SSM - Mental Health 1 (2021) 100010

Contents lists available at ScienceDirect

SSM - Mental Health

journal homepage: www.journals.elsevier.com/ssm-mental-health

Risk factors for generalized anxiety disorder among young women and men in informal settlements in South Africa: A cross-sectional study

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ARTICLE INFO

Keywords:
Young people
Gender
Violence
Poverty
Generalized anxiety

ABSTRACT

Generalized anxiety disorder (GAD) is common globally, particularly among young people, but limited research has been done on the risk factors for GAD especially in low-income settings. We sought to understand risk factors for GAD among young (ages 18–32) women and men from urban informal settlements in Durban, South Africa, enrolled in an intervention trial. Descriptive statistics and multivariable logistic regressions were used to assess risk factors, separately by sex. Using the GAD7 scale, among 484 women, 18.6 % reported moderate or severe symptoms of GAD. In multivariable analysis, moderate or severe GAD symptoms were associated with stealing because of hunger in the past month, stress because of lack of work, experiencing three or more past year experiences of adverse events, and past year experience of intimate partner violence. Among 505 men, 19.6 % reported moderate or severe GAD symptoms. In multivariable analysis, moderate or severe GAD symptoms were associated with stealing because of hunger in the past month, greater adverse childhood experiences, and three or more adverse experiences in the past year. Overall higher GAD symptoms were associated with poverty and violence experience and exposure, addressing these two factors is critical for reducing poor mental health.

1. Introduction

Anxiety disorders, which include excessive worry, social anxiety disorders, agoraphobia, and separation anxiety disorders, are a highly prevalent mental health disorder, and generalized anxiety disorder (GAD) a wider ranging, non-specific form of anxiety, is the sixth leading cause of disability in terms of Years of a Life Lived with Disability (YLDs) (A. Baxter, Vos, Scott, Ferrari, & Whiteford, 2014). Studies have suggested a global prevalence of GAD of 7.3 % (A. J. Baxter, Scott, Vos, & Whiteford, 2013), with research suggesting women are more likely to experience GAD than men (A. J. Baxter et al., 2013), and GAD being more common in later life (Wittchen, 2002).

GAD is associated with a range of poor health outcomes. For instance, studies have demonstrated people with anxiety are more likely to report suicidal behavior (Bolton et al., 2008; Sareen et al., 2005). There is also strong evidence that GAD overlaps with other mental health problems, including major depressive disorders (Stein & Sareen, 2015; Tyrer & Baldwin, 2006), as well as substance misuse, which may be a coping strategy for people experiencing GAD (Fröjd, Ranta, Kaltiala-Heino, & Marttunen, 2011; Kushner, Abrams, & Borchardt, 2000; Stein & Sareen, 2015). These overlapping health challenges makes diagnosis complicated. In addition, GAD is also associated with increased HIV-risk and delayed HIV-care seeking (Chong et al., 2019).

In South Africa, the nationally representative South African Stress and Health (SASH) study found GAD was the most frequent mental health issue reported, with a national prevalence estimated at 8.1 % (Herman et al., 2009). Despite being the most common mental health issue, relatively little research on GAD has been published in South Africa, particularly in general populations. Several studies conducted in self-selecting samples drawn from clinics have explored the prevalence of anxiety. For instance, a study of pregnant women from one clinic (n = 376) in Cape Town, found a prevalence of GAD of 18 % as assessed using the Mini-International Neuropsychiatric Interview (van Heyningen et al., 2017). While a third (30.6 %) of self-selecting respondents attending 12 HIV-clinics in the Free State reported clinically relevant symptoms of anxiety based on the Hospital Anxiety and Depression Scale (Pappin, Wouters, & Booysen, 2012). Finally, in a population based study, among young (14–24 year old) men in a rural community of KwaZulu-Natal, 40.2 % reported potentially clinically relevant symptoms of anxiety as assessed via the Brief Symptom Inventory (Mngoma, Ayonrinde, Fergus, Jeeves, & Jolly, 2020).

Studies globally have broadly identified two main structural drivers

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https://doi.org/10.1016/j.ssmmh.2021.100010
Received 13 May 2021; Received in revised form 22 July 2021; Accepted 22 July 2021
Available online 24 July 2021

of anxiety: poverty, and the experience of violence over the life course. Poverty is a key driver of anxiety disorders (Najman et al., 2010), especially in low- and middle-countries (Lund et al., 2010), and reflects a social causation framing of mental health (Lund et al., 2011). A recent systematic review found food insecurity was associated with increased symptoms of anxiety, with women more affected than men (Trudell, Burnet, Ziegler, & Luginaah, 2021). Studies also highlight how multiple experiences of family poverty are associated with increased anxiety (Najman et al., 2010). More recent research has suggested the association between poverty and anxiety is likely mediated by the stress related to living in poverty (Ridley, Rao, Schilbach, & Patel, 2020). It is also likely that poverty is a marker for living in more marginalized communities, where other risk factors, including community violence, are more prevalent, thus also contributing to increased anxiety. There is also some evidence that anxiety may also lead to increased poverty, as anxiety can limit economic activity (Ridley et al., 2020), sometimes termed the social drift theory of mental health (Lund et al., 2011). Thus, it is likely that there is a bidirectional relationship between poverty and anxiety.

Violence across the lifespan is also a major cause of generalized anxiety. A systematic review found that physical and sexual abuse in childhood was associated with anxiety in later life (Lindert et al., 2014). Similarly, another systematic review assessing the association between childhood experiences of violence among girls found those who experienced physical abuse, sexual abuse and 'unspecified' neglect in childhood, were more likely to experience anxiety in the peri-natal period (Choi & Sikkema, 2016). Other cross-sectional studies have highlighted how among adolescents witnessing of violence and other traumatic experiences in communities (Singer, Anglin, Yu Song, & Lunghofer, 1995) and in the home, including witnessing violence against mothers (Malta, McDonald, Hegadoren, Weller, & Tough, 2012), are associated with greater anxiety. For instance Kennedy, Bybee, Sullivan, and Greeson (2009) found that among children in the USA, aged 8–12 years old, who had witnessed a range of traumatic experiences, including seeing people being attacked, and witnessed their mother being abused, were more likely to be experienced an anxiety disorder. While in adults, studies have shown how women who experience intimate partner violence (IPV) are much more likely to have anxiety disorders (Dillon, Hussain, Loxton, & Rahman, 2013; Fonseca-Machado, Monteiro, Haas, Abrão, & Gomes-Sponholz, 2015).

For men there is some evidence that gender role stress is associated with greater anxiety (Eisler, Skidmore, & Ward, 1988; McCreary, Newcomb, & Sadava, 1998; Zamarripa, Wampold, & Gregory, 2003). Gender role stress refers to the stress men feel from being unable to achieve socially approved forms of what it means to be a man (McCreary et al., 1998). In contexts of poverty where there is an assumption of male economic provision to a family, gender role stress is exacerbated when men cannot achieve this, and this may increase men's anxiety (Gili et al., 2016; Vandello & Bosson, 2013).

In South Africa and globally, urban informal settlements have been rapidly growing and an estimated 863 million people globally currently live in them (UN Habitat, 2015). Studies have shown that informal settlements have multiple health and social challenges including high levels of poverty, violence and HIV (Corburn & Sverdlik, 2019; Andrew Gibbs, Reddy, Dunkle, & Jewkes, 2020). Studies have also suggested that informal settlements are likely sites of particularly high rates of poor mental health (Weimann & Oni, 2019), driven by the overlapping social and economic challenges. In South Africa, one population-based nationally representative study found that among older age groups (18–49) poorer mental health was associated with residing in informal settlements (Ardington & Case, 2010). While in a non-representative self--selecting sample of young (18–30) women and men in informal settlements, Andrew Gibbs, Govender, and Jewkes (2018) found depression to be 57.9 % for women and 49.5 % for men, exceedingly high. Despite prior studies suggesting people living in informal settlements have exceedingly high rates of poor mental health, studies in South Africa have not explored the prevalence and risk factors for GAD in these contexts, primarily focusing on clinical populations. It may be that given the high level of challenges and threats to this population, the factors shaping GAD may be different to other contexts.

In this study, we seek to understand the prevalence of GAD and the risk factors for anxiety among young women and men living in urban informal settlements in Durban, South Africa, enrolled in a violence prevention intervention. We hypothesize that higher levels of anxiety symptoms are associated with: i) higher poverty and stress related to poverty, and for men, greater gender role stress; ii) greater experience or witnessing of violence, and iii) poorer relationship dynamics.

2. Materials and methods

2.1. Study design

Data for this *post-hoc* analysis comes from the final round of women and men participating in the Stepping Stones and Creating Futures trial, a cluster randomized controlled trial in urban informal settlements in Durban, South Africa, which sought to strengthen livelihoods and reduce IPV (Andrew Gibbs et al., 2017).

2.2. Setting

The study was conducted in urban informal settlements in Durban, South Africa, where there are estimated 581 informal settlements (Visagie, Turok, & Misselhorn, 2020), comprising approximately 25 % of households in the city (HDA, 2011). In these settlements water and sanitation is provided by the government in public spaces.

2.3. Participants

In 2015 an NGO called Project Empower, who subsequently delivered the Stepping Stones and Creating Futures intervention, identified 36 potential clusters in urban informal settlements in Durban, South Africa. Clusters were identified either through being standalone groups of shacks, or else large informal settlements were sub-divided where naturally occurring barriers occurred, such as a river, or major road, leading to a cluster being identified (Andrew Gibbs et al., 2017). Settlements also had to be deemed safe to work in. These clusters were randomized by a statistician into intervention or control group.

Between September 2015 and September 2016, women and men were recruited from 34 identified clusters. We worked with Project Empower for two to three days per cluster, walking around the cluster to identify potential participants. Participants needed to be aged 18 to 30, not in formal work or education, and normally resident in selected clusters (informal settlements). In each cluster we sought to recruit 20 male and 20 female participants (with 18–21/cluster). At recruitment, participants knew whether they were in an intervention or control cluster. In the clusters randomized to the intervention they received the programme shortly thereafter, while the control clusters were offered it after final data collection (this time point) and received nothing in between (Gibbs et al., 2017).

2.4. Ethics

Ethical approval for the study was provided by the South African Medical Research Council ethics committee and the Biomedical Research Ethics Committee, of the University of KwaZulu-Natal. All participants provided written informed consent to participate, and community leaders provided permission to access the community.

2.5. Data collection

At the final timepoint between March and September 2018, approximately 24 months after the baseline, a team of data collectors used information provided by participants at previous rounds to trace

participants, and verify who they were, prior to completing the questionnaire. Self-completed questionnaires were done via audio computer-assisted self-interviewing (ACASI), and were available in English, isiZulu, or isiXhosa. As such, the participants could hear, as well as read, questions and response options, and choose the most appropriate response. ACASI additionally allowed in-built skip patterns and range checks. The data collectors were available to support them if necessary. The GAD7 scale was only added for this final data collection point.

2.6. Measures

To translate measures from English into isiZulu and isiXhosa, questionnaires were first translated by two bilingual fieldworkers. We then undertook a focus-group with participants similar to the target group to check comprehension and understanding. Finally, the fieldwork team reviewed and edited questions further to ensure meaning was retained.

Generaliszed anxiety disorder symptoms were assessed using the Generalized Anxiety Disorders 7 item (GAD7) self-report scale (Spitzer, Kroenke, Williams, & Löwe, 2006). GAD7 assesses past two-week symptoms of anxiety focused on nervousness, on edge, unable to stop worrying, having trouble relaxing and so forth. Responses to each item are "not at all", "several days", "more than half the days", "nearly every day", with scores summed (range 0–21, Cronbach $\alpha = 0.87$ men, $\alpha = 0.85$ women). The original developers identified a range of symptom categories, with scores of 0–4 minimal symptoms; 5–9 mild symptoms; 10–14 moderate symptoms; and 15–21 as severe symptoms as anxiety (Spitzer et al., 2006). To create a binary variable for analysis, we recoded the GAD7 scores into either minimal or mild (scores 0–9) or moderate or severe (scores 10–21).

We assessed a range of risk factors. Socio-demographic factors were age, treated as a continuous variable, education coded as primary or less, or secondary or more. To assess poverty we asked three items of the Household Hunger Scale, which assesses past month household food insecurity, which we summed with larger scores indicating greater food insecurity (Coates, Swindale, & Bilinsky, 2007). We asked a single item about stealing in the past month because of hunger, with responses yes or no. To assess stress about lack of work we asked four-items which were taken from the IMAGES study (Barker et al., 2011), for example: "I am frequently stressed or depressed because of not having enough income." Responses were on a four-point Likert scale, and higher scores indicated higher levels of stress about lack of work (range: s4-16, Cronbach $\alpha = 0.78$ men, $\alpha = 0.75$ women).

To assess adverse events during people's lifetime we asked a range of questions. We assessed childhood adverse events using a modified Adverse Childhood Events scale (Bernstein et al., 2003). This was modified based on prior experience of using the scale in multiple studies in South Africa (Jewkes et al., 2006; Machisa, Jewkes, Morna, & Rama, 2011), and assessed nine different forms of abuse and neglect prior to the age of eighteen. Responses were on a four point scale (never, sometimes, often, very often), and summed (range 12–48), with higher scores indicating more adverse childhood events. We also asked separately about eight other adverse events in the past 12 months, including witnessing of a murder, extreme physical pain, and being attacked (responses yes/no). We created a score of different experiences and recoded this into none, one or two, and three or more types. For women we also assessed experience of past year physical and/or sexual IPV with eight-items drawn from the WHO's multi-country study (WHO, 2005), any positive response led to women coded as having experienced past year IPV. We also asked women about non-partner sexual violence experience in the past 12 months, using five items first developed in South Africa, and recoded any woman reporting a positive response as experiencing non-partner sexual violence (Jewkes et al., 2006).

For men, we also assessed gender role strain using nineteen items drawn from the Gender Role Stress and Conflict scale, previously used and validated in South Africa (Gottert et al., 2016). An example of the item was: "Having a girlfriend or wife is part of my idea of being a successful man." And men could answer "do not agree at all", "somewhat agree" or "agree a lot". The items were summed (range 19–57, Cronbach $\alpha = 0.83$), with higher scores indicative of greater gender role stress.

2.7. Statistical analysis

All analyses included adjustment for clustering. We first estimated summary statistics for each measure using n's and percentages, or means and 95 percent confidence intervals (95%CIs) as appropriate. We then assessed descriptively the distribution of risk factors by whether people reported moderate or severe anxiety symptoms or not, reporting n's and percentages and means and 95%CIs as appropriate. Pearson's chi-squared tests were used to assess differences for categorical variables, while Adjusted Wald t-tests were used to assess differences between groups for continuous variables. Finally, we undertook multivariable logistic regression with all candidate variables included in the model comparing those with minimal or mild symptoms to those with moderate or severe symptoms. All models used Gaussian random effects models, with the cluster as the random effect, and additionally included the term for intervention arm. We report adjusted odds ratios (aORs), 95%CIs, and p-values. All analyses were undertaken in STATA16.1/IC.

3. Results

3.1. Women

483 women were retained at endline data collection and provided data on anxiety using the GAD7 scale. Using a score of 10 or more on the GAD7 scale, 18.2 % had moderate or severe symptoms of GAD. Table 1 shows the background demographic statistics for women. The mean age for women was 26 years (95%CI: 26.0–26.2). The vast majority had secondary education (93 %), and only 7 % had primary education or less. Just under the third (31 %) reported stealing because of hunger in the past month. Experiences of violence and other adverse experiences were common. Just over a third (37.3 %) reported one or two adverse experiences in adulthood, while the quarter (25.1 %) reported three or more adverse experiences. Moreover, just over half (56.9 %) had experienced IPV in the past year and a third (32.9 %) reported experiencing non-partner violence in the past year.

In descriptive analysis for women (Table 1) a greater proportion of those reporting moderate or severe GAD symptoms reported stealing because of hunger ($p < 0.001$), and mean scores related to stress because of lack of work were also higher among this group compared to those with minimal or mild symptoms ($p = 0.005$). Experiences of violence across the life-cycle were also descriptively associated with higher symptoms of GAD; specifically women with moderate or severe symptoms of GAD reported higher mean scores for adverse childhood experiences ($p = 0.007$), and a greater proportion reported three or more adverse experiences in adulthood ($p < 0.001$), past year IPV ($p < 0.001$), and past year non-partner sexual violence ($p = 0.020$), compared to those with minimal or mild symptoms.

In multivariable adjusted analysis (Table 1) poverty and violence were associated with moderate or severe symptoms of GAD. In terms of poverty, stealing in the past month because of hunger (aOR 2.03, $p = 0.006$), and greater stress because of a lack of work (aOR1.12, $p = 0.017$) were both associated with a higher odds of reporting moderate or severe symptoms of GAD, compared to those with minimal or mild symptoms. While women reporting past year IPV (aOR 1.83, $p = 0.04$), and three or more different forms of adverse experience in their lifetime (aOR 2.17, $p = 0.018$) were more likely to report moderate or severe symptoms of GAD, compared to those with minimal or mild symptoms.

3.2. Men

Amongst the 505 men in this sample size just under a fifth (19.6 %) reported moderate or severe symptoms of GAD. Table 2 presents

Table 1
Socio-demographic and risk factors for generalized anxiety, descriptive associations, and multivariable logistic regression assessing risk factors for moderate or severe generalized anxiety disorder (GAD) symptoms among women (n = 488).

	Full sample	Minimal or mild GAD symptoms	Moderate or severe GAD symptoms	*p*-value[a]	aOR[b]	95 % lc[c]	95 % uc[d]	p-value
	n(%)/mean(95% CI)	n(%)/mean(95%CI)	n(%)/mean(95%CI)					
Demographics								
Age	26.3 (26.0, 26.2)	26.2 (25.8, 26.5)	26.8 (26.0, 27.7)	0.191	1.05	0.98	1.11	0.228
Education (primary or less)	34 (7.0)	27 (6.9)	7 (7.8)		ref			
Secondary or more	449 (93.0)	366 (93.1)	83 (92.2)	0.762	1.19	0.47	3.01	0.720
Poverty								
Food insecurity (>=more)	2.64 (2.50, 2.77)	2.58 (2.43, 2.72)	2.91 (2.56, 3.26)	0.067	0.98	0.83	1.16	0.843
Steal because of hunger (yes)	150 (31.1)	109 (27.7)	41 (45.6)	<0.001	2.03	1.23	3.36	0.006
Stress because of lack of work (>=more)	12.02 (11.77, 12.27)	11.85 (11.56, 12.13)	12.77 (12.23, 13.30)	0.005	1.12	1.02	1.23	0.017
Adverse experiences and violence								
Adverse childhood experiences (>=more)	18.10 (17.61, 18.59)	17.78 (17.26, 18.31)	19.49 (18.22, 20.75)	0.007	1.03	0.98	1.07	0.244
Adverse experiences in adulthood: none	182 (37.7)	159 (40.5)	23 (25.6)	<0.001	ref			
1 or 2	180 (37.3)	150 (28.2)	30 (33.3)		1.17	0.63	2.16	0.621
3+	121 (25.1)	84 (21.4)	37 (41.1)		2.17	1.14	4.14	0.018
Past year intimate partner violence (yes)	275 (56.9)	208 (52.9)	67 (74.4)	<0.001	1.83	1.03	3.24	0.040
Past year non-partner sexual violence (yes)	159 (32.9)	120 (30.5)	39 (43.3)	0.020	1.1	0.65	1.86	0.725
GAD (moderate or severe symptoms)	90 (18.6)							

Notes: all descriptive analyses present column percentages and take clustering into account.
[a] p-values estimated via Pearsons chi-squared tests for ordinal measures, or Adjusted Wald test for continuous variables; Logistic regression model adjusted for clustering and intervention arm, and all candidate variables; sample n = 483.
[b] Adjusted odds ratio.
[c] Lower 95 % confidence interval.
[d] Upper 95 % confidence interval.

Table 2
Socio-demographic and risk factors for generalized anxiety, descriptive associations, and multivariable logistic regression assessing risk factors for moderate or severe generalized anxiety disorder (GAD) symptoms among men (n = 505).

	Full sample	Minimal or mild GAD symptoms	Moderate or severe GAD symptoms	*p*-value[a]	aOR[b]	95 % lc[c]	95 % uc[d]	p-value
	n(%)/mean(95% CI)	n(%)/mean(95%CI)	n(%)/mean(95%CI)					
Demographics								
Age	26.1 (25.8, 26.4)	26.1 (25.7, 26.4)	26.3 (25.6, 27.1)	0.586	1.01	0.95	1.08	0.740
Education (primary or less)	41 (8.1)	35 (8.6)	6 (6.1)	0.408	ref			
Secondary or more	464 (91.9)	371 (91.4)	93 (93.9)		1.8	0.70	4.58	0.221
Poverty								
Food insecurity (>=more)	2.70 (2.57, 2.84)	2.62 (2.48, 2.77)	3.04 (2.74, 3.34)	0.018	1.12	0.95	1.31	0.182
Steal because of hunger (yes)	196 (38.8)	143 (35.2)	53 (53.5)	<0.001	1.8	1.13	2.88	0.013
Stress because of lack of work (>=more)	11.92 (11.68, 12.16)	11.88 (11.62, 12.15)	12.06 (11.51, 12.61)	0.570	1	0.91	1.09	0.930
Adverse experiences								
Adverse childhood experiences (>=more)	19.0 (18.48, 19.52)	18.63 (18.06, 19.20)	20.52 (19.24, 21.79)	0.003	1.04	1.00	1.08	0.031
Adverse experiences in adulthood: none	131 (25.9)	116 (28.6)	15 (15.2)	0.004	ref			
1 or 2	176 (34.9)	144 (35.5)	32 (32.3)		1.55	0.79	3.07	0.205
3+	198 (39.2)	146 (36.0)	52 (52.5)		2.2	1.14	4.25	0.019
Gender role								
Gender role strain (>=more)	40.44 (39.82, 41.06)	40.11 (39.42, 40.80)	41.82 (40.43, 43.20)	0.028	1.03	0.99	1.07	0.095
GAD (moderate or severe symptoms)	99 (19.6)							

Notes: all descriptive analyses present column percentages and take clustering into account.
[a] p-values estimated via Pearsons chi-squared tests for ordinal measures, or Adjusted Wald test for continuous variables; Logistic regression model adjusted for clustering and intervention arm, and all candidate variables; sample n = 483.
[b] Adjusted odds ratio.
[c] Lower 95 % confidence interval.
[d] Upper 95 % confidence interval.

background demographic statistics for the sample. In this sample men's mean age was 26 years (95%CI: 26.0–26.2). Almost everyone had completed secondary education (91.9 %), with only 8.1 % only having primary education. Just over the third (38.8 %) reported stealing in the past month because of hunger. Adverse experiences in adulthood were common, with a third (34.9 %) reporting one or two experiences, and just over a third (39.2 %) reporting three or more adverse adulthood experiences.

For men descriptive associations (Table 2) showed poverty and adverse events was associated with moderate or severe symptoms of GAD, compared to those with minimal or mild symptoms. Specifically, mean scores for food insecurity were higher ($p = 0.018$) and a greater proportion reported stealing because of hunger (<0.001), among those moderate or severe symptoms of GAD as opposed to those reporting minimal or moderate GAD symptoms. Men's experiences of adverse events were also descriptively higher symptoms of GAD, specifically those with moderate or severe symptoms of GAD had higher mean scores for adverse childhood experiences ($p = 0.003$) and a greater proportion reported three or more past year adverse experiences ($p = 0.004$), compared to those with minimal or mild symptoms. Gender role strain was also associated with increased anxiety symptoms, whereby those with moderate or severe GAD symptoms had higher mean gender role strain scores than those with minimal or moderate symptoms ($p = 0.028$).

For men, in multivariable-adjusted analysis (Table 2) poverty and adverse experiences were associated with greater likelihood of moderate or severe symptoms of GAD. Specifically, stealing in the last month because of hunger (aOR1.80, $p = 0.013$), greater adverse childhood experiences (aORR1.04, $p = 0.031$), and experiencing three or more adverse experiences in their lifetime (aOR2.20, $p = 0.019$) were more likely to report moderate or severe symptoms of GAD.

4. Discussion

Among a self-selecting population of young women and men, living in urban informal settlements in Durban, South Africa, who enrolled in a structured intervention and were followed up after approximately 24 months, the self-reported prevalence of moderate or severe symptoms of GAD as assessed by GAD7 was high – with 1 in 5 women and men reporting symptoms at this level. Of note, while globally studies suggest a greater proportion of women report anxiety disorders than men (A. Baxter et al., 2014), in this study, we saw no difference in the prevalence of moderate and severe GAD symptoms by sex. It may be that many studies of anxiety are undertaken in clinical settings, where women are more likely to be included. An alternative explanation is that the similar rates of GAD symptoms in women and men are indicative of the exceedingly high rates of poverty and adverse events that they all experience in informal settlements, which are more equitably distributed in these settings, than in other contexts. Indeed, previous work on mental health in informal settlements has also indicated similar prevalence of depression in both women and men (Andrew Gibbs et al., 2018). Understanding the distribution of poor mental health by sex in informal settlements, and the reasons for the similar prevalence is an important question for future research.

Among women and men, the drivers of higher levels of GAD were similar and linked to poverty and experiences of violence and adverse events across the life-course. In this study, women's experience of past year IPV and other adverse experiences were associated with increased GAD symptoms, while for men higher GAD symptoms were associated with adverse childhood experiences and other adverse events. Prior research has similarly identified that adverse experiences in childhood (Choi & Sikkema, 2016; Hughes et al., 2017; Lindert et al., 2014), including in the community and family (Kennedy et al., 2009) as associated with increased anxiety in later life. For women, studies have shown that experiences of violence from men, including IPV and non-partner sexual violence are associated with anxiety (Dillon et al., 2013). While for women and men, community level experiences of adversity are also associated with anxiety. The importance of addressing violence across the life course, as a way to address anxiety is strongly indicated.

Poverty was also associated with higher levels of GAD symptoms among women and men in this study, but it was specific to stealing because of hunger, and only among women was stress related to lack of work associated with increased anxiety symptoms. Prior work has similarly highlighted poverty as a key driver of anxiety (Lund et al., 2010), in particular food insecurity (Trudell et al., 2021; Whittle et al., 2019). In our study food insecurity was not associated with anxiety symptoms. It may have been that there was little variation in terms of food insecurity in this sample, as all lived in challenging circumstances. In addition, stealing because of hunger could have been a proxy for extreme food insecurity in this population; stealing needs to be seen as a response to extreme hunger. It may also be the act of stealing also drove increased anxiety and stress.

Stress because of lack of work was only associated with higher GAD symptoms among women, and not men in this study. Prior studies however, have shown this association among women and men (Ridley et al., 2020). It is unclear why stress related to lack of work was not associated with men's anxiety symptoms. The majority of men in this study lacked continuous work, and qualitative research has highlighted the shame and anxiety men felt because they were not working, and how these men often felt they were seen by others in their community as 'children' (A. Gibbs, Sikweyiya, & Jewkes, 2014). The association between stress because of work and increased GAD symptoms for women may have been linked to the higher rates of poverty women experience, thus placing them under greater pressure to survive. In addition, it may have been associated with household structure; in this sample, two-thirds of women reported they had children, and the stress linked to the need to support their children may have been driving generalized anxiety, while men were much less likely to have children, and live with them.

Previous research (Eisler et al., 1988; Zamarripa et al., 2003) has shown gender role strain among men as associated with anxiety, yet our study did not show this. However, other research has suggested that men's restricted emotionality (part of gender role strain) while associated with depression, was not related to anxiety (Zamarripa et al., 2003). This may be partly explained with the sample; our sample is also characterized with high levels of poverty and violence which are the positive drivers of anxiety.

The study has several challenged that add to be the limit of study. A significant limitation of the study is the use of a self-reported screener for GAD, the GAD7, which likely led to an over-estimation of the symptoms GAD, however it is unclear how this would have impacted the association of risk factors. Similarly, we did not undertake a validation study of the appropriate categorization of GAD7 scores, and how they related to actual generalized anxiety disorder diagnoses. The population self-selected participation in the study, and were also those who were retained 24 months later. This group are likely quite different to others in the same community who were not recruited, or not followed-up over time, and as such generalizability to the wider informal settlement communities, or the intervention population cannot be assured. In our analysis we did not report on all experiences of violence that participants may have seen as we only looked at childhood and adulthood violence. Our analysis focused exclusively on GAD without considering the likelihood of other comorbid mental health challenges, particularly depression, post-traumatic stress disorder, and substance misuse. Currently there is a lack of evidence on how to disentangle these different diagnoses (Stein & Sareen, 2015; Tyrer & Baldwin, 2006) and therefore how to handle them in modelling. In larger samples, looking at GAD as comorbid with other challenges, as well as GAD alone would be an important analysis, but was not possible because of small sample sizes. The population was marked by extremely high levels of poverty and violence, and this may have changed some of the associations with anxiety, but it is unclear how.

5. Conclusions

In this population of highly marginalized young people living in informal settlements in South Africa, the long legacies of unemployment, poverty and inequality in post-apartheid South Africa were associated with increased symptoms of generalized anxiety disorder symptoms, and supports a social causation hypothesis of poor mental health (Lund et al., 2011). Addressing GAD is important because of the burden of ill-health it causes, as well as the subsequent sequalae of anxiety to other health outcomes. While the current set of treatment approaches to GAD has emphasized psychological and pharmacological treatments (Stein & Sareen, 2015; Tyrer & Baldwin, 2006; Wittchen, 2002), which have shown benefit, our analysis has emphasized the importance of wider structural interventions that also address poverty, and reduce experiences of violence across the lifespan. Emerging evidence suggests approaches such as improved parenting, addressing food insecurity and increasing access to supportive parenting may be one approach during childhood (Cluver, Orkin, Meinck, Boyes, & Sherr, 2016). While in later life, cash transfers and group-interventions, such as Stepping Stones and Creating Futures, may also be important in reducing poverty and violence experience (Buller et al., 2018; Gibbs et al., 2017). More widely, upgrading of informal settlements, may also reduce violence in the community (Matzopoulos et al., 2020). Addressing these factors may have a substantial impact on young people's mental health. In addition, in this sample of young people in very challenging contexts, the prevalence of moderate and severe generalized anxiety disorder symptoms was the same for women and men, as seen in for other mental health outcomes in other analyses (Gibbs et al., 2020), and contrasts to research elsewhere which highlights significant disparities by sex. Understanding why the prevalence of poor mental health is similar across women and men in these settings is critical for developing effective interventions to address poor mental health and improve overall health and wellbeing of this population.

Funding

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). All funding was managed by the South African Medical Research Council.

Declaration of competing interests

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.

Acknowledgements

We would like to thank the participants for providing their data for this study, and the fieldwork team who collected the data. In addition, we recognize the research team at the SAMRC, and Project Empower who were part of the broader project.

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