A Prospective Analysis of the Interrelationship between Physical Intimate Partner Violence and Alcohol Use: A Post-Hoc Analysis of Young Women Involved in the Stepping Stones and Creating Futures Trial in South Africa

Andrew Gibbs¹,², Esnat Chirwa¹, and Kristin Dunkle¹

Abstract
Prospective studies assessing women’s experience of intimate partner violence (IPV) and alcohol use have shown mixed results and all are from high-income countries. Using longitudinal data from young women in South Africa we assess whether changes in physical IPV impact alcohol use, and whether changes in alcohol use impact physical IPV experience. Post-hoc analysis of women aged 18–30 living in informal settlements in eThekwini Municipality, South Africa, involved in the Stepping Stones and Creating Futures trial,
between September 2015 and October 2019, with data collected at baseline ($n = 677$) and endline at 24 months ($n = 545$, 80.5% retention). At both timepoints, women were asked about their past year physical IPV experience and alcohol use. We estimated changes in physical IPV over time and whether this was associated with harmful alcohol use at endline. We then estimated changes in alcohol use over time, and whether this was associated with experience of past year physical IPV at endline. Women who experienced an increase in physical IPV over the study period were more likely to report harmful drinking at 24 months (aOR2.45, 95% CI 1.21–4.97). Similarly, women reporting increased alcohol use over time were more likely to report past year physical IPV at 24 months (aOR2.04, 95% CI 1.21–3.46). Among young women living in urban poverty those who experienced increasing physical violence from intimate partners were more likely to report increased and problematic alcohol use. Similarly, women reporting increasing alcohol use over 24 months were more likely to report physical IPV. However, there was no evidence that decreased alcohol use led to reductions in IPV, or that reduced IPV experience led to decreased alcohol use. Future research and interventions need to consider the reciprocal risks of physical IPV and alcohol use, with a focus on joint underlying drivers.

**Keywords**
violence, alcohol, substance use, young people, informal settlements

**Background**
Reducing harmful alcohol use and intimate partner violence (IPV) are both targets of the Sustainable Development Goals (SDG) (SDG 3.5 alcohol and SDG 5.2 IPV), as individually and together these have multiple negative impacts on health and development (Degenhardt et al., 2018; Ellsberg et al., 2008). In South Africa, high rates of both IPV and alcohol misuse have been reported (Davis et al., 2017; Machisa et al., 2011; Norman et al., 2010; Peltzer et al., 2011). This is particularly the case in urban informal settlements where overlapping factors of poverty, limited state support and engagement, sparse social networks, gender inequalities and generalised community violence have led to a particularly acute confluence of IPV and harmful alcohol use (Davis et al., 2017; Gibbs et al., 2018; Ndungu et al., 2020; Zembe et al., 2013). These two public health issues may have a syndemic relationship, whereby they overlap with one another, as well as being mutually reinforcing (Gilbert et al., 2015).

There is consistent evidence from high-income countries on the relationship between women’s experience of IPV and subsequent increases in
alcohol use. A recent systematic review exploring the health impacts of IPV identified 10 longitudinal studies all showing positive relationships (Bacchus et al., 2018). Eight studies were from the USA and two further studies were from New Zealand (Bacchus et al., 2018). More recent research from high-income settings yielded similar findings. In Australia, a 9-year study found that women who experienced IPV by age 21 had significantly more alcohol use disorders, across a range of different forms of IPV during the follow-up period (Ahmadabadi et al., 2019).

There is mixed evidence on the impact of women’s alcohol use as a potential driver of experience of IPV, and all prospective studies are from high-income countries. An early systematic review and meta-analysis on three prospective studies from high-income countries found a significant positive association between alcohol use and subsequent experience of IPV (Devries et al., 2014). A more recent meta-analysis found seven longitudinal studies and presented two meta-analyses, where alcohol was treated as either a continuous or binary exposure variable (Bacchus et al., 2018). These meta-analyses found that while alcohol was associated with an increase in experience of IPV, this association was not statistically significant (Bacchus et al., 2018). In low- and middle-income countries, some existing evidence shows a significant relationship between alcohol and IPV (Davis et al., 2017; Greene et al., 2017; Russell et al., 2014), but none of these analyses are prospective.

In low- and middle-income countries, patterns of alcohol use, and the relationships between alcohol use and IPV, may differ from high-income countries. In some settings, alcohol use among women is limited, and this may be particularly true where social norms look unfavourably on young women’s drinking (Hlomani-Nyawasha et al., 2020; Sommer et al., 2019). Additionally, it may be that women tend to consume alcohol only if male partners are paying, given the high levels of poverty and reliance on men for survival (Zembe et al., 2013). Many low- and middle-income countries have high rates of community violence, and thus high prevalence unresolved trauma (McDonald & Richmond, 2008; Mmari et al., 2014), which may increase background rates of substance use, and thereby dilute or wash out any relationship between alcohol with IPV. It is therefore critical to expand the global evidence base on the relationships between alcohol and IPV to lower- and middle-income countries.

There has been substantial research on the inter-relationship between alcohol and IPV in South Africa. Broadly, South Africa has high rates of alcohol related harm, with the cost of alcohol harm estimated at 10–12% of Gross Domestic Product (GDP) (Matzopoulos et al., 2014). Many cross-sectional studies have highlighted the association between alcohol and women’s experiences of violence (Minnis et al., 2015; Ndungu et al., 2020; Pitpitan et al., 2013; Selin et al., 2019). Qualitative studies have emphasised how the centrality of informal drinking establishments (shebeens) in shaping the
relationship between alcohol and IPV (Wojcicki, 2002; Zembe et al., 2013), as well as how alcohol becomes embedded in everyday conflict in intimate relationships (Backe et al., 2021), and how these are experiences are patterned by broader issues of poverty, and gendered expectations in relationships (Zembe et al., 2013).

To address the paucity of research on the temporal relationship between women’s use alcohol and experience of IPV outside high-income countries, we conducted a post-hoc longitudinal analysis of data collected as part of a cluster randomised controlled trial of the Stepping Stones and Creating Futures programme in urban informal settlements in South Africa (Gibbs et al., 2017). The primary aim of the main trial was to assess the effectiveness of the intervention in preventing IPV over a 24-month follow-up (Gibbs et al., 2020); alcohol use was included as a secondary outcome. The intervention did not impact either outcome for women. In the analyses presented here, we first examine whether changes in women’s experience of past-year physical IPV between baseline and endline has an effect on alcohol use at endline. Second, we look at whether changes in women’s alcohol use between baseline and endline impacted their experience of physical IPV in the past 12 months as reported at endline.

**Methods**

**Study Setting and Design**

Data were collected as part of a cluster randomised control trial evaluating the impact of the Stepping Stones and Creating Futures intervention on young women’s experiences of intimate partner violence, gender attitudes, substance use and livelihoods in urban informal settlements (Gibbs et al., 2020). The trial was implemented in 34 clusters in informal settlements in the eThekwini Municipality, South Africa, and details have been published elsewhere (Gibbs et al., 2017). Studies demonstrate high and strongly correlated rates of IPV and substance use in these communities (Gibbs et al., 2018; Ndungu et al., 2020).

Study participants at baseline were women aged 18 to 30, normally resident in the selected clusters, not in formal work and not studying full-time and able to communicate in English, isiZulu or isiXhosa. Questionnaires covered socio-demographics, experiences of IPV, gender attitudes, mental health, alcohol and drug use and livelihoods. They were self-administered using an app-created by Mobenzi, within in-built logic and range checks, on a cell-phone lent to participants for data collection. Participants could complete the survey in English, isiZulu or isiXhosa, and trained female interviewers were available to support participants if needed. Baseline data were collected from September 2015–2016, with those in the intervention group receiving the intervention immediately. We traced participants approximately 24 months
post-baseline, using information they provided, and re-administered the questionnaire. Further study details are available elsewhere (Gibbs et al., 2017).

**Ethics Approval and Consent to Participate**

The study received ethical approval from the South African Medical Research Council’s Ethics Committee and the Biomedical Research Ethics Committee at the University of KwaZulu-Natal. All participants provided written informed consent prior to participation, and local community leadership provided letters of support.

**Measures**

Past year alcohol use at both baseline and endline was assessed using the Alcohol Use Disorders Identification Test (AUDIT), which comprises of 10 questions assessing alcohol consumption, binge drinking and alcohol dependency (Saunders et al., 1993). AUDIT has been widely used in South Africa (Dunkle et al., 2004; Jewkes et al., 2006). Item responses were summed with higher scores indicating greater alcohol use (range 0–40, Cronbach α = 0.77 at both baseline and 24 months). To generate a prevalence of potentially harmful alcohol use, we coded women scoring 8 points or higher as having harmful use of alcohol (Saunders et al., 1993).

Past year physical IPV was assessed using five items (see Table 1) slightly modified from the WHO’s Women’s Health and Domestic Violence study (Garcia-Moreno et al., 2006), which has been widely used and revised in South Africa (Dunkle et al., 2004; Jewkes et al., 2006). Responses to all items were: ‘never’, ‘once’, ‘a few times’ or ‘many’. The potential range of scores was 0–

**Table 1.** Items Used to Assess Past Year Intimate Partner Violence Experience.

|   |   |
|---|---|
| 1) | In the past 12 months how many times has a current or previous husband or boyfriend ever slapped you or thrown something at you which could hurt you? |
| 2) | In the past 12 months how many times has a current or previous husband or boyfriend ever pushed or shoved you? |
| 3) | In the past 12 months how many times has a current or previous husband or boyfriend ever hit you with a fist or with something else which could hurt you? |
| 4) | In the past 12 months, how many times has a current or previous husband or boyfriend ever kicked, dragged, beaten, choked or burnt you? |
| 5) | In the past 12 months, how many times has a current or previous husband or boyfriend ever threatened to use or actually used a gun, knife or other weapon against you? |

Response options were: ‘Never’, ‘once’, ‘a few times’, ‘many times’
15. To generate a binary variable of past year physical IPV experience, we coded any woman reporting ‘once’, ‘few’ or ‘many’ on one or more items, as having experienced physical IPV.

We assessed a range of co-variates. Age in years was treated as a continuous variable. Relationship status was assessed as ‘married or living together’, ‘boyfriend but not living together’ or ‘no relationship’. Education was coded as either completed secondary school (matric) or not. Food insecurity was assessed using three items of the Household Hunger Scale (Deitchler et al., 2010), and recoded into little or none, moderate or severe. A single item assessed whether a person had worked in the past 3 months.

Gender attitudes were assessed using 20 items modified from the Gender Equitable Men’s Scale (Pulerwitz & Barker, 2008), with a Likert response. Scores were summed, with higher scores indicate more inequitable attitudes (range 0–60, $\alpha = 0.86$ at baseline). We assessed male partner’s controlling behaviour using a modified sexual relationship power scale (Pulerwitz et al., 2000), comprising eight items, with higher scores indicative of being controlled more (range 0–24, $\alpha = 0.75$). Women’s mental health was assessed using the Centre for Epidemiological Studies Depression (CES-D) scale, 20-item version, to capture past week depressive symptoms (range 0–60, $\alpha = 0.88$), with higher scores indicating more depressive symptoms. A score >20 was used to indicate possible depression (Radloff, 1977). Past week post-traumatic stress symptoms were measured using 16 items comprising the Harvard Trauma Questionnaire (Mollica et al., 1992) (range 0–48, $\alpha = 0.92$), and we calculated the mean score across all 16 items for each individual. Individuals who had mean scores of >2.5 were classed as indicative of potential post-traumatic stress disorder (PTSD) (Mollica et al., 1992). We also assessed other forms of IPV women may have experienced in the past year, specifically emotional, economic and sexual IPV, all drawing on the WHO’s scales used in the Health and Domestic Violence study (Garcia-Moreno et al., 2006), although our primary analysis remained on the association between alcohol use and physical IPV.

**Statistical Analysis**

We first described the baseline characteristics of the retained cohort at both timepoints, using n’s and percentages or means and standard deviations as appropriate. We assessed difference between timepoints using chi-squared tests, or t-tests, as appropriate. We then assessed loss-to-follow-up (LTFU) of the whole baseline sample, with those retained at 24 months, using chi-squared tests and t-tests to assess potential difference, on all outcomes and co-variates. At endline, a software issue on some cellphones meant that not all women completed the AUDIT scale. To address this, we compared those retained at
endline who completed the scale to those who did not, on both baseline and endline characteristics, reporting n’s and percentages or means and standard deviations, with chi-squared tests and t-tests as necessary.

We then assessed the association between changes in physical IPV scores between baseline and endline and harmful alcohol use at endline. We calculated the change in IPV scores over time as endline physical IPV score minus baseline physical IPV score, recoded into a three-level variable: 0) no change in physical IPV scores (difference in scores equal to zero); 1) decrease in physical IPV scores (difference <0); and 3) Increase in physical IPV scores (difference >0).

We described the women in terms of their allocation to each IPV change group and the proportion reporting harmful alcohol use at baseline and endline. We then modelled the association between change in experience of IPV over time and harmful alcohol use at endline, using generalized estimating equations with a binomial link function for the binary outcome. We used an individual-level analysis, adjusted for the clustered nature of the sampling as per the original trial (Gibbs et al., 2020). In Model 1, we assessed the association between change in physical IPV score (as a three-level variable), and harmful alcohol use at 24 months, adjusting for age, IPV score at baseline, harmful alcohol use at baseline, and assignment to intervention or control arm. In Model 2, we additionally adjusted for depression score at baseline and change in depression score between baseline and endline. In all models we reported odds ratios, ninety-five percent confidence intervals (95% CI) and p-values. We assessed multicollinearity in all models and found none.

We then assessed the impact of changing alcohol use between baseline and endline on experience of physical IPV at endline. We calculated change in alcohol scores through endline AUDIT score minus baseline AUDIT score. We then recoded this into a three-level variable: 0) no change in AUDIT score (difference in scores equal to zero), (1) a decrease in AUDIT (difference <0), and (2) increase in AUDIT scores (difference >0). Past year physical IPV at endline was treated as a binary variable.

We then described the women in terms of their allocation into their group of alcohol change scores (none, decrease, and increase) with the proportion who experienced past year physical IPV and harmful alcohol use at baseline and endline. We then modelled the association between changes in AUDIT score as a categorical variable and its association with past year physical IPV (as a binary variable) at endline (Model 1). Modelling reflected the approach described above. In Model 2, we adjusted for relationship control as a baseline and change variable, as well as depression. We assessed multicollinearity in all models and found none.

We checked the robustness of the findings through multiple sensitivity analyses. First, given the missing data on alcohol use at 24 months, we performed multiple imputation for all models described above. Both the
imputation and estimation models adjusted for the variables included in the initial complete case analysis above and factors associated with missing alcohol data. Second, we re-ran all analyses changing how we modelled the outcome and main exposure variable. Specifically, to assess the impact of changing physical IPV experience on alcohol use, we assessed alcohol change as a continuous variable, and then physical IPV as a continuous variable. We also repeated these analyses looking at alcohol as the dependent variable and physical IPV as the outcome variable, treating variables in the same way.

Results

At baseline, 677 women were enrolled in the study, with overall retention of 80.5% (n = 545) at 24 months. The 545 women who provided data at both timepoints, had a mean age 24.0 years at baseline, two-thirds (67.3%) had a current relationship, but did not live with their partner and a fifth (18.2%) reported no current relationship (Table 2). Half reported moderate food insecurity and nearly a third (30.5%) severe food insecurity, while only a quarter (25.1%) had worked in the past month. Three-quarters (77.6%) reported past year emotional IPV experience, half reported past year economic IPV experience and 28.1% past year sexual IPV experience. Nearly half (44.6%) scored with likely depression on the CES-D, and a fifth (19.6%) scored with potential PTSD. At baseline over half (58.5%) reported past year physical IPV and a quarter (23.9%) past year problem alcohol use. At 24 months, there were only slight changes, with slightly improving food insecurity (from severe to moderate), an increase in past month work, a borderline increase in economic IPV experience and an increase in depressive symptoms.

Supplementary Table 1 shows LTFU in the overall sample. Baseline characteristics associated with LTFU were being in the intervention group, being married or living with partner and higher mean relationship control scores. Supplementary Table 2 shows baseline and endline factors associated with missing data on the AUDIT score data at 24 months. Baseline characteristics associated with this were greater food insecurity, problem drinking and probable depression and PTSD. Endline characteristics associated with missing alcohol data were greater food insecurity, probable depression, PTSD and higher mean scores of controlling behaviour and we tested these as potential confounders, including in models those which impacted on the outcome models.
Table 2. Socio-Demographics and Prevalence of IPV at Baseline and 24 m.

|                                      | Baseline (N = 545) | 24m (N = 545) | p-Value |
|--------------------------------------|--------------------|---------------|---------|
|                                      | n/mean sd/%        | n/mean sd/%   |         |
| Intervention group                   |                    |               |         |
| Control                              | 285 52.3           | 269 53.0      |         |
| Intervention                         | 260 47.7           | 269 53.0      |         |
| Age (mean)                           | 24.0 3.6           | 26.2 3.7      |         |
| Relationship status                  |                    |               |         |
| Married or living together           | 79 14.5            | 84 15.4       | 0.515   |
| Not living together                  | 367 67.3           | 376 69.0      |         |
| No current relationship              | 99 18.2            | 85 15.6       |         |
| Household food insecurity            |                    |               | 0.001   |
| Little or no insecurity              | 106 19.5           | 119 21.8      |         |
| Moderate insecurity                  | 273 50.1           | 314 57.6      |         |
| Severe insecurity                    | 166 30.5           | 112 20.6      |         |
| Worked in past 3 months              | 137 25.1           | 235 43.1      | <0.001  |
| Past year physical IPV               | 319 58.5           | 289 53.0      | 0.067   |
| Past year sexual IPV                 | 153 28.1           | 187 34.3      | 0.026   |
| Past year emotional IPV              | 423 77.6           | 412 75.6      | 0.431   |
| Past year economic IPV               | 283 51.9           | 331 60.7      | 0.003   |
| Past year any IPV                    | 475 87.1           | 472 86.6      | 0.788   |
| Problem drinking                     | 130 23.9           | 117 24.2      | 0.904   |
| Severe symptoms of depression        | 243 44.6           | 277 50.8      | 0.039   |
| Severe symptoms of PTSD              | 108 19.8           | 122 22.4      | 0.291   |
| Relationship control score (mean)    | 10.1 4.3           | 9.7 4.6       | 0.146   |
| Gender attitude score (mean)         | 25.3 9.5           | 21.8 9.6      | <0.001  |

*denominator is n = 484 (missing data, n = 61, 11.2%).

Changes in Physical Intimate Partner Violence as a Driver of Harmful Alcohol Use

Table 3 shows patterns of change in physical IPV scores between the two timepoints. Overall, 29.5% reported no change in past year IPV scores, just over a third (38.0%) reported a decrease and a third (32.5%) reported an increase in past year IPV scores.

Among those reporting no change in IPV scores, only a tenth (11.2%) reported past year IPV and 8.1% harmful alcohol use at baseline, and there was no change in this at 24 months. In the group with decreasing physical IPV, there was overall a reduction in median physical IPV scores from 5 to 0 points, with a mean change of −3.9 points. Baseline IPV experience was reported by
Table 3. Descriptive Associations between Changes in Physical IPV and Alcohol Use between Baseline and 24 m.

| Proportion in Each category | Physical IPV score |  |  |  |  |  |  |  |  |
|-----------------------------|--------------------|--|--|--|--|--|--|--|--|
|                             | All (N = 545)      | Baseline | 24m | Change in score<sup>a</sup> | Experienced Physical IPV at Baseline |  |  |  |  |
|                             |                    | Median (IQR) | Median (IQR) | Mean (sd) | No (n = 226) | Yes (n = 319) | No (n = 256) | Yes (n = 289) |  |
| Physical IPV score          | No change          | 29.5 | 0 (0–0) | 0 (0–0) | 0 | 88.8 | 11.2 | 88.8 | 11.2 | 91.9 | 8.1 | 89.3 | 10.7 |
|                             | Decrease in physical IPV score | 38.0 | 5 (2–8) | 0 (0–3) | −3.9 (2.9) | 0.0 | 100 | 0 | 54.6 | 45.4 | 65.2 | 34.8 | 71.3 | 28.7 |
|                             | Increase in physical IPV score | 32.5 | 1 (0–3) | 5 (3–10) | 4.2 (3.3) | 46.9 | 53.1 | 0.0 | 100.0 | 74.6 | 25.4 | 68.0 | 32.0 |
| AUDIT score                 | No change          | 30.6 | 0 (0–0) | 0 (0–0) | 0 | 55.1 | 44.9 | 60.5 | 39.5 | 97.0 | 3.0 | 97.0 | 3.0 |
|                             | Decrease in AUDIT score | 27.5 | 7 (4–13) | 1 (0–4) | −6.3 (6.2) | 32.7 | 67.3 | 46.7 | 53.3 | 51.3 | 48.7 | 84 | 16 |
|                             | Increase in AUDIT score | 30.6 | 2 (0–5) | 9 (5–14) | 6.3 (5.7) | 37.1 | 62.9 | 37.7 | 62.3 | 82.0 | 18.0 | 47.3 | 52.7 |

IQR = inter-quartile range; sd = standard deviation.
<sup>a</sup>All percentages indicated in the columns are row percentages.
all and a third (34.8%) reported harmful alcohol use at baseline. At 24 months among those reporting a decrease in IPV scores, just under half (45.4%) reported past year IPV, and a quarter (28.7%) harmful alcohol use. In the group reporting increasing IPV scores, the median physical IPV score rose from 1 to 5 points (mean change +4.2 points), with half (53.1%) reporting IPV and a quarter (25.4%) harmful alcohol use at baseline. At endline, all in the increasing IPV group reported past year IPV and a third (32.2%) harmful alcohol use. Supplementary tables report these for depression and controlling behaviours as well (Supplemental Table 3).

Adjusted models examining the impact of changes in physical IPV scores on likelihood of harmful alcohol use at 24 months (Table 4) show a consistent pattern whereby those with increasing physical IPV scores over time have a greater likelihood of reporting harmful alcohol at endline. In Model 1, the effect size is \textit{aOR} = 2.73 (1.37–5.47). In Model 2, the association is slightly attenuated (\textit{aOR} = 2.45 (1.21–4.97), and additionally, shows that a one-point increase in depressive symptoms increases the likelihood of harmful alcohol use at endline (\textit{aOR}1.03; 1.01–1.04). The imputed analyses for both models show similar, but slightly reduced, effect sizes.

| Model | Change from Baseline to 24 months | Complete Case Analysis (N = 484) | Multiple Imputation Analysis (N = 545) |
|-------|----------------------------------|---------------------------------|---------------------------------------|
|       |                                  | \textit{aOR (95% CI)} p-Value | \textit{aOR (95% CI)} p-Value |
| Model 1 | No change in physical IPV experience | Ref (1.36 0.67–2.78) 0.394 | Ref (1.41 0.69–2.91) 0.345 |
|       | Decrease in physical IPV           | 1.44 (0.70–2.94) 0.321 | 1.50 (0.72–3.13) 0.273 |
|       | Increase in physical IPV           | 2.73 (1.37–5.47) 0.004 | 2.54 (1.30–4.96) 0.007 |
| Model 2 | No change in physical IPV experience | Ref | Ref |
|       | Decrease in physical IPV experience | 1.44 (0.70–2.94) 0.321 | 1.50 (0.72–3.13) 0.273 |
|       | Increase in physical IPV experience | 2.45 (1.21–4.97) 0.013 | 2.27 (1.15–4.48) 0.019 |
|       | 1 unit increase in depression score | 1.03 (1.01–1.04) 0.006 | 1.03 (1.00–1.05) 0.029 |

**Table 4.** Effect of Change in Physical IPV Experience on Problem Drinking at 24 months.

Model 1: Adjusted for intervention arm, age at baseline, physical IPV at baseline and baseline problem drinking.

Model 2: Adjusted for intervention arm, age at baseline, physical IPV at baseline and baseline problem drinking, plus baseline depression score and change in depression score.
Changes in Alcohol Use as a Driver of Past Year Physical Intimate Partner Violence

Assessing the relationship between changes in AUDIT scores and subsequent IPV experience, there was about a third split between those reporting no change, those reporting decreases, and those reporting increases in AUDIT scores over time (Table 3). Among those with no change in AUDIT scores, just under half (44.9%) reported past year physical IPV, and only reported 3% ($n = 5$) reported harmful alcohol use at baseline, with similar percentages at endline. In the group with reducing AUDIT scores, median AUDIT scores declined from 7 points to 1 point (mean change $-6.3$ AUDIT points), and two-thirds (67.3%) reported past year physical IPV, and half (48.7%) harmful alcohol use at baseline. In the decreasing AUDIT score group at endline, past year IPV experience had declined to a half (53.3%) and harmful alcohol use to 16%. In the group where AUDIT scores increased, median AUDIT scores changed from 2 to 9 (mean increase $+6.3$ points). At baseline just under two-thirds (62.3%) reported past year physical IPV, and a fifth (18.0%) harmful

---

**Table 5.** Effect of Change in Alcohol Use on Physical IPV Experience at 24 months.

| Change from Baseline to 24 months | Complete Case Analysis ($N = 484$) | Multiple Imputation Analysis ($N = 545$) |
|-----------------------------------|------------------------------------|-----------------------------------------|
|                                   | aOR (95% CI) | p-value | aOR (95% CI) | p-value |
| Model 1                           |           |          |             |          |
| No change in AUDIT score          | Ref       |          | Ref         |          |
| Decrease in AUDIT score           | 0.76 (0.38–1.49) | 0.422 | 0.75 (0.39–1.43) | 0.404 |
| Increase in AUDIT score           | 1.87 (1.10–3.15) | 0.02 | 1.87 (1.13–3.07) | 0.014 |
| Model 2                           |           |          |             |          |
| No change in AUDIT score          | Ref       |          | Ref         |          |
| Decrease in AUDIT score           | 0.84 (0.41–1.73) | 0.639 | 0.84 (0.43–1.65) | 0.608 |
| Increase in AUDIT score           | 2.04 (1.21–3.46) | 0.008 | 1.98 (1.18–3.34) | 0.010 |
| 1 unit increase in depression score | 1.03 (1.00–1.05) | 0.019 | 1.17 (1.12–1.22) | <0.001 |
| 1 unit increase in relationship control score | 1.18 (1.13–1.24) | <0.001 | 1.03 (1.01–1.05) | 0.003 |

Model 1: Adjusted for intervention arm, age at baseline, baseline physical IPV score and baseline AUDIT score.
Model 2: Adjusted for intervention arm, age at baseline, baseline physical IPV score and baseline AUDIT score, plus baseline depression score, relationship control score, change in depression score and change relationship score.
alcohol use, while IPV remained similar at endline (63.9%), a much larger percentage (52.7%) reported harmful alcohol use.

In regression models only increases in AUDIT scores were associated with significant change in past year IPV experience (Table 5), whereby an increase was seen with increased likelihood of past year IPV (Model 1 aOR1.87, 1.10 to 3.15; Model 2 aOR2.04, 1.21 to 3.46). In Model 2, a 1 unit increase in depressive symptoms was associated with an increase IPV experience at endline (aOR1.03, 1.00 to 1.05) and a 1 unit increase in relationship control scores was similarly associated with increased IPV experience (aOR1.18, 1.13 to 1.24). In imputed models, there was no change for Model 1, and in Model 2, the effect size for depressive symptoms increased, while decreasing for relationship control.

Supplementary analyses (Supplemental Tables 4 and 5) confirm the primary analyses. In all these models the same relationships are demonstrated.

**Discussion**

In a sample of young women living in urban informal settlements in eThekwini Municipality, South Africa, facing multiple overlapping challenges of poverty, high levels of background violence and limited social and state support, there was a clear and consistent finding whereby women who experienced increasing amounts of physical violence from partners over time were more likely to subsequently report greater harmful alcohol use, and similarly, women reporting increasing alcohol use over time were more likely to report past year physical IPV at endline. There was no evidence that decreases in alcohol use were associated with reductions in physical IPV, or that reduced IPV experience led to decreased alcohol use.

Our analysis strongly supports the finding from high-income countries that women’s experience of physical IPV is a driver of their subsequent alcohol use (Bacchus et al., 2018; Devries et al., 2014), and extends the evidence base through locating this in urban informal settlements in South Africa. In urban informal settlements, access to social support, psychosocial care and health care in general is limited, as are availability and use of legal strategies to deal with violence in relationships. As such, it is highly likely that increased alcohol use in response to increasing IPV experience is a form of self-medication (Hawn et al., 2020; Kaysen et al., 2007). IPV experience is strongly associated with worse mental health outcomes, including depression and post-traumatic stress (Bacchus et al., 2018; Devries et al., 2013), and there is clear evidence that alcohol is often used to self-medicate for these unresolved mental health issues where formal care is unavailable (Hawn et al., 2020; Kaysen et al., 2007). This hypothesis, around self-medication, gains support from our analyses: when we included depressive symptoms in the model, the overall association between physical IPV increasing and alcohol
use was clearly attenuated, although it remained significant. It is important that alcohol use and poor mental health are acknowledged to have similar underlying drivers, and that interventions actively address this. Similarly, interventions to address IPV, and especially those that support survivors and/or seek to prevent recurrence of IPV, should recognize the importance of addressing alcohol use and depression.

In this analysis there was also evidence that where women increased their alcohol use, they were more likely to experience physical IPV. Global evidence on this point has been varied, with prospective studies from high-income countries showing mixed outcomes (Bacchus et al., 2018; Devries et al., 2014), and current evidence from low- and middle-income countries being cross-sectional only. The potential pathways through which increasing alcohol use may increase women’s experience of IPV may include increased arguments with a partner, either because women’s alcohol use breaks social norms on women’s behaviour (Wechsberg et al., 2013) or because alcohol use increases disinhibition (Babor et al., 1983). In the UK, studies on couples’ use of substances and violence highlighted the importance of arguments about access to substances (though more often hard drugs) as a driver of violence (Gilchrist et al., 2019). Other analyses (Martino et al., 2005) have demonstrated a reciprocal relationship between violence and alcohol use, and it may be that in this cohort, young women’s increasing alcohol use and IPV experience tracked closely together, and we cannot clearly disentangle the exact relationship between these two.

There was no evidence that decreasing experience of physical IPV reduced alcohol use, or that reductions in alcohol use reduced subsequent IPV experience. The reason for the lack of association is unclear. For both physical IPV and alcohol use, the proportion of women in this study who reported a decrease was similar to, or greater than, the proportion reporting an increase, so it is unlikely to be a question of simple statistical power. It may be that there are other factors which jointly impact on both that were not meaningfully changing during this time period, for instance, food insecurity or generalized experiences of community level-violence and trauma. It may also be that the impact of decreasing IPV and/or alcohol on the cycles of reciprocal causality has a reduced effect size compared to the increases we did observe, or that any benefits of reduced IPV/alcohol only appear over a longer time horizon than our 24 months of follow-up. Additional research with longer follow-up and a greater number of observations will be needed to unpack these questions.

In both analyses, increasing depressive symptoms were associated with increased likelihood of physical IPV experience and harmful alcohol use at endline. While studies in high- and low-income settings have previously described the prospective association between depression and IPV experience (Devries et al., 2013; Tsai et al., 2016), there remains limited prospective evidence about the impact of depression on women’s experience of IPV and
women’s alcohol use in low-income settings. Without adequate treatment and support for depression, alcohol may become a form of self-medication, particularly in contexts of ongoing trauma, often starting from early childhood.

This study has several limitations. The population self-selected into an intervention trial, and is thus not representative of the general population; however, it is unclear how this would affect associations. Furthermore, the population consisted entirely of young women who all self-identified as ‘Black’, and we assumed heterosexual relationships, thus limiting generalization further. All measures were self-reported, and this could have led to under-reporting of either IPV or alcohol use, which would likely attenuate the association between the two. In addition, we did not ask about male partners’ alcohol consumption at either timepoint; this is strongly associated with women’s IPV experience and women’s alcohol use, and should be included as a potential confounder in future research. While we modelled changes in both physical IPV and alcohol use, we could not model these as reciprocal relationships. In addition, as the two timepoints were approximately 24 months apart, there could have been changes at 12 months not captured in our measures (which were both past 12 months). It is unclear how this would have affected our analysis. There was missing data at 24 months on a primary outcome – alcohol use – caused by faults in cellphone software, which was associated with potential drivers of alcohol use. To address this limitation, we used multiple imputation to verify the main analysis, which showed consistency in the relationships. We also modelled the relationships in multiple ways, and these too showed the same associations as in our primary analysis. We also only examined the associations between alcohol and physical IPV, rather than multiple forms of IPV, as we wished to disentangle this specific relationship and there remains little clarity on how to model multiple different forms of often overlapping IPV experience simultaneously.

**Conclusion**

Our analysis has several important implications for effective interventions to address alcohol use and IPV experience among young women living in challenging contexts. First, efficacious interventions need to address alcohol use and IPV simultaneously, given that they clearly exacerbate one another. Second, reflecting other recent analyses on effective IPV prevention (Kerr-Wilson et al., 2020), our analysis suggests addressing alcohol and IPV together, is unlikely to be successful without also addressing other shared underlying causes of these two issues. While many effective alcohol reduction and IPV prevention interventions are strongly focussed on addressing poor mental health (Murray et al., 2020), poverty is also an
important driver of both alcohol use and IPV experience and deserves attention (Lund et al., 2010). As such, in low-income settings, addressing multiple drivers of alcohol use and IPV, including structural drivers, is critical for an effective response. Third, women’s alcohol use often occurs with male partners (Greene et al., 2017), and it may be that women are more vulnerable to violence when drinking with partners (Wechsberg et al., 2013). There is some evidence that interventions addressing alcohol and IPV have stronger outcomes when they work with couples, rather than individual women (Minnis et al., 2015). In this population of young women in urban informal settlements, the concept of ‘couple’ may not resonate with their lived experiences, particularly as women do not often reside with male partners (Gibbs et al., 2018). Developing effective ways of working with couples on the interlinked issues of alcohol reduction and violence remains an important priority, but given the complex relationships young women often had (Willan et al., 2019), also how to address these issues for individuals. Fourth, the separation between IPV prevention and response strategies is not clear cut, with many prevention interventions preventing ongoing violence in relationships (Chatterji et al., 2020), and requiring significant focus on the residual traumas of violence manifested in alcohol use, and concurrent depression, needing to be a focus of interventions in highly traumatized populations. Broadly, therefore, addressing the interlinked issues of alcohol use and experience of IPV among young women with multiple overlapping risk factors needs to address the shared risk factors, as well as these two issues directly if they are likely to be successful.

**Acknowledgements**

We would like to thank the participants who provided their time and information. We also acknowledge the fieldwork team involved in the project and the team of researchers who also contributed to the main study.

**Author Contributions**

AG, KD, and EC conceptualised the analysis jointly. EC led data analysis, with supervision by AG and KD. AG wrote the first draft of the manuscript. EC and KD contributed sections of the manuscript. All authors agreed the interpretation and suitability for publication.

**Declaration of Conflicting Interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.
Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The original study for which the data were collected was funded by What Works To Prevent Violence? A Global Programme on Violence Against Women and Girls (VAWG) funded by the UK Government’s Department for International Development (DFID). This analysis was funded by UKRI Global Challenges Research Fund, Context and Health Grant (MR/T029803/1), and the South African Medical Research Council. All funding was managed by the South African Medical Research Council. The funders had no role in data collection, analysis, interpretation or decision to publish.

ORCID iD

Andrew Gibbs  
https://orcid.org/0000-0003-2812-5377

Supplemental Material

Supplemental material for this article is available online.

References

Ahmadabadi, Z., Najman, J. M., Williams, G. M., Clavarino, A. M., d’Abbs, P., & Smirnov, A. (2019). Intimate partner violence in emerging adulthood and subsequent substance use disorders: findings from a longitudinal study. Addiction, 114(7), 1264–1273. http://doi.org/10.1111/add.14592

Babor, T. F., Berglas, S., Mendelson, J. H., Ellingboe, J., & Miller, K. (1983). Alcohol, affect, and the disinhibition of verbal behavior. Psychopharmacology, 80(1), 53–60. http://doi.org/10.1007/bf00427496

Bacchus, L. J., Ranganathan, M., Watts, C., & Devries, K. (2018). Recent intimate partner violence against women and health: a systematic review and meta-analysis of cohort studies. BMJ Open, 8(7), Article e019995. http://doi.org/10.1136/bmjopen-2017-019995

Backe, E. L., Bosire, E., & Mendenhall, E. (2021). “Drinking too much, fighting too much”: The dual “disasters” of intimate partner violence and alcohol use in South Africa. Violence Against Women. http://doi.org/10.1177/10778012211034206

Chatterji, S., Heise, L., Gibbs, A., & Dunkle, K. (2020). Exploring differential impacts of interventions to reduce and prevent intimate partner violence (IPV) on subgroups of women and men: A case study using impact evaluations from Rwanda and South Africa. SSM-population Health, 11, 100635. http://doi.org/10.1016/j.ssmph.2020.100635

Davis, E. C., Rotheram-Borus, M. J., Weichle, T. W., Rezai, R., & Tomlinson, M. (2017). Patterns of alcohol abuse, depression, and intimate partner violence among township mothers in South Africa over 5 years. AIDS and Behavior, 21(2), 174–182. http://doi.org/10.1007/s10461-017-1927-y
Degenhardt, L., Charlson, F., Ferrari, A., Santomauro, D., Erskine, H., Mantilla-Herrara, A., & Griswold, M. (2018). The global burden of disease attributable to alcohol and drug use in 195 countries and territories, 1990–2016: A systematic analysis for the Global Burden of Disease Study 2016. *The Lancet Psychiatry*, 5(12), 987–1012. https://doi.org/10.1016/S2215-0366(18)30337-7

Deitchler, M., Ballard, T., Swindale, A., & Coates, J. (2010). Validation of a measure of household hunger for cross-cultural use. *Washington, DC: Food and Nutrition Technical Assistance II Project (FANTA-2), Academy for Educational Development*.

Devries, K. M., Child, J. C., Bacchus, L. J., Mak, J., Falder, G., Graham, K., & Heise, L. (2014). Intimate partner violence victimization and alcohol consumption in women: a systematic review and meta-analysis. *Addiction, 109*(3), 379–391. http://doi.org/10.1111/add.12393

Devries, K., Mak, J., Bacchus, L., Child, J., Falder, G., Petzold, M., & Watts, C. (2013). Intimate Partner Violence and Incident Depressive Symptoms and Suicide Attempts: A systematic review of longitudinal studies. *Plos Medicine, 10*(5), e1001439.

Dunkle, K., Jewkes, R., Brown, H. C., Gray, G. E., McIntryre, J. A., & Harlow, S. D. (2004). Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Social Science & Medicine, 59*(8), 1581–1592. http://doi.org/10.1016/j.socscimed.2004.02.003

Ellsberg, M., Jansen, H. A. F. M., Heise, L., Watts, C. H., Garcia-Moreno, C., & Hlth, W. M. S. W. (2008). Intimate partner violence and women’s physical and mental health in the WHO multi-country study on women’s health and domestic violence: an observational study. *Lancet, 371*(9619), 1165–1172. http://doi.org/10.1016/s0140-6736(08)60522-x

Garcia-Moreno, C., Jansen, H. A. F. M., Ellsberg, M., Heise, L., Watts, C. H., & Wo, W. M.-C. S. (2006). Prevalence of intimate partner violence: findings from the WHO multi-country study on women’s health and domestic violence. *Lancet*, 368(9543), 1260–1269. http://doi.org/10.1016/s0140-6736(06)69523-8

Gibbs, A., Jewkes, R., Willan, S., & Washington, L. (2018). Associations between poverty, mental health and substance use, gender power, and intimate partner violence amongst young (18–30) women and men in urban informal settlements in South Africa: A cross-sectional study and structural equation model. *Plos One, 13*(10), Article e0204956. http://doi.org/10.1371/journal.pone.0204956

Gibbs, A., Washington, L., Abdelatif, N., Chirwa, E., Willan, S., Shai, N., & Jewkes, R. (2020). Stepping stones and creating futures intervention to prevent intimate partner violence among young people: Cluster randomized controlled trial. *Journal of Adolescent Health, 66*(3), 323–335. https://doi.org/10.1016/j.jadohealth.2019.10.004

Gibbs, A., Washington, L., Willan, S., Ntini, N., Khumalo, T., Mbathe, N., & Strauss, M. (2017). The Stepping Stones and Creating Futures intervention to prevent intimate partner violence and HIV-risk behaviours in Durban, South Africa: study
protocol for a cluster randomized control trial, and baseline characteristics. BMC Public Health, 17(1), 336. http://doi.org/10.1186/s12889-017-4223-x

Gilbert, L., Raj, A., Hien, D., Stockman, J., Terlikbayeva, A., & Wyatt, G. (2015). Targeting the SAVA (substance abuse, violence and AIDS) syndemic among women and girls: A global review of epidemiology and integrated interventions. Journal of Acquired Immune Deficiency Syndromes (1999), 69(0 2), S118. http://doi.org/10.1097/qai.0000000000007626

Gilchrist, G., Dennis, F., Radcliffe, P., Henderson, J., Howard, L. M., & Gadd, D. (2019). The interplay between substance use and intimate partner violence perpetration: A meta-ethnography. International Journal of Drug Policy, 65(■■■), 8–23. http://doi.org/10.1016/j.drugpo.2018.12.009

Greene, M. C., Kane, J., & Tol, W. A. (2017). Alcohol use and intimate partner violence among women and their partners in sub-Saharan Africa. Global Mental Health, 4(■■■). http://doi.org/10.1017/gmh.2017.9

Hawn, S. E., Cusack, S. E., & Amstader, A. B. (2020). A systematic review of the self-medication hypothesis in the context of posttraumatic stress disorder and co-morbid problematic alcohol use. Journal of Traumatic Stress, 33(5), 699–708. http://doi.org/10.1002/jts.22521

Hlomani-Nyawasha, T. J., Meyer-Weitz, A., & Egbe, C. O. (2020). Factors influencing alcohol use among female in-school adolescents in the Western Cape, South Africa. South African Journal of Psychology, 50(4), 574–586. http://doi.org/10.1177/0081246320946298

Jewkes, R., Nduna, M., Levin, J., Jama, N., Dunkle, K., Khuzwayo, N., & Duvvury, N. (2006). A cluster randomized-controlled trial to determine the effectiveness of Stepping Stones in preventing HIV infections and promoting safer sexual behaviour amongst youth in the rural Eastern Cape, South Africa: trial design, methods and baseline findings. Tropical Medicine & International Health, 11(1), 3–16. https://doi.org/10.1111/j.1365-3156.2005.01530.x

Kaysen, D., Dillworth, T. M., Simpson, T., Waldrop, A., Larimer, M. E., & Resick, P. A. (2007). Domestic violence and alcohol use: Trauma-related symptoms and motives for drinking. Addictive Behaviors, 32(6), 1272–1283. http://doi.org/10.1016/j.addbeh.2006.09.007

Kerr-Wilson, A., Gibbs, A., McAslan Fraser, E., Ramsoomar, L., Parke, A., Khuwaja, H., & Jewkes, R. (2020). What works to prevent violence against women and girls? A rigorous global evidence review of interventions to prevent violence against women and girls.

Lund, C., Breen, A., Flisher, A. J., Kakuma, R., Corrigall, J., Joska, J. A., & Patel, V. (2010). Poverty and common mental disorders in low and middle income countries: a systematic review. Social Science & Medicine, 71(3), 517–528. http://doi.org/10.1016/j.socscimed.2010.04.027

Machisa, M., Jewkes, R., Morna, C., & Rama, K. (2011). The war at home: Gender based violence indicators project.
Martino, S. C., Collins, R. L., & Ellickson, P. L. (2005). Cross-lagged relationships between substance use and intimate partner violence among a sample of young adult women. *Journal of Studies on Alcohol, 66*(1), 139–148. http://doi.org/10.15288/jsa.2005.66.139

Matzopoulos, R. G., Truen, S., Bowman, B., & Corrigall, J. (2014). The cost of harmful alcohol use in South Africa. *South African Medical Journal, 104*(2), 127–132. http://doi.org/10.7196/samj.7644

McDonald, C. C., & Richmond, T. R. (2008). The relationship between community violence exposure and mental health symptoms in urban adolescents. *Journal of Psychiatric and Mental Health Nursing, 15*(10), 833–849. http://doi.org/10.1111/j.1365-2850.2008.01321.x

Minnis, A. M., Doherty, I. A., Kline, T. L., Zule, W. A., Myers, B., Carney, T., & Wechsberg, W. M. (2015). Relationship power, communication, and violence among couples: results of a cluster-randomized HIV prevention study in a South African township. *International Journal of Women’s Health, 7*(Ill), 517. http://doi.org/10.2147/ijwh.s77398

Mmari, K., Lantos, H., Blum, R. W., Brahmbhatt, H., Sangowawa, A., Yu, C., & Delany-Moretwe, S. (2014). A global study on the influence of neighborhood contextual factors on adolescent health. *Journal of Adolescent Health, 55*(6), S13–S20. http://doi.org/10.1016/j.jadohealth.2014.08.023

Mollica, R. F., Caspi-Yavin, Y., Bollini, P., Truong, T., Tor, S., & Lavelle, J. (1992). The Harvard Trauma Questionnaire: validating a cross-cultural instrument for measuring torture, trauma, and posttraumatic stress disorder in Indochinese refugees. *The Journal of Nervous and Mental Disease, 180*(2), 111–116. http://doi.org/10.1097/00005053-199202000-00008

Murray, L. K., Kane, J. C., Glass, N., Skavenski van Wyk, S., Melendez, F., Paul, R., & Simenda, F. (2020). Effectiveness of the Common Elements Treatment Approach (CETA) in reducing intimate partner violence and hazardous alcohol use in Zambia (VATU): A randomized controlled trial. *PLoS Medicine, 17*(4), Article e1003056. http://doi.org/10.1371/journal.pmed.1003056

Ndungu, J., Washington, L., Willan, S., Ramsoomar, L., Ngcobo-Sithole, M., & Gibbs, A. (2020). Risk factors for alcohol and drug misuse amongst young women in informal settlements in Durban, South Africa. *Global Public Health, 15*(9), 1322–1336. http://doi.org/10.1080/17441692.2020.1775866

Norman, R., Schneider, M., Bradshaw, D., Jewkes, R., Abrahams, N., Matzopoulos, R., & Vos, T. (2010). Interpersonal violence: An important risk factor for disease and injury in South Africa. *Population Health Metrics, 8*(1), 1–12. http://doi.org/10.1186/1478-7954-8-32

Peltzer, K., Davids, A., & Njuho, P. (2011). Alcohol use and problem drinking in South Africa: Findings from a national population-based survey. *African Journal of Psychiatry, 14*(1). http://doi.org/10.4314/ajpsy.v14i1.65466

Pitpitan, E. V., Kalichman, S. C., Eaton, L. A., Cain, D., Sikkema, K. J., Skinner, D., & Pieterse, D. (2013). Gender-based violence, alcohol use, and sexual risk among...
female patrons of drinking venues in Cape Town, South Africa. *Journal of Behavioral Medicine, 36*(3), 295–304. http://doi.org/10.1007/s10865-012-9423-3

Pulerwitz, J., & Barker, G. (2008). Measuring attitudes toward gender norms among young men in Brazil development and psychometric evaluation of the GEM scale. *Men and Masculinities, 10*(3), 322–338. http://doi.org/10.1177/1097184x06298778

Pulerwitz, J., Gortmaker, S. L., & DeJong, W. (2000). Measuring sexual relationship power in HIV/STD research. *Sex Roles, 42*(7), 637–660. https://doi.org/10.1023/A:1007051506972

Radloff, L. S. (1977). The CES-D scale a self-report depression scale for research in the general population. *Applied psychological measurement, 1*(3), 385–401. http://doi.org/10.1177/014662167700100306

Russell, M., Cupp, P. K., Jewkes, R. K., Gevers, A., Mathews, C., LeFleur-Bellerose, C., & Small, J. (2014). Intimate partner violence among adolescents in Cape Town, South Africa. *Prevention Science, 15*(3), 283–295. http://doi.org/10.1007/s11121-013-0405-7

Saunders, J. B., Aasland, O. G., Babor, T. F, De la Fuente, J. R., & Grant, M. (1993). Development of the alcohol use disorders identification test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction, 88*(6), 791–804. http://doi.org/10.1111/j.1360-0443.1993.tb02093.x

Selin, A., DeLong, S. M., Julien, A., MacPhail, C., Twine, R., Hughes, J. P., & Pettifor, A. (2019). Prevalence and associations, by age group, of IPV among AGYW in rural South Africa. *Sage Open, 9*(1), 1–12. https://doi.org/10.1177/2158244019830016

Sommer, M., Parker, R., Msacky, G., Kajula, L., & Kaaya, S. (2019). How alcohol, space, and time influence young people’s sexual encounters in Tanzania: A qualitative analysis. *Archives of Sexual Behavior, 48*(6), 1847–1857. http://doi.org/10.1007/s10508-018-1311-7

Tsai, A. C., Tomlinson, M., Comulada, W. S., & Rotheram-Borus, M. J. (2016). Intimate partner violence and depression symptom severity among South African women during pregnancy and postpartum: population-based prospective cohort study. *Plos Medicine, 13*(1), Article e1001943. http://doi.org/10.1371/journal.pmed.1001943

Wechsberg, W. M., Myers, B., Reed, E., Carney, T., Emanuel, A. N., & Browne, F. A. (2013). Substance use, gender inequity, violence and sexual risk among couples in Cape Town. *Culture, Health & Sexuality, 15*(10), 1221–1236. http://doi.org/10.1080/13691058.2013.815366

Willan, S., Ntini, N., Gibbs, A., & Jewkes, R. (2019). Exploring young women’s constructions of love and strategies to navigate violent relationships in South African informal settlements. *Culture, Health & Sexuality, 21*(11), 1225–1239. http://doi.org/10.1080/13691058.2018.1554189
Wojcicki, J. M. (2002). “She drank his money”: Survival sex and the problem of violence in taverns in Gauteng province, South Africa. *Medical Anthropology Quarterly, 16*(3), 267–293. http://doi.org/10.1525/maq.2002.16.3.267

Zembe, Y. Z., Townsend, L., Thorson, A., Ekström, A. M., Naidoo, R., Johnson, K., & Shemaghembe, E. (2013). Money talks, bullshit walks” interrogating notions of consumption and survival sex among young women engaging in transactional sex in post-apartheid South Africa: a qualitative enquiry. *Glob Health, 9*(1), 28. http://doi.org/10.1186/1744-8603-9-28

**Author Biographies**

**Andrew Gibbs** is a Senior Specialist Scientist at the Gender and Health Research Unit, in the SAMRC. He was the PI on the Stepping Stones and Creating Futures trial.

**Esnat Chirwa** is a Senior Statistician in the Gender and Health Research Unit, in the SAMRC. She was the study statistician on the Stepping Stones and Creating Futures trial.

**Kristin Dunkle** is a Chief Scientist in the Gender and Health Research Unit, in the SAMRC. She has been involved in multiple intervention evaluations.