,~~ gave input on manuscript drafts. All authors read and approved the final manuscript.

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**DATA SHARING STATEMENT**

The dataset is available form the corresponding author at lotta.nybergh@socmed.gu.se. Consent for sharing the dataset was not obtained but the presented data are anonymised and risk of identification is low.

Appendix 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, thrashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

**Sexual Violence**

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?

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Figure 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

**Physical Violence**

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, trashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

**Sexual Violence**

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?

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STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

| | Item No | Recommendation |
|---|---|---|
| **Title and abstract** | 1 | (*a*) Indicate the study's design with a commonly used term in the title or the abstract |
| | | (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found |
| **Introduction** | | |
| Background/rationale | 2 | Explain the scientific background and rationale for the investigation being reported |
| Objectives | 3 | State specific objectives, including any prespecified hypotheses |
| **Methods** | | |
| Study design | 4 | Present key elements of study design early in the paper |
| Setting | 5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection |
| Participants | 6 | (*a*) Give the eligibility criteria, and the sources and methods of selection of participants |
| Variables | 7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable |
| Data sources/ measurement | 8* | For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group |
| Bias | 9 | Describe any efforts to address potential sources of bias |
| Study size | 10 | Explain how the study size was arrived at |
| Quantitative variables | 11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why |
| Statistical methods | 12 | (*a*) Describe all statistical methods, including those used to control for confounding |
| | | (*b*) Describe any methods used to examine subgroups and interactions |
| | | (*c*) Explain how missing data were addressed |
| | | (*d*) If applicable, describe analytical methods taking account of sampling strategy |
| | | (*e*) Describe any sensitivity analyses |
| **Results** | | |
| Participants | 13* | (a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed |
| | | (b) Give reasons for non-participation at each stage |
| | | (c) Consider use of a flow diagram |
| Descriptive data | 14* | (a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders |
| | | (b) Indicate number of participants with missing data for each variable of interest |
| Outcome data | 15* | Report numbers of outcome events or summary measures |
| Main results | 16 | (*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included |
| | | (*b*) Report category boundaries when continuous variables were categorized |
| | | (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period |
| Other analyses | 17 | Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses |

| | | |
|---|---|---|
| **Discussion** | | |
| Key results | 18 | Summarise key results with reference to study objectives |
| Limitations | 19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias |
| Interpretation | 20 | Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence |
| Generalisability | 21 | Discuss the generalisability (external validity) of the study results |
| **Other information** | | |
| Funding | 22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based |

*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

Appendix 1. *The NorAQ violence items.*

**Psychological Violence**

Has your partner systematically and for a longer period tried to repress, degrade or humiliate you?
Have you experienced living in fear because your partner systematically and for a longer period threatened you or somebody close to you?
Has your partner systematically and under threat or force tried to limit your contacts with others, or totally control what you may and may not do?

Has your partner hit you, smacked your face or held you firmly against your will?
Has your partner hit you with his/her fist(s) or with a hard object, kicked you, pushed you violently, given you a beating, thrashed you or done anything similar to you?
Has your partner threatened your life by, for instance, trying to strangle you, showing a weapon or knife or by any other similar act?

Has your partner against your will touched your genitals, used your body to satisfy him/herself sexually or forced you to touch your partner's genitals?
Has your partner against your will forced intercourse on you?
Has your partner against your will touched parts of your body other than the genitals in a 'sexual way' or forced you to touch other parts of his or her body in a 'sexual way'?
Have you any other way been sexually humiliated; e.g. by being forced to watch a porno movie or similar, forced to participate in a porno movie or similar, forced to show your body naked or forced to watch when your partner showed his/her body naked?