High Prevalence of Affective Disorders among Adolescents Living in Rural Zimbabwe

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Abstract

Poor mental health accounts for considerable disease burden among young people globally. We investigated the prevalence and determinants of affective disorders among rural Zimbabwean youth in 2006. We undertook a cross-sectional survey among 1495 Zimbabwean youth aged 15–23 (median 18) from 12 rural communities in three provinces in south-eastern Zimbabwe. Mental health was assessed using the Shona Symptom Questionnaire (SSQ), a locally validated 14-item indigenous screening tool for affective disorders, notably depression and anxiety disorders. Participants scoring ≥8/14 were considered at risk of being affected and ≥11 as at risk of being severely affected. Most participants (93.1%) completed the SSQ. Of these, 51.7% (95%CI:49.0–54.3%) scored ≥8/14 and 23.8% (95%CI:21.5–26.0%) scored ≥11. Affective disorders were

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independently associated with household poverty (adjusted odds ratio (AOR) 1.9, 95%CI:1.4–2.7), living in a female-headed household (AOR 1.3, 95%CI:1.0–1.7), having moved home within last 5 years (AOR 1.4, 95%CI:1.0–1.9) and feeling stigmatized (AOR being shunned by others 3.7, 95%CI:2.5–5.7). There was a strong linear association between risk of affective disorders and sexual risk taking (ever sex AOR 1.5, 95%CI:1.0–2.4, and 2.8, 95%CI:1.9–4.2 for affected and severely affected, respectively, test for trend $P < 0.001$; ≥2 lifetime partners AOR 2.3, 95%CI: 1.1–4.8 and 5.4, 95%CI:2.7–10.7, test for trend $P < 0.001$). This study indicates high levels of psychological morbidity among rural Zimbabwean youth which was associated with sexual risk taking. Interventions to prevent, identify and treat mental health disorders in this vulnerable population are urgently required. In HIV-endemic countries, such interventions may also help reduce HIV transmission.

Keywords

Adolescence; Mental health; Sexual behavior; HIV seroprevalence; Zimbabwe

Introduction

It is estimated that around 450 million people suffer from mental or behavioral disorders worldwide and that one in four people will become mentally unwell at some time during their lives [1]. Many first become unwell when they are young, although their illness often goes unrecognised until later life. Despite this lack of recognition, affective disorders such as depression and anxiety, still account for a large proportion of the disease burden in young people in all societies [2]. The causes are multi-factorial and include biological, social and psychological factors. In East and Southern Africa, where HIV infection is endemic, young people face particular challenges, with high rates of orphaning and exposure to illness and death of family members. Rural to urban migration is common, often leading to disintegration of the extended family. Poverty is widespread [3]. In addition to the indirect effects of HIV on mental health, HIV is itself a direct cause of anxiety and depression [2]. Half of new HIV infections now occur in 15–24 year olds with young women bearing the brunt of early infection [4]. In addition to the cost of psychological morbidity *per se*, affective disorders in young people are strongly associated with other health and social problems including low educational attainment, unemployment, alcohol and drug abuse, violence, sexual abuse and poor sexual and reproductive health [5]. Where HIV is endemic, poor sexual health translates to an increased risk of acquiring (and subsequently transmitting) HIV.

Evidence of the prevalence of affective disorders remains poor in developing countries. The Regai Dzive Shiri Trial was a community randomized trial of a multi-component adolescent reproductive health intervention being conducted in 30 rural communities in south-east Zimbabwe. The trial measured the impact of the intervention on the prevalence of HIV, HSV-2 and unintended pregnancy among young people living in these communities. Baseline data for this trial were collected in 2003 from young people enrolled in their second year of secondary schools [6]. Of these pupils, 35.0% (95%CI: 33.9–36.2) reported that they had lost one or both parents. Orphans were at greatly increased risk of HIV compared to non-orphans (age-sex adjusted odds ratio (OR) 3.4; 95%CI: 1.9–6.1) [7]. Data collected subsequently from 60 trial participants through in-depth qualitative interviews suggested that orphaning was associated with having had to move from one family member's household to another in the past 5 years and stigma. During these interviews, participants also expressed feelings of depression and anxiety about the future. We therefore expanded the objectives of the interim survey for the trial to explore factors associated with HIV vulnerability more broadly, including its association with mental health. In this paper we

report on the mental health burden of young people in rural Zimbabwe as measured in the interim trial survey.

Methods

Study Population

In 2003, the Regai Dzive Shiri baseline survey was conducted in 30 rural communities in seven districts in three provinces in rural Zimbabwe (Masvingo, Manicaland and Mashonaland East). Eighty-six percent (*n* = 6791) of Form 2 pupils (in their second year of secondary school following 7 years of primary schooling) attending 82 secondary schools in the trial communities took part. In 2006, the interim survey, within which this study was nested, was conducted in 12 of the 30 study communities, selected by restricted randomization to ensure balance between intervention and control arms of the trial and between the three provinces. Survey participants were eligible if they were cohort members who had participated in the baseline survey and were currently residing in these communities.

Data Collection

Following written informed consent, interim survey participants were asked to self-complete a questionnaire in Shona (the indigenous language), which collected detailed demographic, economic, behavioral and mental health information using the Shona Symptom Questionnaire (SSQ). The SSQ, a locally validated, 14-item, indigenous measure used to screen for those at risk of affective disorders, including depressive and generalized anxiety disorders, was included in this questionnaire [8–11]. The SSQ was developed and validated among patients attending primary care clinics and traditional medical practitioners in Harare and combines elements that reflect both the concerns of the health care provider (includes items from WHO Self-Report Questionnaire) and those that are socio-culturally meaningful to the patient [12]. The aim of the SSQ is to measure psychiatric morbidity. Participants were asked to respond to whether or not they felt that each of the 14 statements applied to them 'always', 'sometimes' or 'never' during the previous week. The SSQ was originally validated against a gold standard that required diagnosis of a mental disorder by a health care worker *and* a score of 12 or more on the Revised Clinical Interview Schedule (CISR) [8]. Compared with this gold standard, the sensitivity and specificity of the SSQ, using a cut-off of ≥8 of 14 items, were 63% and 83%, respectively.

Focus group discussions were held with community members to formulate culturally-appropriate questions to measure stigma. Issues included terminology that identified individuals as inanimate objects, increased household chores compared with peers, and being given second-hand rather than new clothes.

Trial participants were also asked to provide a finger-prick blood sample which was tested for antibodies to HIV using a validated HIV testing algorithm [13] (two ELISAs with western blot for discrepant results). Young women were each asked to provide a urine sample, which was tested on site for pregnancy using the Cortez OneStep hCG Rapidip InstaTest®.

Statistical Methods

Data were entered into an MS Access database and range and consistency checks carried out. Statistical analyses were performed using Stata 9.2 (College Station, TX).

The internal consistency of the SSQ scale was assessed by calculating the intra-class correlation coefficient (Cronbach's alpha) to ensure that the SSQ psychometric properties in

this population-based sample were as expected from its use in other settings. High internal consistency is traditionally defined as alpha >0.7. Cronbach's alpha was maximal when all 14 items from the scale were included ($\propto = 0.83$), suggesting that the instrument items are measuring the same underlying construct (mood). Only participants who completed all 14 items were assessed. Previously validated cutoffs were used; participants who answered affirmatively ('always' or 'sometimes') to ≥8 of the 14 statements were defined as 'at risk of being affected', and those scoring ≥11 were defined as 'at risk of being severely affected' [8].

Factors associated with affective disorders were examined on univariate analysis. Categorical data were analysed using chi-square tests, and logistic regression was used to determine unadjusted odds ratios. Continuous data were categorized where appropriate.

Factors that were significantly associated with affective disorders on univariate analysis ($P < 0.10$) and other variables where existing knowledge provided evidence for inclusion were included in a multivariate model adjusted for *a priori* confounders (age, gender, education, marital status and district) and for each other. Variables that were not independently associated with affective disorders after adjustment ($P > 0.10$) were excluded from the model. The same analysis was repeated to identify risk factors for severely affected participants (score of 11 or more on SSQ scale).

The association between affective disorders and sexual and other risk behaviors were explored on univariate and multivariate analysis adjusting for *a priori* confounders as previously defined. Specifically the odds of various risk behaviors were calculated by severity of risk of affective disorder (SSQ < 8, SSQ = 8–10, SSQ ≥ 11), and tests for trend were used to assess possible linear associations between risk of severity and these behaviors.

Ethics Approval

Ethical approval was obtained from the Medical Research Council of Zimbabwe and the ethics committees of University College London and the London School of Hygiene and Tropical Medicine.

Results

Of 1,557 cohort participants still living in the study communities, 1,495 (96%) took part in the interim survey (Fig. 1). When baseline survey characteristics were compared between participants and non-participants, interim survey participants were more likely than non-participants to be male (55% vs 48%; $P < 0.001$) and were younger (26% < 15 years vs 20%; $P < 0.001$) and less likely to be orphaned (64% vs 66% $P = 0.016$) but were no more or less likely to be sexually active ($P = 0.088$).

General Characteristics of Interim Survey Participants

Overall, 45% of participants were female (Table 1). Participants were aged between 15 and 23 years (mean 18.2 years), 4.3% (95%CI: 3.3–5.3%) were married (7.6% of females and 1.6% of males) and 87% (95%CI: 84.8–88.3%) had completed Year 4 of secondary school. Overall 40% (95%CI: 37.5–42.6%) reported that they had lost one or both parents. Poverty assessed using a variety of measures, was widespread. For example 20% (95%CI: 18.2–22.3%) of participants reported that an adult in their home had skipped a meal in the previous week in order for there to be enough food for children in their household.

HIV prevalence was 2.2% in young women (95%CI: 1.1–3.4%) and 0.4% (95%CI: 0.0–0.8%) in young men. Overall 2.4% ($n = 16$; 95%CI: 1.2–3.6%) of the young women were

pregnant; 12.5% of young women reported being sexually active compared with 15.4% of young men ($P = 0.12$).

Mental Health

Response rates for completion of the mental health scale were high; 93.1% of survey participants completed all 14 items while only 1.7% ($n = 26$; 18 males; 8 females) did not complete any. Of those who completed the scale, 51.7% (95%CI 49.0–54.3%) scored ≥ 8 on the SSQ and were considered at risk of affective disorders; 23.8% (95%CI: 21.5–26.0%) were classified as at risk of severe affective disorders (scoring ≥ 11). Table 2 shows the responses to each item on the SSQ scale by gender. Of note, 10.1% of participants (95%CI: 8.6–11.7%) reported that they had felt like committing suicide either sometimes or always within the previous week (males = 8.5%, females = 12.1%, $P = 0.023$), with 1.2% (95%CI: 0.6–1.7) reporting that they had 'always' felt like committing suicide in the previous week.

Factors Associated with Being at Risk of Affective Disorders

The factors associated with being at risk of affective disorders are shown in Table 3. There was no significant difference in prevalence by age ($P = 0.146$), gender ($P = 0.803$), marital status ($P = 0.143$) or level of education ($P = 0.066$) but there were significant differences in prevalence by district ($P < 0.001$) with the poorest district (Buhera) having the highest rates of risk for affective disorders.

Other factors that remained independently associated with risk for affective disorders after adjusting for confounding variables were poverty, living in a female-headed household and having had to move from one household to another at least once in the last 5 years (Table 3).

Participants at risk of affective disorders were more likely to report feeling stigmatised than those who were not at risk on both univariate and multivariate analysis (Table 4).

Risky Sexual Behavior Associated with Common Affective Disorders

Whilst not significantly associated with HIV infection, which was relatively uncommon in this cohort of school students, being at risk for affective disorders was associated with behavioral factors that increase susceptibility to HIV. After adjusting for *a priori* confounders, participants at risk of having affective disorders (i.e. those with an SSQ score of 8–10) were 1.5 times as likely to report ever having sex than those who were not at risk, and those who were at risk of severe affective disorders (SSQ score ≥ 11) were almost 3 times as likely to report ever having sex than those not at risk (Table 5). They were also more likely to report multiple sexual partners, a younger age of sexual debut, and use of drugs or alcohol. Young women at risk of affective disorders were more likely to be pregnant on their urine test. Tests for trend showed strong evidence of an association between the severity of risk for affective disorders and each of these behaviorial factors that remained even after adjusting for *a priori* confounders (Table 5).

Discussion

In this paper we report on data collected from school-going youth in rural south-east Zimbabwe which indicate a high prevalence of anxiety and depression, which was associated with behavioral risk factors for HIV acquisition and transmission. Zimbabwe has one of the most sustained and severe HIV epidemics in the world, resulting in widespread morbidity and mortality and leading to high rates of orphaning and family disruption. Perhaps not surprisingly, we found that having moved to different family members' homes, being from a poor household and feeling stigmatized, all factors that applied more to orphans than non-orphans, were strongly associated with affective disorders. However,

being orphaned was not directly associated with being at risk of an affective disorder, suggesting that it is these factors and not the experience of orphanhood *per se* that is associated with poor mental health.

Of particular importance in this community, where HIV is common, is the fact that participants at risk for affective disorders were more likely to report being sexually active, having earlier sexual debut and having more lifetime sexual partners than those not at risk. We also demonstrated a strong linear association between severity of risk for affective disorders and riskiness of behavior. Studies in the US have also shown a relationship between psychological distress and risky sexual behaviors. In the National Longitudinal Study of Adolescent Health, Waller and colleagues found that girls experience more depressive symptoms than boys and that every reported risk behavior studied (including sexual and drug abuse) was related to an increase in depressive symptoms [14]. Two other studies also show that adolescents girls are at an increased risk for HIV if they are psychologically distressed [15,16]. More recently, research in southern Africa has demonstrated a relationship between psychological distress and risky sexual behaviors. In South Africa a study among youth indicated that after adjusting for demographic characteristics, youth reporting the presence of either depression, alcohol abuse or post traumatic stress disorder were at increased risk of forced sex (AOR = 2.53 95%CI 1.64–4.02); transactional sex (AOR = 2.88; 95%CI 1.6–4.02), but also increased condom use (AOR = 2.07; 95%CI 1.29–6.48) [17]. In Zimbabwe, children aged 12–17 were interviewed as part of a nationally representative survey of orphans and vulnerable children. Maternal and paternal orphans who scored higher on the psychosocial distress scale reported earlier onset of sexual activity (boys AOR = 1.36; 95%CI 1.06–1.75; girls AOR = 1.23; 95%CI 1.10–1.50) [18].

With regards to stigma, those at risk clearly felt more stigmatized than those not at risk. However, in a cross-sectional survey it is difficult to determine the direction of effect. Poor mental health is a cause of stigma in its own right, while being stigmatized by others for being poor or orphaned may likewise lead to mental health disorders.

The importance of using culturally appropriate scales is increasingly recognized [19]. The Shona Symptom Questionnaire is a well-validated mental health scale which was initially developed for use as a screening tool in adult patients presenting to a primary care clinic or traditional healer [8–11]. The SSQ has been used in other population-based settings where results in clinic patients and general population participants were found to be similar (personal communication Dixon Chibanda). The internal consistency of the scale in this survey was high, with a Cronbach's alpha of 0.83 suggesting that the items in the scale were indeed measuring similar constructs (mood) in this population. While the cut-offs for these affective disorders were defined at the time of the original validation and have been used in various populations in Zimbabwe, these cut-offs have not specifically been validated for use in young people. However, the majority of participants in our study were aged 18 or over, and even if the cut-offs used in this population are over-inclusive, raising them by one or two points would still indicate high levels of psychological morbidity in this population. For example, if the cut-off is raised to 11 or more (being at risk for severely affected) then the prevalence is 23.8%.

The SSQ was originally designed to be administered with a response option of yes/no. In the current study, we expanded the response options to examine the intensity of a participant's response, asking them to state whether they experienced particular feelings always, sometimes or never. Expanding the response categories may have increased the proportion of participants who were categorized as at risk overall, in that a participant may be more likely to respond 'sometimes' to a question rather than 'yes'. However, in a subsequent

population-based survey run in some of the same districts in 2007 as part of the evaluation of the Zimbabwe Government's National Behavior Change Strategy, similar rates were detected among a representative sample of 18–24 year olds (55% at risk of being affected, at risk 24% of being severely affected) using the 'yes/no' response option rather than 'always/sometime/never' (data not shown).

Previous studies in Zimbabwe and elsewhere in the region have demonstrated high rates of depression in adults and associations between depression and life stressors such as poverty, bereavement and exposure to ill health. A study in the 1980s of Zimbabwean rural and urban clinic attendees found that 26% of 16–60 year olds had signs of psychological disorder [20] and that rates were similar between urban and rural communities. A more detailed study of 172 randomly selected female city-dwellers conducted in the mid 1990s found that 31% of women were depressed [21] and that this high rate of depression was associated with a high rate of adverse life events and difficulties [22], including relationship difficulties, infertility, bereavement and entrapment in a difficult situation. These findings are in keeping with studies from other developing countries which show that in adverse circumstances rates of depression may exceed 50% [23]. More recently, in South Africa, 9.1% of respondents aged 18 and over in a nationally representative sample reported suicide ideation, rates that are similar to those reported here [24]. In Zimbabwe, as in many other developing countries with high rates of HIV-associated morbidity and mortality, life stressors are a common aspect of daily life. The prevailing economic challenges no doubt increase this stress as families that were previously able to function fall below the poverty line. In the 2005–2006 Zimbabwe Demographic and Health Survey [25] some of these stressors were quantified; it found that there has been a dramatic increase in the rates of orphaning since the previous DHS survey in 1999 with 24% of children now reporting having lost one or both parents. There was evidence that the rate of childhood malnutrition, a marker of family poverty, has also risen substantially from 21% in 1994 to 28% in 2005/6 as have age-specific adult mortality rates [26].

The overall survey response rate was lower than we had hoped as a result of out-migration from the study communities, a consequence of the high rates of mobility within Zimbabwe. However, we believe our interim survey participants are broadly representative of school-going youth living in the rural communities where the study was set. Our cohort initially enrolled 87% of eligible participants in the community. Three years after the cohort was recruited, almost all cohort members still living in the study communities (96%) took part. Of note, only school-going adolescents were eligible for recruitment into the original cohort. Adolescents from poorer families and orphans not attending school will, if anything, be under-represented suggesting that our estimates of risk of affective disorders represent minimum levels. Survey participants were broadly similar to non-participants with respect to characteristics measured at baseline. We have found that moving to different family members' homes in the previous 5 years, something that happens frequently to orphaned children who are moved between different branches of their extended family, is associated with increased rates of psychological morbidity, making it unlikely that non-respondents would have had much lower rates of poor mental health than respondents.

There is increasing recognition of the burden of poor mental health among young people and the devastating impact it has on development [1]. In Southern Africa, where HIV combined with the more general stresses of poverty and rapid social and economic changes have had damaging effects, the burden of psychological morbidity is particularly high. While there is widespread recognition of the need to alleviate poverty, reduce rates of HIV and minimise its consequences, these goals are hard to attain and are unlikely to be achieved in the near future. Zimbabwe has one of the most severe and sustained HIV epidemics with some of the highest rates of orphaning in the region. This data suggests that psychological interventions

to prevent, identify, and treat mental health disorders in young people in Zimbabwe and likely more widely in sub-Saharan Africa need to be prioritized. Widespread provision of specialist mental health services in the region is unaffordable and unrealistic but there is some evidence to suggest that non-specialist community-based psychological services can make an impact on the psychological well-being of young people which will likely also impact on other social and behavioral outcomes. In countries where HIV is common, the additional risk of acquiring HIV and subsequently transmitting the virus makes implementing and rigorously evaluating such programmes an even more urgent priority.

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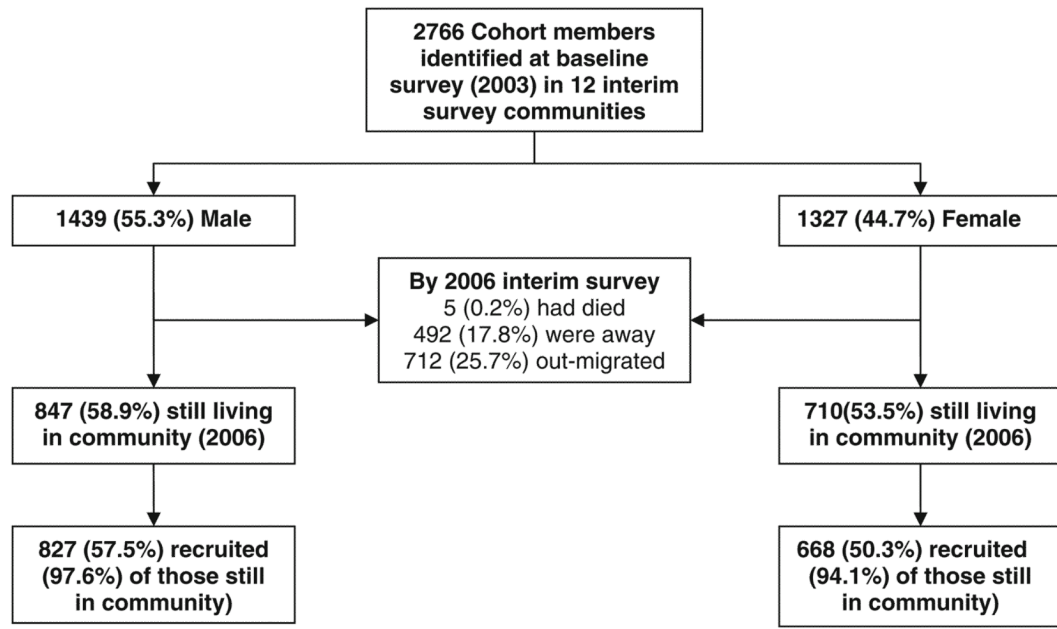
Fig. 1.
Flow chart showing participation in interim survey

Table 1

Characteristics of interim survey participants (*n* = 1495; 827 male, 668 female)

Characteristic	Male n	Male (%)	Female n	Female (%)	Total n	Total (%)
Demographic and household						
Age						
Less than 18 years	162	(19.6)	225	(33.7)	387	(25.9)
18 years old	269	(32.5)	279	(41.8)	548	(36.7)
19 years old	247	(29.9)	132	(19.8)	379	(23.4)
20 years old or more	149	(18.0)	32	(4.8)	181	(12.1)
Ever been married	13	(1.6)	50	(7.6)	63	(4.3)
Completed Form 4	721	(88.8)	556	(83.9)	1,277	(86.7)
Still in school	170	(20.6)	88	(13.2)	258	(17.3)
Orphanhood						
Both parents alive	469	(59.7)	390	(60.3)	859	(60.0)
Maternal orphan	60	(7.6)	39	(6.0)	99	(6.9)
Paternal orphan	164	(20.9)	152	(23.5)	316	(22.1)
Both parents dead	92	(11.7)	66	(10.2)	158	(11.0)
Moved in the last 5 years	163	(20.1)	179	(27.2)	342	(23.3)
Female headed household	239	(30.5)	254	(40.0)	493	(34.7)
Socio-economic status and poverty						
House made of poles and mud or mud bricks	756	(92.4)	586	(88.4)	1,342	(90.6)
Grass roof	286	(35.2)	181	(27.3)	467	(31.6)
Cannot afford washing soap	181	(21.9)	129	(19.3)	310	(20.7)
Absent from school no money for fees	470	(56.8)	354	(53.0)	824	(55.1)
Gone day without food in last week	172	(21.1)	102	(15.5)	274	(18.6)
Adult skipped a meal in the last week	173	(21.3)	124	(18.9)	297	(20.3)
Reported sexual behaviour						
Age of first sex						
Never had sex	688	(87.1)	579	(88.8)	1,267	(87.8)
15 years and under	26	(3.3)	11	(1.7)	37	(2.6)

Characteristic	Male		Female		Total	
	n	(%)	*n*	(%)	*n*	(%)
16 years and older	76	(9.6)	62	(9.5)	138	(9.6)
≥2 lifetime partners (of those who reported having had sex)	49	(48.5)	13	(18.6)	62	(36.3)
Biomarkers (with [95%CI])						
HIV prevalence	3	(0.4) [0.0–0.8]	15	(2.2) [1.1–3.4]	18	(1.2) [0.6–1.8]
Pregnant	N/A		16	(2.4) [1.2–3.6]		

Table 2

Shona symptom questionnaire (SSQ): item response rates by gender and overall response

Shona symptom questionnaire items		Males				Females		
	N	Always	Sometimes	Never	N	Always	Sometimes	Never
There were times in which I was thinking deeply or thinking about many things (thinking too much).	801	11.9%	66.5%	21.6%	653	11.6%	64.9%	23.4%
I found myself sometimes failing to concentrate	800	6.3%	60.3%	33.5%	653	5.1%	61.6%	33.4%
I lost my temper or got annoyed over trivial matters	796	2.0%	59.4%	38.6%	649	4.9%	56.9%	38.2%
I had nightmares or bad dreams	801	3.9%	62.8%	33.3%	653	5.8%	68.2%	26.0%
I sometimes saw or heard things which others could not see or hear	801	1.4%	26.6%	72.0%	651	2.8%	21.5%	75.7%
My stomach was aching	801	4.9%	51.8%	43.3%	651	3.8%	60.1%	36.1%
I was frightened by trivial things	802	3.0%	39.9%	57.1%	653	2.6%	40.6%	56.8%
I sometimes failed to sleep or lost sleep	802	3.6%	49.1%	47.3%	653	2.6%	46.9%	50.5%
There were moments when I felt life was so tough that I cried or wanted to cry	804	7.5%	53.4%	39.2%	654	8.0%	54.3%	37.8%
I felt run down (tired)	789	3.4%	64.1%	32.5%	645	1.6%	63.7%	34.7%
At times I felt like committing suicide	802	0.9%	7.6%	91.5%	653	1.5%	10.6%	87.9%
I was generally unhappy with things that I would be doing each day	801	2.4%	48.8%	48.8%	650	3.5%	41.5%	54.9%
My work was lagging behind (impairment of functioning)	802	5.2%	44.3%	50.5%	650	5.1%	35.9%	59.1%
I felt I had problems in deciding what to do	802	5.5%	50.3%	44.3%	654	4.9%	47.6%	47.6%
SSQ scores								
Completed all 14 items	768	92.9%			624	93.4%		
Scored 8 or more (at risk of being affected)	399	51.9%	[95%CI: 48.4–55.5%]		320	51.3%	[95%CI: 47.3–55.2%]	
Scored 11 or more (at risk of being severely affected)	188	24.5%	[95%CI: 21.4–27.5%]		143	22.9%	[95%CI: 19.6–26.2%]	

Table 3

Risk factors for being at risk of being affected (SSQ score ≥ 8) and at risk of being severely affected (SSQ score ≥ 11) (n = 1392 completing all 14 items)

Factor	N	At risk of being affected (SSQ score = 8–14)				At risk of being severely affected (SSQ score = 11–14)			
		n	%	Crude† OR [95%CI]	Adjusted^b OR [95%CI]	n	%	Crude† OR [95%CI]	Adjusted^b OR [95%CI]
Age:				(P = 0.146)	(P = 0.217)			(P = 0.002)*	(P = 0.089)
Less than 18 years	367	172	46.9	1.0	1.0	61	16.6	1.0	1.0
18 years old	515	282	54.8	1.4 [1.0–1.8]	1.3 [0.9–1.8]	136	26.4	1.8 [1.3–2.5]	1.6 [1.1–2.3]
19 years old	350	182	52.0	1.2 [0.9–1.6]	1.0 [0.7–1.4]	94	26.9	1.8 [1.3–2.6]	1.4 [1.0–2.2]
20 years or older	160	160	51.9	1.2 [0.8–1.8]	0.8 [0.5–1.4]	40	25.0	1.7 [1.1–2.6]	1.1 [0.6–2.0]
Gender:				(P = 0.803)	(P = 0.270)			(P = 0.496)	(P = 0.368)
Male	768	399	52	1.0	1.0	188	24.5	1.0	1.0
Female	624	320	51.3	1.0 [0.8–1.2]	0.9 [0.6–1.1]	143	22.9	0.9 [0.7–1.2]	0.9 [0.6–1.2]
Secondary education:^a				(P = 0.065)	(P = 0.414)			(P = 0.617)	(P = 0.834)
Years 2–3	183	106	57.9	1.0	1.0	46	25.1	1.0	1.0
Completed year 4 or higher	1203	609	50.6	0.7 [0.5–1.0]	0.8 [0.6–1.3]	282	23.4	0.9 [0.6–1.3]	1.0 [0.7–1.7]
Marital status:				(P = 0.141)	(P = 0.900)			(P = 0.176)	(P = 0.904)
Never married	1322	681	51.5	1.0	1.0	311	23.5	1.0	1.0
Currently/have been married	57	35	61.4	1.5 [0.9–2.6]	1.0 [0.4–2.1]	18	31.6	1.5 [0.8–2.7]	0.9 [0.4–2.2]
District:				(P < 0.001)*	(P = 0.018)*			(P = 0.075)	(P = 0.672)
Mashonaland East—Chikomba	216	112	51.9	1.0	1.0	57	26.4	1.0	1.0
Manicaland—Buhera	282	178	63.1	1.6 [1.1–2.3]	1.6 [1.0–2.4]	82	29.1	1.1 [0.8–1.7]	1.2 [0.7–1.9]
Manicaland—Makoni	148	83	56.1	1.2 [0.8–1.8]	1.5 [0.9–2.4]	37	25.0	0.9 [0.6–1.5]	1.0 [0.6–1.7]
Masvingo—Gutu	117	59	50.4	0.9 [0.6–1.5]	1.3 [0.7–2.2]	25	21.4	0.8 [0.4–1.3]	1.0 [0.5–1.9]
Masvingo—Zaka	458	201	43.9	0.7 [0.5–1.0]	0.8 [0.6–1.3]	90	19.7	0.7 [0.5–1.0]	0.8 [0.5–1.3]
Masvingo—Masvingo rural	171	86	50.3	0.9 [0.6–1.4]	1.2 [0.7–1.9]	40	23.4	0.9 [0.5–1.4]	1.1 [0.6–1.9]
Household, mobility and SES:									
Orphanhood:				(P = 0.056)	(P = 0.522)			(P = 0.288)	(P = 0.371)
Both parents alive	803	398	49.6	1.0	1.0	181	22.5	1.0	1.0
One or both parents dead	547	300	54.8	1.2 [1.0–1.5]	1.1 [0.8–1.5]	137	25.1	1.1 [0.9–1.5]	0.8 [0.6–1.2]
Female headed household:				(P = 0.038)*	(P = 0.074)			(P = 0.045)*	(P = 0.048)*
No	874	433	49.5	1.0	1.0	191	21.9	1.0	1.0

Factor	N	n	%	At risk of being affected (SSQ score = 8–14)		At risk of being severely affected (SSQ score = 11–14)			
				Crude† OR [95%CI]	Adjusted^b OR [95%CI]	n	%	Crude† OR [95%CI]	Adjusted^b OR [95%CI]
Yes	463	257	55.5	1.3 [1.0–1.6]	1.3 [1.0–1.7]	124	26.8	1.3 [1.0–1.7]	1.4 [1.0–1.8]
Moved in last 5 years:				(P < 0.001)*	(P = 0.034)*			(P = 0.002)*	(P = 0.031)*
No	1060	515	48.6	1.0	1.0	230	21.7	1.0	1.0
Yes	320	195	60.9	1.7 [1.3–2.1]	1.4 [1.0–1.9]	97	30.3	1.6 [1.2–2.1]	1.4 [1.0–2.0]
Adult skipped a meal in last week:				(P < 0.001)*	(P < 0.001)*			(P < 0.001)*	(P = 0.055)
No	1103	523	47.4	1.0	1.0	229	20.8	1.0	1.0
Yes	275	192	69.8	2.6 [1.9–3.4]	1.9 [1.4–2.7]	100	36.4	2.2 [1.6–2.9]	1.4 [1.0–2.0]
Ability to afford soap:				(P < 0.001)*	(P = 0.115)			(P < 0.001)*	(P = 0.727)
Can afford soap	1131	548	48.5	1.0	1.0	250	22.1	1.0	1.0
Cannot afford soap	261	171	65.5	2.0 [1.5–2.7]	1.3 [0.9–1.9]	81	31	1.6 [1.2–2.1]	0.9 [0.6–1.4]

†Chi–square P-value presented from univariate analysis

[a]As cohort members all participants had completed at least Year 2 of secondary school

[b]OR adjusted for a priori confounders (age, gender, marital status, education, district) and all factors independently associated with being at risk or severely at risk for common affected disorder (Likelihood ratton test P-value < 0.1) (i.e. Female headed house, moved house, skipped a meal, referred to in negative way, shunned by others, given more work, not given clothes)

*P < 0.05

Table 4

Association between stigma and being at risk (SSQ score ≥ 8) or severely at risk (SSQ score ≥ 11) of being affected ($n = 1392$ completing all 14 items)

	N	At risk of being affected (SSQ score = 8–14)				At risk of being severely affected (SSQ score = 11–14)			
		n	%	Crude† OR [95%CI]	Adjusted^a OR [95%CI]	n	%	Crude† OR [95%CI]	Adjusted^a OR [95%CI]
Sigma									
Referred to in negative way:				$(P < 0.001)*$	$(P < 0.001)*$			$(P < 0.001)*$	$(P < 0.001)*$
Never	641	199	31.1	1.0	1.0	59	9.2	1.0	1.0
Sometimes/always	747	519	69.5	5.0 [4.0–6.4]	3.5 [2.7–4.5]	271	36.3	5.6 [4.1–7.6]	3.6 [2.6–5.0]
Shunned by others:				$(P < 0.001)*$	$(P < 0.001)*$			$(P < 0.001)*$	$(P < 0.001)*$
Never	1108	484	43.7	1.0	1.0	196	17.7	1.0	1.0
Sometimes/always	276	230	83.3	6.4 [4.6–9.0]	3.7 [2.5–5.4]	133	48.2	4.3 [3.2–5.7]	2.3 [1.7–3.2]
Given more work than others in house:				$(P < 0.001)*$	$(P = 0.028)*$			$(P < 0.001)*$	$(P = 0.003)*$
Never	1010	451	44.7	1.0	1.0	174	17.2	1.0	1.0
Sometimes/always	375	264	70.4	2.9 [2.3–3.8]	1.4 [1.0–1.9]	155	41.3	3.4 [2.6–4.4]	1.6 [1.2–2.2]
Not given clothes like others in house:				$(P < 0.001)*$	$(P < 0.001)*$			$(P < 0.001)*$	$(P < 0.001)*$
Never	865	358	41.4	1.0	1.0	129	14.9	1.0	1.0
Sometimes/always	521	359	68.9	3.1 [2.3–3.8]	2.0 [1.6–2.7]	200	38.4	3.6 [2.7–4.6]	2.2 [1.6–3.1]
Given less food than others in house:				$(P < 0.001)*$	$(P = 0.299)$			$(P < 0.001)*$	$(P = 0.308)$
Never	1222	589	48.2	1.0	1.0	250	20.5	1.0	1.0
Sometimes/always	159	122	76.7	3.5 [2.4–5.2]	1.3 [0.8–2.1]	76	47.8	3.6 [2.5–5.0]	1.2 [0.8–1.9]

†Chi-square *P*-value presented from univariate analysis

^a OR adjusted for a priori confounders (age, gender, marital status, education, district) and all factors independently associated with being at risk or severely at risk for common affected disorder (Likelihood ratton test *P*-value < 0.1) (i.e. Female headed house, moved house, skipped a meal, referred to in negative way, shunned by others, given more work, not given clothes)

*
P < 0.05

Table 5

Association between psychological morbidity and sexual behaviour

	n (%) reporting behaviour/outcome				At risk (SSQ score 8–10)		Severely at risk (SSQ score 11–14)	
	Mentally healthy	At risk (SSQ = 8–10)	Severely at risk (SSQ = 11–14)	P-value test for trend	Crude OR [95%CI]	Adjusted* OR [95%CI]	Crude OR [95%CI]	Adjusted* OR [95%CI]
Ever had sex	67 (10.0)	54 (14.0)	75 (22.7)	P < 0.001	1.5 [1.0–2.2]	1.5 [1.0–2.4]	2.6 [1.8–3.8]	2.8 [1.9–4.2]
2 or more lifetime partners	14 (2.1)	17 (4.5)	31 (9.7)	P < 0.001	2.2 [1.1–4.5]	2.3 [1.1–4.8]	5.0 [2.6–9.6]	5.4 [2.7–10.7]
Sexual debut aged 15 or younger	11 (1.7)	13 (3.4)	12 (3.8)	P = 0.034	2.1 [0.9–4.7]	2.0 [0.9–4.5]	2.3 [1.0–5.4]	2.2 [1.0–5.2]
Positive pregnancy result (females only)	3 (1.0)	4 (2.3)	9 (6.3)	P = 0.002	2.3 [0.5–10.5]	3.4 [0.7–16.8]	6.7 [1.8–25.3]	8.0 [1.9–33.8]
Ever tried drugs or alcohol	180 (26.9)	140 (36.3)	132 (40.4)	P < 0.001	1.5 [1.2–2.0]	1.7 [1.3–2.2]	1.8 [1.4–2.4]	2.0 [1.5–2.7]

*
Adjusted OR adjusted for *a priori* confounders only (age, gender, marital status, education and district)