Depression among carers of AIDS-orphaned and other-orphaned children in Umlazi Township, South Africa

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South Africa faces the challenge of supporting the well-being of adults caring for growing numbers of AIDS-orphaned children. These adults play a critical role in responses to the epidemic, but little information exists in regard to their mental health needs. This paper reports on findings from $n = 1599$ adults, recruited through representative household sampling, who serve as primary carers for children in Umlazi Township, an HIV-endemic community. Overall, 22% of participants were carers of AIDS-orphaned children, 11% were carers of other-orphaned children and 67% were carers of non-orphaned children. Prevalence of depression was 30.3%. Orphan carers, regardless of whether they cared for AIDS-orphaned or other-orphaned children, were significantly more likely than carers of non-orphaned children to meet the clinical threshold for depression (35.2% vs. 27.9%, $p < 0.01$). In multivariate logistic regressions, food insecurity and being a female carer were identified as additional risk factors for greater depression. In contrast, households with access to running water and households dependent on salaries as the main source of income were identified as protective factors for disparities in depression. Mental health interventions are urgently needed to address an increased risk for depression among all orphan carers, not just those caring for AIDS-orphaned children.

Keywords: South Africa; depression; HIV/AIDS; carer; orphan

Introduction

Developing countries face a large burden due to mental health disorders (Desjarlais *et al.* 1995). Mental disorders account for 15% of the total burden of disease in low- and middle-income countries (Patel 2007). South Africa experiences a high prevalence of mental health disorders. The first nationally representative study of common mental health disorders in South Africa showed that 30.3% of the population experienced a lifetime mental health disorder. The 12-month prevalence of mood disorders (e.g., major depressive disorder) was 4.9% in South Africa

(Herman *et al.* 2009). A better understanding of mental disorders in South Africa is important for improving the well-being of individuals in HIV-affected communities, especially since mental disorders can contribute to other health issues prevalent in developing countries, including poor child nutrition, low birth weight and risky health behaviours (Patel 2007).

Increased mental health problems in South African individuals and families might be a consequence of the HIV/AIDS epidemic, a disease that 5.7 million people live with in South Africa (Joint United Nations Programme on HIV/AIDS [UNAIDS] 2008). There is a growing understanding of the mental health burden for people affected by HIV/AIDS in South Africa, including HIV-infected individuals (Kuo and Operario 2010) and children orphaned by AIDS (Cluver *et al.* 2007). However, little information exists in regard to the mental health of adults caring for AIDS-orphaned and other vulnerable children (Kuo and Operario 2009). This is a potentially vulnerable population given that they have experienced AIDS-related deaths of family members and, consequently, have taken on the responsibilities of caring for AIDS-orphaned children and other vulnerable children.

A number of studies indicate that carers of orphaned children, regardless of the cause of orphanhood, face a number of negative mental health outcomes. These outcomes include reports of stress (Kelley 1993, Goldberg-Glen *et al.* 1998, Haglund 2000). Other studies document depression among orphan carers (Burton 1992, Jendrek 1993, Minkler and Roe 1993, Roe *et al.* 1996, Goldberg-Glen, et al. 1998, Szinovacz *et al.* 1999, Fuller-Thomson and Minkler 2000).

In addition to this literature, a number of small-scale studies focusing specifically on carers of AIDS-orphaned children also indicate a range of negative mental health outcomes. Oburu and Palmerus (2003) examined a sample of grandparents fostering AIDS-orphaned grandchildren in Kenya and found higher levels of stress among older full-time grandparents. Rotheram-Borus *et al.*'s (2002) longitudinal study of carers of AIDS-orphaned children in the USA found that carers reported stress due to care duties. Strug and Burr's (2003) study in the USA revealed that male carers of AIDS-orphaned children felt that their mental health needs were unmet. Ssengonzi's (2007) study of the challenges faced by elder surrogate carers of AIDS-orphaned children in Uganda showed that carers reported emotional stress that impacted their health. Given that carers play a substantial and direct role in supporting 1.4 million children orphaned by AIDS in South Africa, a better understanding of the mental health of carers can inform health and psychosocial interventions for families and communities affected by HIV/AIDS (UNAIDS 2008).

Although the literature suggests that caring for an orphaned child–either orphaned due to AIDS or by other causes of parental death–can influence the psychological health of carers, other factors can also contribute to and confound the association between caregiving and psychological health. A large body of literature points to potential demographic and structural risk and protective factors for depression relevant to psychological health, which must be considered in analyses of carers in South Africa. For example, anecdotal reports characterise orphan carers as more likely to be older 'grannies' who might be less educated and poorer than non-orphan carers (Madhavan 2004). Studies document the inverse correlation between age and depression (e.g., see Mirowsky and Ross 1992, Knight *et al.* 2003, Mojtabai and Olfson 2005, Kim *et al.* 2009). Age

may result in decreased physical activity or social support, which are both linked to depression (Tyler 2000, Strawbridge *et al.* 2002). Education may be another important protective factor against depression, with studies indicating a negative association between education and depression (e.g., see Francis *et al.* 2007). Higher education may act as a protective factor for depression since higher education may result in full-time employment and high incomes, increasing access to health resources (Linn *et al.* 1985) and leading to healthier lifestyle behaviours (Ford *et al.* 1991, Shea *et al.* 1991), including preventative medical care (Ross and Wu 1995). Studies also show a relationship between gender and depression (e.g., see Frackiewicz *et al.* 2000, Piccinelli and Wilkinson 2000), with females more likely to develop depression than males (Weissman *et al.* 1996, Hankin *et al.* 1998, Nolen-Hoeksema 2001). Females may be more prone to depression due to differences in coping skills as well as physiologic and endocrine responses to adverse life events (Piccinelli and Wilkinson 2000, Kuehner 2003). Studies also show an inverse correlation between economic status and depression (e.g., see Everson *et al.* 2002), with economic status impacting access to mental health services. A number of studies link neighbourhood factors, such as water, access to food, housing, etc. to depression (e.g., see Cutrona *et al.* 2006, Kim 2008). Social support has also been shown to be associated with lower depression, due to both the positive psychological effect of being supported and because social support buffers individuals from adverse effects of stress (Cohen and Wills 1985, Paykel 1994). Finally, studies indicate the importance of policy in mental health outcomes (Flisher *et al.* 2007). In South Africa, policies supporting the provision of social-welfare grants can positively contribute to mental health by serving as an important source of financial support for access to services; grants can also negatively contribute to mental health due to the stigma attached to being a grant recipient (Plagerson *et al.* 2010). We consider these risk and protective factors as important covariates in our analyses of the psychological health of carers in South Africa.

This paper reports on findings from a large cross-sectional survey of adults caring for children in Umlazi, a township in South Africa with a high prevalence of HIV. The two primary study aims were to: (1) assess and compare self-reports of depression among carers of AIDS-orphaned, other-orphaned and non-orphaned children and (2) identify risk and protective factors for depression in this carer population. We hypothesised that carers of orphaned children (whether AIDS-orphaned or other-orphaned children) would report overall greater depression than carers of non-orphaned children. We further hypothesised that due to the social and economic consequences associated with HIV/AIDS, carers of AIDS-orphaned children would show the highest levels of depression.

Methods

The survey included validated measures of depression, which were translated and back-translated from English into isiZulu and piloted to ensure coherency and cultural validity. A team of trained research assistants fluent in isiZulu gathered data between August 2008 and March 2009. The study focused on Umlazi Township, located in KwaZulu Natal (KZN) province, which has the highest antenatal HIV prevalence at 37.4% (South African National Department of

Health 2008) and the highest rates of orphanhood at 19.8% (Shishana *et al.* 2005) in South Africa. Furthermore, Umlazi Township is located in Ethekwini municipality, which has the highest municipality-level antenatal HIV prevalence at 41.6% (Smith 2008).

Sampling

Participants were identified through multi-stage cluster sampling. First, Umlazi was split into geographic clusters based on Geographical Information System mapping of South African census enumeration areas (EAs). Second, EAs were randomly sampled and in each sampled EA, all households were visited and screened for eligibility. Third, household members identified the primary child carer in the home. The primary child carer was defined as the individual responsible for the majority of the day-to-day active care of the child(ren) (e.g., preparing child(ren) for school; overseeing self-care activities; providing emotional support, and possibly economic support). The carer could be related to the child in any way (i.e., carers could be the biological parents of the child, but they could also be aunts or grandparents), or they could be non-relatives. The carer was invited to participate if: (1) he/she was 18 years or older, (2) he/she provided primary care to one or more children and (3) both carer and child(ren) lived in the household at least four nights a week for the previous four weeks (Statistics South Africa 2001). If multiple primary carers existed within a single household, one eligible primary carer was randomly invited to participate.

A total of 2070 households were contacted through this approach and screened for eligibility. Recruiters were unable to make contact with 160 households after three visits (7.7% of households). Of the eligible households, there was a 99.3% response rate, resulting in a sample of 1599 adult carers. Ethical review committees at Oxford University and the University of KwaZulu Natal approved research protocols.

Comparison groups

This paper presents the overall prevalence of depression in the sample and compares depression among three carer sub-groups: AIDS-orphan carers, other-orphan carers (e.g., carers of children orphaned by non-AIDS causes, such as other health reasons, violence or traffic accidents), and non-orphan carers. Carers were classified as AIDS-orphaned carers if any of the children under their care was orphaned due to AIDS; carers were classified as other-orphaned carers if any of the children under their care was orphaned due to a cause other than AIDS and if they did not care for an AIDS-orphaned child. 'Orphan' was defined in accordance with the UNAIDS, United Nations Children's Fund (UNICEF), and United States Agency for International Development (USAID) definition as a child under age 18 whose mother and/or father has died (UNICEF 2004). A validated verbal autopsy (VA) method was used to determine if adults cared for AIDS-orphaned children or other-orphaned children. The VA method was based on Lopman *et al.*'s (2006) study, which used eight signs and symptoms related to HIV to verify cause of death. The original study had a sensitivity of 66% and a specificity of 76% of predicting death due to AIDS; sensitivity and specificity did not vary significantly according to the respondent's gender; the time of death; or

the respondent's status as a primary carer, family member, or other relation to the deceased (Lopman *et al.* 2006).

Measures

Depression measure

Depression was measured using the Centre for Epidemiologic Studies Depression scale (CES-D), a 20-item measure designed to assess levels of depressive symptomology (Radloff 1977). The CES-D is one of the most widely used self-report depression instruments and has been administered in various settings, including South Africa (Pretorius 1991, Smit *et al.* 2006, Hamad *et al.* 2008, Myer *et al.* 2008). Scores ranged from 0 to 60, with a score of 16 or more used to indicate clinical depression (Radloff 1977). The CES-D showed high internal reliability in this sample ($\alpha = 0.92$).

Measures of possible risk and protective factors

In addition to measuring health outcomes, the questionnaire gathered data on possible demographic (e.g., age, gender, education, ethnicity and language); care provision (e.g., social support for the carer, number of children in the household); household (e.g., economic assets, main source of household income, household food insecurity, toilet facilities, access to potable water); and policy risk and protective factors (e.g., receipt of old-age pension, disability, housing, child support and foster care grants). Data were gathered on all children in the household. Social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS), a 12-item scale assessing support from three sources: family, friends and significant others. Scores ranged from 12 to 84 points, with higher scores indicating higher levels of perceived social support (Zimet *et al.* 1988, Zimet *et al.* 1990). The MSPSS has been used in various cultural settings, including KZN Province (Myint and Mash 2008) and elsewhere in South Africa (Bruwer *et al.* 2008). Validation studies show good internal consistency reliability ($\alpha = 0.77–0.98$) in a variety of samples, including adolescents in South Africa (Bruwer *et al.* 2008), individuals with psychiatric illnesses (Cecil *et al.* 1995, Stanley *et al.* 1998) and other developing country populations (Eker and Arkar 1995). The remainder of items to assess risk and protective factors were drawn from the South Africa National Census (Statistics South Africa 2001), South Africa General Household Survey (Statistics South Africa 2006), South Africa Demographic and Health Survey (Department of Health, Medical Research Council 2007) and the KwaZulu-Natal Income Dynamics Study (2004) questionnaire (May *et al.* 1999) in order to ensure the use of culturally appropriate questions and to limit inappropriate phrasing or biasing responses through inappropriate or restrictive answer choices.

Analyses

Data were analysed using SPSS version 17. Bivariate analyses comparing differences in the prevalence of depression between carers of AIDS-orphaned, other-orphaned, and non-orphan children were conducted using chi-square tests. Multivariate logistic regressions tested whether depression varied according to particular carer subgroups, and whether factors were independently associated with depression within

the subgroup with the highest risk. Variables were imputed into regression models based on the socio-ecological model of health, in order of proximal to distal relationship of risk and protective factors to carer depression (e.g., individual socio-demographic, care provision, household and policy variables) (Morris 1975).

Results

Demographic characteristics

Participants were predominantly black African (99.9%), with a small percentage of individuals who were coloured (0.1%). The majority of participants were isiZulu speakers (98.1%), with the remainder speaking isiXhosa (1.6%), Sedepi (0.1%) and Sesotho (0.1%). On average, participants were 39.4 years old (SD = 14.7) and the majority were female (86.4%). Less than a quarter of participants completed the secondary education standard of Grade 12 (22.8%), and even fewer completed tertiary education (1.8%). Participants were responsible for 4039 children in total (average of $M = 2.5$ children per carer [SD = 1.6]). The majority lived in informal dwellings (53.9%) (i.e., buildings made with cardboard, corrugated iron, plastic, etc.) and the remainder lived in formal dwellings (46.1%) (i.e., buildings made with brick, concrete, etc.). The majority of households had some source of income (99.3%); salaries and social-welfare grants ranked as the most frequent sources of income.

Roughly one-third of participants were carers of orphaned children; 22.4% ($n = 359$) of participants were carers of AIDS-orphaned children, 10.7% ($n = 171$) were carers of other-orphaned children, and 66.9% ($n = 1069$) did not care for orphaned children. Groups showed socio-economic and demographic differences. There were age differences between groups ($p < 0.01$, $F = 26.6$). Carers of AIDS-orphaned children were significantly older ($M = 44.2$, SD = 16.4) than carers of other-orphaned children ($M = 39.4$, SD = 14.7) ($p < 0.01$). Carers of AIDS-orphaned children were also significantly older ($M = 44.2$, SD = 16.7) than carers of non-orphaned children ($M = 37.8$, SD = 13.8) ($p < 0.01$). There were also differences in education levels across groups ($p < 0.01$, $F = 10.96$). Carers of AIDS-orphaned children had significantly lower education levels ($M = $ Grade 7, SD = 4.1) than carers of non-orphaned children ($M = $ Grade 8, SD = 3.8) ($p < 0.01$). There were significant differences in social support from friends ($p < 0.01$, $F = 7.19$), family ($p < 0.01$, $F = 9.90$) and significant others ($p < 0.01$, $F = 8.80$). Carers of AIDS-orphaned children had significantly less support from friends ($M = 15.95$ vs. 17.82) ($p < 0.01$), family ($M = 21.81$ vs. 23.20) ($p < 0.01$) and significant others ($M = 22.47$ vs. 23.69) ($p < 0.01$) than those caring for non-orphaned children. Carers of AIDS-orphaned children were significantly less likely to depend on salaries as the main source of household income (54.6%) when compared to carers for other-orphaned (57.1%) and non-orphaned children (69.6%), χ^2 (2, $N = 1599$) = 31.5, $p < 0.01$. Those who cared for AIDS-orphaned children were significantly more likely to have an old-age pension (27.5%) when compared to carers for other-orphaned children (18.1%) and non-orphaned children (11.0%), χ^2 (2, $N = 1599$) = 56.4, $p < 0.01$. There were similar patterns of difference for the housing subsidy and foster-care grant. There were no significant differences in regard to gender, ethnicity, language, economic assets, or a variety of household-descriptive variables (including food insecurity, potable water, etc.)

Depression

One-third of the sample (30.3%) reported scores which met the threshold criteria (CES-D $\geq$ 16) for clinical depression. When carers were disaggregated into those caring for orphaned and non-orphaned children, the former was significantly more likely to meet criteria for depression (35.2%) than carers of non-orphaned children (27.9%), χ^2 (1, $N = 1599$) = 8.75, $p < 0.01$. When those caring for orphans were further disaggregated into carers of AIDS-orphaned and other-orphaned children for comparison, 36.5% of those in the other-orphaned group and 34.5% of carers in the AIDS-orphaned group, and 27.9% of carers in the non-orphaned group met the criteria for depression, χ^2 (2, $N = 1596$) = 8.96, $p < 0.011$ (see Table 1). Carers of AIDS-orphaned children were significantly more likely to meet the criteria for depression (34.5%) than those of non-orphaned children (27.9%), χ^2 (1, $N = 1426$) = 5.64, $p < 0.01$. Similarly, participants caring for other-orphaned children were significantly more likely to meet the criteria for depression (36.5%) than those taking care of non-orphaned children (17.8%), χ^2 (1, $N = 1237$) = 5.19, $p < 0.02$. However, there were no significant differences in depression between carers of AIDS-orphaned and other-orphaned children. Since carers in both the AIDS-orphaned and other-orphaned group were significantly more likely to meet the criteria for depression when compared to carers of non-orphaned children, the carers in the AIDS-orphaned group and the other-orphaned group were combined into one group in multivariate logistic regression models.

We also explored whether levels of depression differed between adults caring for one or more of his/her children vs. adults caring for none of their own children. We found no significant differences in depression between these groups (30.7% vs. 28.1%, respectively), ($p < 0.40$, $\chi^2 = 0.69$). This variable was not included in further multivariate analyses.

Risk and protective factors for depression

Multivariate logistic regression models are summarised in Table 2. Variables were entered into logistic regression models using forward block-wise entry, with variables ordered by those most proximal to the individual followed by those that were more distal. In the first block, a dichotomous variable for carers of orphaned vs. non-orphaned children was entered. In the second block, variables that were most proximally associated with the provision of childcare were entered (number of children in the household, social support for the carer). In the third block, household characteristics were entered (economic assets, source of income, toilet facilities, household food insecurity, source of water, potable water and dwelling type). In the fourth block, policy-related variables were entered (old-age pension, disability grant, housing grant, child-support grant and foster-care grant). In the final block, carer demographic variables were entered (age, gender and education).

In all models, orphan carers were significantly more likely to meet the clinical threshold criteria for depression than non-orphan carers (*Model 1*, OR = 1.39, 95% CI = 1.11–1.74; *Model 2*, OR = 1.47, 95% CI = 1.16–1.85; *Model 3*, OR = 1.40, 95% CI = 1.09–1.79; *Model 4*, OR = 1.37, 95% CI = 1.06–1.77; *Model 5*, OR = 1.32, 95% CI = 1.02–1.71). In the second model, proximal variables were not associated with depression. In the third model, greater depression was associated

Table 1. Differences between carer subgroups on depression and socio-demographic variables.

	All carers (n = 1599)	Carers of AIDS-orphaned children (n = 359)	Carers of other-orphaned children (n = 171)	Carers of non-orphaned children (n = 1069)	P-value[a]
Depression (%)	30.3	34.5	36.5	27.9	<0.01
Age (M, SD)	39.4 (14.7)	44.2 (16.4)	39.4(14.7)	37.8 (13.8)	<0.01
Female (%)	86.4	89.9	87.1	85.1	ns
Education (M, SD)	Grade 8 (3.9)	Grade 7 (4.1)	Grade 8 (3.6)	Grade 8 (3.8)	<0.01
African (%)	99.9	99.7	100	99.9	ns
isiZulu language (%)	98.1	98.3	98.2	98.0	ns
Social support from family (M, SD)	22.9 (5.2)	21.8 (5.9)	23.2 (5.3)	23.2 (4.9)	<0.01
Social support from friends (M, SD)	17.3 (8.2)	15.9 (8.4)	17.7 (8.6)	17.8 (8.1)	<0.01
Social support from significant others (M, SD)	23.4 (4.8)	22.5 (5.5)	23.2 (5.3)	23.7 (4.5)	<0.01
Number of children (M, SD)[b]	2.5 (1.6)	0.5 (1.1)	0.3 (0.9)	−0.2 (0.9)	<0.01
Economic asset index (M, SD)	0.1 (0.7)	0.001 (0.8)	0.1 (0.7)	0.1 (0.6)	ns
Salaries as main household income (%)	64.9	54.6	57.1	69.6	<0.01
Flush toilet (%)	45.0	45.7	50.0	44.9	ns
Household food insecurity (%)	61.7	62.7	64.1	61.0	ns
Piped water (%)	77.5	79.7	84.1	75.7	ns
Potable water (%)	99.4	99.7	99.4	99.3	ns
Formal dwelling (%)	46.1	48.5	47.4	45.8	ns
Old age pension (%)	15.5	27.8	18.1	11.0	<0.01
Disability grant (%)	8.5	10.1	8.8	7.9	ns
Housing grant (%)	5.0	8.4	4.0	5.0	<0.01

Table 1 (*Continued*)

	All carers (n = 1599)	Carers of AIDS-orphaned children (n = 359)	Carers of other-orphaned children (n = 171)	Carers of non-orphaned children (n = 1069)	P-value[a]
Child support grant (%)	74.1	70.3	74.1	75.3	ns
Foster care grant (%)	3.6	9.3	3.5	1.7	<0.01

[a]P-values are associated with one-way ANOVA or chi-square test.
[b]The number of children in the household was abnormally distributed (median = 2.00, mode = 1.00, skewness = 1.37, kurtosis = 2.77) and transformed into z-score.

Table 2. Multivariate logistic regressions testing factors associated with depression (CES-D).

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
Carer type (AIDS-orphan and Other-orphan vs. Non-orphan carers)	1.39**(1.11–1.74)	1.47**(1.16–1.85)	1.40**(1.09–1.79)	1.37*(1.06–1.77)	1.32*(1.02–1.71)
Care provision variables					
Social support from family[a]		0.90 (0.70–1.19)	0.99 (0.73–1.34)	0.99 (0.73–1.34)	0.91 (0.66–1.24)
Social support from friends[a]		1.16 (0.92–1.45)	1.08 (0.85–1.37)	1.07 (0.85–1.37)	1.12 (0.88–1.43)
Social support from significant others[a]		0.92 (0.68–1.23)	0.97 (0.70–1.33)	0.98 (0.71–1.35)	1.00 (0.72–1.40)
Number of children		0.80 (0.63–1.01)	0.77* (0.60–0.99)	0.83 (0.64–1.08)	0.79 (0.60–1.03)
Household variables					
Economic asset index[b]			1.03 (0.72–1.49)	1.02 (0.71–1.49)	0.97 (0.67–1.42)
Source of income[b]			0.51** (0.40–0.65)	0.50** (0.39–0.65)	0.55** (0.42–0.71)
Toilet facilities[c]			0.84 (0.58–1.21)	0.83 (0.57–1.20)	0.84 (0.58–1.23)
Household food insecurity[c]			3.42** (2.63–4.46)	3.57** (2.74–4.66)	3.51** (2.68–4.61)
Source of water[c]			0.72* (0.53–0.98)	0.73* (0.54–0.98)	0.73* (0.54–0.99)
Potable water[c]			0.69 (0.17–2.71)	0.67 (0.17–2.69)	0.62 (0.15–2.56)
Dwelling Type[d]			0.83 (0.60–1.13)	0.81 (0.58–1.11)	0.82 (0.60–1.14)
Policy variables					
Old age pension[c]				0.98 (0.70–1.38)	0.77 (0.54–1.09)
Disability grant[c]				0.98 (0.65–1.47)	0.81 (0.54–1.23)
Housing grant[c]				0.57* (0.33–0.98)	0.62 (0.36–1.07)
Child support grant[c]				0.76* (0.58–0.99)	0.83 (0.63–1.11)
Foster care grant[c]				1.22 (0.67–2.21)	1.13 (0.62–2.08)
Socio-demographic cofactors					
Age					1.39 (0.97–1.99)
Gender[e]					1.98** (1.51–2.60)

Table 2 (*Continued*)

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)	Model 4 OR (95% CI)	Model 5 OR (95% CI)
Education[f]					0.82 (0.63–1.06)

*Denotes significance at $p < 0.05$ level.
**Denotes significance at $p < 0.01$ level.
[a]Measured on a 84-point scale; higher values reflect more social support.
[b]Dichotomous variable calculated based on mean value; higher values reflect more household assets/income; 1 = high, 0 = low.
[c]Dichotomous variable; 1 = yes, 0 = no.
[d]Dichotomous variable; 1 = formal dwelling, 0 = informal dwelling.
[e]Dichotomous variable; 1 = female, 0 = male.
[f]Dichotomous variable calculated based on mean value; higher values reflect more education.

with low income, lack of water and hunger ($ps < 0.01$). In the forth model, presence of household and childhood support grants were associated with less depression ($ps < 0.01$). In the final model, gender was associated with a nearly two-fold increase in depression.

The final adjusted model (*Model 5*) identified a number of important risk and protective factors for higher rates of depression among carers. Carers had three and a half times greater odds of meeting the clinical threshold for depression if someone in their household reported being hungry (OR = 3.51, 95% CI = 2.68–4.61). Also, the odds of meeting the clinical threshold for depression were twice as great if the carers were female (OR = 1.98, 95% CI = 1.51–2.60). The final adjusted model also highlighted two important protective factors. Carers had 55% lower odds of being depressed when the primary source of household income was salaries (OR = 0.55, 95% CI = 0.42–0.71). Carers had 73% lower odds to be depressed when they had piped water (OR = 0.73, 95% CI = 0.54–0.99).

Conclusion

This is one of the largest known representative household studies of depression among carers in South Africa. This study draws attention to the mental health needs of carers in settings with a high HIV prevalence. Regardless of whether they cared for AIDS-orphaned, other-orphaned, or non-orphaned children, our findings showed that a high percentage of carers (30.3%) reported clinically significant depression. The findings supported our hypothesis that adults caring for orphaned children reported heightened depression. The association between caring for an orphan and depression was independent of proximal, household, and policy-relevant variables that might contribute to depression. However, findings did not support our hypothesis that carers of AIDS-orphaned children would report a higher depression level than carers of other-orphaned children. One possible factor that may have contributed to the unexpectedly high depression among carers of other-orphaned children was the violent means through which children came under their care. In exploratory analyses, we found that causes of non-AIDS death among parents were frequently violent or traumatic. Indeed, the three most frequent causes of non-AIDS death among parents were shootings (60%), car accidents (20%), or stabbings (13%).

This study also identified risk and protective factors for depression among carers in this sample. Findings suggested that increasing access to salaried employment, addressing food insecurity at the household level, providing households with access to potable piped water, and improving access to specific social-welfare grants might reduce depression among carers. Furthermore, because of the wide gender effects, mental health interventions targeting female carers may be warranted. We were surprised to find no associations between social support and depression in this sample. This might be because of practical or material needs might take precedence over psychosocial needs in determining depression among carers in South Africa.

This study has several limitations which can be addressed in future studies. The cross-sectional nature of the data prevented predictions regarding the causal relationship between variables. Further testing is needed to determine the temporal mechanisms of risk and protective factors for depression. In addition, the data focused exclusively on carers and cannot depict family or household

dynamics associated with depression. For example, additional data on family members, such as the children's health status and the relationship of the carer to the child may have shown a relationship between these family factors and carer mental health. Capturing the relationship of the carer to the child was particularly difficult in analyses because a carer was often related to different children in the family in different ways; one carer could be caring for their children as well as their nieces, nephews and grandchildren. The complicated nature of the relationship of the carer to the child(ren) arises due to the dynamic nature of South African families, which are often mixed generation, extended-family households due to dislocation because of apartheid or migratory work; this may be particularly common in HIV-endemic communities, where households often experience deaths of multiple family members (Madhavan 2004). This complex relationship made it difficult to distinguish whether depression differed in a surviving parent caring for his/her own child vs. a grandmother caring for an orphaned child. Findings from this study highlight a need for mental health interventions for carers in South Africa – especially those caring for orphaned children. Emerging literature suggests that mental health interventions in low- and middle-income countries can be affordable and feasible even in human- and financially-scarce environments. For example, a number of studies point toward the efficacy of community-based interventions, including community outreach, community care and family-based interventions in effectively addressing mental health in low-resource environments. For example, a community-based cluster randomised trial showed that group therapy for men and women with depressive disorder in a poor population in Uganda was effective, feasible and affordable. Following the intervention, 6.5% of participants who received group therapy were depressed compared to half in the control group, and this effect was sustained 6 months later (Bass *et al.* 2006). Similarly, family-based psychoeducational interventions for adults with schizophrenia in China show improved treatment compliance and clinical outcomes (Ran *et al.* 2003). In addition, a number of studies show that interventions can be both low-cost and cost-effective. A randomised controlled trial in India for depression showed that psychological treatment significantly decreased overall health care costs, resulting in long-term cost savings (Patel *et al.* 2003). Another randomised controlled trial in Chile showed that interventions do not need to be costly, with daily interventions costing just over US$1 a day (Araya *et al.* 2006).

In conclusion, this study demonstrates a strong need for mental health interventions among carers in South African settings with a high prevalence of HIV. Furthermore, carers who support orphaned children and female carers might warrant prioritisation for mental health interventions. Economic interventions, such as those that improve access to social-welfare grants and that address household living conditions, might be particularly useful for addressing the mental health needs in this population.

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