A latent class analysis of young women's co-occurring health risks in urban informal settlements in Durban, South Africa

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ABSTRACT

In South Africa, substance use, violence, and HIV risk disproportionately affect young poor Black women. Few studies have explicitly measured the co-occurrence of these health risks or the impact on mental health and wellbeing for this population. To this aim, we use a person-centred approach to explore the clustering of health risks among young Black women from urban informal settlements in Durban, South Africa, enrolled in an intervention trial. Latent class analysis identified three health risk subgroups with increasing levels of health risk co-occurrence: while all three subgroups had high rates of emotional/economic intimate partner violence, they differed in their levels of the other health risks, with one ("lower-risk") subgroup defined by experiencing violence against women (VAW), another by the co-occurrence of VAW with problematic alcohol use (i.e. "mid-risk"), and the last ("high-risk") subgroup by the co-occurrence of VAW, problematic alcohol use and sexual risk behaviour. Descriptive analyses showed that lower education and food insecurity were associated with greater health risk co-occurrence and that this in turn was associated with increased chances of depression and suicidal ideation. Between subgroup differences persisted over time - after two years, the chances of experiencing violence, problematic alcohol use, transactional sex and depression remained elevated for the women who initially experienced more health risks. Persistent yet differing levels of risk suggest the need for urgent structural interventions that address these health risks synergistically while taking account of individual differing primary and secondary prevention needs. Our analyses highlight that social epidemics such as poverty, racism and gender inequality play into the production of poor health outcomes, including poor mental health. These are the underlying structural issues that need to be addressed in order to protect women's health and reduce harm.

1. Introduction

Interactions and mutual causality between substance abuse, violence perpetration and experience and HIV-acquisition risk are well established. For example, HIV is a known sequalae of experiencing intimate partner violence (IPV), and women who acquire HIV also have an increased risk of IPV following disclosure of a positive HIV test result (Campbell et al., 2008; Jewkes et al., 2010). Additionally, male perpetrators of IPV are more likely to engage in risky sexual behaviour that confers higher HIV transmission risk (Campbell et al., 2008; Dunkle et al., 2006). Problematic alcohol and substance use has been linked with an increased risk of men's perpetration of violence against women (VAW) globally and has also been associated with women's experience of IPV (Devries et al., 2014; Greene et al., 2021; Mannell et al., 2022; Mashaphu et al., 2018; Ramsoomar et al., 2021; Yakubovich et al., 2018). Alcohol use has also been tied to increased HIV incidence through increased sexual risk behaviours, such as greater chances of unprotected sex (Assaf and Mallick, 2017; Fritz et al., 2010; Rwafa-Ponela et al., 2022; World Health Organization, 2005), although causality is complex, and biological susceptibility likely also plays a role (Shuper

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et al., 2010).

These co-occurring and mutually enforcing "synergistic" epidemics (The Lancet, 2017) of HIV, substance/alcohol abuse and VAW are thought to be particularly pronounced in Sub-Saharan Africa (Campbell et al., 2008; Russell et al., 2013). South African research has demonstrated that men who perpetrate IPV are also more likely to engage in risky sexual behaviour and problematic drug and alcohol use (Hatcher et al., 2019; Jewkes and Morrell, 2018). However, less attention has been paid to the co-occurrence of these corresponding health risks amongst women, in South Africa, as well as globally (Tsai et al., 2017a).

Poor mental health has been tied to other health risks and outcomes, such as in Mendenhall's syndemics work on Mexican immigrant women which explored how diabetes is tied together with depression through adverse social conditions (Mendenhall, 2012). In addition, the interaction between poor mental health and other health risks has led to interventions such as the Programme for Improving Mental Health Care (PRIME) project in South Africa striving to integrate mental health care into packages of care for other chronic conditions (Petersen et al., 2016). Whilst the separate links between violence against women (Oram et al., 2017), problematic alcohol use (Mchugh and Weiss, 2019; Wilsnack et al., 2013), sexual risk behaviour (Lundberg et al., 2011) and poor mental health are relatively well-established, including in the South African context (Mkhwanazi and Gibbs, 2021; Ndungu et al., 2020; Pengpid and Peltzer, 2020; Rotheram-Borus et al., 2019), the potentially worsened mental health impact of the co-occurrence of these particular health risks has been less well-studied.

Social phenomena such as poverty, racism and colonialism play critical roles in the production and spread of epidemics, and contemporary scholars have called for these social drivers to be reframed as epidemics themselves (Weiss, 2021). Seen as epidemics in their own right, structural issues can then be understood to interplay with other "biological" epidemics to create increased health risks through accelerating exposure, morbidity and mortality (Weiss, 2021). For those disadvantaged by structural hierarchies, these social phenomena can induce a prolonged stress response through the accumulation of discrimination and disadvantage, which become internalised and embodied, creating stress-related illnesses and experiences, and additionally impacting the ability to buffer against future stress (McEwen and McEwen, 2017). Furthermore, poverty and race are inextricably linked; even apart from socioeconomic disadvantage, racialised groups suffer greater health disadvantages because of structural racism (Geronimus et al., 2016).

In South Africa, the historical legacy of apartheid, including continued racism and socioeconomic inequality, has served to create a context of pronounced health disparities between white and Black South Africans (Coovadia et al., 2009). For example, the prevalence of HIV is higher amongst Black South Africans than in any other racial group, and highest in municipalities with greater racial segregation (Bell et al., 2022; Muula, 2008). Amongst Black South Africans, there are also pronounced urban and rural health differences, with particularly high rates of HIV found in informal urban settlements, especially for Black women (Gibbs et al., 2020b; Mabaso et al., 2019). In addition, as well as being particularly vulnerable to HIV, young Black South African women also have increased levels of alcohol use and violence victimisation (Centre for the Study of Violence and Reconciliation, 2016; Mabaso et al., 2018; Mannell et al., 2019; Wamoyi et al., 2016).

Whilst young Black women, such as those living in the urban informal settlements of this study, are likely to have disproportionate health risks compared to other groups in South Africa, there is likely wide variation in how these are experienced. Such variability is influenced by people's relative positionalities within the socio-political context they inhabit. In other words, despite sharing similar socio-political contexts, individuals' social and historically determined positions within that context lead to differential levels of exposure to the realities of their living conditions. Exploring how health risks vary and co-occur is important for understanding drivers of risk and developing interventions to mitigate against these.

In this study we explore the extent to which different health risks co-occur for young Black women living in informal urban settlements in Durban, South Africa. We do this through a post-hoc exploratory latent class analysis of data collected as part of the Stepping Stones and Creating Futures (SS/CF) intervention, a group-based, participatory gender transformative and livelihoods strengthening intervention designed to reduce IPV and HIV risk behaviours and strengthen livelihoods (Gibbs et al., 2020c). Previous post-hoc analyses have focused just on men (Gibbs et al., 2020a), and here we focus on the women's data only.

Latent class analysis (LCA) uses a categorical latent variable to capture the possibility that different response profiles arise because there are underlying subgroups with distinct combinations of features (Hallquist and Wright, 2014). LCA is used to derive subgroups based on patterns of shared characteristics that distinguish members of one subgroup from those of another (Golder et al., 2012), allowing unique combinations of risk factors to be identified (Turpin et al., 2019). In IPV research, this approach has been used to explore links between different masculinities and IPV perpetration among men (Gibbs et al., 2020a; Jewkes et al., 2020; Jewkes and Morrell, 2018), and to understand which subgroups of women experiencing IPV are at greatest risk of other problems, such as substance use and poor mental health (Golder et al., 2012). We build on this in our study by using LCA to group women into 'classes' to examine underlying 'health risk subgroups'. Specifically, we explore: 1) the extent to which VAW experience, sexual risk behaviours and problematic alcohol use co-occur; 2) how age, relationship status, education and food insecurity may shape these co-occurring risks (i.e. who is most vulnerable); 3) how these co-occurrences relate to poor mental health and wellbeing; 4) whether the SS/CF intervention differentially impacted women according to these co-occurrences; and 5) whether these risk profiles persist over time.

2. Methods

2.1. Context of current study

The SS/CF evaluation was carried out as a cluster randomised controlled trial (cRCT) amongst young women and men (aged 18–30yrs) living in urban informal settlements in Durban, eThekwini Municipality, KwaZulu-Natal Province, South Africa, between 2015 and 2018. We conducted a secondary post-hoc (i.e. not pre-specified) analysis using data at baseline and endline (24 months) for women enrolled in the study.

2.1.1. Study setting

The study was conducted in the eThekwini Municipality, KwaZulu-Natal Province, South Africa, which is the third largest city in the country. The research site comprises urban informal settlements, where an estimated 25% of the population live in informal housing (The Housing Development Agency, 2012) These settlements are characterised by dense housing, limited access to basic amenities such as water and electricity, and lack formal provision of these services within homes. Informal settlements in eThekwini Municipality are typically located on previously under-utilised land, steep hillsides, or flood-prone areas, and they often fill spaces between formal housing. Despite the challenges of defining clusters in informal settlements due to the lack of clear governmental boundaries, larger informal settlements in eThekwini are usually geographically bounded (Gibbs et al., 2017).

2.1.2. Sampling and data collection procedures

SS/CF was a two-arm cRCT and clusters comprised informal settlements with naturally occurring boundaries (n = 34). Around 20 men and 20 women were recruited in each cluster with the help of the NGO implementation partner, Project Empower (https://projectempower.org.za). At baseline, 646 men and 677 women were recruited and at

endline 78.2% (n = 505) and 80.5% (n = 545) were retained, respectively.

Eligible participants were aged 18–30 years, resident in a cluster, had no current formal employment, were not in education, and were competent to complete informed consent. Participants in the intervention clusters received the participatory group-based gender transformative and livelihoods strengthening intervention immediately. Male and female groups were conducted separately, and participants were typically not in romantic relationships with each other.

Data were collected at baseline before the intervention and 24 months post intervention, using tablets programmed for the study, with built-in skip and logic patterns. An adapted version of the WHO instrument administered through tablet and/or Audio Computer-Assisted Self-Interview (ACASI) was used to assess all outcomes (Garcia-Moreno et al., 2005). Further information can be found in the trial protocol (Gibbs et al., 2017).

The study was approved by the Biomedical Research Ethics Committee (BREC) at the University of KwaZulu- Natal, Durban, South Africa (BFC043/15) and the South African Medical Research Council Ethics Committee (EC006–2/2015). Further details on the study rationale, setting, methods and intervention are available elsewhere (Gibbs et al., 2020c).

2.2. Statistical analysis

2.2.1. Creating subgroups of women defined by co-occurring health risks

We used latent class analysis to identify possible health risk subgroups, defined by the extent of health risk co-occurrence at baseline across the inter-related domains of VAW, problematic alcohol use and

sexual risk behaviour. Experiences of violence are not the same as health risk behaviours, as violence against women is very much something that is done to women rather than something they do themselves. However, we have chosen to explore these domains together and to use the term "health risks" to acknowledge that some risks are linked to behaviour, and others are linked to the behaviour of others (i.e. being victimised by violence), but all accumulate in producing vulnerability, and cannot and should not be separated.

In the VAW domain, past year experience of physical, sexual, economic, and emotional intimate partner violence (IPV) and past year experience of non-partner sexual violence (NPV) were included as binary variables. Physical, sexual and economic IPV were measured with the WHO VAW scale, adapted and widely used in South Africa (Garcia-Moreno et al., 2006; Jewkes et al., 2010), with five, three, and four items, respectively. Emotional IPV (based on four items) and non-partner sexual violence (based on six items) were measured with scales developed for the original Stepping Stones trial (Jewkes et al., 2010). Experiences of control in primary relationships (another dimension of emotional IPV) was measured continuously using a modified Sexual Relationship Power scale (eight items) (Pulerwitz et al., 2000), with scores ranging from 0 to 24, and re-categorised as tertiles, with the highest tertile considered as women experiencing the most control from their partner.

Problematic alcohol use was indicated by a 7/8 cut on the AUDIT scale (ten items) (Saunders et al., 1993). Sexual risk behaviour was captured with a five item scale developed for previous South African research (Dunkle et al., 2007) which measured transactional sex with a casual or main partner in the past year (defined as sex motivated by material gain e.g. provision of food, cosmetics, clothes, transportation,

Table 1
Health risks used as latent class analysis indicators.

Health risk	Indicator	Scale	Items	Interpretation	Initial coding	Input into LCA
Problematic alcohol use	Problem drinking in the past year	Alcohol Use Disorders Identification Test (AUDIT) scale	10	Excessive alcohol use using AUDIT (7/8 cut)	Binary – yes (1), no (0)	Four level joint item combining binary problematic alcohol use and physical and/or sexual IPV variables (as testing for violation of the conditional independence assumption found these to be correlated).
Violence against women	Past year physical IPV experience	Modified WHO VAW scale	5	Binary: Past year physical IPV is coded as positive (1) if one or more items are responded to positively (otherwise coded 0).	Binary variable combining past year physical and sexual IPV variables together. Past year physical and/or sexual IPV – yes (1), no (0)	1 - Past year problem drinking & physical/sexual IPV (Yes/Yes)
Violence against women	Past year sexual IPV experience	Modified WHO VAW scale	3	Binary: Past year sexual IPV is coded as positive (1) for anyone responding positively to one or more items on the scale (otherwise coded 0)		2 - Past year problem drinking & physical/sexual IPV (No/Yes) 3 - Past year problem drinking & physical/sexual IPV (Yes/No) 4 - Past year problem drinking & physical/sexual IPV (No/No)
Violence against women	Controlling behaviours	Modified Sexual Relationship Power (SRP) scale	8	Dimension of emotional violence. Continuous variable with higher scores referring to more controlling behaviour by male partner in primary relationship	Re-categorised as tertiles, with highest tertile considered as most controlling and coded as 1 in binary variable (other two tertiles coded 0)	Binary variable combining controlling behaviours, and past year emotional and economic IPV together, whereby women who scored 1 on any of the three variables were scored 1 on the combinatory variable
Violence against women	Past year emotional IPV experience	Scale developed for original Stepping Stones trial	5	Binary: One or more episodes of emotional IPV in past 12 months	–	
Violence against women	Past year economic IPV experience	Modified WHO VAW scale	4	Binary: One or more episodes of economic IPV in past 12 months	–	
Violence against women	Past year non-partner sexual violence experience	Scale developed for original Stepping Stones trial	6	Binary: One or more episodes of NPV in past 12 months	–	Binary – yes (1), no (0)
Sexual risk behaviour	Transactional sex with casual partner in past year	A scale developed for use in South Africa	5	Positive response to at least one item = transactional sex in last 12 months	–	Binary - transactional sex (1), no transactional sex (0)
Sexual risk behaviour	Transactional sex with main partner in past year	A scale used widely in South Africa	5	Positive response to at least one item = transactional sex in last 12 months	–	Binary - transactional sex (1), no transactional sex (0)

items for children or family, school fees, somewhere to sleep, or cash). As LCA works best with fewer variables, we combined some variables into single items to reduce collinearity (i.e., where there were conceptual overlaps or the conditional independence assumption was violated (Snyder and Monroe, 2013; Uebersax, 2009)), resulting in a total of five LCA indicators, as described in Table 1 below.

Analyses were conducted in Stata/MP 16.1 using the structural equation modelling framework's latent class expansion (Lanza et al., 2015; StataCorp, n.d.) which permits adjusting for clustering of data. The SS/CF women's dataset had a maximum useable sample size of 677 for creating the latent health risk subgroups of women.

Models were estimated with 20 Expectation-Maximisation iterations and 100 draws of random starting values to ensure that a global rather than a local (sub-optimal) solution was found. Parameters were freely estimated (i.e. means and variances were not constrained to be equal across latent classes) (Ng, 2019). Example Stata syntax is included in Appendix A.

We used a combination of model fit statistics and class separation measures to aid with model selection. We examined model fit with the AIC, sample size adjusted BIC and the Lo-Mendell-Rubin Likelihood Ratio Test comparing k to k-1 classes (Lo et al., 2001; Ng, 2018), and compared neatness of classification with normalised entropy (Ng and Schechter, 2017; Silverwood et al., 2011), Average Posterior Probability and Odds of Correct Classification (Nagin, 2005). To further assist with model selection, response profiles for models with different numbers of classes were evaluated for substantive meaning.

2.2.2. Sociodemographic characteristics and poor mental health and wellbeing

Once the number of classes were identified, we compared their baseline sociodemographic characteristics (age, education, relationship status, and food insecurity) and mental ill health (depressive symptomology and suicidal ideation) and wellbeing (life satisfaction). Food insecurity was assessed with three items from the Household Food Insecurity Access Scale (Coates et al., 2007). Mental ill health was indicated by two measures: past week depressive symptomology was measured with the 20 questions of the Center for Epidemiologic Studies Depression (CES-D) scale (Radloff, 1977), and suicidal ideation was captured by asking whether participants had thoughts about ending their life in the past month. Wellbeing was indicated by past week life satisfaction and measured continuously based on Likert scale responses to four items from the Satisfaction with Life Scale (Diener et al., 1985), with scores ranging from 4 to 20, where strongly disagree was scored 1 point and strongly agree 5 points, and lower scores indicated less satisfaction. Differences in sociodemographic characteristics and mental ill health and wellbeing between classes were assessed with the design-based F statistic conversion (Rao and Scott, 1984) of chi-squared and adjusted Wald tests for categorical and continuous variables, respectively (at an alpha of 0.05).

2.2.3. Testing for differential intervention impact

We also tested for differential intervention impact by comparing endline trial outcomes (at 24 months) related to VAW, sexual risk behaviour, problematic alcohol use and mental ill health and wellbeing across trial arms for women in each of the classes separately. In other words, we performed an individual level, intention-to-treat analysis, stratified by latent class, with arm allocation as randomised and adjusted for sample clustering. This was to test whether the different groups of women responded to the intervention differently i.e. whether their health risk profiles changed differentially as a result of the intervention. Endline proportions (for physical IPV, sexual IPV, emotional IPV, economic IPV, non-partner sexual violence, problematic alcohol use, transactional sex with casual partner, transactional sex with main partner, depressive symptomology, and suicidal ideation) and means (for controlling behaviours, and life satisfaction) for control and intervention arms were compared for each class separately and differences

were assessed using the design-based F statistic conversion of chi-squared and Wald tests, respectively (Rao and Scott, 1984). We then compared the odds of experiencing these separate health risks at endline in the intervention compared to the control group, again for each class separately. In keeping with the original trial analyses (Gibbs et al., 2020c), we ran both unadjusted and adjusted logistic regression models for each trial outcome in turn, with adjusted models controlling only for the equivalent baseline trial outcome measure (to take account of the correlations between measures across time). A Bonferroni-adjusted alpha was used to assess significance to mitigate against the Type I error inherent in multiple comparisons. Endline data were available for up to 545 women for these intervention efficacy analyses.

2.2.4. Testing for the persistence of health risks and poor mental health and wellbeing over time

Taking advantage of the available longitudinal data (n = 545), we also tested whether class differences in health risks and mental ill-health and wellbeing persisted at endline (24 months) using logistic regression for binary outcomes (physical IPV, sexual IPV, emotional IPV, economic IPV, non-partner sexual violence, problematic alcohol use, transactional sex with casual partner, transactional sex with main partner, depressive symptomology and suicidal ideation) and linear regression for continuous outcomes (controlling behaviours and life satisfaction). These unadjusted bivariate analyses were conducted to examine health risks separately (i.e. rather than as combinatory variables in the LCA) and helped to demonstrate whether for each of the latent classes, health risks and associated mental ill health indicators persisted over time.

All analyses were adjusted for sample clustering and the analyses following the LCA used assigned class membership based on the highest posterior probabilities and were weighted by the posterior probabilities of class membership to take account of the uncertainty in the estimates.

2.2.5. Missing data

Latent class analysis indicators are allowed to have missing data, and this is assumed to be missing at random (Lanza et al., 2015). Although missingness is likely to vary across classes, sociodemographic characteristics, mental ill health and wellbeing, and trial outcomes, multiple imputation analyses yielded similar results for the main trial analysis (Gibbs et al., 2020c), suggesting that it should not be an issue here either.

3. Results

3.1. Latent classes

The three class solution was the best both theoretically and based on model fit indices and class separation (see Table B.1 in Appendix B). Experiencing physical and/or sexual IPV was correlated with problematic alcohol use and so these variables were treated as a four-level joint item to account for their conditional dependence (Uebersax, 2009). Fig. 1 shows how likely class members were to provide different responses to each categorical indicator (i.e. the item-response probabilities). As shown in Fig. 1, the three classes of women were defined by their varying levels of health risk co-occurrence.

The highest probability for women assigned to Class 1 ("Lower-risk") was for emotional/economic IPV (0.60). Despite this relatively high probability, women in this class, which represented 26% of the sample (n = 177), were less likely to experience any of the health risks compared to the other two classes. The probability of experiencing sexual NPV was very low (0.07), and much lower than for the other two classes. However, the probability of transactional sex with a main partner was not negligible (0.26), and the probabilities of both measures of sexual risk behaviour were relatively close to the probabilities for Class 2 (main partner 0.26 vs 0.32, casual partner 0.10 vs 0.14). The probability of problem drinking and/or experiencing physical/sexual IPV was low (0.14). Probabilities of problem drinking without
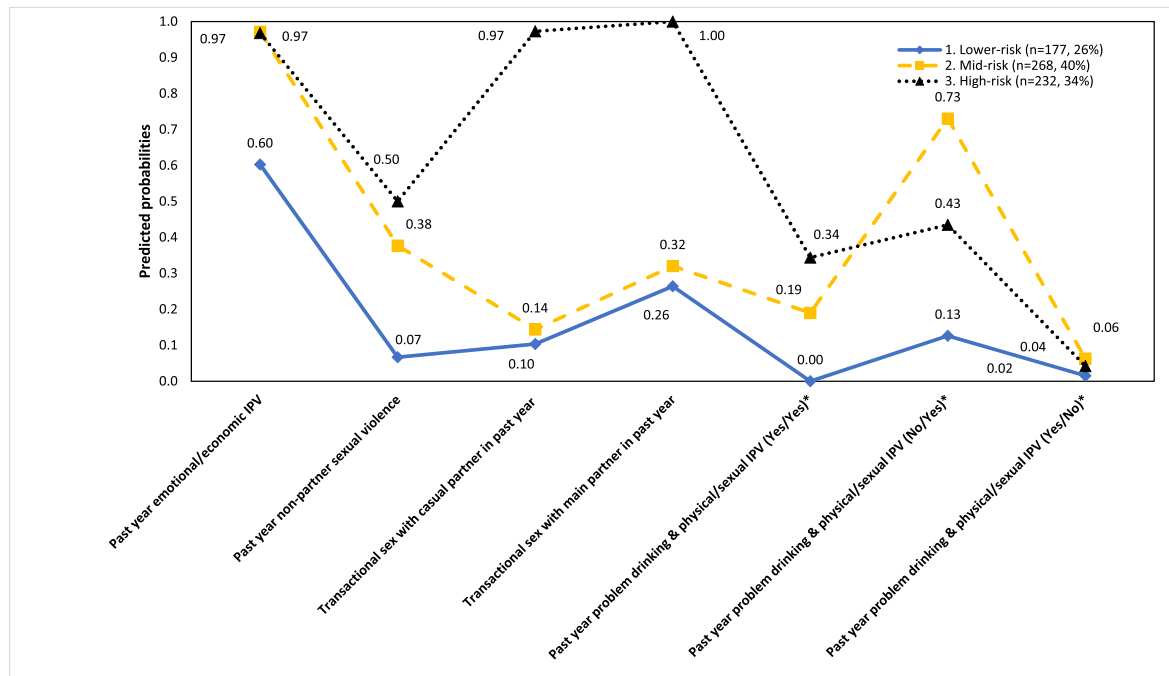
Fig. 1. Probabilities of different health risks in each subgroup. N = 677. IPV: Intimate partner violence. * Four category joint item, No/No category not shown.

experiencing physical/sexual IPV were very low across all three classes, but lowest in this class (0.02).

Class 2 ("Mid-risk", 40% of the sample, n = 268) had very high levels of emotional/economic IPV (0.97). In this regard, this class was similar to Class 3 ("High-risk"). However, this class had middling levels of sexual NPV (0.38) and as described above, chances of transactional sex similar to, but higher than for Class 1. Class 2 had the highest probability of problem drinking and/or experiencing physical/sexual IPV (0.98), with more women in this class reporting physical/sexual IPV but no problem drinking (0.73) compared to the other classes, and middling levels of women reporting both problem drinking and physical/sexual IPV (0.19).

In addition to very high levels of emotional/economic IPV (0.97), Class 3 ("High-risk", 34% of the sample, n = 232) had the highest levels of sexual NPV (0.50) amongst the three classes, as well as very high levels of transactional sex with casual (0.97) and main partners (1.00). Although not as high as Class 2, this class had a high probability of problem drinking and/or experiencing physical/sexual IPV (0.82). This class had the most women reporting both problem drinking and experiencing physical/sexual IPV (0.34), and middling levels of women reporting physical/sexual IPV without problem drinking (0.43).

In sum, while all three latent classes had high rates of emotional/economic IPV, they differed in their levels of the other health risks, so that one was primarily defined by experiencing VAW (Class 1, "Lower-

Table 2
Sociodemographic characteristics associated with health risk subgroups.

	N	Lower-risk		Mid-risk		High-risk		p-value
		n	% (95% CI)	*n*	% (95% CI)	*n*	% (95% CI)	
Age								
18/19	85	24	13.8 (9.2, 20.0)	35	13.0 (8.8, 18.6)	26	11.1 (7.5, 16.2)	0.620
20–24	303	84	47.0 (40.7, 53.5)	120	44.9 (38.5, 51.4)	99	42.7 (36.0, 49.6)	
25–29	238	56	31.9 (26.5, 37.7)	97	36.3 (29.8, 43.2)	85	36.7 (31.4, 42.4)	
30+	51	13	7.4 (4.6, 11.7)	16	5.9 (3.2, 10.9)	22	9.5 (6.2, 14.4)	
Education								
Primary	56	14	7.5 (4.6, 12.2)	21	7.9 (4.8, 12.9)	21	9.2 (5.4, 15.2)	**0.025**
Secondary, not completed	415	92	51.6 (41.9, 61.2)	168	62.8 (56.7, 68.5)	155	66.8 (59.9, 73.1)	
Secondary, completed	206	71	40.9 (31.3, 51.2)	79	29.2 (22.9, 36.5)	56	24.0 (18.7, 30.2)	
Relationship status [a]								
Currently married, living together	19	6	3.3 (1.6, 6.9)	9	3.2 (1.7, 6.2)	4	1.8 (0.7, 4.7)	0.255
Currently married, not living together	10	2	1.2 (0.3, 4.8)	4	1.5 (0.6, 3.9)	4	1.7 (0.7, 4.2)	
Living together, not married	94	20	10.7 (7.2, 15.6)	42	15.8 (11.2, 21.9)	32	13.8 (9.7, 19.4)	
Boyfriend, not living together	430	111	63.2 (56.0, 70.0)	158	59.0 (51.7, 66.0)	161	69.2 (62.1, 75.4)	
No relationship	124	38	21.5 (14.5, 30.6)	55	20.5 (15.0, 27.3)	31	13.6 (9.4, 19.2)	
Food insecurity								
Little/no hunger	126	57	32.1 (25.1, 40.2)	41	15.4 (11.3, 20.7)	28	11.8 (8.0, 17.2)	**<0.001**
Moderate hunger	339	82	46.6 (39.5, 53.9)	137	51.0 (45.8, 56.2)	120	51.8 (44.1, 59.5)	
Severe hunger	212	38	21.2 (15.3, 28.6)	90	33.6 (28.6, 39.0)	84	36.3 (28.8, 44.6)	

N = 677. Adjusted for sample clustering.

[a] Fishers exact test not compatible with svy weights, to account for the survey design, the statistic is turned into an F statistic with non-integer degrees of freedom by using a second-order Rao and Scott correction. Fishers exact without svy weights gave a similar p-value of 0.226.

risk", n = 177, 26%), another by the co-occurrence of VAW with problematic alcohol use (Class 2, "Mid-risk", n = 268, 40%) and the last by the co-occurrence of VAW, problematic alcohol use and sexual risk behaviour (Class 3, "High-risk", n = 232, 34%). We refer to these three latent classes separately as "Lower-risk", "Mid-risk" and "High-risk" and collectively as "health risk subgroups" to aid interpretation hereafter.

3.2. Association with sociodemographic characteristics

As Table 2 shows, the association between health risk subgroup and education was statistically significant. Women experiencing higher levels of risk were less likely to have secondary education compared to women in the lower-risk subgroup. The association between health risk subgroup and food insecurity was also significant, with severe hunger more likely for women in the mid- and high-risk subgroups than for women in the lower-risk subgroup.

3.3. Association with mental ill health and wellbeing indicators

As Table 3 shows, women in the mid- and high-risk subgroups were significantly more likely to report past week depressive symptoms and past 4 weeks suicidal ideation compared to women in the lower-risk subgroup.

3.4. No differential intervention impact

The differential outcomes analysis (Table B.2 in Appendix B) showed that the intervention was not significantly associated with any of the trial outcomes for any of the health risk subgroups at the Bonferroni-adjusted alpha of 0.00104.

3.5. Persistence over time

As we found no evidence of differential intervention impact, women were not split into control and intervention groups for the analysis comparing baseline and endline health risks and mental ill health and wellbeing outcomes. Table 4 shows how much more likely mid and high-risk women were to experience health risks and poor mental health and wellbeing at endline, compared to lower-risk women. Mid-risk women were two to three times more likely to experience IPV at endline than lower-risk women (physical IPV OR 2.81, CI 1.73–4.57; sexual IPV OR 2.25, CI 1.19–4.27; emotional IPV OR 2.78, CI 1.60–4.83; economic IPV OR 3.00, CI 1.88–4.76), and they had an average of 2.08 more points on the controlling behaviours scale (CI 1.24–2.92). High-risk women experienced even more VAW at endline, with odds of IPV around three to four times higher than for lower-risk women (physical IPV OR 4.27, CI 2.57–7.11; sexual IPV OR 3.27, CI 1.86–5.74; emotional IPV OR 3.02, CI 1.83–4.99; economic IPV OR 4.08, CI 2.57–6.46), with an average of 2.69 more points on the controlling behaviours scale, and odds of NPV

2.76 times higher (CI 1.75–4.35).

Compared to women experiencing less risk at baseline, women in the mid- and high-risk subgroups had 2.54 (CI 1.32–4.89) and 3.96 (CI 2.10–7.47) times higher odds of past year problematic alcohol use at endline. Transactional sex with casual and main partners was also more likely for these two subgroups at endline, with again the highest odds seen for those in the high-risk subgroup at baseline (casual partner OR 3.92, CI 2.31–6.64; main partner OR 3.41, CI 2.14–5.45; mid-risk ORs 1.88, CI 1.25–2.84 and 2.07, CI 1.34–3.18).

These persistent health risks were associated with higher chances of depression in the mid-risk (OR 2.18, CI 1.38–3.45) and high-risk (OR 2.19, CI 1.26–3.81) subgroups at endline.

4. Discussion

Our analysis has shown clear intragroup diversity in the health risks of young Black women living in urban informal settlements in Durban, eThekwini Municipality, South Africa. We found that VAW, problematic alcohol use, sexual risk behaviour and mental ill health and wellbeing varied between women, and these differences persisted over time. Specifically, we found that there were three health risk subgroups that were defined by differing levels of risk. While all three subgroups had high rates of emotional/economic IPV, they differed in their levels of the other health risks, so that one was defined by experiencing VAW, another by the co-occurrence of VAW with problematic alcohol use, and the last by the co-occurrence of VAW, problematic alcohol use and sexual risk behaviour. These increasing levels of co-occurrence of health risks represent their interdependent and compounding nature: while all women experienced some risk, the greater co-occurrence in two of the three subgroups resulted in poorer mental health and wellbeing for some women.

Our latent class analysis used a person-centred approach to capture the co-occurring nature of different health risks. Latent class analysis is considered a person-centred approach because it focuses on identifying subgroups or classes of individuals who share similar patterns of health risk factors, rather than solely examining associations between individual risk factors in a variable-centred approach (Bauer, 2022). Other studies have shown that women's sexual risk behaviour, problematic alcohol use, experience of violence, and mental ill health and wellbeing are interrelated (Lundberg et al., 2011; Pengpid and Peltzer, 2020; Pitpitan et al., 2012), including a South African study exploring risk factors for problematic alcohol use using the same dataset as we used here (Ndungu et al., 2020). However, the variable-centred approaches of these studies have just looked at associations between pairs of health risks, with the exploration of interrelations limited to adjusting for an additional health risk as a confounder or mediator. For example, the study exploring risk factors for problematic alcohol use using the same SS/CF dataset mutually adjusted relationships between different health risks, controlling for several of these in the same model to assess

Table 3
Mental ill health and wellbeing associated with health risk subgroups.

		Descriptive associations between health risk subgroups and baseline mental ill health and wellbeing						
	N	Lower-risk		Mid-risk		High-risk		p-value
		n	% or mean (95% CI)	n	% or mean (95% CI)	n	% or mean (95% CI)	
Past week depressive symptoms								
Score of ≤20 (not depressed)	371	128	72.1 (64.4, 78.6)	134	49.6 (41.7, 57.6)	109	46.3 (39.9, 52.8)	**<0.001**
Score of ≥21 (depressed)	306	49	27.9 (21.4, 35.6)	134	50.4 (42.4, 58.3)	123	53.7 (47.2, 60.1)	
Past 4 weeks suicidal ideation								
No	473	142	80.7 (74.9, 85.4)	182	67.6 (61.8, 73.0)	149	64.1 (56.6, 70.9)	**0.003**
Yes	204	35	19.3 (14.6, 25.1)	86	32.4 (27.0, 38.2)	83	36.0 (29.1, 43.4)	
Life satisfaction [a]	677	177	10.3 (9.8, 10.8)	268	9.7 (9.3, 10.1)	232	9.9 (9.4, 10.3)	0.161

N = 677. Adjusted for sample clustering.

[a] Continuous variable, mean shown; views around current life context, lower scores indicate less life satisfaction.

Table 4
Persistence of subgroup health risks and poor mental health and wellbeing over time.

		Bivariate regressions of endline (24 months) health risks and mental ill health and wellbeing indicators and health risk subgroups							
		Mid-risk versus Lower-risk				High-risk versus Lower-risk			
	N	OR/Coef.	95%	CI	p-value	OR/Coef.	95%	CI	p-value
Health risks: VAW									
Past year physical IPV	545	2.81	1.73	4.57	<0.001	4.27	2.57	7.11	<0.001
Past year sexual IPV	545	2.25	1.19	4.27	0.015	3.27	1.86	5.74	<0.001
Past year emotional IPV	545	2.78	1.60	4.83	0.001	3.02	1.83	4.99	<0.001
Past year economic IPV	545	3.00	1.88	4.76	<0.001	4.08	2.57	6.46	<0.001
Controlling behaviours in current/most recent relationship [a]	545	2.08	1.24	2.92	<0.001	2.69	1.82	3.57	<0.001
Past year NPV	545	1.59	0.93	2.75	0.090	2.76	1.75	4.35	<0.001
Health risks: Substance abuse									
Past year problematic alcohol use	484	2.54	1.32	4.89	0.007	3.96	2.10	7.47	<0.001
Health risks: Sexual risk behaviour									
Transactional sex with casual partner in past year	479	1.88	1.25	2.84	0.004	3.92	2.31	6.64	<0.001
Transactional sex with main partner in past year	479	2.07	1.34	3.18	0.002	3.41	2.14	5.45	<0.001
Mental ill health and wellbeing									
Past week depressive symptoms	545	2.18	1.38	3.45	0.002	2.19	1.26	3.81	0.007
Past 4 weeks suicidal ideation	545	1.42	0.79	2.56	0.232	1.23	0.69	2.20	0.469
Life satisfaction [b]	545	−0.62	−1.37	0.13	0.102	−0.04	−0.76	0.67	0.901

Adjusted for sample clustering. OR: Odds ratio for binary variables. Coef.: linear regression coefficient for continuous variables.
[a] Continuous variable with higher scores referring to more controlling behaviour by male partner in primary relationship.
[b] Views around current life context, lower scores indicate less life satisfaction.

independent effects (Ndungu et al., 2020). While such a variable-centred approach provides valuable insights into the associations between specific risk factors, it overlooks the complex interplay and co-occurrence of multiple risk factors within individuals. By using latent class analysis in the present study, we have been able to detect unique combinations of health risks that would not have been observable using standard single variable analyses, or even cumulative indices (Golder et al., 2012; Turpin et al., 2019). The person-centred perspective of latent class analysis has allowed us to model the clustering of *multiple* health risks, rather than looking at health risks in isolation, identifying homogenous subgroups within the population based on their shared risk profiles.

We found that the two subgroups with the greatest co-occurrence of health risks were more likely to be socioeconomically disadvantaged in terms of having less education and greater food insecurity. This speaks to the importance of social factors and structural issues in increasing health risks and resonates with findings from qualitative studies on how women's mental health is closely linked to structural challenges and/or inequities (Burgess and Campbell, 2014; e.g. Mendenhall, 2012; Zamora-Moncayo et al., 2021). For example, a qualitative study with women affected by HIV/AIDS, also set in KwaZulu-Natal province, found that poverty was central to women's accounts of emotional distress, and that concerns over not being able to feed their children were at the heart of their worry and sadness (Burgess and Campbell, 2014).

Our comparison of subgroup endline health risks showed that differences in VAW, problematic alcohol use and sexual risk behaviour remained after 24 months: Lower-risk situations continued for the first subgroup of women, whilst the higher levels of health risk co-occurrence persisted for the higher risk subgroups. Our analysis suggests that there are persistent risk profiles for women, and that latent class analysis is useful for identifying co-occurring risk in this context.

In terms of risk trajectories, in line with previous analyses (Chatterji et al., 2020), our endline analyses show that those at least risk remain at least risk over time, suggesting that both protection (primary prevention) and harm reduction (secondary prevention) initiatives are needed in this context. These persistent risk profiles have implications for how future interventions might work; meaningful change will be unalike for different subgroups of women. As such we need to think critically about the use of language of harm reduction as its applicability is not necessarily universal. In addition, the increased mental health burden associated with co-occurrence across the domains of VAW, problematic

alcohol use and sexual risk behaviour suggests urgent need for mental health intervention in this context. Such interventions would need to be complex and focus on addressing the structural drivers of these health disparities in conjunction with addressing the immediate – and varying – (mental) health needs of individuals (Nelson and Wilson, 2017).

Our analyses suggest that social epidemics such as poverty, racism and gender inequality play into the production of poor health outcomes, including poor mental health. These are the underlying structural issues that need to be addressed in order to protect women's health and reduce harm. Women with more co-occurring health risks were more likely to report symptoms of depression at baseline and endline, and more likely to report suicidal ideation at endline. As already outlined in the introduction, experiencing VAW, problematic alcohol use or risky sexual behaviour is associated with poor mental health outcomes for women in various contexts. This includes South Africa, where for example, a study of Limpopo University students found that women who experienced physical IPV, forced sex, or physical and sexual child abuse were more likely to experience PTSD, and women who experienced forced sex were also more likely to experience depression (Pengpid et al., 2013). Our study has used a person-centred approach to build on these variable-centred analyses to show that greater *co-occurrence* of health risks is associated with worse mental health outcomes, thereby highlighting the inseparability of these health risks from one another, and from their underlying social causes.

How women's mental ill health interplays with other health risks warrants further investigation. For example, a Cape Town study conceptualised poor mental health as linking VAW with sexual risk and found that the association between physical/sexual IPV and sexual risk behaviour was mediated through alcohol use, but not mental health problems (Pitpitan et al., 2012). We did not test for mediation in our study so cannot be sure exactly how health risks and mental ill health and wellbeing outcomes are interrelated, but both our baseline and endline analyses suggest that poor mental health, particularly depression, is an important sequalae of the other health risks. However, the relationships between poor mental health and VAW, problematic alcohol use and sexual risk behaviour are likely bi-directional, and the contexts which drive these co-occurring health risks are historically embedded, meaning they will have been there the women's entire lives. Poor mental health is therefore structurally determined, yet also serves to further entrench inequalities, with poverty and depression intricately tied in a reinforcing cycle (Lund and Cois, 2018; Mal-Sarkar et al., 2021).

The interplay of different aspects of mental ill health is also important to consider, and future research would benefit from the use of more sensitive mental health measures and tools which account for mental health co-morbidities.

Although original analyses of the SS/CF intervention found no impact on women's experiences of IPV or HIV-risk behaviour (Gibbs et al., 2020c), they showed a suggestive impact on reducing depression in the per protocol analysis. Whilst this potential mental health benefit may seem promising, our analyses found no evidence that the intervention helped to mitigate against health-risk co-occurrence. We found no differential impact by risk grouping in VAW, problematic alcohol use, sexual risk behaviour, or mental ill health and wellbeing.

In urban informal settlements in South Africa, young Black women face multiple intersecting oppressions, including poverty and racism. These social inequities interplay to create a clustering of health risks that ties together social and biological risk in deep and pervasive ways. The uncertainty inherent in the precarious living situations of many young Black South African women living in urban informal settlements is likely associated with high levels of stress (Zerbo et al., 2020), which in turn may go some way in explaining their relatively high levels of VAW, problematic alcohol use, HIV (and associated sexual risk behaviours), and mental health burdens (Pakhomova et al., 2021). Structural violence feeds interpersonal violence, and women's health and wellbeing need to be considered as outcomes of multiple interacting social axes of oppression (Weiss, 2021).

We used a quantitative approach to explore the co-occurrence of health risks and poor mental health in this population. We acknowledge this may be criticised for its potential to homogenise populations and appreciate intersectionality theory as a potential alternative (Sangaramoorthy and Benton, 2021; Weiss, 2021). An intersectional and qualitative approach could be useful in unpacking some of the individualised trajectories arising from our research and may help to explore the complex dynamics, ideologies and institutions that are shaping this diverse group of women's health risks in the first place (Sangaramoorthy and Benton, 2021).

4.1. Limitations

Novel insights notwithstanding, this study has several important limitations. Firstly, all study measures relied on self-report, making them subject to reporting bias, although this was likely minimised through the ACASI administration to some extent (Fenton et al., 2001). In addition, the SS/CF trial was not designed to conduct the current study's subgroup analysis and therefore our results must be seen as exploratory. Relatedly, the small sample sizes make it harder to detect a treatment effect by subgroup (Espinoza et al., 2014), which may explain the null differential trial impact results; although latent class analysis mitigates this power issue to some extent (Lanza and Rhoades, 2013). Subgroup analyses are critical to unpacking trial results and future trials should plan for these types of analyses to ensure adequate sample sizes for all subgroups of interest (Barraclough and Govindan, 2010; Espinoza et al., 2014). Lastly, whilst our use of LCA has effectively highlighted the clustering of multiple and varied health risks in this population, i.e., the extent to which VAW, problematic alcohol use, sexual risk behaviour and poor mental health (and their social antecedents) co-occur, we have not looked at the specific interactions between these different components, nor have we explored individual and population level interactions. Future longitudinal qualitative and ethnographic research would be well suited to explore the synergies between these different components and future quantitative research on this topic would benefit from modelling interaction effects in a multilevel and/or structural equation model framework to further unpack synergies between these different domains (Mendenhall and Singer, 2020; Tsai, 2018; Tsai et al., 2017b).

4.2. Recommendations

The complex interplay of health risks observed among young women living in urban informal settlements in our study has implications for participant recruitment and intervention design.

Firstly, the identification of three distinct health risk subgroups allows for more targeted and efficient participant recruitment. By understanding the different risk profiles of individuals, researchers and programme implementers can focus their efforts on recruiting participants who match specific risk profiles. For instance, individuals from the "lower-risk" subgroup might require less intensive interventions or preventive efforts, while those from the "mid-risk" and "high-risk" subgroups might require more tailored and intensive support. This targeted approach can lead to higher participant engagement and intervention adherence, as individuals feel that their specific needs are being addressed.

Secondly, our findings suggest that health risks in the "mid-risk" and "high-risk" subgroups are more persistent over time, indicating the need for longer and more sustained interventions for these groups. Tailoring interventions based on risk categories can involve designing specific modules or components that address the unique needs of each subgroup. For example, individuals in the "mid-risk" and "high-risk" subgroups may benefit from interventions that focus on building coping mechanisms, resilience, and enhancing social support networks. On the other hand, individuals in the "lower-risk" subgroup may require more targeted approaches to maintain their lower risk status or prevent any potential increase in risk over time. In addition, individuals in the "mid-risk" and "high-risk" subgroups may require longer-term interventions to address the complex interplay of their health risks. Short-term interventions may not be sufficient to produce lasting effects for these subgroups. In contrast, individuals in the "lower-risk" subgroup may benefit from shorter, focused interventions that aim to consolidate their lower-risk status or prevent the escalation of risk factors. The identification of different risk categories also highlights the importance of ongoing monitoring and evaluation of intervention outcomes. By tracking participants' progress and response to interventions over time, programme implementers can identify whether interventions are effective for each subgroup and make necessary adjustments based on their evolving needs.

Stepping Stones and Creating Futures was a gender-transformative and livelihoods strengthening intervention designed to address some of the underlying drivers of violence against women and poor health outcomes in the South African context, focussed on empowering women, challenging harmful gender norms, and providing livelihood support to improve economic opportunities (Gibbs and Washington, 2018). Although original analyses (Gibbs et al., 2020c) and the current findings suggest limited impact on women's health risks, there are core components of this kind of intervention that would be particularly valuable to carry forward and strengthen. In fact, building on the learnings from the original SS/CF trial, the project team have gone on to co-develop an intervention with young people in this context (*The Siyaphambili Youth – Youth Moving Forward – Project*), which hopes to have more of a positive impact on health outcomes and reduce health risk co-occurrence.

Engaging the community in the design, implementation, and evaluation of interventions is essential for their success. Community-driven participatory interventions can better reflect the needs and aspirations of the target population, leading to higher levels of acceptance and engagement (Wilson, 2019). The *Siyaphambili Youth* project has worked with young peer research assistants to understand how interventions like SS/CF can be built upon to work better for them (Mannell et al., 2023). In doing so, this new co-produced intervention will hopefully be responsive to the needs of different subgroups, such as the three health risk subgroups identified in the current study. The diversity of health experiences uncovered in our paper highlights that acknowledging the unique experiences and needs of subgroups within the target population is crucial. Intersectional approaches that consider the multiple axes of

oppression and their intersections can help tailor interventions to address the specific vulnerabilities, and strengths, of different groups.

Furthermore, to address the underlying structural issues contributing to health disparities, interventions should also tackle broader social determinants of health, such as poverty, racism, and inadequate access to resources. Structural interventions might include policies aimed at reducing income inequality, improving access to education and healthcare, and addressing racial discrimination alongside the gender inequality mainstay of violence against women prevention initiatives.

As this analysis shows, given the inseparability of mental health from other health risks, it is essential to prioritise mental health support within interventions (Keynejad et al., 2020; Tol et al., 2019). Integrating mental health services and packages such as Problem Management Plus (World Health Organization, 2018) and similar interventions can help address depression and other mental health issues that may arise from the interplay of various health risks and structural inequities. These services should be culturally sensitive and tailored to the specific needs of different subgroups within the population. Moreover, as we have done in *The Siyaphambili Youth Project* intervention, it may be helpful to integrate mental health focussed activities within intervention sessions, and these can be focused on building good mental health, not just on treating poor mental health after the fact.

Considering the co-occurrence of problematic alcohol use with other health risks observed in this study (particularly its tight link with physical and sexual IPV experience), interventions that address substance abuse and promote harm reduction strategies are vital. These programmes should include access to substance abuse treatment services, education on the risks associated with substance use, and harm reduction initiatives to minimise the negative consequences of risky behaviours, whilst also recognising that not all drinking is problematic. Drinking alcohol can be a form of self-medication but is also often a social activity that helps young people forge new relationships and connect into their support networks, as recent research with young people in this context has shown (Brown et al., n.d.). Understanding the differences between this kind of drinking and harmful drinking and the costs and benefits of both types might be a useful topic for discussion in intervention activities.

Relatedly, strengthening social support networks and promoting community empowerment can enhance resilience and coping mechanisms among young women facing multiple health risks (Mannell and Dadswell, 2017; Ogbe et al., 2020). Such empowerment and social support programmes can foster a sense of belonging and social cohesion, providing a supportive environment for individuals to navigate their health challenges, as well as potentially buffering their impact. Interventions that work with strengthening the existing social capital of young people by working with their friendship groups may be particularly promising (an approach we are also undertaking in *The Siyaphambili Youth Project*).

In summary, valuable programming and interventions for young women living in urban informal settlements should take a holistic approach, addressing both individual health risks and the structural forces shaping these risks. By following a participatory approach to co-produce interventions, integrating mental health and substance use support into violence prevention programmes and building social capital, we can create comprehensive and effective strategies to improve the health and well-being of these women. Adopting an intersectional lens and tailoring interventions to the unique needs of different subgroups within the population will further enhance their impact and contribute to reducing health risk co-occurrence in this vulnerable context.

4.3. Conclusions

Subgroup analyses are helpful for exploring heterogeneity, and in this case, they have helped to explicate variation in health risk co-occurrence even at a small geospatial scale. Understanding these differences is important to help inform future programme design and delivery, and to ensure that the diversity and severity of women's experiences is accounted for. Our study showed that in this context women could be split broadly into three levels of health risk, with increasing levels of co-occurrence of the interrelated epidemics of violence against women, problematic alcohol use and sexual risk. For some women, this created a situation of sustained health risks and poor mental health that persisted two years later. Our findings highlight the importance of integrating mental ill health into health risk analyses and intervention design, in order to acknowledge and account for its inseparability, not only from these other health risks, but from the social dynamics that underpin them. Moving away from simply individualising poor health outcomes, interventions should try to tackle some of the underlying structural drivers of these health inequalities. Stepping Stones and Creating Futures, a combined gender-transformative and livelihoods intervention, addressed gender inequality and poverty, two key drivers, and future structural interventions could additionally address issues such as racism head on too. Structural problems can, and should be, considered simultaneously alongside the immediate (mental) health needs of individuals. These individual health needs vary, as our analyses have shown, and future interventions may be more effective if tailored according to pre-existing health risks and designed to address varying primary and secondary prevention needs, ensuring that mental health is also prioritised.

Ethics approval

The study was approved by the Biomedical Research Ethics Committee (BREC) at the University of KwaZulu-Natal, Durban, South Africa (BFC043/15) and the South African Medical Research Council Ethics Committee (EC006–2/2015).

Consent to participate

Participants provided written informed consent prior to participation in the study.

Availability of data and material (data transparency)

Data are available in a public, open access repository. De-identified data sets for the project are available from http://medat.samrc.ac.za/index.php/catalog/WW managed by the South African Medical Research Council.

Code availability (software application or custom code)

Example Stata syntax is provided in the supplementary material and full analysis code is available upon request.

CRediT authorship contribution statement

Laura J. Brown: Conceptualization, Methodology, Formal analysis, Writing – original draft, Visualization, Project administration. **Tarylee**

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssmmh.2023.100273.

References

Assaf, S., Mallick, L., 2017. Event-based analysis of the association between alcohol use and unsafe sex in seven sub-Saharan African countries. Int. J. Alcohol Drug Res. 7, 1–9. https://doi.org/10.7895/ijadr.245.

Barraclough, H., Govindan, R., 2010. Biostatistics primer: what a clinician ought to know: subgroup analyses. J. Thorac. Oncol. 5, 741–746. https://doi.org/10.1097/JTO.0b013e3181d9009e.

Bauer, J., 2022. A primer to latent profile and latent class analysis. In: Goller, M., Kyndt, E., Paloniemi, S., Damşa, C. (Eds.), Methods for Researching Professional Learning and Development. Professional and Practice-Based Learning. Springer, pp. 243–268. https://doi.org/10.1007/978-3-031-08518-5_11.

Bell, G.J., Ncayiyana, J., Sholomon, A., Goel, V., Zuma, K., Emch, M., 2022. Race, place, and HIV: the legacies of apartheid and racist policy in South Africa. Soc. Sci. Med. 296, 114755 https://doi.org/10.1016/j.socscimed.2022.114755.

Brown, L.J., Mannell, J., Washington, L., Khaula, S., Gibbs, A., n.d. "Something that we can all share": exploring the social significance of food insecurity for young people in KwaZulu-Natal, South Africa. PLOS Global Public Health (under review)..

Burgess, R., Campbell, C., 2014. Contextualising women's mental distress and coping strategies in the time of AIDS: a rural South African case study. Transcult. Psychiatr. 51, 875–903. https://doi.org/10.1177/1363461514526925.

Campbell, J.C., Baty, M.L., Ghandour, R.M., Stockman, J.K., Francisco, L., Wagman, J., 2008. The intersection of intimate partner violence against women and HIV/AIDS: a review. Int. J. Inj. Control Saf. Promot. 15, 221–231. https://doi.org/10.1080/17457300802423224.

Centre for the Study of Violence and Reconciliation, 2016. Mapping Local Gender-Based Violence Prevention and Response Strategies in South Africa. Cape Town.

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

Coates, J., Swindale, A., Bilinsky, P., 2007. Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access. Indicator Guide. In: Food and Nutrition Technical Assistance Project. Washington, DC.

Coovadia, H., Jewkes, R., Barron, P., Sanders, D., McIntyre, D., 2009. The health and health system of South Africa: historical roots of current public health challenges. Lancet 374, 817–834. https://doi.org/10.1016/S0140-6736(09)60951-X.

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

Diener, E., Emmons, R.A., Larsen, R.J., Griffin, S., 1985. The satisfaction with life scale. J. Pers. Assess. 49, 71–75. https://doi.org/10.1207/s15327752jpa4901_13.

Dunkle, K.L., Jewkes, R.K., Nduna, M., Levin, J., Jama, N., Khuzwayo, N., Koss, M.P., Duvvury, N., 2006. Perpetration of partner violence and HIV risk behaviour among young men in the rural Eastern Cape, South Africa. AIDS 20, 2107–2114. https://doi.org/10.1097/01.aids.0000247582.00826.52.

Dunkle, K.L., Jewkes, R., Nduna, M., Jama, N., Levin, J., Sikweyiya, Y., Koss, M.P., 2007. Transactional sex with casual and main partners among young South African men in the rural Eastern Cape: prevalence, predictors, and associations with gender-based violence. Soc. Sci. Med. 65, 1235–1248. https://doi.org/10.1016/j.socscimed.2007.04.029.

Espinoza, M.A., Manca, A., Claxton, K., Sculpher, M.J., 2014. The value of heterogeneity for cost-effectiveness subgroup analysis. Med. Decis. Making 34, 951–964. https://doi.org/10.1177/0272989X14538705.

Fenton, K.A., Johnson, A.M., McManus, S., Erens, B., 2001. Measuring sexual behaviour: methodological challenges in survey research. Sex. Transm. Infect. 77, 84–92. https://doi.org/10.1136/sti.77.2.84.

Fritz, K., Morojele, N., Kalichman, S., 2010. Alcohol: the forgotten drug in HIV/AIDS. Lancet 376, 398–400. https://doi.org/10.1016/S0140-6736(10)60884-7.

Garcia-Moreno, C., Jansen, H.A.F.M., Ellsberg, M., Heise, L., Watts, C., 2005. WHO Multi-Country Study on Women's Health and Domestic Violence against Women: Report on the First Results. Geneva.

Garcia-Moreno, C., Jansen, H.A., Ellsberg, M., Heise, L., Watts, C.H., 2006. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. Lancet 368, 1260–1269. https://doi.org/10.1016/S0140-6736(06)69523-8.

Geronimus, A.T., James, S.A., Destin, M., Graham, L.F., Hatzenbuehler, M.L., Murphy, M.C., Pearson, J.A., Omari, A., Thompson, J.P., 2016. Jedi public health: co-creating an identity-safe culture to promote health equity. SSM Popul. Health. https://doi.org/10.1016/j.ssmph.2016.02.008.

Gibbs, A., Washington, L., 2018. Stepping Stones and Creating Futures: an Evidence-Based Intervention to Prevent Violence against Women and Improve Livelihoods.

Gibbs, A., Washington, L., Willan, S., Ntini, N., Khumalo, T., Mbatha, N., Sikweyiya, Y., Shai, N., Chirwa, E., Strauss, M., Ferrari, G., Jewkes, R., 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 Publ. Health 17, 1–15. https://doi.org/10.1186/s12889-017-4223-x.

Gibbs, A., Abdelatif, N., Washington, L., Chirwa, E., Willan, S., Shai, N., Sikweyiya, Y., Jewkes, R., 2020a. Differential impact on men in an IPV prevention intervention: a post hoc analysis using latent class analysis of the Stepping Stones and Creating Futures intervention in South Africa. Soc. Sci. Med. 265, 113538 https://doi.org/10.1016/j.socscimed.2020.113538.

Gibbs, A., Reddy, T., Dunkle, K., Jewkes, R., 2020b. HIV-Prevalence in South Africa by settlement type: a repeat population-based cross-sectional analysis of men and women. PLoS One 15, e0230105. https://doi.org/10.1371/journal.pone.0230105.

Gibbs, A., Washington, L., Abdelatif, N., Chirwa, E., Willan, S., Shai, N., Sikweyiya, Y., Mkhwanazi, S., Ntini, N., Jewkes, R., 2020c. Stepping Stones and creating futures intervention to prevent intimate partner violence among young people: cluster randomized controlled trial. J. Adolesc. Health 66, 323–335. https://doi.org/10.1016/j.jadohealth.2019.10.004.

Golder, S., Connell, C.M., Sullivan, T.P., 2012. Psychological distress and substance use among community-recruited women currently victimized by intimate partners. Violence Against Women 18, 934–957. https://doi.org/10.1177/1077801212456991.

Greene, M.C., Heise, L., Musci, R.J., Wirtz, A.L., Johnson, R., Leoutsakos, J.-M., Wainberg, M.L., Tol, W.A., 2021. Improving estimation of the association between alcohol use and intimate partner violence in low-income and middle-income countries. Inj. Prev. 27, 221–226. https://doi.org/10.1136/injuryprev-2019-043433.

Hallquist, M.N., Wright, A.G.C., 2014. Mixture modeling methods for the assessment of normal and abnormal personality, Part I: cross-sectional models. J. Pers. Assess. 96, 256–268. https://doi.org/10.1080/00223891.2013.845201.

Hatcher, A.M., Gibbs, A., McBride, R.-S., Rebombo, D., Khumalo, M., Christofides, N.J., 2019. Gendered syndemic of intimate partner violence, alcohol misuse, and HIV risk among peri-urban, heterosexual men in South Africa. Soc. Sci. Med. 112637 https://doi.org/10.1016/j.socscimed.2019.112637.

Jewkes, R., Morrell, R., 2018. Hegemonic masculinity, violence, and gender equality: using latent class analysis to investigate the origins and correlates of differences between men. Men Masculinities 21, 547–571. https://doi.org/10.1177/1097184X17696171.

Jewkes, R.K., Dunkle, K., Nduna, M., Shai, N., 2010. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. Lancet 376, 41–48. https://doi.org/10.1016/S0140-6736(10)60548-X.

Jewkes, R., Jordaan, E., Myrttinen, H., Gibbs, A., 2020. Masculinities and violence: using latent class analysis to investigate the origins and correlates of differences between men in the cross-sectional UN Multi-country Study on men and violence in Asia and the Pacific. J. Glob. Health 10. https://doi.org/10.7189/jogh.10.020439.

Keynejad, R.C., Hanlon, C., Howard, L.M., 2020. Psychological interventions for common mental disorders in women experiencing intimate partner violence in low-income

and middle-income countries: a systematic review and meta-analysis. Lancet Psychiatr. 7, 173–190. https://doi.org/10.1016/S2215-0366(19)30510-3.

Lanza, S.T., Rhoades, B.L., 2013. Latent class analysis: an alternative perspective on subgroup analysis in prevention and treatment. Prev. Sci. 14, 157–168. https://doi.org/10.1007/s11121-011-0201-1.

Lanza, S.T., Dziak, J.J., Huang, L., Wagner, A.T., Collins, L.M., 2015. LCA Stata Plugin Users' Guide. The Pennsylvania State Univeristy, Penn State, Version 1.2.

Lo, Y., Mendell, N.R., Rubin, D.R., 2001. Testing the number of components in a normal mixture. Biometrika 88, 767–778. https://doi.org/10.1093/biomet/88.3.767.

Lund, C., Cois, A., 2018. Simultaneous social causation and social drift: longitudinal analysis of depression and poverty in South Africa. J. Affect. Disord. 229, 396–402. https://doi.org/10.1016/j.jad.2017.12.050.

Lundberg, P., Rukundo, G., Ashaba, S., Thorson, A., Allebeck, P., Östergren, P.-O., Cantor-Graae, E., 2011. Poor mental health and sexual risk behaviours in Uganda: a cross-sectional population-based study. BMC Publ. Health 11, 125. https://doi.org/10.1186/1471-2458-11-125.

Mabaso, M., Sokhela, Z., Mohlabane, N., Chibi, B., Zuma, K., Simbayi, L., 2018. Determinants of HIV infection among adolescent girls and young women aged 15-24 years in South Africa: a 2012 population-based national household survey. BMC Publ. Health 18, 1–7. https://doi.org/10.1186/s12889-018-5051-3.

Mabaso, M., Makola, L., Naidoo, I., Mlangeni, L.L., Jooste, S., Simbayi, L., 2019. HIV prevalence in South Africa through gender and racial lenses: results from the 2012 population-based national household survey. Int. J. Equity Health 18, 167. https://doi.org/10.1186/s12939-019-1055-6.

Mal-Sarkar, T., Keyes, K., Koen, N., Barnett, W., Myer, L., Rutherford, C., Zar, H.J., Stein, D.J., Lund, C., 2021. The relationship between childhood trauma, socioeconomic status, and maternal depression among pregnant women in a South African birth cohort study. SSM Popul. Health 14, 100770. https://doi.org/10.1016/j.ssmph.2021.100770.

Mannell, J., Dadswell, A., 2017. Preventing intimate partner violence: towards a framework for supporting effective community mobilisation. J. Community Appl. Soc. Psychol. 27, 196–211. https://doi.org/10.1002/casp.2297.

Mannell, J., Willan, S., Shahmanesh, M., Seeley, J., Sherr, L., Gibbs, A., 2019. Why interventions to prevent intimate partner violence and HIV have failed young women in southern Africa. J. Int. AIDS Soc. 22, 1–6. https://doi.org/10.1002/jia2.25380.

Mannell, J., Lowe, H., Brown, L., Mukerji, R., Devakumar, D., Gram, L., Jansen, H.A.F.M., Minckas, N., Osrin, D., Prost, A., Shannon, G., Vyas, S., 2022. Risk factors for violence against women in high-prevalence settings: a mixed-methods systematic review and meta-synthesis. BMJ Glob. Health 7, e007704. https://doi.org/10.1136/bmjgh-2021-007704.

Mannell, J., Washington, L., Khaula, S., Khoza, Z., Mkhwanazi, S., Burgess, R.A., Brown, L.J., Jewkes, R., Shai, N., Willan, S., Gibbs, A., 2023. Challenges and opportunities in coproduction: reflections on working with young people to develop an intervention to prevent violence in informal settlements in South Africa. BMJ Glob. Health 8, e011463. https://doi.org/10.1136/bmjgh-2022-011463.

Mashaphu, S., Wyatt, G.E., Gomo, E., Tomita, A., 2018. Intimate partner violence among HIV-serodiscordant couples in Durban, South Africa. S. Afr. Med. J. 108, 960–964. https://doi.org/10.7196/SAMJ.2018.v108i11.13095.

McEwen, C.A., McEwen, B.S., 2017. Social structure, adversity, toxic stress, and intergenerational poverty: an early childhood model. Annu. Rev. Sociol. 43, 445–472. https://doi.org/10.1146/annurev-soc-060116-053252.

Mchugh, R.K., Weiss, R.D., 2019. Alcohol use disorder and depressive disorders. Alcohol Res 40, e1–e8. https://doi.org/10.35946/arcr.v40.1.01.

Mendenhall, E., 2012. Syndemic Suffering: Social Distress, Depression, and Diabetes Among Mexican Immigrant Women, first ed. Routledge. https://doi.org/10.4324/9781315419459.

Mendenhall, E., Singer, M., 2020. What constitutes a syndemic? Methods, contexts, and framing from 2019. Curr. Opin. HIV AIDS 15, 213–217. https://doi.org/10.1097/COH.0000000000000628.

Mkhwanazi, S., Gibbs, A., 2021. Risk factors for generalized anxiety disorder among young women and men in informal settlements in South Africa: a cross-sectional study. SSM - Mental Health 1, 100010. https://doi.org/10.1016/j.ssmmh.2021.100010.

Muula, A.S., 2008. HIV infection and AIDS among young women in South Africa. Croat. Med. J. 49, 423–435. https://doi.org/10.3325/cmj.2008.3.423.

Nagin, D.S., 2005. Group-Based Modeling of Development. Harvard University Press, Cambridge, Massachusetts; London, England.

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 Publ. Health 15, 1322–1336. https://doi.org/10.1080/17441692.2020.1775866.

Nelson, S.E., Wilson, K., 2017. The mental health of Indigenous peoples in Canada: a critical review of research. Soc. Sci. Med. 176, 93–112. https://doi.org/10.1016/j.socscimed.2017.01.021.

Ng, W., 2018. Lo–Mendell–Rubin Adjusted Likelihood Ratio Test and Wald Test [WWW Document]. Statalist - The Stata Forum. URL. https://www.statalist.org/forums/forum/general-stata-discussion/general/1438666-lo–mendell–rubin-adjusted-likelihood-ratio-test-and-wald-test/page2. accessed 7.8.20.

Ng, W., 2019. Predictors of Class Membership with Latent Class Analysis [WWW Document]. Statalist - The Stata Forum. URL. https://www.statalist.org/forums/forum/general-stata-discussion/general/1490812-predictors-of-class-membership-with-latent-class-analysis. accessed 2.7.21.

Ng, W., Schechter, C., 2017. Calculating entropy for LCA (latent class analysis) in STATA 15 - Statalist [WWW Document]. Statalist - The Stata Forum. URL. https://www.statalist.org/forums/forum/general-stata-discussion/general/1412686-calculating-entropy-for-lca-latent-class-analysis-in-stata-15. accessed 9.25.18.

Ogbe, E., Harmon, S., Van den Bergh, R., Degomme, O., 2020. A systematic review of intimate partner violence interventions focused on improving social support and/mental health outcomes of survivors. PLoS One 15, e0235177. https://doi.org/10.1371/journal.pone.0235177.

Oram, S., Khalifeh, H., Howard, L.M., 2017. Violence against women and mental health. Lancet Psychiatr. https://doi.org/10.1016/S2215-0366(16)30261-9.

Pakhomova, T.E., Dietrich, J.J., Closson, K., Smit, J., Hornschuh, S., Smith, P., Beksinska, M., Ndung'u, T., Brockman, M., Gray, G., Kaida, A., 2021. Intimate partner violence, depression, and anxiety are associated with higher perceived stress among both young men and women in soweto and durban, South Africa. Front. Reprod. Health 3, 1–12. https://doi.org/10.3389/frph.2021.638116.

Pengpid, S., Peltzer, K., 2020. Associations of physical partner violence and sexual violence victimization on health risk behaviours and mental health among university students from 25 countries. BMC Publ. Health 20, 937. https://doi.org/10.1186/s12889-020-09064-y.

Pengpid, S., Peltzer, K., Skaal, L., 2013. Mental health and HIV sexual risk behaviour among University of Limpopo students. S. Afr. J. Psychiatr. 19, 25–30. https://doi.org/10.7196/SAJP.415.

Petersen, I., Fairall, L., Bhana, A., Kathree, T., Selohilwe, O., Brooke-Sumner, C., Faris, G., Breuer, E., Sibanyoni, N., Lund, C., Patel, V., 2016. Integrating mental health into chronic care in South Africa: the development of a district mental healthcare plan. Br. J. Psychiatry 208, s29–s39. https://doi.org/10.1192/bjp.bp.114.153726.

Pitpitan, E.V., Kalichman, S.C., Eaton, L.A., Sikkema, K.J., Watt, M.H., Skinner, D., 2012. Gender-based violence and HIV sexual risk behavior: alcohol use and mental health problems as mediators among women in drinking venues, Cape Town. Soc. Sci. Med. 75, 1417–1425. https://doi.org/10.1016/j.socscimed.2012.06.020.

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

Radloff, L.S., 1977. The CES-D scale. Appl. Psychol. Meas. 1, 385–401. https://doi.org/10.1177/014662167700100306.

Ramsoomar, L., Gibbs, A., Chirwa, E.D., Dunkle, K., Jewkes, R., 2021. Pooled analysis of the association between alcohol use and violence against women: evidence from four violence prevention studies in Africa. BMJ Open 11, 1–11. https://doi.org/10.1136/bmjopen-2021-049282.

Rao, J.N.K., Scott, A.J., 1984. On chi-squared tests for multiway contingency tables with cell proportions estimated from survey data. Ann. Stat. 12 https://doi.org/10.1214/aos/1176346391.

Rotheram-Borus, M.J., Weichle, T.W., Wynn, A., Almirol, E., Davis, E., Stewart, J., Gordon, S., Tubert, J., Tomlinson, M., 2019. Alcohol, but not depression or IPV, reduces HIV adherence among South African mothers living with HIV over 5 years. AIDS Behav. 23, 3247–3256. https://doi.org/10.1007/s10461-019-02617-2.

Russell, B.S., Eaton, L.A., Petersen-Williams, P., 2013. Intersecting epidemics among pregnant women: alcohol use, interpersonal violence, and HIV infection in South Africa. Curr. HIV AIDS Rep. 10, 103–110. https://doi.org/10.1007/s11904-012-0145-5.

Rwafa-Ponela, T., McBride, R.-S., Rebombo, D., Christofides, N., Hatcher, A., 2022. HIV non-testing, perpetration of violence against women, and sexual risk-behaviour: a cross-sectional analysis of South African peri-urban township men. Global Publ. Health 17, 512–525. https://doi.org/10.1080/17441692.2021.1876134.

Sangaramoorthy, T., Benton, A., 2021. Intersectionality and syndemics: a commentary. Soc. Sci. Med. 113783 https://doi.org/10.1016/j.socscimed.2021.113783.

Saunders, J.B., Aasland, O.G., Babro, 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, 791–804. https://doi.org/10.1111/j.1360-0443.1993.tb02093.x.

Shuper, P.A., Neuman, M., Kanteres, F., Baliunas, D., Joharchi, N., Rehm, J., 2010. Causal considerations on alcohol and HIV/AIDS – A systematic review. Alcohol Alcohol 45, 159–166. https://doi.org/10.1093/alcalc/agp091.

Silverwood, R.J., Nitsch, D., Pierce, M., Kuh, D., Mishra, G.D., 2011. Characterizing longitudinal patterns of physical activity in mid-adulthood using latent class analysis: results from a prospective cohort study. Am. J. Epidemiol. 174, 1406–1415. https://doi.org/10.1093/aje/kwr266.

Snyder, S.M., Monroe, C.R., 2013. Do child physical abuse and adolescent peer relationships influence typologies of illegal and substance-use behaviors during emerging adulthood? J. Soc. Soc. Work. Res. 4, 214–244. https://doi.org/10.5243/jsswr.2013.15.

StataCorp, n.d. Latent Class Analysis (LCA) [WWW Document]. New in Stata release 15. URL https://www.stata.com/new-in-stata/latent-class-analysis/(accessed 9.5.18)..

The Housing Development Agency, 2012. KwaZulu-Natal: Informal Settlements Status. Johannesburg.

The Lancet, 2017. Syndemics: health in context. Lancet 389, 881. https://doi.org/10.1016/S0140-6736(17)30640-2.

Tol, W.A., Murray, S.M., Lund, C., Bolton, P., Murray, L.K., Davies, T., Haushofer, J., Orkin, K., Witte, M., Salama, L., Patel, V., Thornicroft, G., Bass, J.K., 2019. Can mental health treatments help prevent or reduce intimate partner violence in low-and middle-income countries? A systematic review. BMC Wom. Health https://doi.org/10.1186/s12905-019-0728-z.

Tsai, A.C., 2018. Syndemics: a theory in search of data or data in search of a theory? Soc. Sci. Med. 206, 117–122. https://doi.org/10.1016/j.socscimed.2018.03.040.

Tsai, A.C., Mendenhall, E., Trostle, J.A., Kawachi, I., 2017a. Co-occurring epidemics, syndemics, and population health. Lancet 389, 978–982. https://doi.org/10.1016/S0140-6736(17)30403-8.

Tsai, A.C., Mendenhall, E., Trostle, J.A., Kawachi, I., 2017b. Co-occurring epidemics, syndemics, and population health. Lancet. https://doi.org/10.1016/S0140-6736(17)30403-8.

Turpin, R.E., Slopen, N., Chen, S., Boekeloo, B., Dallal, C., Dyer, T., 2019. Latent class analysis of a syndemic of risk factors on HIV testing among black men. AIDS Care - Psychol. Socio-Medical Aspects AIDS/HIV 31, 216–223. https://doi.org/10.1080/09540121.2018.1524117.

Uebersax, J., 2009. Modeling conditional dependence | the joint item method [WWW document]. A practical guide to conditional dependence in latent class models. https://www.john-uebersax.com/stat/condep.htm#joint accessed 3.15.22.

Wamoyi, J., Stobeanau, K., Bobrova, N., Abramsky, T., Watts, C., 2016. Transactional sex and risk for HIV infection in sub-Saharan Africa: a systematic review and meta-analysis: a. J. Int. AIDS Soc. 19 https://doi.org/10.7448/IAS.19.1.20992.

Weiss, N.M., 2021. A critical perspective on syndemic theory and social justice. Public Anthropologist 3, 285–317. https://doi.org/10.1163/25891715-bja10022.

Wilsnack, S.C., Wilsnack, R.W., Kantor, L.W., 2013. Focus on: women and the costs of alcohol use. Alcohol Res 35, 219–228.

Wilson, E., 2019. Community-based participatory action research. Handbook of Research Methods in Health Social Sciences 285–298. https://doi.org/10.1007/978-981-10-5251-4_87.

World Health Organization, 2005. Alcohol Use and Sexual Risk Behaviour: A Cross-Cultural Study in Eight Countries. Geneva.

World Health Organization, 2018. Problem Management Plus (PM+): Individual Psychological Help for Adults Impaired by Distress in Communities Exposed to Adversity. Geneva.

Yakubovich, A.R., Stöckl, H., Murray, J., Melendez-Torres, G.J., Steinert, J.I., Glavin, C. E.Y., Humphreys, D.K., 2018. Risk and protective factors for intimate partner violence against women: systematic review and meta-analyses of prospective–longitudinal studies. Am. J. Publ. Health 108, e1–e11. https://doi.org/10.2105/AJPH.2018.304428.

Zamora-Moncayo, E., Burgess, R.A., Fonseca, L., González-Gort, M., Kakuma, R., 2021. Gender, mental health and resilience in armed conflict: listening to life stories of internally displaced women in Colombia. BMJ Glob. Health 6, e005770. https://doi.org/10.1136/bmjgh-2021-005770.

Zerbo, A., Delgado, R.C., González, P.A., 2020. Vulnerability and everyday health risks of urban informal settlements in Sub-Saharan Africa. Glob. Health J. 4, 46–50. https://doi.org/10.1016/j.glohj.2020.04.003.