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

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Abstract

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 regards 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, a 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 and other-orphaned children, were significantly more likely than carers of non-orphaned children to meet the clinical threshold for depression (35.2% versus 27.9%, $p < .01$). 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 amongst 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 from mental health disorders (Desjarlais, Eisenberg, Good, & Kleinman, 1995). Mental disorders account for 15 percent 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 percent of the

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population experienced a lifetime mental health disorder. The twelve-month prevalence for mood disorders (*e.g.*, major depressive disorder) was 4.9 percent 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 behaviors (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 (UNAIDS, 2008). There is a growing understanding of the mental health burden for people affected by HIV/AIDS South Africa, including HIV-infected individuals (Kuo & Operario, 2010) and children orphaned by AIDS (Cluver, Gardner, & Operario, 2007). However, little information exists in regards to mental health of adults caring for AIDS-orphaned and other vulnerable children (Kuo & Operario, 2009). This is a potentially vulnerable population given that they have experienced AIDS-related deaths of family members and, consequently, have taken on responsibilities of caring for AIDS-orphaned children and other vulnerable children.

A number of studies indicate that carers of orphaned children, regardless of cause of orphanhood, face a number of negative mental health outcomes. This includes reports of stress (Goldberg-Glen, Sands, Cole, & Cristofalo, 1998; Haglund, 2000; Kelley, 1993). Other studies document depression among orphan carers (Burton, 1992; Fuller-Thomson & Minkler, 2000; Goldberg-Glen, et al., 1998; Jendrek, 1993; Minkler & Roe, 1993; Roe, Minkler, Thompson, & Saunders, 1996; Szinovacz, DeViney, & Atkinson, 1999).

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 revealed higher levels of stress amongst older, full time grandparents. Rotherman-Borus et al.'s (2002) longitudinal study of carers of AIDS-orphaned children in the United States found that carers reported stress due to care duties. Strug and Burr's (2003) study in the United States 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 carer reported emotional stresses which 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 the psychological health, which must be considered in analyses of carers in South Africa. For example, anecdotal reports characterize 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 (for example, see S. Kim et al., 2009; Knight, Ofstun, Teng, Lazarus, & Curhan, 2003; Mirowsky & Ross, 1992; Mojtabai & Olfson, 2005). Age may result in decreased physical activity or social support, which are both linked to depression (Strawbridge, Deleger, Roberts, & Kaplan, 2002; Tyler, 2000).

Education may be another important protective factor against depression with studies

indicating a negative association between education and depression (for example, see Francis, Weiss, Senf, Heist, & Hargraves, 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, Sandifer, & Stein, 1985) and leading to healthier lifestyle behaviors (Ford et al., 1991; Shea et al., 1991) including preventative medical care (Ross & Wu, 1995). Studies also show a relationship between gender and depression (for example, see Frackiewicz, Sramek, & Cutler, 2000; Piccinelli & Wilkinson, 2000) with females more likely to develop depression than males (Hankin et al., 1998; Nolen-Hoeksema, 2001; Weissman et al., 1996). Females may be more prone to depression due to differences in coping skills as well as physiologic and endocrine responses to adverse life events (Kuehner, 2003; Piccinelli & Wilkinson, 2000). Studies also show an inverse correlation between economic status and depression (for example, see Everson, Maty, Lynch, & Kaplan, 2002) with economic status impacting access to mental health services. A number of studies link neighborhood factors such as water, access to food, housing, etc. to depression (for example, see Cutrona, Wallace, & Wesner, 2006; D. 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 & 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, Patel, Harpham, Kielmann, & Mathee, 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 high HIV prevalence township in South Africa. The two primary study aims were to: (a) assess and compare self-reports of depression amongst carers of AIDS-orphaned, other-orphaned, and non-orphaned children; and (b) identify risk and protective factors for depression in this carer population. We hypothesized 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 hypothesized 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. Data were gathered by a team of trained research assistants fluent in isiZulu 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 percent (South African National Department of Health, *The National HIV and Syphilis Prevalence Survey*, 2008) and highest rates of orphanhood at 19.8 percent (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 percent (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 day-to-day active care of the child(ren) (*e.g.*, preparing child(ren) for school, overseeing self-care activities, 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 could also be aunts, grandparents, non-relatives). This carer was invited to participate if: (a) they were 18 years or older; (b) provided primary care to one or more children; and, (c) both carer and child(ren) lived in the household at least four nights a week for the past four weeks (Statistics South Africa Census 2001 *Questionnaire*, 2001). If multiple primary carers existed within a single household, one eligible primary carer was randomly invited to participate.

A total of 2,070 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 eligible households, there was a 99.3 percent response rate resulting in a sample of 1599 adult carers. Research protocols were approved by ethical review committees at Oxford University and University of KwaZulu Natal.

Comparison Groups

This paper presents overall prevalence of depression in the sample and compares depression amongst three carer subgroups: AIDS-orphan carers, other-orphan carers (*e.g.*, carers of children orphaned by non-AIDS causes such as violence, traffic accidents, other health reasons), and non-orphan carers. Carers were classified as AIDS-orphaned carers if any of the children under their care was orphaned by AIDS; carers were classified as other-orphaned carers if any of the children under their care was orphaned by a non-AIDS cause and if they did not care for an AIDS-orphaned child. ‘Orphan’ was defined in accordance with the UNAIDS, UNICEF, and 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 percent and specificity of 76 percent of predicting death due to AIDS; sensitivity and specificity did not vary significantly according to gender of respondent, time of death, and whether the respondent was 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 (Hamad, Fernald, Karlan, & Zinman, 2008; Myer et al., 2008; Pretorius, 1991; Smit et al., 2006). Scores range 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, 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 the 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 range from 12 to 84 points with higher scores indicating higher levels of perceived social support (Zimet, Dahlem, Zimet, & Farley, 1988; Zimet, Powell, Farley, Werkman, & Berkoff, 1990). MSPSS has been used in various cultural settings including KZN Province (Myint & Mash, 2008) and elsewhere in South Africa (Bruwer, Emsley, Kidd, Lochner, & Seedat, 2008). Validation studies show good internal consistency reliability ($\alpha=0.77$ to 0.98) in a variety of samples including adolescents in South Africa (Bruwer, et al., 2008), individuals with psychiatric illnesses (Cecil, Stanley, Carrion, & Swann, 1995; Stanley, Beck, & Zebb, 1998) and other developing country populations (Eker & Arkar, 1995). The remainder of items to assess risk and protective factors were drawn from the South Africa National Census (Census 2001 Questionnaire, 2001), South Africa General Household Survey (General Household Survey, 2005), South Africa Demographic and Health Survey (South African Demographic and Health Survey, 2003), and the KwaZulu-Natal Income Dynamics Study (KIDS) 2004 questionnaire (KwaZulu-Natal Income Dynamics Study (KIDS) 1993–1998: A Longitudinal Household Data Set for South African Policy Analysis) in order to ensure use of culturally appropriate questions and to limit inappropriate phrasing or biasing responses through inappropriate or restrictive answer choices.

Analyses

Data was analyzed using SPSS version 17. Bivariate analyses comparing differences in the prevalence of depression between AIDS-orphan, other-orphan, and non-orphan carers 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 most high-risk subgroup. 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 Colored (0.1%). The majority of participants were isiZulu speakers (98.1%) with the remainder speaking isiXhosa (1.6%), Sedepi (0.13%), 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 percent ($n=359$) of participants were carers of AIDS-orphaned children, 10.7 percent ($n=171$) were carers of other-orphaned children, and 66.9 percent ($n=1069$) did not care for orphaned children. Groups showed socioeconomic and demographic differences. There were age differences between groups ($p<.01$, $F=26.6$). AIDS-orphan carers were significantly older ($M=44.2$, $SD=16.4$) than other-orphan carers ($M=39.4$, $SD=14.7$) ($p<.01$). AIDS-orphan carers were also significantly older ($M=44.2$, $SD=16.7$) than non-orphan carers ($M=37.8$, $SD=13.8$) ($p<$

01). There were also differences in education levels across groups ($p < 0.01$, $F = 10.96$). AIDS-orphan carers had significantly lower education ($M = \text{Grade 7}$, $SD = 4.1$) than non-orphan carers ($M = \text{Grade 8}$, $SD = 3.8$) ($p < 0.01$). 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 ($p < 0.01$, $F = 8.80$). AIDS-orphan carers had significantly less support than non-orphan carers 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) ($p < 0.01$). AIDS-orphan carers were significantly less likely to depend on salaries as the main source of household income (54.6%) compared to other-orphan (57.1%) and non-orphan carers (69.6%), $\chi^2 (2, N = 1599) = 31.5$, $p < 0.01$. AIDS-orphan carers were significantly more likely to have an old age pension (27.5%) compared to other-orphan (18.1%) and non-orphan carers (11.0%), $\chi^2 (2, N = 1599) = 56.4$, $p < 0.01$. There were similar patterns of difference for the housing subsidy and foster care grant. There were no significant differences in regards 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 orphan and non-orphan carers, orphan carers were significantly more likely to meet criteria for depression (35.2%) than non-orphan carers (27.9%), $\chi^2 (1, N = 1599) = 8.75$, $p < 0.01$. When orphan carers were further disaggregated into AIDS-orphan and other-orphan carers for comparison, 36.5 percent of other-orphan carers and 34.5 percent of AIDS-orphaned carers, and 27.9 percent of non-orphan carers met the criteria for depression, $\chi^2 (2, N = 1596) = 8.96$, $p < 0.01$ (see Table 1). AIDS-orphan carers were significantly more likely to meet the criteria for depression (34.5%) than non-orphan carers (27.9%), $\chi^2 (1, N = 1426) = 5.64$, $p < 0.01$. Similarly, other-orphan carers were significantly more likely to meet the criteria for depression (36.5%) than non-orphan carers (17.8%), $\chi^2 (1, N = 1237) = 5.19$, $p < 0.02$. However, there were no significant differences in depression between AIDS-orphan and other-orphan carers. Since both AIDS-orphan and other-orphan carers were significantly more likely to meet the criteria for depression compared to non-orphan carers, AIDS-orphan and other-orphan carers were combined into one group in multivariate logistic regression models.

We also explored whether levels of depression different between adults caring for one or more of his/her children versus adults caring for none of their own children. We found no significant differences in depression between these groups (30.7% versus 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 summarized 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 orphan versus non-orphan carers 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, 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, 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 with low income, lack of water, and hunger ($ps < .01$). In the fourth model, presence of household and childhood support grants were associated with less depression ($ps < .01$). 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 amongst 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, carers had twice as greater odds of meeting the clinical threshold for depression if they were female (OR=1.98, 95% CI=1.51–2.60). The final adjusted model also highlighted two important protective factors. Carers had a 55 percent lower odds to be depressed when the primary source of household income was salaries (OR=0.55, 95% CI=0.42–0.71). Carers had a 73 percent 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 amongst carers in South Africa. This study draws attention to the mental health needs of carers in settings with high HIV prevalence. Regardless of whether they cared for AIDS-orphaned, other-orphaned, or non-orphaned children, our findings showed a high percentage of carers (30.3%) who reported clinically significant depression. Findings supported our hypothesis that adults caring for orphaned children reported heightened depression. The association between orphan caring 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 the higher depression than carers of other-orphaned children. One possible factor that may have contributed to the unexpectedly high depression amongst other-orphan carers was the violent means through which children came under their care. In exploratory analyses, we found that causes of non-AIDS death amongst parents were frequently violent or traumatic. Indeed, the three most frequent causes of non-AIDS deaths amongst 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 amongst 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 practical or material needs might take precedence over psychosocial needs in determining depression amongst 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 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 from apartheid, 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 their own child versus 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. An 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 towards 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 randomized 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 percent of participants who received group therapy were depressed compared to half in the control group, and this effect was sustained six months later (Bass, Neugebauer, & Clougherty, 2006). Similarly, family based psychoeducational interventions for adults with schizophrenia in China showing 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 randomized controlled trial in India for depression showed that psychological treatment significantly decreased overall health care costs resulted in long-term cost savings (Patel et al., 2003). Another randomized controlled trial in Chile showed that interventions need not be costly, with daily interventions costing just over \$1 a day (Araya, Flynn, Rojas, Fritsch, & Simon, 2006).

In conclusion, this study demonstrates a strong need for mental health interventions amongst carers in high HIV prevalence settings in South Africa. Furthermore, carers who support orphaned children and female carers might warrant prioritization 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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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 ¹
Depression (%)	30.3	34.5	36.5	27.9	<.01
Age (M, SD)	39.4 (14.7)	44.2 (16.4)	39.4(14.7)	37.8 (13.8)	<.01
Female (%)	86.4	89.9	87.1	85.1	ns
Education (M, SD)	Grd. 8 (3.9)	Grd. 7 (4.1)	Grd. 8 (3.6)	Grd. 8 (3.8)	<.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)	<.01
Social support from friends (M, SD)	17.3 (8.2)	15.9 (8.4)	17.7 (8.6)	17.8 (8.1)	<.01
Social support from significant others (M, SD)	23.4 (4.8)	22.5 (5.5)	23.2 (5.3)	23.7 (4.5)	<.01
Number of children (M, SD) ²	2.5 (1.6)	0.5 (1.1)	0.3 (0.9)	-0.2 (0.9)	<.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	<.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	<.01
Disability grant (%)	8.5	10.1	8.8	7.9	ns
Housing grant (%)	5.0	8.4	4.0	5.0	<.01
Child support grant (%)	74.1	70.3	74.1	75.3	ns
Foster care grant (%)	3.6	9.3	3.5	1.7	<.01

¹ P-values are associated with one-way ANOVA or chi-square test.

² 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)
Care 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					
<i>Social support from family</i> ¹		0.90 (0.70–1.19)	0.99 (0.73–1.34)	0.99 (0.73–1.34)	0.91 (0.66–1.24)
<i>Social support from friends</i> ¹		1.16 (0.92–1.45)	1.08 (0.85–1.37)	1.07 (0.85–1.37)	1.12 (0.88–1.43)
<i>Social support from significant others</i> ¹		0.92 (0.68–1.23)	0.97 (0.70–1.33)	0.98 (0.71–1.35)	1.00 (0.72–1.40)
<i>Number of children</i>		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					
<i>Economic asset index</i> ²			1.03 (0.72–1.49)	1.02 (0.71–1.49)	0.97 (0.67–1.42)
<i>Source of income</i> ²			0.51** (0.40–0.65)	0.50** (0.39–0.65)	0.55** (0.42–0.71)
<i>Toilet facilities</i> ³			0.84 (0.58–1.21)	0.83 (0.57–1.20)	0.84 (0.58–1.23)
<i>Household food insecurity</i> ³			3.42** (2.63–4.46)	3.57** (2.74–4.66)	3.51** (2.68–4.61)
<i>Source of water</i> ³			0.72* (0.53–0.98)	0.73* (0.54–0.98)	0.73* (0.54–0.99)
<i>Potable water</i> ³			0.69 (0.17–2.71)	0.67 (0.17–2.69)	0.62 (0.15–2.56)
<i>Dwelling Type</i> ⁴			0.83 (0.60–1.13)	0.81 (0.58–1.11)	0.82 (0.60–1.14)
Policy variables					
<i>Old age pension</i> ³				0.98 (0.70–1.38)	0.77 (0.54–1.09)
<i>Disability grant</i> ³				0.98 (0.65–1.47)	0.81 (0.54–1.23)
<i>Housing grant</i> ³				0.57* (0.33–0.98)	0.62 (0.36–1.07)
<i>Child support grant</i> ³				0.76* (0.58–0.99)	0.83 (0.63–1.11)
<i>Foster care grant</i> ³				1.22 (0.67–2.21)	1.13 (0.62–2.08)
Socio-demographic cofactors					
<i>Age</i>					1.39 (0.97–1.99)
<i>Gender</i> ⁵					1.98** (1.51–2.60)
<i>Education</i> ⁶					0.82 (0.63–1.06)

* Denotes significance at p<.05 level.

** Denotes significance at $p < .01$ level

- 1 Measured on a 84-point scale; higher values reflect more social support
- 2 Dichotomous variable calculated based on mean value; higher values reflect more household assets/income; 1=high, 0=low
- 3 Dichotomous variable; 1=yes, 0=no
- 4 Dichotomous variable; 1=formal dwelling, 0=informal dwelling
- 5 Dichotomous variable; 1=female, 0=male
- 6 Dichotomous variable calculated based on mean value; higher values reflect more education