

**Direct and indirect effects of caregiver social support on adolescent psychological  
outcomes in two South African AIDS-affected communities**

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## **Abstract** (191 words)

Caregiver social support has been shown to be protective for caregiver mental health, parenting and child psychosocial outcomes. This is the first known analysis to quantitatively investigate the relationship between caregiver social support and adolescent psychosocial outcomes in HIV-endemic, resource-scarce Southern African communities. A cross-sectional household survey was conducted over 2009-2010 with 2477 South African adolescents aged 10-17 and their adult caregivers (18 years or older) in one urban and one rural community in South Africa's KwaZulu-Natal province. Adolescent adjustment was assessed using adult caregiver reports of the Strengths and Difficulties questionnaire (SDQ), which measures peer problems, hyperactivity, conduct problems, emotional symptoms and child prosocial behavior. Hierarchical linear regressions and multiple mediation analyses, using bootstrapping procedures, were conducted to assess for: a) direct effects of more caregiver social support on better adolescent psychosocial wellbeing; and b) indirect effects mediated by better parenting and caregiver mental health. Direct associations ( $p < .001$ ), and indirect associations mediated through better parenting, were found for all adolescent outcomes. Findings reinforce the importance of social support components within parenting interventions but also point to scope for positive intervention on adolescent psychosocial wellbeing through the broader family social network.

**Key words:** caregiver social support; parenting; caregiver mental health; child mental health; child behavior; South Africa

**Word count:** 4311 (main text only)

## **Introduction**

Young adults living in communities with high levels of social stressors such as poverty, violence, parental illness and mortality have heightened vulnerability to mental health problems, substance abuse, sexual risk behaviors and poor educational outcomes (Cluver, Orkin, Boyes, Gardner, & Meinck, 2011; Sharp et al., 2014). Effective parenting and healthy child-caregiver interaction are central to mitigating the effects of environmental stressors on child psychological and behavioral outcomes (Bronfenbrenner, 1986). However, the same social stressors which may disrupt a young child's or adolescent's healthy development may also negatively affect caregivers' mental health and parenting capacity (J Belsky, 1984; Lachman, Cluver, Boyes, Kuo, & Casale, 2013). Previous research has found that chronically stressed caregivers are more likely to be socially isolated, have worse mental health, experience greater relationship problems, and engage in authoritarian, harsh parenting practices (J Belsky, 1993; Conger, Conger, & Martin, 2010; Lachman, et al., 2013). Poor parental (and specifically maternal) mental health is associated with adverse child mental health and behavioral outcomes (S. Goodman et al., 2010). Lowered parenting capacity is an established pathway, although other possible mechanisms include economic insecurity, the ability of the caregiver to maintain relationships, and gene-environment interactions such as heritable mental health conditions and caregiver-child exposure to similar stressors (S. Goodman, et al., 2010; Turney, 2012).

It is important to identify protective factors for caregiver health, parenting and adolescent outcomes, particularly in communities exposed to difficult social and

economic conditions. The interplay of stress and support for parental functioning has received attention in this regard (Leinonen, Solantaus, & Punamäki, 2003). A number of studies positively link social support with better caregiver mental health (Casale & Wild, 2013), better perceived parenting efficacy (Izzo, Weiss, Shanahan, & Rodriguez-Brown, 2000), and better quality of parenting and parent-child interaction (Green, Furrer, & McAllister, 2007; Simons, Beaman, Conger, & Chao, 1993). Better caregiver mental health and more effective parenting have in turn been associated with better child health and developmental outcomes (Lindsey et al., 2008; Smith Fawzi et al., 2010). A few studies link caregiver social support and caregiver and child outcomes in the same analysis, using path modelling. For example, more parental social support has been associated with less emotional distress, more parental self-efficacy and better parenting, and these outcomes, in turn, have been found to predict the psychosocial adjustment of their children (Hough, Brumitt, Templin, Saltz, & Mood, 2003; Izzo, et al., 2000).

However, most of the empirical work linking caregiver social support, caregiver and child outcomes is derived from high-income countries, and research in developing world settings is lacking (S. Goodman, et al., 2010). In particular, there is overall very little empirical research on parenting and adolescent health and development in sub-Saharan Africa, one of the regions in the world where children are most affected by poverty and orphanhood (UNAIDS, 2010). Few studies have quantitatively investigated how caregiver protective factors might influence adolescent outcomes and whether these protective factors have a familial (versus merely caregiver) effect. More specifically, no known previous studies have quantitatively assessed the potential

protective effects of caregiver social support on adolescent behavior in HIV-endemic and resource-scarce Southern African communities.

### **Objective**

The objective of this paper is to investigate the following questions on the role of caregiver social support as a protective factor for adolescent emotional and behavioral problems, in two resource-deprived, HIV-affected South African communities:

- a) Are higher levels of caregiver (instrumental and emotional) social support associated with fewer adolescent emotional and behavioural problems?
- b) Are higher levels of caregiver social support associated with more adolescent prosocial behavior?
- c) Are these associations mediated by better caregiver mental health and better parenting?

A primary caregiver was defined as the individual who takes on primary childcare duties; this care provision was envisaged to involve various responsibilities, including meeting the economic, social, and psychological needs of a child. A primary caregiver could therefore be a biological parent, other adult relative (e.g. grandparent, aunt, uncle, sibling) or non-relative.

## Methods

A cross-sectional household survey was conducted over 2009-2010 with 2477 adolescent-caregiver dyads (18+ adult primary caregivers of children aged 10-17), in one urban and one rural community site in South Africa's KwaZulu-Natal province. 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 organizations.

Site selection criteria included HIV prevalence rates (> 30% HIV prevalence among antenatal clinic attendees), their respective urban and rural nature, and provincial health deprivation indices (Noble et al., 2006). The rural site was situated in the Umhlabuyalingana municipality, bordering with Southern Mozambique; its lack of road infrastructure and transport (most roads or pathways are sandy tracks), along with limited service availability and communication, make this community deep rural. The Umhlabuyalingana municipality spans an area of 3621 km<sup>2</sup> and was reported to have a population of approximately 164,000 people and an average household size of 6 people in 2007 (Umhlabuyalingana Local Municipality, 2011). About 60% of the municipal area falls under traditional authority ownership, while the remaining 40% constitutes commercial farms and conservation areas. Available socio-demographic indicators highlight the high level of poverty and many social challenges in the area (Umhlabuyalingana Local Municipality, 2011): for example, in 2001, unemployment among the labor force was estimated to be around 70% and 47% of the economically

active population within the municipality receives either no income or less than R1600 (equivalent to approximately 180\$) a month. Nearly 50% of all residents live in traditional dwellings, typically consisting of reed and/or thatch huts and the large majority of residents in the area travel by foot to reach schools, clinics and other destinations, as public transport is non-existent in many parts of the district (Umhlabyalingana Local Municipality, 2011). The challenges experienced during field research in the rural site, and adaptive strategies adopted, have been published in detail elsewhere (Casale, Lane, Sello, Kuo, & Cluver, 2013). The rural field research was undertaken in collaboration with a well-established and respected community-based NGO (non-governmental organization), whose activities included home-based care, life skills training and other capacity building.

The urban site was a township, consisting of both informal and formal urban dwellings, in the eThekweni municipality, approximately 20 kilometers south of the city of Durban. As with most South African townships, this area has a history of segregation linked to migrant labor and political violence under apartheid, and was also an important center of political activism and resistance. Based on data from the 2001 South African national household census it was estimated that only approximately 40% of the labor force were employed and about 34% did not have formal housing (Statistics South Africa, 2001).

Households were selected by means of stratified systematic random sampling in each of the sites. Areas representing the smallest political boundary (census enumerator or tribal authority areas) were randomly selected and door-to-door household sampling was carried out. Child-caregiver pairs were randomly selected in the case of multiple eligible dyads in the same household.

Caregivers and their adolescent children were interviewed only where informed verbal and written consent was obtained from both. Consent forms were read to participants in their mother tongue (Zulu), after which participants were given the opportunity to ask clarification questions. The refusal rate was very low (<1%). Questionnaires were translated into Zulu and back-translated into English. Trained Zulu fieldworkers carried out face-to-face interviews with caregivers and their children that lasted 40-60 minutes. No incentives were provided, although participants were given a certificate to thank them for their participation.

Ethical approval was obtained from the University of Oxford, U.K., and the University of KwaZulu-Natal, South Africa. Approval was also received from community and municipal representatives (e.g. tribal leaders, Ward Councilors) and the KwaZulu-Natal provincial departments of Health and Education.

Engagement with communities has been ongoing since the consultative phase of the research. This has included: verbal and written information and feedback provided to community representatives and research participants (e.g. through door-to-door visits; meetings with local leaders); consultation with key stakeholders (e.g. councilors and traditional leaders; NGO partners); as well as engagement and links with key community structures (e.g. community policing fora; local home-based care networks; social services). As a result of numerous presentations of key findings from the broader national study (including the KwaZulu-Natal research) and ongoing engagement with the South African national government and international stakeholders (including UNICEF, the World Bank, UNAIDS, WHO) over the past four years, this research has already informed a number of national and international policy documents and programs (Young Carers SA).



## Measures

The choice of psychometric scales to include in the questionnaire was based on an extensive review of existing validated measurement tools. 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 in South Africa and/or used in similar contexts and with similar populations.

**Caregiver social support.** Caregiver social support was measured by the Medical Outcomes Study Social Support Scale (MOS-SSS), which is a measure of emotional, informational and tangible support and positive social interaction (Sherbourne & Stewart, 1991). The MOS-SSS has been widely applied in the developing world, including South Africa. It is a 20-item tool through which respondents are asked to rate how often each type of support is available if they need it (e.g. “Someone to help you if you were confined to bed”). Higher scores indicate higher levels of perceived support availability ( $\alpha = 0.99$ ).

**Parenting.** Parenting was measured using caregiver reports of the Alabama Parenting Questionnaire (APQ) – Short Form. Its subscales measure positive parenting, consistency of discipline and caregiver supervision (Elgar, Waschbusch, Dadds, & Sigvaldason, 2007). Although no parenting scales have been psychometrically validated in South Africa, the APQ has been widely used as a reliable tool to assess parent behavior. Caregivers reported on the frequency of parenting behaviors (e.g. “You let your child know when he/she is doing a good job with something”). For this analysis, an

aggregate score was computed from the three individual subscales to measure overall better parenting. Higher scores therefore indicate better parenting ( $\alpha = 0.63$ ).

**Caregiver mental health.** Caregiver mental health was measured using an aggregate score of the four domains (6 items) from the SF-12 general health and functioning scale associated with psychological wellbeing (mental health, vitality, role emotional, social functioning). The SF-12 is a shorter version of the SF-36 Health Survey (Ware, 2000), which has been used in over 7,000 studies, in varying populations and cultural settings, including South Africa , and has been translated into 60 languages, including Zulu (see for example: O'Keefe & Wood, 1996). Respondents rate each health and functioning item based on the frequency of their feelings and experiences (e.g. “How much of the time over the past four weeks have you felt downhearted and depressed?”). Higher scores represent better mental health ( $\alpha = 0.66$ ).

**Adolescent Behavior Problems.** Adolescent adjustment was measured using adult caregiver reports<sup>1</sup> of the Strengths and Difficulties questionnaire (SDQ) (R. Goodman, 2001), which has previously been used in over 40 countries and recently validated among orphaned children in South Africa (Sharp, et al., 2014). The SDQ is a 25-item screening tool designed to measure internal and external behavioral attributes among children aged 4-17 years. It consists of four subscales measuring maladaptive behavioral and emotional outcomes (peer problems, hyperactivity, conduct problems and emotional symptoms respectively), which are added together to generate a Total Difficulties Score (TDS), and a fifth subscale measuring adaptive behavior through the

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<sup>1</sup> Three versions of the SDQ exist to respectively collect child self-reports, carer reports and teacher reports of child behavior.

child's prosocial behavior (PB). Caregivers report on the quality of their child's behavior (e.g. whether the child is "restless, overactive, cannot stay still for long"). Higher total difficulty scores correspond to more child emotional and behavioral problems ( $\alpha = 0.71$ ). Higher prosocial scores indicate more positive social behavior ( $\alpha = 0.69$ ). There is also some theoretical and empirical support for combining the emotional and peer subscales into an internalizing problems subscale, and the behavioral and hyperactivity subscales into an externalizing problems subscale, in low-risk samples (A. Goodman, Lamping, & Ploubidis, 2010).

**Sociodemographic factors.** All analyses were conducted after controlling for key socio-demographic variables: caregiver and adolescent age and gender, caregiver education, household size, whether or not the adolescent was an orphan, household location (urban versus rural) and household socio-economic status. The definition used for an orphaned child was a child (aged 0-17) that had lost one or both biological parents, as per the definition adopted by UNICEF and linked global development partners (UNICEF, 2013); it therefore included both single and double orphans. 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).

## Analysis

Data analyses were conducted using SPSS 21. Missing data was <1% and appeared to be missing at random; for psychometric scales, mean imputation was used to replace missing values (Schlomer, Bauman, & Card, 2010).

The analysis was conducted in three stages. First, bivariate partial correlations were conducted, to determine whether, after controlling for socio-demographic variables, statistically significant relationships existed between; a) social support and the adolescent emotional and behavioral outcomes (the five individual SDQ subscales and the TDS); b) social support and the potential mediating variables (caregiver mental health and parenting); and c) the potential mediating variables and the SDQ adolescent outcomes.

Second, hierarchical multivariate regressions<sup>2</sup> were conducted for each adolescent behavioral outcome which was found to be significantly correlated with social support and the potential mediating variables (parenting and caregiver mental health). These regressions served to highlight significant associations between socio-demographic variables and specific child outcomes, and test social support and the two potential mediating variables as predictors of each respective adolescent outcome variable.

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<sup>2</sup> We refer to 'hierarchical logistic regression,' to indicate the practice of building successive regression models, adding more predictors to each model.

Third, multiple mediation analysis was conducted in SPSS, using PROCESS software<sup>3</sup>, in order to further test the direct and indirect associations linking social support to adolescent behavior. Bootstrapping, a non-parametric sampling procedure, was used to simultaneously assess for direct effects and indirect effects of multiple mediators for each outcome, and to determine the relative mediation effect of each variable in the presence of other potential mediators (Preacher & Hayes, 2008). For 1000 bootstrap samples, results are statistically significant where 95% confidence intervals do not overlap zero (Preacher & Hayes, 2008).

## **Results**

### **Sample characteristics**

Key socio-demographic characteristics for the population sample are illustrated in Table 1. Participants were predominantly of African descent (99%) and Zulu-speaking (96%). The large majority of primary caregivers were women and the average age was 44; the average child age was 14 and over 33% of these adolescents were orphaned. Approximately 64% of primary caregivers were biological parents (of which the large majority, 92%, were mothers), 20% were grandparents (of which the large majority, 90%, were grandmothers), 11% were either aunts, uncles or siblings, 4% were foster or

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<sup>3</sup> This software is available at: <http://www.afhayes.com/introduction-to-mediation-moderation-and-conditional-process-analysis.html>.

step-parents and 1% ‘other’ (which included neighbors, family friends and in-laws). Over 40% of caregivers reported their households experiencing hunger, and between 40 and 60% of participant households did not have access to services such as electricity and running water.

[insert table 1]

### **Regression results**

Partial correlations (Table 2) showed statistically significant associations ( $p < .01$ ) between all variables of interest: social support, parenting, caregiver mental health and all SDQ variables. Both potential mediators (better caregiver mental health and better parenting) were therefore included in the regression analyses for all adolescent emotional and behavioral outcomes.

[insert Table 2]

**Socio-demographic predictors.** Hierarchical multivariate regressions, illustrated in Table 3, showed higher caregiver education to be the one socio-demographic variable associated with fewer adolescent emotional and behavioral problems for all four TDS subscales. Adolescent children who were female and/or orphaned had, on average, more

emotional problems, while adolescents with older caregivers had fewer conduct problems. Caregivers living in the urban (versus rural) site reported more adolescent child peer and conduct problems, and less prosocial behavior. Lower household socioeconomic status was also associated with more adolescent peer problems and less prosocial behavior.

[insert Table 3]

**Social support as a predictor.** More caregiver social support and better parenting were significant predictors of fewer adolescent problems, for all four total difficulties subscales, and of more prosocial behavior ( $p < .001$  for all associations). Effect sizes were particularly large for the associations between social support and prosocial behavior ( $B = 0.45$ ) and social support and peer problems ( $B = -0.38$ ) respectively. Better caregiver mental health predicted fewer adolescent peer problems and emotional problems ( $p < .001$ ), but was not significantly associated with adolescent conduct disorders, hyperactivity or prosocial behavior.

Table 4 contains results of multiple mediation analyses for all adolescent emotional and behavioral outcomes, after controlling for socio-demographic variables; only significant associations are reported (i.e. for confidence intervals that do not overlap with zero). It shows significant direct effects of more caregiver social support on better adolescent outcomes for all five SDQ domains. The size effect of this direct association was particularly large for the Prosocial Behavior (PB) subscale ( $B=0.69$ ,  $p < .001$ ).

Results also show significant indirect effects. The associations between more caregiver social support and better adolescent child emotional and behavioral outcomes were partially mediated through better parenting for all five SDQ outcomes. For peer problems and emotional problems (internalizing problems), as well as the Total Difficulties Scale, better caregiver mental health was also a significant mediator, although effect sizes were small ( $B < 0.05$ ). Better caregiver mental health was not, however, a significant mediator for conduct problems and hyperactivity (externalizing problems) (A. Goodman, et al., 2010).

It is also noteworthy that, for the Prosocial Behavior and Peer Problems subscales, direct effect sizes from social support to adolescent outcomes were considerably larger than indirect effect sizes. Direct and indirect effects of social support on adolescent outcomes are also illustrated in Figure 1 for the Total Difficulties Scale and the Prosocial Behavior subscales respectively.

[Insert Table 4 and Figure 1]

## **Discussion**

Results of this analysis indicate that caregiver social support is a protective factor for psychosocial wellbeing in this sample of adolescent children living in South African communities affected by HIV and other health and social challenges. In particular, findings suggest that caregiver social support may be especially protective for their



children's prosocial behavior and peer problems. This has important implications for child health risk behaviors and educational and health outcomes, during adolescence and later in life. Difficulties with peers have, for example, been shown to place children at risk for later externalizing, internalizing and school problems (Rubin, Bukowski, & Parker, 2006). In contrast, prosocial behavior is associated with academic success and positive peer relationships (Caprara, Barbaranelli, Pastorelli, Bandura, & Zimbardo, 2000), low levels of externalizing problems (Eisenberg, Fabes, & Spinrad, 2006) and fewer health-risk behaviors in adulthood (Carlo, Crockett, Wilkinson, & Beal, 2011).

In line with studies from other parts of the world, our findings suggest that these protective effects of social support on adolescent emotional and behavioral outcomes are in part occurring through better parenting and – specifically for peer and emotional problems – through better caregiver psychological wellbeing (J Belsky, 1984; Green, et al., 2007; Hough, et al., 2003; Lindsey, et al., 2008). However, findings also highlight strong direct relationships for all adolescent outcomes - and especially for prosocial behavior and peer problems - that cannot be accounted for by the primary caregiver's parenting style or mental health. We therefore have to consider other possible explanations as to why young adults in this sample whose caregivers receive more tangible and emotional support from their informal support networks may have less emotional and behavioral problems and more adaptive prosocial behavior. It is likely that the availability of caregiver support is, to some extent, an indicator of other dimensions of family dynamics and social relations, such as the dimension and quality of the caregiver or family support network, or the amount of adult support and positive interaction provided directly to the adolescent child by members of this network. Effects of the caregiver/family support network on adolescent outcomes could occur through

various potential mechanisms, for example: co-parenting among household and extended family members; positive interaction between adolescents and adult friends or family members, leading to modelling; the provision of emotional support and guidance; the influence of interaction with a larger caregiver/family social network on adolescent psychological factors associated with resilience (e.g. self-efficacy); socialization and a sense of connection to others (Eisenberg, et al., 2006; Thoits, 2011); social monitoring, social expectations and social control<sup>4</sup> (J Belsky, 1984; Thoits, 2011). It would be useful for future studies to test these possible mechanisms and pathways in order to better understand family dynamics in relation to adolescent wellbeing in similar populations. Achieving a greater understanding of the presence and effects of co-parenting, and the direct role of members of the caregiver's social network for child health and development, may be particularly relevant in contexts such as HIV-endemic Southern African communities. Caregiving responsibilities are typically shared among various individuals in the extended family and even broader community, and biological parents may be absent, ill or have died (Richter & Naicker, 2013; UNAIDS, 2010).

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<sup>4</sup> This refers to social support mechanisms mirroring social norms and expectations related to appropriate forms of behavior, which may be experienced directly by the child through exposure to the caregiver's support providers (Belsky 1984).

## Limitations

This study has a number of limitations. The key outcomes (caregiver social support, parenting, mental health and adolescent behavioral problems) are based on caregiver self-reports, increasing the risk of method overlap. However, when the mediation analysis was rerun substituting the caregiver report of their adolescent's peer problems with the corresponding adolescent report of peer problems, significant direct associations between more maternal social support and less peer problems still held, as did mediated effects through better parenting (direct effect:  $B = -1.00$ ,  $p < .001$ ; indirect effect through better parenting:  $B = -0.16$ , 95% CI = -1.12 to -0.89). Unfortunately, it was not possible to test reliability in the same way for the other SDQ subscales, as child reports were not available for these domains. However, there is evidence that parent SDQs are more useful than self-report SDQs for predicting child psychological disorders; for example, the parent (versus child or teacher) version of the SDQ has been shown to have the best results when tested for construct validity among orphaned children in Sub-Saharan Africa (Sharp, et al., 2014).

Also, as indicated above, some of the psychometric tools used had not been validated with similar populations in South Africa. It is possible that their limitations in measuring the desired constructs in this particular population may be affecting the results (e.g. the absence of or weak mediation through caregiver mental health). In particular, the Chronbach's alpha reliability coefficients for the tools used to measure caregiver mental health (0.66) and parenting (0.63) in this study fell within the interval of minimum values widely considered to indicate acceptable reliability in social science

research (0.6 - 0.7). As poorer reliability generally leads to more conservative statistical test outcomes, it is possible that the lower reliability of the scales used for these mediating variables may have diluted the effect sizes (Iacobucci & Duhachek, 2003). This may, for example, partially explain the small effect sizes observed for the role of caregiver mental health as a mediator between social support and peer problems/emotional problems, as well as the lack significant effect sizes for conduct problems and hyperactivity. It may also have contributed to the considerably larger direct (versus indirect) effect sizes.

In addition, while this mediation analysis is based on assumptions regarding directionality, we cannot statistically determine causality from this cross-sectional data. It is, for example, possible for caregiver mental health to influence perceived and received social support (Thoits, 2011). The literature also points to a potential two-way relationship between better child behavior and better parenting (Pardini, 2008). More caregiver social support may therefore be positively affecting both parenting and adolescent emotional and behavioral outcomes, while at the same time the quality of parenting and these adolescent outcomes may be bi-directionally linked to each other. It is possible that certain effect sizes are inflated due to these potential feedback loops; cross-sectional approaches to mediation have in fact been shown to typically generate biased estimates of longitudinal parameters (Maxwell & Cole, 2007). This could in part be explaining the particularly strong associations observed in this sample between caregiver social support and both adolescent peer problems and prosocial behavior. It would be useful to explore these associations through future longitudinal analyses.

## Conclusion

Findings of this study reinforce the potential role of interventions aimed at boosting caregiver social support to improve parenting and reduce the risk of adolescent behavioral and emotional problems. Previous evidence has, in fact, shown social support to be a key component of successful parenting interventions, even in low-income HIV-affected communities (Richter & Naicker, 2013). One approach is cognitive-behavioral group-based parenting programs, which have been shown to be effective for improving short-term child conduct problems, parental mental health and parenting skills in high-income countries (Furlong et al., 2012). However, the implementation and evaluation of these types of programs are still at an early stage in South and Southern Africa; moreover, their long-term effects on caregiver social support and child outcomes are still uncertain (Furlong, et al., 2012).

Importantly, our findings also indicate that emotional and instrumental support deriving from caregiver support networks may have additional – and possibly greater – direct benefits for adolescent health and behavior, over and above its effects on the primary caregiver's parenting. This points to scope for positive intervention on the psychosocial wellbeing of young adults through the broader extended family or community social network, beyond targeting the interaction between these young adults and their primary caregivers. These could include interventions that aim to boost adolescent social support and/or work with other individuals (besides the caregiver) in the young adult's social network.

High mortality of biological parents, and high caregiver morbidity and absence, are phenomena that unfortunately characterize the lives of a large number of young children and adolescents in HIV-endemic communities of Southern Africa and the developing world. The direct positive influence of a familial social support network on adolescent psychosocial wellbeing may assume particular importance in these contexts.

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### **Ethical standards**

This study was approved by the relevant social science research ethics committees of the University of Oxford, U.K., and the University of KwaZulu-Natal, South Africa. It has been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and other amendments and is compliant with APA ethical principles in the treatment of individual participants.

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**Table 1. Socio-demographic characteristics of the population sample (N = 2477 dyads)**

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<i>Caregiver demographic characteristics</i>	
Caregiver age (mean, SD) <sup>a</sup>	44.2 (13.9)
Caregiver gender (% female)	88.8
Caregiver education level (% completed high school) <sup>b</sup>	18.1
<i>Child demographic characteristics</i>	
Child age (mean, SD)	13.6 (2.2)
Child gender (% female)	53.9
Child orphaned (%)	33.5
<i>Relationship of primary caregiver to child</i>	
Biological parent (%)	63.8
Grandparent (%)	19.5
Other (%)	16.7
<i>Household socio-demographic characteristics</i>	
Number of people in the household (mean, SD)	6.0 (2.8)
Household members experience hunger at least occasionally (%)	40.4
Access to running water on property (%)	56.0
Access to electricity (%)	50.8
Access to flush toilet (%)	41.3
Urban (%)	48.4

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<sup>a</sup> n = 2473 for this variable, due to 4 missing values

<sup>b</sup> n = 2461 for this variable, due to 16 missing values

**Table 2. Partial correlations between social support, caregiver mental health, parenting and child behavioral outcomes, controlling for socio-demographic variables<sup>g</sup>**

	Better caregiver mental health	Better parenting	Total Difficulties Score (TDS)	Hyperactivity	Peer Problems	Conduct Problems	Emotional Symptoms	Prosocial Behavior (PB)
More social support	0.13***	0.32***	-0.34***	-0.25***	-0.37***	-0.22***	-0.15***	0.44***
Better caregiver mental health	1	0.16***	-0.17***	-0.05**	-0.21***	-0.10***	-0.14***	0.08***
Better parenting	0.16***	1	-0.47***	-0.32***	-0.40***	-0.38***	-0.26***	0.34***

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

<sup>g</sup> Partial correlations after controlling for: child age, child gender, child orphan status, caregiver age, caregiver gender, caregiver education (having completed high school); household size, household socio-economic status, household location (urban versus rural).

**Table 3. Summary for hierarchical multiple regressions predicting child behavioral problems**

	Total Difficulties Score (TDS)		Hyperactivity	Peer Problems		Conduct Problems		Emotional Symptoms		Prosocial Behavior (PB)	
	$\Delta R^2$	$B$		$\Delta R^2$	$B$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$	$\Delta R^2$	$\beta$
<b>Step 1. Demographics</b>	0.02***		0.01***	0.01***		0.01***		0.03***		0.01***	
Child age		-0.01	-0.04*		0.02		-0.01		-0.01		-0.02
Child gender (female)		0.05*	0.00		0.04		-0.02		0.12***		0.02
Child orphaned		0.04	0.02		0.01		0.02		0.06**		0.01
Caregiver age		-0.04	-0.03		-0.02		-0.06**		-0.01		-0.01
Caregiver gender (female)		0.01	0.00		-0.02		0.02		0.03		-0.01
Caregiver education (completed high school)		-0.11***	-0.09***		-0.07**		-0.06**		-0.09***		0.04
Household location (urban)		0.05*	-0.02		0.10***		0.10***		-0.03		-0.11***
Household size		-0.03	-0.00		-0.05*		-0.03		-0.02		0.03
Household socio- economic status		-0.05*	-0.04		-0.06*		-0.03		-0.02		0.07**
<b>Step 2. Social support</b>	0.12***		0.06***	0.13***		0.05***		0.02***		0.19***	
Social support score		-0.35***	-0.25***		-0.38***		-0.22***		-0.16***		0.45***
<b>Step 3: Potential mediating factors</b>	0.15***		0.06***	0.10***		0.11***		0.06***		0.05***	
Better caregiver mental health		-0.09***	0.01		-0.13***		-0.03		-0.10***		0.00
Better parenting		-0.39***	-0.26***		-0.30***		-0.34***		-0.22***		0.22***
<b>Final model statistics</b>	R <sup>2</sup> = 0.28 F = 80.35***		R <sup>2</sup> = 0.14 F = 31.98***	R <sup>2</sup> = 0.25 F = 67.90***		R <sup>2</sup> = 0.17 F = 40.20***		R <sup>2</sup> = 0.11 F = 24.71***		R <sup>2</sup> = 0.25 F = 68.02***	

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ .

**Table 4. Results of multiple mediation analysis (after controlling for socio-demographic variables)<sup>h</sup>**

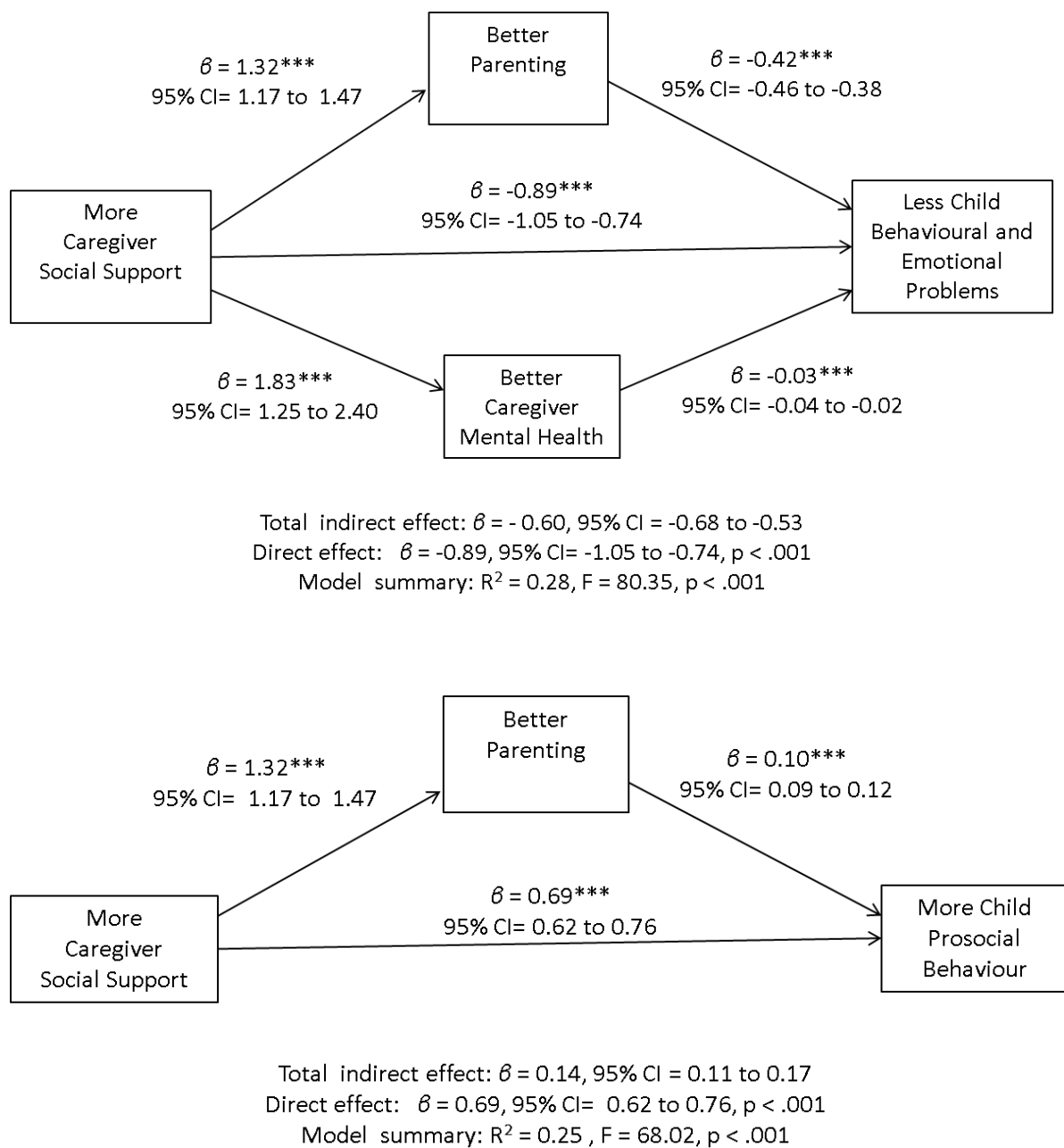
	Total Difficulties Score (TDS)	Hyperactivity	Peer Problems	Conduct Problems	Emotional Symptoms	Prosocial Behavior (PB)
	<i>B (95% CIs)</i>	<i>B (95% CIs)</i>	<i>B (95% CIs)</i>	<i>B (95% CIs)</i>	<i>B (95% CIs)</i>	<i>B (95% CIs)</i>
<b>Direct effect of caregiver social support</b>	-0.89*** (-1.05; -0.74)	-0.25*** (-0.31;-0.19)	-0.38*** (-0.43;-0.32)	-0.15*** (-0.21; -0.09)	-0.11*** (-0.18;-0.05)	0.69*** (0.62;-0.76)
<b>Indirect effect of caregiver social support through:</b>						
Better caregiver mental health	-0.05 (-0.08;-0.02)	n.s.	-0.02 (-0.04;-0.02)	n.s.	-0.02 (-0.03;-0.01)	n.s.
Better parenting	-0.55 (-0.63;-0.48)	-0.13 (-0.16;-0.11)	-0.14 (-0.16;-0.12)	-0.16 (-0.19; -0.14)	-0.12 (-0.15; -0.10)	0.14 (0.11;0.17)
<b>Final model statistics</b>	R <sup>2</sup> = 0.28 F = 86.60***	R <sup>2</sup> = 0.14 F = 34.92***	R <sup>2</sup> = 0.25 F = 73.22***	R <sup>2</sup> = 0.16 F = 42.75***	R <sup>2</sup> = 0.11 F = 26.72***	R <sup>2</sup> = 0.25 F = 74.37***

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$

<sup>h</sup> Results are reported after controlling for: child age, child gender, child orphan status, caregiver age, caregiver gender, caregiver education (having completed high school); household size, household socio-economic status, household location (urban versus rural). For multiple mediation analysis in PROCESS, only significant associations are reported, that is: associations for which confidence intervals do not cross '0'.



**Figure 1.**



**Figure 1 caption:** Final multiple mediation model predicting direct and indirect associations between caregiver social support and child emotional and behavioral problems (as measured by the Total Difficulties Score) and the child Prosocial Behavior subscale.