



Published in final edited form as:

J Behav Med. 2015 February ; 38(1): 17–27. doi:10.1007/s10865-014-9556-7.

Social support as a protective factor for depression among women caring for children in HIV-endemic South Africa

Marisa Casale^{a,b,*}, Lauren Wild^b, Lucie Cluver^{c,d}, and Caroline Kuo^{d,e,f}

^aHealth Economics and HIV and AIDS Research Division, University of Kwazulu-Natal, Durban, South Africa

^bDepartment of Psychology, University of Cape Town

^cDepartment of Social Policy and Intervention, University of Oxford

^dDepartment of Psychiatry and Mental Health, University of Cape Town

^eDepartment of Behavioral and Social Sciences, Brown University

^fCenter for Alcohol and Addiction Studies, Alcohol Research Center on HIV, Brown University

Abstract

Social support has been shown to be a protective resource for mental health among chronically ill adults and caregiver populations. However, to date no known studies have quantitatively explored the relationship between social support and depression among women caring for children in HIV-endemic Southern Africa, although they represent a high risk population for mental health conditions. Using data from a household survey with 2199 adult female caregivers of children, living in two resource-deprived high HIV-prevalence South African communities, we conducted hierarchical logistic regression analysis with interaction terms to assess whether social support had a main effect or stress-buffering effect on depression. Findings provide evidence of stress-buffering of non-HIV-related chronic illness, but not HIV-related illness. Results reinforce the importance of social support for the mental health of chronically ill caregivers, and suggest that factors related to the specific nature of HIV/AIDS may be hindering the potential stress-buffering effects of social support among people living with the disease. Implications for future research and interventions are discussed.

BACKGROUND

Stressors linked to caregiving and chronic illness in HIV-endemic Southern Africa

The increasing number of orphans and vulnerable children in need of care in HIV-endemic areas is arguably the greatest social impact of the 'long wave event' HIV epidemic (Barnett

*Corresponding author's contact details: HEARD, PO BOX X54001, Durban 4000; phone: +27(31)2602592; fax: +27(31)2602587; casale@ukzn.ac.za.

Statements regarding conflict of interest and adherence to ethical standards for working with human subjects:

Marisa Casale, Lauren Wild, Lucie Cluver and Caroline Kuo declare that they have no conflict of interest.

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all patients for being included in the study.

and Whiteside 2006; UNICEF 2003). Seventeen million children worldwide are estimated to have been orphaned by AIDS, of which about 90% live in Southern Africa (UNAIDS 2010). In many of the most affected Southern African countries, the large majority of these children are cared for by the extended family (Kuo and Operario 2009; UNICEF 2003). Caregivers of children in poor HIV-endemic communities are a potentially high risk group for mental health conditions, given the increasing burden of care for children in the context of HIV and multiple social challenges, and mental health risks associated with caregiving stress (Belue et al. 2008; Musil et al. 2009; Reading 2005). For example, stresses related to the presence of a child orphaned by AIDS in the home may include stigma (Madavahnu et al. 2008), concern about the child's HIV status (Bennetts et al. 1999), stress linked to caregiving tasks and responsibilities (Linsk and Mason 2004; Madavahnu et al. 2008), additional financial pressure and emotional stressors derived from the fostering of children and the death or illness of their biological parents (often members of the same household or extended family) (Howard et al. 2006; Madavahnu et al. 2008; UNICEF 2003).

Risks for poor mental health are likely to be greater among caregivers who are themselves living with HIV or other chronic illness, as is the case for a large proportion of individuals and households in HIV-endemic Southern Africa communities (Holmes et al. 2010; UNAIDS 2012; UNICEF 2003). Many serious long-term medical illnesses, including HIV/AIDS, have been found to be a source of considerable stress and a key risk factor for poor mental health (Breuer et al. 2011; Catalan et al. 2011; Ciesla and Roberts 2001; Rodin and Voshart; Sherr et al. 2011; WHO 2008). However, research also suggests that HIV/AIDS may pose particular risks for poor mental health, due to the social consequences of the disease, such as stigma, difficult disclosure and social isolation (Ciesla and Roberts 2001; WHO 2008).

In Southern Africa this has particular relevance for women. First, women most commonly take on the role of care provider in the home, for various reasons, including traditionally accepted gender roles of women as principal care providers and the absence of men in the homes due to factors such as death, abandonment or men's involvement in income-earning activities (Akintola 2008; Freeman and Nkomo 2006; Kuo and Operario 2009). Second, the prevalence and persistence of common mental health disorders, such as depression, have been shown to be higher among women (Herman et al. 2009; WHO 2012). Moreover, women are disproportionately affected by HIV (WHO et al. 2011).

Social support as a positive resource for mental health

The role of social support in relation to health has been described simply as "... supportive relationships that directly provide something that people need to stay healthy or adapt to stress" (House et al. 1988, page 302); this 'something' may comprise emotional support, instrumental support, informational support and appraisal support (i.e. constructive feedback). Social support has been shown to be a positive resource for mental health for various adult populations, including adult caregivers of children and adults living with HIV/AIDS or other chronic illness (see for example: Casale and Wild 2013; Fasce 2008; House et al. 1988; Musil et al. 2009; Uchino et al. 2012; Umberson and Montez 2010). It has been found to have both a direct relationship with better mental health (that is, to have main or

general health sustaining effects) and to buffer effects of stress or specific stressors on mental health, including stressors related to illness (House et al. 1988; Robbins et al. 2003)¹. There is also evidence to suggest that social support may be especially important as a protective resource for mental health among females, in particular for certain outcomes such as depression (Kendler et al. 2005; Schraedley et al. 1999).

However, most of the evidence on the protective role of social support on mental health among caregiver and HIV-affected populations derives from the developed world. This was highlighted by a recent systematic review of studies quantitatively assessing the relationship between social support and health among populations of HIV-positive caregivers or caregivers of AIDS-affected children, which showed an overall positive relationship between social support and better mental health outcomes, particularly psychological distress (Casale and Wild 2013). Most of the studies, conducted predominantly with samples of biological mothers attending clinics, tested for and found evidence of main effects of support, though three studies found stress-buffering effects of HIV-illness-related stressors (Casale and Wild 2013). However, the review also revealed that almost all studies found had been conducted in developed countries, and none in Africa, though the continent comprises some of the countries most affected by HIV.

Objective of this paper

To our knowledge, this paper presents the first analysis to quantitatively investigate the relationship between social support and symptomatic depression with a large sample ($n = 2199$) of adult female primary caregivers of children aged 10–17, living in HIV-endemic Southern African communities. South Africa is one of the world's countries most affected by the HIV epidemic, with an estimated 1 in 5 adults between 15–49 years living with HIV, and 1.9 million children orphaned by AIDS (UNAIDS 2010). It is also a country with a high and increasing burden of other infectious diseases (e.g. TB and intestinal infections, often linked to HIV) and non-communicable diseases (e.g. diabetes, heart disease, epilepsy and asthma) (Bradshaw et al. 2010).

The analysis presented in this paper aims to assess: a) whether living with HIV or other-illness is associated with a greater likelihood of symptomatic depression among this population of women caring for children; b) whether the presence of children in the household orphaned by AIDS or other causes is associated with a higher likelihood of caregiver depression; c) whether social support is directly associated with less depression for these caregivers (i.e. test for main effects); d) whether social support moderates the relationship between the above-indicated stressors and depression for caregivers (i.e. test for stress-buffering effects).

The data collected allows us to categorize caregivers into comparison groups of caregivers living with HIV, caregivers living with other illness, and caregivers without a health condition. Similarly, from the available data it is possible to distinguish between comparison

¹Main effects occur when social support is directly associated with better health outcomes, indicating that people with more social support have better mental health outcomes than people with less social support, regardless of the presence or level of stress (House et al. 1988). Stress-buffering, instead, would indicate that social support is protective of health primarily or only in the presence of stressful circumstances (House et al. 1988).

groups of caregivers living in a household with children orphaned by AIDS (at least one child in their home has a biological parent who has died due to AIDS), children orphaned by other causes (at least one child in their home has a biological parent who has died from a non-AIDS-related cause) and children who are not orphaned. The value of the two reference groups (healthy and other ill; no orphans or other orphans) is that they enable us to determine whether it is the presence of HIV/AIDS specifically, as opposed to illness or responsibility for orphaned children more generally, that poses a particular risk for mental health (Ciesla and Roberts 2001; Kuo and Operario 2011). They also allow for an investigation of whether social support plays a different or greater role in buffering these HIV/AIDS-related versus other stressors.

DATA AND METHODS

Sampling and participants

Data were derived from a household health survey conducted over 2009–2010 with 2477 primary caregivers of children 18 years or older and children aged 10–17 in their care, in two resource-deprived (urban and rural) communities in South Africa's KwaZulu-Natal province². A primary caregiver was defined as the individual who takes responsibility for primary childcare duties to address the economic, social, and psychological needs of the child, whether a biological or foster parent. This analysis is based only on data from the interviews with female caregivers of children, who represented the large majority (89%/2199) of eligible households interviewed.

The research was a collaboration between the Health Economics and HIV/AIDS Division (HEARD) at the University of Kwazulu-Natal, the University of Oxford, Brown University and various South African government departments and non-governmental organisations (NGOs). The survey aim was to examine the impact of living in an HIV/AIDS-affected family on the wellbeing of children and their caregivers, in order to identify risk and protective factors to inform policy and programming. Ethics approval to conduct the research was obtained from the relevant ethics committees at the Universities of Kwazulu-Natal and Oxford. Approval was also received from relevant national government, municipal and community-level authorities.

Survey research was conducted in an urban and rural resource-deprived high HIV-prevalence setting in Kwazulu-Natal province, South Africa. The urban site was a township approximately 20 kilometres south of the city of Durban in the eThekweni municipality; the rural site was located in the uMhlabuyalingana municipality, bordering Southern Mozambique. Sites were selected based on HIV prevalence rates (30% HIV prevalence among antenatal clinic attendees) (Department of Health 2008), provincial health deprivation indices (Noble et al. 2006) and their respective representative urban and rural nature (based on Statistics South Africa 2003). Within research sites, random sampling of geographical areas representing the smallest political boundary (census enumeration areas in the urban site and designated tribal areas in the rural site) and door-to-door consecutive

²Further information on the survey research and broader national Young Carers project is available on the following website: www.youngcarers.org.za

household sampling were conducted. Given the interest in ensuring sufficiently large subsamples of caregivers living with HIV/AIDS or other illness, interviews with (self-reported) ill adults caring for children were prioritized in households where both ill and healthy caregivers of children 10–17 years of age were present. In the case of more than one ill or healthy eligible adult in the same household and/or more than one child cared for, random selection (e.g. by tossing a coin or rolling dice) was used to decide which caregiver-child pair to interview.

Measures

Primary considerations in choosing measurement tools were their psychometric properties, whether they were appropriate for administration via self-report through a non-clinician interview and whether they had been validated and/or used in South Africa or in similar contexts and with similar populations. All survey questionnaire tools were translated into the local language (isiZulu) and back-translated into English, and then piloted to ensure cultural validity.

HIV status and child orphan status—HIV-positive caregivers and children orphaned by AIDS in the household were identified using algorithms taking into account caregiver reports of their own HIV-status or HIV-related cause of parental death, as well as the symptom-based verbal autopsy (VA) method. The VA method was developed to identify symptoms of AIDS in areas with over 20% HIV-prevalence and where data on cause of death or illness is unavailable or unreliable (Lopman et al. 2006). The presence of three or more HIV-illness related conditions, such as moderate or severe weight loss, jaundice and oral candidiasis, is used to determine AIDS-related death. A validation study conducted in Zimbabwe showed a sensitivity of 83% and specificity of 75% for AIDS death (Lopman et al. 2006); an earlier South African validation study showed a sensitivity of 89% and specificity of 93% of diagnoses for deaths caused by AIDS and other communicable diseases (Kahn et al. 2000).

‘Other illness’ status was determined through questions on illnesses and symptoms pertaining to the most common causes of adult illness in South Africa, as identified in the South African Demographic and Health Survey (Department of Health 2003) and the Health Systems Trust Annual Review (18 items) (Health Systems Trust 2006); these included diabetes, arthritis, epilepsy and hypertension. ‘Other orphanhood’ referred to parental death from causes such as road accidents, homicide and other illnesses.

Social support—Social support was measured using the Medical Outcomes Study Social Support Survey (Sherbourne and Stewart 1991). The MOS-SSS is a 19-item tool with 5-point answer scales. Respondents are asked to rate how often each type of support is available if they need it, and choose one of five options ranging from ‘none of the time’ (1) to ‘all of the time’ (5). These responses are scored together to derive a mean support index, ranging from 1 to 5, with higher scores representing higher levels of perceived support. This scale measures perceived availability of functional support, including emotional support, informational support, tangible support, positive social interaction and affection. The MOS-SSS has strong psychometric properties ($\alpha=0.97$; 1-year test-retest reliability = 0.78)

(Sherbourne and Stewart 1991). Though it has not been validated in South Africa, it has been widely applied in the developing world and used multiple times in South Africa, including with urban and rural women living with HIV (Gaede et al. 2006) and diabetes mellitus patients ($\alpha=0.97$) (Westaway et al. 2005). The reliability statistic for the MOS-SSS scale in this sample is very high ($\alpha = 0.99$).

Depression—Depressive symptoms were measured using the Centre for Epidemiologic Studies Depression Scale (CES-D) (Radloff 1977). This is one of the most widely used self-report tools designed to measure depressive symptomatology in the general population. It is a 20-item tool through which respondents are asked to indicate how often they may have experienced symptoms of depression on a four-point scale ranging from ‘Rarely or none of the time’ (0) to ‘Most of the time’ (3). Responses are summed to compute a total score ranging from 0 to 60, with higher scores representing higher levels of depressive symptoms. A cut-off score of 16 or higher was used in this study to indicate the presence of depression as this is the generally accepted cut-off score for high risk of clinical depression, above which professional care is recommended (Cheung and Bagley 1998; Hamad et al. 2008; Radloff 1977); this was the cut-off used by the original author (Radloff 1977) and previous studies conducted in Africa (Hamad et al. 2008; Kaharuza et al. 2006; Kuo and Operario 2011). The CES-D has been validated in numerous samples internationally, including in South Africa (Pretorius 1991) and the cultural validity of the tool has also been tested in South African populations (Smit et al. 2006b). Moreover, the CES-D has been widely used among populations in South Africa and other parts of Africa, including low-income populations and HIV positive individuals (Hamad et al. 2008; Kaharuza et al. 2006; Kuo and Operario 2011; Myer et al. 2008; Smit et al. 2006a). It has been shown to have strong psychometric properties, with high internal consistency reliability among the general population ($\alpha = 0.85$) (Radloff 1977); Cronbach Alpha coefficients reported for the above-cited studies with samples in Africa ranged between 0.88 and 0.92. The CES-D showed high internal reliability in this sample ($\alpha = 0.95$).

Socio-demographic control variables—This analysis controlled for caregiver location (i.e. whether the caregiver was living on the urban or rural site), as well as key socio-demographic variables shown to be predictors of mental health among HIV-positive individuals and adult caregivers (Crosier et al. 2007; Patel 2007; Pinguart and Sorensen 2007; Whetten et al. 2008); these are: age, gender, education levels, household size and number of children in the home, and socio-economic status. Socio-economic status was measured using Booysen’s (2001) South African economic asset index, based on factor and principal component analysis of variables relating to ownership of consumer goods, household size, dwelling characteristics, and access to services and resources (Booyesen 2001; Filmer and Pritchett 2001). This method for estimating economic status has been shown to be as or more reliable than other conventional income or expenditure-based measures in the South African context (Filmer and Pritchett 2001).

Procedure

Trained bilingual (English and isiZulu-speaking) interviewers went from home to home within each selected area to determine household eligibility and conduct the interviews.

Information sheets and consent forms were read aloud to potential participants in their preferred language and written informed consent was obtained from all caregivers who agreed to participate. The refusal rate was very low (less than 0.5%). Caregivers completed face-to-face interviews lasting about 45–60 minutes, based on a survey questionnaire. No incentives were provided, but following the interviews participants received a certificate of thanks. Where there was a need for a particular participant to access more extensive support (such as seeing a counsellor or attending a clinic), and consent was provided by the participant, referrals were made to the relevant local social services agencies.

Analytic approach

Data were analyzed using PASW Statistics (v. 18). Levels of missing data were very low (< 1%) and appeared to be missing at random (Schlomer et al. 2010). Missing values for psychometric tools were addressed through mean imputation (Scholmer, et al. 2010); for other variables a discrete missing value was assigned to the case variable. Chi-square tests and ANOVAs were used to test for significant differences between subgroups of HIV-positive, other ill and healthy caregivers for key socio-demographic indicators.

Hierarchical logistic regression analysis with interaction terms was conducted to test for both main effects and stress-buffering effects of social support on depression. This analytic approach is in line with that of previous studies assessing main and stress-buffering effects of social support on mental health with similar populations (Klein et al. 2000; Mellins et al. 2000). Results are reported after having controlled for the socio-demographic control variables listed above. The four ‘stressors’ included in the model were: 1) caregiver HIV/AIDS, 2) caregiver other illness, 3) the presence of children orphaned by AIDS in the household and 4) the presence of children orphaned by other causes in the household. Dichotomous variables were created for each of the stressors, whereby ‘1’ indicated the presence of the stressor and ‘0’ the absence of the stressor. After controlling for socio-demographic variables, stressors were entered first in the regression model (step 1), social support as a potential protective factor was entered second (step 2), and the interaction of stressors and social support third (step 3). Interaction terms were created by multiplying each respective binary stressor variable by the mean-centered continuous social support score; mean-centering of continuous variables is suggested in order to reduce multicollinearity when using interaction terms (Holmbeck 1997; Mellins et al. 2000). Associations were reported as statistically significant where the *p* value was less than 0.05.

RESULTS

Participant characteristics

Table 1 contains descriptive statistics for the whole sample, and for the respective subsample of caregivers living with HIV, caregivers living with other chronic illness, and well caregivers. Almost the entire sample of female caregivers (99.9%) defined themselves as Black African and the mean age was 44 years. Twenty-eight per cent of caregivers were defined as HIV-positive, 38% other ill and the remaining 34% as healthy. Among the ‘other ill’ caregivers, around 56% reported suffering from arthritis, 50% hypertension or low blood pressure, 18% diabetes, 3% epilepsy and 1% cancer³.

Selected descriptive variables included in the computation of the Economic Asset Index variable, such as household size, access to services and food security, are also illustrated in Table 1. These variables highlight the difficult socio-economic conditions of households in these communities; for example, approximately 41% of the sample of female caregivers reported members of their household experiencing hunger at least occasionally. HIV-positive caregivers were more likely to be living in the rural site and report worse socio-economic status, while caregivers with other chronic illness were more likely to be older, living in the urban site and (most likely as a result) have better access to services. Orphaned children were present in 73% of the households interviewed and approximately 17% of households were caring for children orphaned by AIDS; HIV- or other- ill caregivers were more likely to be living in a home with orphaned children than healthy caregivers.

Around 36% of these caregivers had CES-D scores ≥ 16 , indicating a high risk of clinical depression. The prevalence of depression was considerably higher among HIV-positive caregivers (56.3%) than other ill caregivers (34.1%), which was in turn higher than the prevalence among healthy caregivers (22.9%).

Regression analysis results

Table 2 displays results of the logistic regression analysis. After controlling for socio-demographic variables, both HIV/AIDS and other illness were found to be significant stressors associated with depression for these female caregivers (see Model 1). HIV/AIDS appeared to be a greater risk factor for depression than other illness: the odds of female caregivers with HIV falling into the ‘depressed’ category were almost four times greater than the odds for healthy caregivers (odds ratio = 3.94, $p < .001$), while the odds for female caregivers with other illnesses of experiencing depression were just over one and a half times those for healthy caregivers (odds ratio = 1.63, $p < .001$). Neither the presence of children orphaned by AIDS nor children orphaned through other causes were significantly associated with depression.

When the social support score variable was added to the model (see Model 2), it was found to be significantly associated with lower odds of depression for caregivers, indicating a main effect of social support (odds ratio = 0.91, $p < .05$). However, when the interaction terms were included in the model (Model 3), the interaction effect for ‘Other Illness x Social Support’ was significant (odds ratio = 0.75, $p < .001$) and the main effect was no longer significant. It is worth noting that the interaction of HIV/AIDS with social support appeared to follow a similar trend, but did not reach significance at the 0.05 level (odds ratio = 0.85, $p < .10$). The direction of the associations are consistent with the stress buffering hypothesis, as living with illness and reporting more social support was associated with lower odds of depression⁴. In order to investigate the interaction, further analysis was conducted by

³It should be noted that caregivers identified as HIV-positive (through self-report or the VA) were included in the HIV-positive subgroup, whether or not they reported suffering from one of these other chronic conditions. Approximately 32% of individuals identified as HIV-positive also reported experiencing one or more other chronic illnesses. It should also be noted that the rates of (HIV- or other-) illness in this sample are likely to be over-representative of those in the general caregiver population, given the sampling strategy adopted.

⁴We note that the results reported hold when the regressions are repeated using the continuous CES-D score variable. Results also hold when four separate regressions are conducted in order to test each individual ‘stressor’ interaction term, after controlling for all variables included in regression model 2.

subgroups of HIV-positive, other ill and healthy caregivers, repeating the regressions for each subgroup without the interaction terms; this analysis confirmed that social support was significantly associated with lower odds of depression only for the group of caregivers with non-HIV-related illness (odds ratio = 0.80, $p < .001$, CI = [0.71–0.90]), although the association approached significance at the 0.05 level for the HIV-positive subgroup (odds ratio = 0.89, $p = .07$, CI = [0.78 – 1.01]).

DISCUSSION

Our data point to high risks of clinical depression among this sample of caregivers, particularly for HIV-positive and other chronically ill caregivers. While a comparison of exact rates found by other studies is not possible, due to different sample populations and instruments used, it should be noted that the proportion of caregivers experiencing symptomatic depression in this sample (36% for the entire sample and 56% for HIV-positive caregivers) are considerably higher than the 10% estimated national prevalence rates for major depressive disorder in South Africa (Herman et al. 2009). They are, however, more in line with depression rates between 20% and 40% found by South African studies conducted with samples of HIV-positive or chronically ill adults, and/or with caregivers living in similar resource-deprived HIV-endemic communities (Hughes et al. 2004; Olley et al. 2003; Kagee 2008; Kuo and Operario 2011).

Consistent with a substantial body of existing empirical literature with diverse samples of adults, findings of the regression analysis show that experiences of HIV/AIDS and other illness are significantly related to higher odds of depression for this sample of female primary caregivers of children living in HIV-endemic South African communities. Our results also show that caregivers living with HIV/AIDS have higher odds of experiencing depression than caregivers with other non-HIV related illness, compared to healthy caregivers, after controlling for key socio-demographic factors. These findings highlight the particular risks of HIV/AIDS for mental health among these populations of women caring for children, which likely derive in part from the social impacts of the disease (Ciesla and Roberts 2001).

Interestingly, however, the presence of children orphaned due to non-AIDS-related causes was not a significant risk factor for depression in this sample. There could be various reasons for these findings. All respondents were primary caregivers of children living in low-resourced communities and therefore potentially dealing with multiple stresses related to caregiving in difficult socio-economic conditions (Brandt 2009), whether or not living in a home with orphaned children. Also, the fact that orphaned children were present in the large majority (72%) of households in our sample may indicate that households in these communities are accustomed to taking in and caring for orphaned children, and that this is considered the norm as opposed to the exception. These explanations for the lack of observed associations are, however, beyond the scope of this work and would need to be explored by future research.

Results of this analysis indicate that social support may be buffering against the negative effects of illness-related stressors on symptomatic depression for female caregivers,

suggesting that social support is a particularly important coping resource for caregivers experiencing stress related to illness (House et al. 1988). However, the interaction effect was significant at the 0.05 level only for other (non HIV-related) illness, and not for HIV/AIDS. As argued by previous authors, it is possible that protective resources such as social support may be insufficient to protect women caring for children from the particular effects of HIV, especially when living in difficult social conditions; the impact of HIV-related stressors on mental health outcomes may simply be too large to observe the support impact (Mellins et al. 2000).

It should be noted, however, that this analysis has a number of limitations. These include possible bias and inaccuracies related to self-reported data and the inevitable margin of error in assessing HIV-related illness and death through the verbal autopsy method (Lopman et al. 2006). A further important limitation is that the presence of caregiver HIV or other chronic illness was used as a proxy for illness-related stressors, in the absence of direct measures for illness- or caregiving- related stress; similarly the presence or absence of orphans in the home was taken as a proxy for stressors related to caring for orphaned children. It should be noted that this approach has been used in previous analyses investigating the stress-buffering effects of support resources for individuals living with HIV (see for example: Klein et al. 2000; Robbins et al. 2003). Nevertheless, future studies should attempt to measure these stressors directly, in order to take into account individual differences in the levels of stress experienced. Lastly, while hypotheses related to directionality of associations have to some extent been made based on previous theory and evidence, it is not possible to infer causality from this cross-sectional analysis.

CONCLUSION

The finding that social support may be a protective resource for depression specifically among female caregivers of children living with chronic illness has important implications for policy and interventions aimed at safeguarding the health of caregiver and child populations in the Southern African region. Social support could be an important component of interventions working with ill female caregivers, whether support-focused interventions or broader health programmes incorporating elements of social support. This is relevant not only because of high levels of mental health conditions (Patel 2007) and the mental health risks of HIV, but also because worse mental health has been linked to disease progression and mortality (Antelman et al. 2007; Ickovics et al. 2001; Sherr et al. 2011), as well as worse parenting and child health outcomes (Reading 2005; Stein, Ramchandani and Murray 2008). Moreover, as previously indicated, women in the region are taking on the majority of caregiving responsibilities for children and are disproportionately affected by HIV and mental health conditions (WHO et al. 2011; WHO 2012).

However, results also suggest that social support is unable to buffer the mental health effects of stressors related to HIV/AIDS as it does for stressors related to other illness among this sample of female caregivers. The question of why this may be is an important potential focal area for future research aimed at furthering the potential contribution of this work to evidence-based policy and interventions for caregiver health (Umberson and Montez 2010). In order to better understand the reasons behind observed associations or a lack thereof, it

would be useful to explore the psychological and behavioural pathways and mediating mechanisms linking social support to health among these specific populations of caregivers (House et al. 1988; Uchino et al. 2012). In this regard, mixed methods research designs may be best suited to shed light on these complex phenomena. For example, recent qualitative research with a sample of 24 ill and healthy (male and female) primary caregivers of children who participated in this survey research showed that social support was perceived to positively influence caregiver mental health through multiple mediating behavioural and psychological mechanisms, including coping responses and psychological factors such as self-esteem and hope (Casale 2013; Casale et al. 2013). In particular, social support's perceived positive effect on mental health through rumination emerged as especially important for female and for ill caregivers (Casale 2013; Casale et al. 2013). Rumination refers to repetitive thinking about the causes, consequences and symptoms of one's negative affect (in this case illness) and may be considered a form of maladaptive coping (Nolen-Hoeksema 1991). More broadly, it has been found to mediate the relationship between more social support and less depression specifically among women (Butler and Nolen-Hoeksema 1994; Nolen-Hoeksema 1991). It could therefore be one of the key mediating variables explaining the protective effect of social support on mental health for chronically ill caregivers, to be further explored quantitatively in this population.

Better understanding why social relationships may or may not be positively influencing specific health outcomes for particular caregiver populations would place us in a much stronger position to effectively incorporate support components within programmes aimed at protecting the wellbeing of caregivers and children in communities highly affected by HIV. For example, policy and programmes will need to take into account and simultaneously address other social factors, such as stigma, that may be hindering potential stress-buffering effects of support among people living with HIV.

Lastly, while this analysis focused on female caregivers, it could be useful for future studies to focus on the potential protective role of social support among men caring for children. Although males represent the minority of caregivers in many Southern African communities, they and the children in their care may have specific, and possibly even more acute, health risks and needs. Previous research suggests that there is value in investigating the support-health relationship separately by gender, as studies have shown gender differences in depression rates, social networks, propensity to seek social support as a coping mechanism and the protective effect of this support on mental health (Schraedley et al. 1999; Tamres et al. 2002; Walen and Lachman 2000; WHO 2012). In communities where child caregiving responsibilities are most commonly taken on by women, male primary caregivers may represent a sub-population with particular characteristics and experiences, that requires a more specific research focus.

Acknowledgments

This Young Carers study was funded by the Health Economics and HIV and AIDS Research Division (HEARD) at the University of KwaZulu-Natal, the Economic and Social Research Council (UK), the National Research Foundation (SA), the National Department of Social Development (South Africa), the Claude Leon Foundation and the John Fell Fund. The study in the KwaZulu-Natal provincial site was generously funded by HEARD. We would like to acknowledge the important contribution of our entire Young Carers Kwazulu-Natal research team and our local NGO partner in the rural site, Tholulwazi Uzivikele, to this research. We would also like to thank the children

and their families who welcomed us into their homes. Additional support was provided to C. Kuo for analysis and writing by the National Institute for Mental Health grant award T32 NIMH 078788 (PI: Larry Brown) and grant award K01 MH096646-01A1 (PI: Kuo).

References

- Akintola O. Defying all odds: coping with the challenges of volunteer caregiving for patients with AIDS in South Africa. *Journal of Advanced Nursing*. 2008; 63(4):357–365. [PubMed: 18727763]
- Antelman G, Kaaya S, Wei R, Mbwambo J, Msamanga G, Fawzi W, Fawzi M. Depressive symptoms increase risk of HIV disease progression and mortality among women in Tanzania. *Journal of Acquired Immune Deficiency Syndromes*. 2007; 44(4):470–477. [PubMed: 17179766]
- Barnett, T.; Whiteside, A. *AIDS in the twenty-first century: Disease and globalization*. New York: Palgrave Macmillan; 2006.
- Belue R, Schreiner A, Taylor-Richardson K, Murray-Kolb L, Beard J. What matters most: an investigation of predictors of perceived stress among mothers in Khayelitsha. *Health Care for Women International*. 2008; 29(6):638–648. [PubMed: 18569048]
- Bennetts A, Shaffer N, Manopaiboon C, Chaiyakul P, Siriwasin W, Mock P, Klumthanom K, Sorapipatana S, Yuvaseevee C, Jalanchavanapate S, Clark L. Determinants of depression and HIV-related worry among HIV-positive women who have recently given birth, Bangkok, Thailand. *Social Science & Medicine*. 1999; 49:737–749. [PubMed: 10459886]
- Booyens, F. The measurement of poverty. In: Bradshaw, D.; Steyn, K., editors. *Poverty and Chronic Diseases in South Africa, A Technical Report*. Medical Research Council and World Health Organization; 2001. p. 15-37.
- Bradshaw, D.; Pillay-Van Wyk, V.; Laubscher, R.; Nojilana, B.; Groenewald, P.; Nannan, N.; Metcalf, C. Cause of death statistics for South Africa: Challenges and possibilities for improvement. MRC Burden of Disease Unit; 2010. Available at www.mrc.ac.za/bod/cause_death_statsSA.pdf [Accessed 15December 2013.]
- Brandt R. Putting mental health on the agenda for HIV + women: A review of evidence from sub-Saharan Africa. *Women and Health*. 2009; 49:215–228. [PubMed: 19533511]
- Breuer E, Myer L, Struthers H, Joska J. HIV/AIDS and mental health research in sub-Saharan Africa: a systematic review. *African Journal of AIDS Research*. 2011; 10(2):101–122.
- Butler L, Nolen-Hoeksema S. Gender differences in responses to depressed mood in a college sample. *Sex Roles*. 1994; 30(5–6):331–346.
- Casale M, Wild L. Effects and processes linking social support to caregiver health among HIV/AIDS-affected carer-child dyads: a critical review of the empirical evidence. *AIDS and Behavior*. 2013; 17(5):1511–1611.
- Casale, M. Doctoral thesis. Department of Psychology, University of Cape Town; South Africa: 2013. The protective role of social support for the health of caregivers of children in HIV-endemic South Africa.
- Casale M, Wild L, Kuo C. “They give us hope”: HIV-positive caregivers’ perspectives on the role of social support for health. *AIDS Care*. 2013; 25(10):1203–1209. [PubMed: 23356672]
- Catalan J, Harding R, Sibley E, Clucas C, Croome N, Sherr L. HIV infection and mental health: Suicidal behavior - Systematic review. *Psychology, Health & Medicine*. 2011; 16(5):588–611.
- Cheung C, Bagley C. Validating an American scale in Hong Kong: the Center for Epidemiological Studies Depression Scale (CES-D). *Journal of Psychology*. 1998; 132:169–186. [PubMed: 9529665]
- Ciesla J, Roberts J. Meta-analysis of the relationship between HIV infection and risk for depressive disorders. *The American Journal Of Psychiatry*. 2001; 158:725–730. [PubMed: 11329393]
- Crosier T, Butterworth P, Rodgers B. Mental health problems among single and partnered mothers: The role of financial hardship and social support. *Social Psychiatry and Psychiatric Epidemiology*. 2007; 42(1):6–13. [PubMed: 17203237]
- Department of Health. [Accessed October 20, 2007] The South African demographic and health survey. 2003. Available at <http://www.mrc.ac.za/bod/sadhs.htm>

- Department of Health. [Accessed February 15, 2009] The National HIV and Syphilis Prevalence Survey South Africa. 2008. Available at http://www.unaids.org/en/dataanalysis/knowyourepidemic/countryreportsonhivestimates/20080904_southafrica_anc_2008_en.pdf
- Fasce N. Depression and Social Support Among Men and Women Living With HIV. *Journal of Applied Biobehavioral Research*. 2008; 12(3–4):221–236.
- Filmer D, Pritchett L. Estimating wealth effects without expenditure data-or tears: An application to educational enrollments in states of India. *Demography*. 2001; 38(1):115–132. [PubMed: 11227840]
- Freeman M, Nkomo N. Guardianship of orphans and vulnerable children. A survey of current and perspective South African caregivers. *AIDS Care*. 2006; 18(4):302–10. [PubMed: 16809107]
- Gaede B, Majeke S, Modetse R, Naidoo J, Titus M, Uys L. Social support and health behaviour in women living with HIV in KwaZulu-Natal. *Journal of Social Aspects of HIV/AIDS*. 2006; 3(1): 326–368.
- Hamad R, Fernald L, Karlan D, Zinman J. Social and economic correlates of depressive symptoms and perceived stress in South African adults. *Journal of Epidemiology And Community Health*. 2008; 62:538–544. [PubMed: 18477753]
- Health Systems Trust. [Accessed November 5, 2008] South African Health Review 2006. 2006. Available at <http://www.hst.org.za/publications/south-african-health-review-2006>
- Herman A, Stein D, Seedat S, Heeringa S, Moomal H, Williams D. The South African Stress and Health (SASH) study: 12-month and lifetime prevalence of common mental health disorders. *South African Medical Journal*. 2009; 99(5):339–344. [PubMed: 19588796]
- Holmbeck G. Toward terminological, conceptual, and statistical clarity in the study of mediators and moderators: Examples from the child-clinical and pediatric psychology literatures. *Journal of Consulting and Clinical Psychology*. 1997; 65(4):599–610. [PubMed: 9256561]
- Holmes M, Dalal S, Volmink J, Adebamowo C, Njelekela M, Fawzi W, Willett W, Adami H-O. Non-communicable diseases in sub-Saharan Africa: The case for cohort studies. *PLoS Medicine*. 2010; 7(5):e1000244. [PubMed: 20485489]
- House J, Umberson D, Landis K. Structures and processes of social support. *Annual Review of Sociology*. 1988; 14:293–318.
- Howard B, Phillips C, Matinhure N, Goodman K, McCurdy S, Johnson C. Barriers and incentives to orphan care in a time of AIDS and economic crisis: a cross-sectional survey of caregivers in rural Zimbabwe. *BMC Public Health*. 2006; 6(27)
- Hughes J, Jelsma J, Maclean E, Darder M, Tinise X. The health-related quality of life of people living with HIV/AIDS. *Disability and Rehabilitation*. 2004; 26:371–376. [PubMed: 15204489]
- Ickovics J, Hamburger M, Vlahov D, Schoenbaum E, Schuman P, Boland R, Moore J. Mortality, CD4 cell count decline, and depressive symptoms among HIV-seropositive women: longitudinal analysis from the HIV Epidemiology Research Study. *JAMA*. 2001; 285(11):1466–1474. [PubMed: 11255423]
- Kagee A. Symptoms of depression and anxiety among a sample of South African patients living with a chronic illness. *Journal of Health Psychology*. 2008; 13(4):541–549.
- Kaharuza F, Bunnell R, Moss S, Purcell D, Bikaako-Kajura W, Wamai N, Downing R, Solberg P, Coutinho A, Mermin J. Depression and CD4 cell count among persons with HIV infection in Uganda. *AIDS*. 2006; 10:S105–S111.
- Kahn K, Tollman S, Garenne M, Gear J. Validation and application of verbal autopsies in a rural area of South Africa. *Tropical Medicine & International Health*. 2000; 5(11):824–831. [PubMed: 11123832]
- Kendler K, Myers J, Prescott C. Sex differences in the relationship between social support and risk for major depression: a longitudinal study of opposite-sex twin pairs. *The American Journal Of Psychiatry*. 2005; 162(2):250–256. [PubMed: 15677587]
- Klein K, Armistead L, Devine D, Kotchick B, Forehand R, Morse E, Simon P, Stock M, Clark L. Socioemotional support in African American families coping with maternal HIV: An examination of mothers' and children's psychosocial adjustment. *Behavior Therapy*. 2000; 31:1–26.
- Kuo C, Operario D. Caring for AIDS-orphaned children: A systematic review of studies on caregivers. *Vulnerable Children and Youth Studies*. 2009; 4(1):1–12.

- Kuo C, Operario D. Health of adults caring for orphaned children in an HIV endemic community in South Africa. *AIDS CARE*. 2011; 23(9):1128–35. [PubMed: 21480009]
- Linsk N, Mason S. Stresses on grandparents and other relatives caring for children affected by HIV/AIDS. *Health and Social Work*. 2004; 29:127–136. [PubMed: 15156845]
- Lopman B, Barnabas R, Boerma J, Chawira G, Gaitskell K, Harrop T, Mason P, Donnelly C, Garnett G, Nyamukapa C, Gregson S. Creating and validating an algorithm to measure AIDS mortality in the adult population using verbal autopsy. *Plos Medicine*. 2006; 3(8):e312. [PubMed: 16881730]
- Madavahnu D, Segalo P, Fourie E. Grandmothers caring for their grandchildren orphaned by HIV and AIDS. *New Voices in Psychology*. 2008; 4(1):76–97.
- Mellins C, Ehrhardt A, Rapkin B, Havens J. Psychosocial factors associated with adaptation in HIV-infected mothers. *AIDS And Behavior*. 2000; 4(4):317–328.
- Musil C, Warner C, Zauszniewski J, Wykle M, Standing T. Grandmother caregiving, family stress and strain, and depressive symptoms. *Western Journal of Nursing Research*. 2009; 31(3):389–408. [PubMed: 19261805]
- Myer L, Smit J, Le Roux L, Parker S, Stein D, Seedat D. Common mental disorders among HIV-infected individuals in South Africa: Prevalence, predictors, and validation of brief psychiatric rating scales. *AIDS Patient Care And Stds*. 2008; 22(2):147–158. [PubMed: 18260806]
- Noble, M.; Babita, M.; Barnes, H.; Dibben, C.; Magasela, W.; Ntshongwana Noble, S.; Phillips, P.; Rama, S.; Roberts, B.; Wright, G.; Zungu, S. *The provincial indices of multiple deprivation for South Africa 2001*. Oxford: Centre for the Analysis of South African Social Policy, University of Oxford; 2006.
- Nolen-Hoeksema S. Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology*. 1991; 100:569–582. [PubMed: 1757671]
- Olley B, Gxamza F, Seedat S, Theron H, Taljaard J, Reid E, Stein D. Psychopathology and coping in recently diagnosed HIV/AIDS patients - the role of gender. *SAMJ*. 2003; 93:928–931. [PubMed: 14750493]
- Patel V. Mental health in low- and middle-income countries. *British Medical Bulletin*. 2007; 81 and 82:81–96. [PubMed: 17470476]
- Pinquart M, Sorensen S. Correlates of physical health of informal caregivers: A meta-analysis. *Journals of Gerontology, Series B, Psychological Sciences and Social Sciences*. 2007; 62(2):126–137.
- Pretorius T. Cross-cultural application of the centre for epidemiological studies depression scale: A study of Black South African students. *Psychological Reports*. 1991; 69:1179–1185. [PubMed: 1792288]
- Radloff L. The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurements*. 1977; 1(3):385–401.
- Reading R. Depressive symptoms in mothers of pre-school children. Effects of deprivation, social support, stress and neighbourhood social capital. *Child: Care, Health and Development*. 2005; 31(4):489.
- Robbins M, Szapocznik J, Tejada M, Samuels D, Ironson G, Antoni M. The protective role of the family and social support network in a sample of HIV-positive African American men: Results of a pilot study. *Journal of Black Psychology*. 2003; 29(1):17–37. [PubMed: 16609750]
- Rodin G, Voshart K. Depression in the medically ill: an overview. *The American Journal of Psychiatry*. 1986; 143:696–705. [PubMed: 3521339]
- Schlomer G, Bauman S, Card N. Best practices for missing data management in counseling psychology. *Journal of Counseling Psychology*. 2010; 57(1):1–10. [PubMed: 21133556]
- Schraedley P, Gotlib I, Hayward C. Gender differences in correlates of depressive symptoms in adolescents. *Journal of Adolescent Health*. 1999; 25(2):98–108. [PubMed: 10447037]
- Sherbourne C, Stewart A. The MOS Social Support Survey. *Social Science & Medicine*. 1991; 32(6):705–714. [PubMed: 2035047]
- Sherr L, Clucas C, Harding R, Sibley E, Catalan J. HIV and depression - a systematic review of interventions. *Psychology, Health & Medicine*. 2011; 16(5):493–527.

- Smit J, Myer L, Middelkoop K, Seedat S, Wood R, Bekker L, Stein D. Mental health and sexual behaviours in a South African township: A community-based cross-sectional study. *Public Health*. 2006a; 120:534–42. [PubMed: 16684549]
- Smit J, van den Berg C, Bekker L, Seedat S, Stein D. Translation and cross-cultural adaptation of a mental health battery in an African setting. *African Health Sciences*. 2006b; 6(4):215–222. [PubMed: 17604510]
- Statistics South Africa. Census 2001: Investigation into appropriate definitions of urban and rural areas for South Africa: discussion document. Pretoria: Statistics South Africa. 2003
- Stein, A.; Ramchandani, P.; Murray, L. Impact of parental psychiatric disorder and physical illness. In: Rutter, M.; Bishop, D.; Pine, D.; Scott, S.; Stevenson, J.; Taylor, E.; Thapar, A., editors. *Child and Adolescent Psychiatry*. 5. Oxford: Oxford Blackwell Publishing; 2008.
- Tamres L, Janicki D, Helgeson V. Sex differences in coping behavior: A meta-analytic review and an examination of relative coping. *Personality and Social Psychology Review*. 2002; 6(1):2–30.
- Uchino B, Bowen K, Carlisle M, Birmingham W. Psychological pathways linking social support to health outcomes: A visit with the “ghosts” of research past, present, and future. *Social Science & Medicine*. 2012; 74:949–957. [PubMed: 22326104]
- Umberson D, Montez J. Social relationships and health: A flashpoint for health policy. *Journal of Health and Social Behavior*. 2010; 51(Special Issue):S54–66. [PubMed: 20943583]
- UNAIDS. Global Report: UNAIDS Report on the Global AIDS Epidemic 2010. Geneva: UNAIDS; 2010.
- UNAIDS. Global Report: UNAIDS Report on the Global AIDS Epidemic 2012. Geneva: UNAIDS; 2012.
- UNICEF. [Accessed 14 February, 2013.] Africa’s orphaned generations. 2003. Available at http://www.unicef.org/sowc06/pdfs/africas_orphans.pdf
- Walen H, Lachman M. Social support and strain from partner, family and friends: Costs and benefits for men and women in adulthood. *Journal of Social & Personal Relationships*. 2000; 17(1):5–30.
- Westaway M, Seager J, Rheeder P, Van Zyl D. The effects of social support on health, well-being and management of diabetes mellitus: a black South African perspective. *Ethnicity & Health*. 2005; 10(1):73–89. [PubMed: 15841588]
- Whetten K, Reif S, Whetten R, Murphy-McMillan L. Trauma, mental health, distrust, and stigma among HIV-positive persons: Implications for effective care. *Psychosomatic Medicine*. 2008; 70(5):531–538. [PubMed: 18541904]
- WHO, UNAIDS, & UNICEF. [Accessed 21 August, 2011.] Global HIV/AIDS response: Epidemic update and health sector progress towards Universal Access. Progress Report 2011. 2011. Available at http://www.who.int/hiv/pub/progress_report2011/en/index.html
- WHO. [Accessed 20 June, 2011.] HIV/AIDS and mental health: Report by the secretariat. 2008. Available at <http://apps.who.int/iris/handle/10665/2107>
- WHO. [Accessed 5 September, 2012] Gender and women’s mental health. 2012. Available at http://www.who.int/mental_health/prevention/genderwomen/en/

Table 1

Socio-demographic and health characteristics for the entire sample (n=2199 female caregivers) and subsamples based on illness status

| | Whole population | Caregivers living with HIV/AIDS (27.6%) ¹ | Caregivers living with other illness (37.6%) | Healthy caregivers (34.8%) | p value for differences between groups ¹ |
|---|------------------|--|--|----------------------------|---|
| <i>Socio-demographic variables</i> | | | | | |
| Age (mean, SD) | 44.3 (13.8) | 41.9 (11.4) | 51.4 (14.0) | 38.6 (11.9) | <.001 |
| Completed high school (%) ² | 16.9 | 10.5 | 11.2 | 28.1 | <.001 |
| Household size (mean, SD) | 6.1 (2.8) | 6.0 (2.9) | 6.3 (3.0) | 5.9 (2.5) | <.05 |
| Number of children in the household ³ (mean, SD) | 3.1 (1.8) | 3.2 (1.7) | 3.2 (1.7) | 3.2 (1.7) | <.05 |
| Household members experience hunger at least occasionally (%) | 40.9 | 57.4 | 36.9 | 31.9 | <.001 |
| Access to running water on property (%) | 55.5 | 39.8 | 67.3 | 54.8 | <.001 |
| Access to electricity (%) | 50.3 | 33.4 | 64.2 | 48.6 | <.001 |
| Access to flush toilet (%) | 41.0 | 26.0 | 53.3 | 39.1 | <.001 |
| Urban site (%) | 47.6 | 31.9 | 61.5 | 45.0 | <.001 |
| <i>Caregiver mental health</i> | | | | | |
| Depression: CES-D score | 16 (36.3) | 56.3 | 34.1 | 22.9 | <.001 |
| <i>Orphan presence in home</i> | | | | | |
| Children orphaned by AIDS in household (%) | 16.5 | 20.6 | 18.4 | 11.2 | <.001 |
| Children orphaned by other causes in household (%) | 56.4 | 56.1 | 55.0 | 58.2 | ns |
| <i>Social support</i> | | | | | |
| Social support score (mean, SD) | 3.6 (1.3) | 3.5 (1.3) | 3.6 (1.2) | 3.6 (1.3) | <.05 |

¹ These are based on results of chi-squared tests for categorical variables or ANOVAs for continuous variables.

² n = 2183 for this variable, as 16 cases were excluded due to missing values.

³ n = 2198 for this variable, as 1 case was excluded due to a missing value

Table 2

Results of hierarchical logistic regression analysis predicting symptomatic depression among female caregivers (n = 2183)⁴

| | Model 1 Wald | OR (95% CI) | Model 2 Wald | OR (95% CI) | Model 3 Wald | OR (95% CI) |
|--|--------------|-----------------------|--------------|-----------------------|--------------|-----------------------|
| Step 1: Stressors related to illness and orphan presence in household | | | | | | |
| HIV/AIDS ⁵ | 124.82*** | 3.94*** (3.10 – 5.01) | 125.55*** | 3.96*** (3.12 – 5.04) | 125.68*** | 3.98*** (3.12 – 5.06) |
| Other illness ⁵ | 15.14*** | 1.63*** (1.27 – 2.08) | 15.71*** | 1.65*** (1.29 – 2.11) | 16.25*** | 1.66*** (1.30 – 2.13) |
| Children orphaned by AIDS in household ⁶ | 0.24 | 0.93 (0.69 – 1.25) | 0.36 | 0.91 (0.67 – 1.23) | 0.35 | 0.91 (0.67 – 1.24) |
| Children orphaned by other causes in household ⁶ | 0.41 | 1.08 (0.86 – 1.36) | 0.37 | 1.07 (0.85 – 1.35) | 0.38 | 1.08 (0.85 – 1.36) |
| Step 2: Social support | | | | | | |
| Social support score | | | 6.13* | 0.91* (0.85 – 0.98) | 1.57 | 1.12 (0.94 – 1.33) |
| Step 3: Interactions | | | | | | |
| HIV/AIDS x Social support score | | | | | 3.02 | 0.85 (0.71 – 1.02) |
| Other illness x Social support score | | | | | 10.26*** | 0.75*** (0.63 – 0.89) |
| Children orphaned by AIDS in household x Social Support Score | | | | | 0.51 | 0.92 (0.73 – 1.16) |
| Children orphaned by other causes in household x Social Support Score | | | | | 0.33 | 0.95 (0.80 – 1.13) |
| Statistics for final model | | | | | | |
| Nagelkerke R ² | 0.13 | | 0.14 | | 0.14 | |
| Chi-square | 223.56 | | 229.48 | | 241.02 | |

⁴ Results are shown after controlling for the following socio-demographic variables: caregiver age, caregiver education, household location (urban versus rural site), number of children in the household and household socio-economic status.

⁵ The reference group is represented by healthy caregivers.

⁶ The reference group is represented by households in which orphans are not present.