

Effect of Caregiver Depression on Adolescent Internalising and Externalising Behaviour: Findings from a Longitudinal Study in a high-risk South African environment

Stefani Du Toit¹, Katharina Haag³, Mark Tomlinson^{1,2}, Lorraine Sherr³, Marguerite Marlow¹, Jackie Stewart⁴, Sarah Skeen^{1,5}

¹ Institute for Life Course Health Research, Department of Global Health, Stellenbosch University, Cape Town, South Africa

² School of Nursing and Midwifery, Queens University, Belfast, UK

³ Institute for Global Health, University College London, London, UK

³ School of Nursing and Midwifery, Queens University, Belfast, UK

⁴ The Division of Global Surgery, Department of Surgery, University of Cape Town, South Africa

⁵ University of Amsterdam, Netherlands

Adolescents living in low and-middle income countries are at a particular risk of poor mental health. Caregiver mental health plays a crucial role in a child's emotional and behavioural development and may directly impact a child's risk for future development of mental health problems. Data collected as part of a two-decade longitudinal multiphase research project were used. Participants, originally women in their third trimester of pregnancy ($n=449$), were recruited from a peri-urban impoverished community outside of Cape Town, South Africa, and assessed at several time-points over subsequent years. Data collected during the three phases of the research were used to assess the effects of early and current caregiver depression on adolescent internalising and externalising behaviour. Analyses of Covariance models were used to explore the effect of caregiver depression on adolescent internalising and externalising behaviour, while controlling for multiple covariates. We analysed data for 313 adolescent participants and their primary caregivers. Caregiver depression patterns had a significant main effect on externalising behaviour, $F(3,305) = 4.10$ ($p = 0.007$), but not on internalising behaviour, $F(3,305) = 2.71$ ($p = 0.09$). Post-hoc analysis showed that those adolescents exposed to early and current caregiver depression scored on average 3.83 points (95% CI [0.99; 6.66]) higher in externalising behaviour than those exposed to no caregiver depression. Also, adolescents who experienced a change in caregiver, compared to those whose biological mother were still their primary caregiver, reported significantly higher levels of externalising behaviour $F(1,305) = 5.10$, $p = 0.03$. The study findings provide crucial insight into critical periods of risk, as well as opportunities for prevention. Preventive interventions should ideally target caregivers and adolescents to prevent or reduce behavioural problems and disrupt intergenerational cycles of mental disorders or behavioural problems.

Keywords: Adolescence, internalising behaviour, externalising behaviour, caregiver depression

BACKGROUND

In 2019, one in every eight people globally were living with a mental health disorder, with anxiety and depressive disorders being the most common (World Health Organization, 2022). Over 80% of people living with a mental health disorder live in low and-middle income countries (LMICs) (Rathod et al., 2017). Adolescents living in LMICs are at a particular risk of poor mental health, as they are often exposed to a number of risk factors simultaneously, including exposure to violence and socioeconomic adversity (World Health Organization, 2021). Untreated mental health conditions can lead to worse social and economic outcomes, and the ongoing occurrence or re-occurrence of mental health conditions across the life course (Ngo et al., 2013). Despite the mental health needs of adolescents living in LMICs, few gain access to quality mental health services (Hodgkinson et al., 2017) and there is an ongoing shortage of evidence, resources, and programming to address mental health problems in LMICs compared to high-income countries (HIC) (Semrau et al., 2015).

Caregiver mental health plays a crucial role in a child's emotional and behavioural development and well-being. Caregiver depression in particular may directly impact child risk for future development of mental health problems through a complex set of genetic, environmental and psychosocial factors (Lannes et al., 2021). The presence of a mental disorder in a caregiver may shape a child's development through the caregiving environment, affecting parenting style, relationship dynamics, parent-child interaction, and broader factors such as economic and household stability [9-14]. This can further limit the caregiver or household's ability to function, and in turn, negatively affect the mental health and behaviour of children and adolescents (Walker et al., 2011).

Child behaviour problems are typically divided into two dimensions: internalising and externalising (Achenbach, 1966). Internalising behaviour is characterised by a negative mood state and behavioural inhibition (e.g. depression, anxiety, and social withdrawal) (Ghandour et al., 2019). Externalising behaviour is characterised by behavioural disinhibitions (e.g. delinquency, tantrums, and hyperactivity) (Liu, 2004). Both can interfere with peer relationships, academic performance, and overall functioning (Ghandour et al., 2019; Liu, 2004). Caregiver depression has been repeatedly found to be associated with both internalising and externalising problems in children and adolescents (Baker & Kuhn, 2018; Gjerde et al., 2017; Lyons-Ruth et al., 1997). Studies investigating trajectories of maternal depression, ranging from none or minimal depressive symptoms to high chronic symptomology, found that children of mothers with chronic or severe depression symptoms were more likely to experience emotional and behavioural problems (Ashman et al., 2008; Maruyama et al., 2019; Matijasevich et al., 2015). Two recent studies have linked caregiver depression in early childhood to later internalising and externalising behaviour in childhood and adolescents (Flouri & Ioakeimidi, 2018; O'Connor et al., 2017). However, such studies are conducted predominantly in HICs.

Families living in LMICs may face a unique set of risks (Marçal, 2020), as economic hardship, and limited access to social and health services that can increase caregiver distress and negatively affect child outcomes through its disruption on family functioning and parenting (Conger et al., 2002). Therefore, families living in adverse socioeconomic circumstances face additional stressors, such as high levels of food insecurity or financial instability, that can negatively affect caregiver mental health and child and adolescent behaviour (Marçal, 2021). Research on the effects of caregiver depression on child behaviour amongst socioeconomically marginalised populations are limited, particularly on adolescent populations. To the best of our knowledge, only five longitudinal studies assess trajectories of maternal depression on adolescent risk behaviour, three from HICs, one from a middle-income country (Brazil), and one from an upper-middle-income country (South Africa) (Bozzini et al., 2021; Campbell et al., 2009; Flouri & Ioakeimidi, 2018; Sevenoaks et al., 2022; Wickham et al., 2015). In order to address the burden of disease of adolescent mental health, it is crucial to understand the relationship between caregiver depression and adolescent behaviour in order to more efficiently target and serve at-risk adolescents (Marçal, 2021). In this study, we sought to better understand the effect of exposure to caregiver depression across early childhood and adolescence on internalising and externalising risk behaviour in adolescents from a socioeconomic adverse context in a LMIC.

METHODS

Setting:

This longitudinal study took place in Khayelitsha, a large peri-urban area, that covers an area of approximately 47 square kilometres, located on the outskirts of Cape Town, South Africa. Khayelitsha is the fastest growing and third largest township in South Africa, with an estimated population of between 400 000 and 750 000 (Super, 2015). There is a mixture of formal brick housing and informal housing in the form of shacks or temporary structures (Levine et al., 2021). The majority of Khayelitsha's residents share communal water taps and rely on inadequate sanitation arrangements (Super, 2015). Half of Khayelitsha's population falls within the poorest income quintile for Cape Town (Seekings, 2013). According to 2011 Census data, the median annual household income was only R20 000 (approximately \$1200) (Seekings, 2013). A high unemployment rate, estimated to lie at 38-74% underpins this poverty (City of Cape Town, 2013). The HIV prevalence rate is amongst the highest in the country, and in 2012 the antenatal HIV rate was measured at 33.1% (Department of Health Republic of South Africa, Western Cape antenatal survey report). The area is characterised by significantly high levels of crime and lack of consistent and effective police services (Freeman & McDonald, 2015).

Participants and procedures

The sample in this study participated in a multiphase research project, that has taken place over nearly two decades. In Phase 1, participants were recruited as part of a randomised controlled trial, “Thula Sana”, which tested an intervention to improve maternal sensitivity and responsiveness, from 1999-2003 (Cooper et al., 2009). In this original trial, 449 pregnant women were enrolled into the study and assessed at five time-points: antenatally ($n = 449$); at 2 months post-partum ($n = 395$); 6 months post-partum ($n = 354$); 12 months post-partum ($n = 346$); and 18 months post-partum ($n = 340$). Mothers in the intervention group received the intervention from the third trimester of pregnancy until their infants were 6 months old, over 14 sessions (the control group received treatment as usual, in the form of government-delivered antenatal and maternity services). The intervention led to significant benefits for the mother-infant relationship and a positive effect on maternal depression symptoms were observed at 6 month follow-up (Cooper et al., 2009). In Phase 2, between 2012 and 2014, as part of the “Saving Brains” initiative, a total of 333 children, along with their primary caregiver ($n = 330$), were re-enrolled into the study, then 13-14 years old, and assessed on measures relating to socioemotional and cognitive functioning in order to investigate potential long-term effects of the early intervention. No significant effects on child outcomes were found, however a beneficial effect on caregiver depression were observed (Tomlinson et al., 2022). In Phase 3, in 2018, all adolescents, then 16-18 years old, were re-enrolled and re-randomised into a new intervention trial called Zifune. The Zifune intervention aimed to reduce interpersonal violence and improve prosocial behaviour. A total of 317 adolescents were assessed at three time-points: baseline; post-intervention follow-up; and 3-month follow-up. Their primary caregivers ($n = 282$) were assessed at one time-point: post-intervention follow-up.

During all three phases of the study, data were collected by trained and supervised data collectors with experience working with vulnerable populations. Data for the latter two phases were collected through entering responses into mobile phones and sent directly to a server which allowed for real-time monitoring of data quality (Tomlinson et al., 2009). All interviews were audio-recorded for quality assurance purposes. Subsamples of these recordings were reviewed by a supervisor for quality control purposes.

All three phases of the longitudinal study received ethical approval. Phase 1 was approved by the research ethics committee of the University of Reading (ref: 99/20) and the University of Cape Town (ref: 180/97). Ethical approval was granted by the Health Research Ethics Committee at Stellenbosch University for Phase 2 (S12/04/113) and Phase 3 (N17/10/094).

Study aims:

The current analysis includes data from all three phases of the study. We aimed to determine if:

- i) Exposure to early and/or current caregiver depression has an impact on adolescent internalising behaviour at the age of 16-19 years
- ii) Exposure to early and/or current caregiver depression has an impact on adolescent externalising behaviour at the age of 16-19 years

To assess early caregiver depression (ED), depression scores collected from biological mothers during the five-time points of Phase 1 of the study were used to assess whether the caregiver was depressed or not depressed. Caregivers were classified as “early depressed” if they screened positive for depression during any of the Phase 1 time-points. Early caregiver depression scores were available for the full sample ($n = 449$).

For current caregiver depressed mood (CD), we included caregiver depression scores collected during Phase 2 and Phase 3 of the study. For some participants ($n=49$), the biological mother was no longer the primary caregiver. In these cases, the depressed mood score of the current primary caregiver was included in the analysis and controlled for. To maximise the information available given attrition over the study period, caregivers were included in the analysis if there was at least one data-point available for them during Phase 2 ($n = 330$) and Phase 3 ($n = 282$) (see figure 1 below).

Insert Figure 1 here

Measures

Socioeconomic status was measured using items collected during Phase 3 of the study, on type of housing, and access to running water, electricity, and sanitation services. A continuous score was then created for each participant based on the sum of the item scores (range 0-4). Higher scores indicated higher levels of socioeconomic resources being available.

Caregiver depression: During each of the time-point during Phase 1, caregiver depression was measured through interviews with biological mothers by using the major depression section of the structured clinical interview for the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) diagnoses (First et al., 1996). Based on the presence of relevant symptoms, a decision about the presence or absence of a DSM-IV major depressive disorder was made (Cooper et al., 2009). During Phase 2 and 3, caregiver depressed mood was measured through the Patient Health Questionnaire (PHQ-9), which is a brief screening tool for depression (Kroenke & Spitzer, 2002). Caregivers were asked to rate how often, over the past two weeks, they had been bothered

by a range of symptoms of depression. Items are scored on a scale of 0-3 (0 = not at all; 1 = several days; 2 = more than half the days; 3 = nearly every day). The PHQ-9 has been extensively used and validated in several South African studies (Bhana et al., 2015; Cholera et al., 2014; Petersen et al., 2014). Caregiver depressed mood was then coded as 0 (depression not present) or 1 (depression present). Scores for caregiver depressed mood during the three phases of the studies were then investigated to create the four “caregiver depression” categories. A caregiver was considered as being “early depressed” if they were assessed as depressed during any of the 5 time-points during Phase 1 (pregnancy to 18 months). A caregiver was considered as being “current depressed” if they had a score of ≤ 9 (Bhana et al., 2015) on the PHQ-9 during either Phase 2 and Phase 3 (at child ages 13 and 16-19 years). We do acknowledge that the PHQ-9 is not a diagnostic tool and a score above the cut-off is indicative of depression. However, for the purpose of reporting, the term “depression” is used throughout. Four categories were then created out of a combination of early/late depression scores: “no depression” = no early depression/no late depression; “improvers” = early depression/no late depression; “deteriorators” = no early depression; late depression; “chronic” = early depression and late depression

Adolescent internalising and externalising behaviour: The Youth Self Report/11-18 (YSR) was used to measure adolescent internalising and externalising behaviour in Phase 2 and Phase 3. The YSR is a self-report questionnaire with 112 items covering different symptoms / behaviours, each to be rated on a three-point scale (0 = not true; 1 = somewhat or sometimes true; 2 = very true or often true) (Achenbach, 2001). The YSR assesses problem behaviours along two broad scales: Internalising and Externalising. The internalising score is calculated by the sum score of the following three subscales (comprises of 34 items): (i) anxious/depressed; (ii) withdrawn/depressed; (iii) somatic complaints. The externalising score is calculated by the sum score of the following two subscales (comprised of 34 items): (i) rule-breaking behaviour; (ii) aggressive behaviour. The YSR has been widely used in studies amongst the adolescent population in Southern Africa (Zieff et al., 2021).

Statistical analysis:

After creating the four caregiver depression categories, we tested the assumptions for ANCOVA. All assumptions were met except for the assumption for normality. To address the non-normal distribution of scores within groups, we applied square root transformations to the two outcome variables (internalising and externalising). We ran two analyses of variance (ANOVA) models, predicting internalising and externalising symptoms in adolescents respectively from the four caregiver depression categories. We then ran two Analyses of Covariances (ANCOVA), predicting adolescent internalising and externalising symptoms respectively from maternal depression

categories. For both ANCOVA models, we controlled for the following four covariates: (1) socioeconomic status, (2) primary caregiver change over time (as the primary caregiver changed for some participants during the phases of the study), (3) gender, and for (4) receiving the early caregiver intervention (Thula Sana), which was found to affect early maternal depression symptoms (Cooper et al., 2009). Finally, we conducted the Bryan Paulson Tukey test to compare the adjusted means between the different caregiver depression groups.

RESULTS

Participant characteristics

The sociodemographic characteristics of the caregivers and adolescent sample are provided in Table 1. A total of 313 adolescent participants were included in the analysis, which was the sample for whom we had data on internalising and externalising behaviours during Phase 3 of the study. ED and CD caregiver scores were available for the full sample. To determine potential bias, we checked if those caregivers with ED were more likely to drop out of assessment, however this was not the case. A total of 142 caregivers were allocated to the “no depression” group (no early depression/no current depression); 65 caregivers to the “improvers” group (early depression/no current depression); 43 caregivers to the “deteriorators” group (no early depression/current depression); and 63 caregivers to group “chronic” (early depression/current depression). The mean age of caregivers at Phase 1 were 25.96 years (SD = 6.37). No significant age differences ($p = 0.51$) between groups were detected. During Phase 1, all primary caregivers were the biological mothers of the adolescent participants. During Phase 2/Phase 3, a total of 264 (84%) primary caregivers were the biological mother and 49 were not, with no significant difference detected amongst groups ($p = 0.28$).

Just over half (53%) of the adolescent sample was female, with no significant difference in gender detected amongst groups ($p = 0.21$). The average age of the adolescents were 17.20 years, with no significant group differences ($p = 0.06$). Most of the sample lived in formal housing (75%), had access to running water at their home (82%), had a flush toilet at home (72%), and electricity at home (97%). No significant differences amongst groups in any of these indicators of socioeconomic status were found.

Insert Table 1 here

Model predicting internalising and externalising behaviour

We first ran two ANOVA models to test the effect of the four different caregiver depression groups on internalising and externalising behaviour. Caregiver depression patterns did not have a significant main effect on internalising behaviour, $F(3,309) = 2.33$ ($p = 0.08$). For externalising behaviour, caregiver depression had a significant main effect $F(3,309) = 5.84$ ($p = 0.008$). We then ran two separate ANCOVA models to test the effect of caregiver depression while controlling for covariates. For internalising behaviour, caregiver depression patterns still did not have a significant main effect on internalising behaviour, $F(3,305) = 2.71$ ($p = 0.09$) when controlling for covariates (Table 2). The following covariates were not significantly related to internalising behaviour: socioeconomic status $F(1,305) = 0.32$, $p = 0.57$; change in caregiver (from Phase 1 to Phase 2/Phase 3) $F(1,305) = 3.48$, $p = 0.06$; and early intervention $F(1,305) = 0.13$, $p = 0.72$. Adolescent gender was significantly related to adolescent internalising behaviour $F(1,305) = 23.00$, $p = 0.000$, with a small effect size (0.10). Female adolescents ($M=4.42$; $SD = 1.00$), compared to male adolescents ($M=3.87$; $SD = 0.94$), reported significantly higher levels of internalising behaviour $t(312) = 4.94$, $p = 0.000$.

Insert Table 2 here

Table 3 shows the effect of caregiver depression on adolescent externalising behaviour, controlling for covariates. Caregiver depression had a significant effect on externalising behaviour, $F(3,305) = 4.10$ ($p = 0.007$), with a small effect size (0.04). The covariate, caregiver change, was significantly related to adolescent externalising behaviour $F(1,305) = 5.10$, $p = 0.03$, with a small effect size (0.02). Adolescents who experienced a change in caregiver ($M=3.15$; $SD=1.30$), compared with those whose biological mother were still their primary caregiver ($M=2.74$; $SD=1.20$), reported significantly higher levels of externalising behaviour $t(311) = 2.80$, $p = 0.03$. Adolescent gender $F(1,305) = 0.43$, $p = 0.52$; socioeconomic status $F(1,305) = 1.55$, $p = 0.21$; and early intervention $F(1,305) = 0.01$, $p = 0.94$ were not significantly related to externalising behaviour.

Insert Table 3 here

Marginal mean models for externalising behaviour

As caregiver depression had a significant effect on externalising behaviour, we conducted post-hoc analysis to compare the adjusted means between the different caregiver depression groups. Table 4 shows the results of the Bryan Paulson Tukey test. A significant difference in the mean externalising scores between the “no depression” (no early depression; no current depression) and “chronic”

(early depression; current depression) groups were detected. Adolescents with caregivers in the “chronic” group scored on average 3.83 points (95% CI [0.99; 6.66]) higher than those with caregivers in “no depression” group. This shows that adolescents exposed to ED and CD scored higher in externalising behaviour than those exposed to no caregiver depression. Interestingly, adolescents with caregivers in the “improver” group scored on average 2.54 points (95% CI [-0.27; 5.34]) higher than those with caregivers in “no depression” group. Although not significant ($p=0.9$), this can be an indication of early exposure driving externalising behaviour. No other significant between group differences were detected.

Insert Table 4 here

Discussion:

In this study we investigated the effect of caregiver depression on adolescent internalising and externalising behaviour in an LMIC environment strongly characterised by socioeconomic deprivation. As this study uses longitudinal data, it allowed for the assessment of the effect of exposure to a depressed caregiver during early childhood and adolescence separately as well as in combination, while controlling for a range of demographic and environmental factors.

In our sample, exposure to caregiver depression was associated with significantly higher adolescent externalising behaviour. This in line with prior research on the effect of caregiver mental health on child and adolescent externalising behaviour (Baker & Kuhn, 2018; Goodman & Gotlib, 1999; Marçal, 2021; Marçal, 2020; Mesman et al., 2017). In recent years, as findings from longitudinal studies have begun to emerge (Gopalan et al., 2018; Gross et al., 2009; Marcal, 2021), it has become clear that single exposure to caregiver depression may have transient or less severe impact across the life course than repeated exposure (Goodman & Gotlib, 1999; Gross et al., 2009). Consistent with this, we showed that adolescents exposed to a depressed caregiver during childhood and adolescence had higher levels of externalising behaviour than those exposed to a depressed caregiver only during childhood or adolescence. This finding is suggestive of a number of pathways from caregiver depression to externalising behaviour. When considering the intergenerational transmission of mental health problems, there are various complex environmental, biological, and genetic factors to consider, as mental health problems often cluster in families. (Goodman & Gotlib, 1999; Kim-Cohen et al., 2005; Thompson, 2020).

A second potential pathway is through parenting styles as it has previously been found that caregiver depression negatively influences parenting styles (Humphreys et al., 2018; Marçal, 2021;

Santona et al., 2015). Increased externalising behaviour has been shown to be associated with both physical and psychological aggression in parenting (Marçal, 2021). Depressed caregivers often have diminished capacity to provide warm and responsive care, and are more likely to use harsh and inconsistent parenting practices than caregivers who are not depressed (Oyserman et al., 2000). A third pathway is through the potential exposure to a stressful home environment. Children raised by depressed caregivers are more likely to be exposed to a stressful home environment (Goodman & Gotlib, 1999). In LMICs caregivers are often exposed to a combination of risk factors, associated with poverty, community violence and a range of other risk factors, all of which contribute to elevated rates of parental stress and depression (Anderson et al., 2022; Ghandour et al., 2012; Gopalan et al., 2018; Nunes et al., 2013; Spieker et al., 2018; Yoshikawa et al., 2012). Adversity contributes to caregiver depression, leading to disruptions to the caregiver-child attachment process, as well as an increase in inconsistent and harsh parenting practices (Gopalan et al., 2018).

Internalising behaviour has also been shown to be associated with caregiver depression (Marçal, 2021; Mowbray et al., 2018), however the association seems strongest amongst children of younger ages, with diminishing effects over time (Mowbray et al., 2018). This is in line with a previous longitudinal study that did not find a significant association between caregiver depression and adolescent internalising behaviour (Gross et al., 2009). One explanation is that children build resilience mechanisms to ameliorate the negative effects of caregiver depression before they reach early adolescence (Mowbray et al., 2018). Our finding that female adolescents reported significantly higher levels of internalising behaviour, is consistent with previous findings (Meyer et al., 2017).

Interestingly, we found that adolescents who experienced a change in primary caregiver from a biological mother to another caregiver prior to adolescence, reported significant higher levels of externalising behaviour. Research suggests that separation from a caregiver can have implications for child and adolescent development, with the strongest effect observed in externalising behaviour (Adam & Chase-Lansdale, 2002; Almas et al., 2020; Briggs-Gowan et al., 2019; Howard et al., 2011). In LMICs caregiver disruption may be more common due to factors such as economic migration and caregiver mortality (Gray et al., 2021; Nsagha et al., 2012). As adolescents in LMICs are more likely to be exposed to multiple risk factors simultaneously, that can have an effect on internalising and externalising behaviour, more research on the long-term effects of exposure is needed.

Recommendations:

More research on the effect of simultaneous exposure to various risk factors, especially in the context of LMICs, on adolescent internalising and externalising behaviour are needed. Also, it is important to acknowledge that investigating different patterns of maternal depression (increasing,

decreasing, stable) could increase predictive power, and while we could not reliably conduct such analyses due to a limited sample size, we would recommend future studies to investigate this further.

Limitations:

First, different measures to assess caregiver depression were used across time points. Second, some adolescents the biological mother was no longer the primary caregiver meaning that early and current depression data was drawn from different caregivers in these cases. Third, there were no data available on the frequency of caregiver change during childhood and adolescence which may have provided a fuller picture of how caregiver changes influence adolescent mental health. Third, due to limited sample size, we were not able to reliably extract trajectories of maternal depression, opting to categorize maternal depression patterns instead.

Conclusion:

The findings of this study provide crucial insight into periods of risk, as well as opportunities for prevention. Prevention interventions should ideally target caregivers and adolescents to prevent or reduce behavioural problems and disrupt intergenerational cycles of mental disorders or behavioural problems (Beardslee et al., 2007; Knitzer et al., 2008; Mowbray et al., 2018). Screening for caregiver depression and providing timely and ongoing caregiving support to vulnerable families can support the healthy development of adolescents (Mowbray et al., 2018). Also, early interventions delivered to adolescents, can potentially limit the impact of caregiver depression on the behavioural problems associated with caregiver depression (Beardslee et al., 2007).

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