**Mediation Pathways of a Parenting Intervention for Reduced Substance Use Among Parents and Their Children: A Randomized Controlled Trial**

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**Abstract**

**Background**

Substance use is a major public health concern worldwide. Alcohol and drug use have increased during recent decades in many low- and middle-income countries, with South Africa, where this study was conducted, having among the highest rates in the world. Despite existing evidence on the effectiveness of family-based interventions in reducing substance use among parents/caregivers and adolescents in low-income countries, little is known about the mechanism of change that contributes to the reduction. This study investigated mediators of change in a parenting programme (Parenting for Lifelong Health [PLH]) on reducing substance use among parents and their children through three potential mediators: parental depression, parenting stress and family poverty.

**Methods**

The current study used a pragmatic cluster randomized controlled trial design. The total sample comprised 552 parent/caregiver and adolescent dyads (parents/caregivers: M = 49.37; SD = 14.69; adolescents: M = 13.84; SD = 2.38) who were recruited from 40 communities in South Africa’s Eastern Cape.Participants completed a structured confidential self-report questionnaire at baseline and a follow-up test 5 to 9 months after the intervention. Structural equation modeling was conducted to investigate direct and indirect effects.

**Results**

Analyses indicated that the effect of the PLH intervention on reducing parental substance use was mediated in one indirect pathway by an improvement in parental mental health (reduction in parental depression levels). No mediation pathways from the PLH intervention on parental substance abuse could be associated with parenting stress or family poverty. Furthermore, findings showed a significant positive correlation between parental substance use and adolescents’ substance use.

**Conclusions**

The findings of the study suggest that in low- and middle-income countries, the PLH parenting intervention may have a significant effect on secondary outcomes, including substance use and depression among parents/caregivers. These findings emphasize the need for creating supportive environments and systems for parents who suffer from emotional strain and mental health problems, in particular within families experiencing adversity. Improving parental mental health as part of a parenting programme may contribute to reducing substance use among parents/caregivers.

**Trial registration:** Pan-African Clinical Trials Registry PACTR201507001119966. Registered on 27 April 2015. The trial can be found by searching for the key word ‘Sinovuyo’ on the Pan-African Clinical Trials Registry website or via the following link: http://www.pactr.org/ATMWeb/appmanager/atm/atmregistry?\_nfpb=true&\_windowLabel=BasicSearchUpdateController\_1&BasicSearchUpdateController\_1\_actionOverride=%2Fpageflows%2Ftrial%2FbasicSearchUpdate%2FviewTrail&BasicSearchUpdateController\_1id=1119

**Keywords:** parental substance use; poverty; parental depression; adolescents

**Background**

Substance use is a major public health concern worldwide [1, 2]. Whereas there is significant variation in levels of substance use globally, alcohol and drug use has increased during recent decades in many low-income countries [1, 2, 3]. The prevalence of alcohol abuse in the general adult population is estimated at 4% globally and 3% in Africa [4]. A study conducted among 1115 adult men in Cape Town, South Africa, showed that most of the participants (75%) reported having engaged in cannabis use and heavy alcohol intake at least once during the preceding week [5]. Empirical studies have shown that substance use among adults (including problematic alcohol, tobacco and drug use) is associated with physical, mental, and social problems [6, 7], in addition to involvement in high-risk, notably sexual, behaviours [8]. Substance abuse among adolescents is also a major concern. A cross-sectional survey conducted among 20,227 adolescents in South Africa found that the rate of reported past-month problematic alcohol use was 23% [9]. Previous studies have shown that substance use has adverse effects on adolescents, such as increasing the likelihood of involvement in criminal activities [10], contributing to poor sleep health [11], and increasing the risk of dropping out of school and poor academic performance [12]. These findings emphasize the need for investigating the effectiveness of intervention programmes that aim to reduce substance abuse (including problematic alcohol, tobacco, and drug use) among adults and adolescents, particularly in low- and middle-income countries.

Existing evidence from low- and middle-income countries has emphasized the effectiveness of family-based interventions on the reduction of substance use among adolescents and caregivers. For example, a mixed-method randomized controlled study conducted among 61 HIV-affected caregivers in post-genocide Rwanda found that a family-based intervention (the Family Strengthening Intervention for HIV-affected Families) that addresses intimate family violence among HIV-affected families was found effective in reducing alcohol use among caregivers [13].

Similarly, findings of a randomized controlled trial of a parenting programme that combined parenting and economic strengthening components and addressed child maltreatment in Africa (the Parenting for Lifelong Health programme – Sinovuyo Teen PLH) found the programme to be effective at reducing substance use among parents/caregivers and adolescents. The trial was conducted among 552 families with adolescent members (aged 10–18 years) in Cape Town, South Africa. At 5 to 9 months after the intervention, the intervention was associated with lower levels of substance use among both parents/caregivers and adolescents [14].

Despite existing evidence of the effectiveness of family-based interventions in reducing substance use among parents/caregivers and adolescents in low-income countries, little is known about the mechanism of change that contributes to substance reduction. To the best of our knowledge, no research has yet examined the mechanisms of substance reduction among parents/caregivers and adolescents for family-based interventions that combine parenting and economic strengthening components.

An understanding of factors related to substance use will contribute to the understanding of the mechanism of reducing substance use among parents/caregivers and adolescents who participated in the PLH intervention. Therefore, the aim of the current study was to investigate the mechanism of substance use reduction among parents/caregivers and adolescents through three potential mediators: parenting stress, parental depression and family poverty.

Parenting stress has been identified as the pressure parents experience as a result of everyday challenges associated with childrearing, especially when the parents have inadequate resources for meeting their responsibilities as caregivers [15, 16]. The findings of previous studies indicate that parenting stress increases adults’ susceptibility to using substances as a coping mechanism [17, 18]. Similarly, a growing body of evidence highlights that substance use and heavy consumption of alcohol among adults have been associated with stressful life experiences; many adults may tend to consume excessive alcohol as a way of coping with negative feelings [19, 20]. Another study has found that mothers with a substance use disorder can benefit from interventions that aim at reducing parenting stress [21]. Therefore, we assumed that improvements in lowering parenting stress would contribute to a reduction in substance use among parents/caregivers.

Previous studies investigating the association between parental depression and substance use have found a significant positive association between depressed moods and substance and alcohol use among adults [22, 23, 24]. One possible explanation for the relationship between depression and substance use is that substance use is a mechanism of coping with dysphoric moods [25]. For example, a study conducted among 1910 African American adults showed that turning to substance use is a means of alleviating depression stemming from stressful life events [26]. Based on these findings, we assumed that improvements in parental mental health (lower levels of depression) would contribute to a reduction in parental substance use.

In addition, previous studies have shown that lower socioeconomic status has been linked to increased substance use among adolescents [27]. Similarly, a study conducted among 1357 young adult people in South Africa indicated that economic hardship and food insecurity are likely to be related to high levels of alcohol and drug use [28]. Disadvantaged Kenyan fathers who participated in a qualitative study reported that supporting their families financially was a motivator to attempt to cease their alcohol abuse and problem drinking [29]. Therefore, we assumed that improving household economic status would contribute to a reduction in substance use among parents/caregivers and adolescents.

The current study investigated the mechanism of a parenting programme (PLH) on the reduction of substance use among parents/caregivers and their children through three potential mediators: parenting stress, parental depression, and family poverty. Based on the model shown in Figure 1, we hypothesized that (1) PLH intervention would reduce parenting stress, parental depression, and family poverty; and (2) parenting stress, parental depression, and family poverty would mediate the association between PLH intervention and reduction of substance use among parents/caregivers and children.

**Methods**

*Study design and sample*

In this pragmatic cluster randomized controlled trial, the total sample comprised 552 dyads of adolescents and their parents/caregivers (parents/caregivers: M = 49.37; SD = 14.69; adolescents: M = 13.84; SD = 2.38) who were recruited from 40 communities (located in 34 rural villages and three large peri-urban townships) in South Africa’s Eastern Cape. Because of high levels of orphaning and fostering in South Africa, there were no requirements for a biological relationship between adolescents and primary caregivers, but both had to reside in the same dwelling at least four nights per week. Further information about the study design and sample and the inclusion and exclusion criteria is available in Cluver et al. [30].

Randomization was stratified by urban location and conducted after the baseline pretest using a random number generator by an independent, blinded statistician (CL). Complete randomization within strata used a 1:1 ratio of intervention: control. The sample included 270 families in the intervention arm and 282 families in the control arm, with a mean (SD) of 14 (1.9) families per cluster. Blinding of participants and programme providers was not feasible for parenting programmes.

Ethical approval was granted by the University of Oxford (SSD/CUREC2/11-40), the University of Cape Town (PSY2014-001), and the Departments of Social Development and Education.

*Procedure and data collection*

Parents/caregivers and adolescents completed a structured self-report questionnaire at three points in time: pretest (baseline), 1 month post-intervention (with a limited subset of items) and 5 to 9 months post-intervention. Programme implementation and post-test data collection were delayed as the result of extended political and civil violence. The final data-collection stage was originally scheduled to take place 12 months post-intervention, but owing to violence, it was moved forward to 3 months post-intervention. However, owing to ongoing election violence, final data collection was unable to begin until 5 months post-intervention, and it took 5 full months to complete, because study areas were often unsafe and volatile. The data analysis was conducted based on the data at baseline and in follow-up tests.

*Intervention group*

Dyads (parent/caregiver and adolescent) in the intervention group participated in a 14-session parenting programme, ‘Parenting for Lifelong Health/Sinovuyo Teen’. Each session lasted for 1 to 1.5 hours a week. All sessions took place in public and community locations, such as churches, community halls and schools, or outdoors, under trees.

Based on Social Learning Theory [31], the programme included a set of 14 psychosocial sessions designed to improve the parent-child relationship and family cohesion and harmony, to promote non-violent discipline, and to encourage the family members to spend quality time together. In addition to the parent-child relationship, the programme also emphasized certain parenting principles as important for maintaining healthy family relationships, such as complimenting each other, engaging in joint problem-solving, implementing rules and routines, responding to crises together, establishing clear communication strategies, and applying mindfulness practices to reduce stress and anger levels. For example, mindfulness practices included taking a pause – a brief breath-awareness activity – and a body relaxation exercise in which participants gave focused attention to each part of their body, aimed at reducing stress. Participants practiced mindful movement exercises at the beginning of each session.

All sessions used collaborative problem-solving techniques (not didactic methods), traditional stories, role-play, modelling, and stress-reduction activities. In addition to its psychosocial elements, the programme also included core economic components designed to improve families’ financial status, including: (1) encouraging families to save some of their earnings through presenting a short play that addressed common financial challenges; (2) teaching fundamental financial skills, such as budgeting and saving through visual budgeting exercises; and (3) motivating mental commitment to saving by clearly defining family saving goals and making a practical family financial plan. The programme was designed for low-resource settings with no technology (such as video) or literacy requirements. For further details about the programme, please see Cluver et al. [30].

Participants were encouraged to engage in home practice in the week following each session. For participants unable to attend sessions because of illness or disability, make-up meetings were arranged at home or in the hospital to provide brief session content. A simple lunch was included at the beginning of each session because many participants found it difficult to concentrate owing to hunger. The programme was delivered by local community members who were trained by a local non-governmental organisation (NGO), Clowns Without Borders South Africa, and supported through weekly supervision.

*Control group*

Dyads in the control group received one session (five hours) of a hygiene programme called ‘SinoSoap’. The control condition was not related to parenting practice, but addressed hygiene and sanitation handwashing activities, in order to increase the likelihood of retention in the control groups. This control activity was unlikely to influence any primary or secondary outcomes.

The programme was implemented by the Clowns without Borders NGO in South Africa and involved drama-based skill building on safe water conservation and handwashing for children. The session was delivered through performance and activities. All children received soap which, when used, revealed a small toy inside.

*Measurements*

Parents/caregivers and adolescents completed self-report questionnaires using tablets at baseline, at 1 month after the intervention, and at 5 to 9 months after the intervention. All questionnaires were pre-piloted with local adolescents and parents/caregivers. All measurements were translated into isiXhosa, one of the 11 official languages spoken in South Africa, and then back-translated.

Alcohol and substance use among parents/caregivers were assessed by using the adapted version of the World Health Organization (WHO) Alcohol Use Disorders Identification Test (AUDIT) [32] and the WHO Global School-based Health Survey. This variable was reported by parents/caregivers and used four items (α = .529), such as ‘In the past month, have you had a drink?’ and ‘Did you take any drugs to help you relax?’ Responses were scored as 0 = *no* and 1 = *yes*. One overall score was derived by computing the sum of the items.

Alcohol and substance use among adolescents were measured using items from the Child Behaviour Checklist Scale [33]. This variable was reported by adolescents using 3 items (α = .547): ‘During the past month, I drank alcohol without the permission/approval of my caregivers’, ‘I smoke cigarettes’, and ‘I use drugs like dagga (marijuana) or other drugs’. Responses ranged from 0 = *not true* to 2 = *very true*.

Parenting stress was measured using 18 items (α = .770) from the Parental Stress Scale [34], such as ‘I feel overwhelmed by the responsibility of being a parent’ and ‘Caring for my children sometimes takes more time and energy than I have to give’. Items were measured on a 5-point Likert-type scale, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). One overall score was derived by computing the sum of the items. Eight items from the scale were reverse coded (‘I am happy in my roles as a parent’, ‘I am satisfied as a parent’, ‘I find my child(ren) enjoyable’, ‘I enjoy spending time with my child(ren)’, ‘My child(ren) is(are) an important source of affection for me’, ‘Having children gives me a more certain and optimistic view of the future’, ‘I feel close to my child(ren)’, and ‘There is little or nothing I wouldn’t do for my child(ren) if it was necessary’).

Parental depression was assessed by using 20 items (α = .876) from the Centre for Epidemiological Studies Depression Scale [35], such as ‘I felt very sad even with help from my family and friends’, ‘I didn’t feel like eating’, and ‘My appetite was poor’. Items were measured on a 5-point Likert-type scale, ranging from 0 (*not at all or less than once a day*) to 4 (*nearly every day*). One overall score was derived by computing the sum of the items. Four items from the scale were reverse coded (‘I enjoyed life’, ‘I was happy’, ‘I felt hopeful about the future’, and ‘I felt I was just as good as other people’).

Family poverty was measured as monthly consistent access to necessities, including food, electricity, communication, and transport [36]. This variable was assessed by using 9 items (α = .683) such as ‘Afford three meals a day’, ‘Afford the costs of the school’ and ‘Afford enough warm clothes’. Responses were 0 = *no* and 1 = *yes*. One overall score was derived by computing the sum of the items.

*Covariates*

Parents and adolescents were asked to provide information about their age, gender, and rural or urban location. All variables (mediators and outcomes) were measured at baseline and at the follow-up 5 to 9 months after the intervention was completed. Mediators were measured only after 5 to 9 months of follow-up, and not at the 1-month follow-up.

*Data analyses*

Analyses used intention-to-treat for all clusters and families irrespective of intervention uptake and included families who were no longer living together at follow-up (n = 53). Independent-sample *t* tests were conducted to compare the means of outcomes and mediator differences between the intervention and control groups at baseline and follow-up.

A linear structural equation model (SEM) was used with the AMOS 21 statistics program. The SEM procedure combined measurement modeling (confirmatory factor analyses) and SEM. Items that were theoretically and empirically perceived as describing the variable were used in the measurement model.

Goodness of fit for the final model was assessed using the comparative fit index (CFI; acceptable fit for CFI is ≥ .90) and the root mean standard error of approximation (RMSEA; acceptable fit for RMSEA is < .06). We also report χ2 fit statistics but acknowledge that the test result is inflated by the sample size of the study.

**Results**

*Descriptive statistics*

The *t* test results for baseline and follow-up outcomes and mediating variables (intervention and control group) are shown in Table 1. Pearson correlations between the study variables are shown in Table 2.

*Direct and indirect effects*

We examined three potential mediators (parenting stress, parental depression, and family poverty) of the effect of PLH intervention on reduction of substance use among parents/caregivers and their children at the follow-up test (5–9 months following the intervention).

Table 3 shows the total, direct and indirect effect of each mediator on the outcome of the study. At the first step of the analyses, each mediator was tested individually. At the second step, all mediators were tested in an SEM simultaneously.

In the results of the measurement-fit model, the values of the CFI (.931) and RMSEA (.043) showed a good model fit (χ2 = 284.89; df = 142; *P* < .000). Structural equation modeling was also used to test the direct and indirect (mediation) effects of the PLH intervention and the potential mediators on substance use among parents/caregivers and their children. The model shown in Figure 1 represents the model fit for all the variables of the study. In the results of the theoretical model, the values of the CFI (.904) and RMSEA (.049) showed a good model fit (χ2 = 369.28; df = 159; *P* < .000).

The results of the SEM showed that the PLH intervention had a significant effect on reducing parental substance use (β = –.167; *P* < .001) and adolescent substance use (β = –.090; *P* < .05) at the follow-up test 5 to 9 months after the intervention. In addition, the findings showed that the PLH intervention had a significant effect on reducing parental depression (β = –.255; *P* < .001), parenting stress (β = –.151; *P* < .05) and family poverty (β = –.288; *P* < .001) at the follow-up test.

Mediation analysis was examined using Bootstrap in AMOS. The results presented in Figure 1 indicate that the PLH intervention’s effect on reducing parental substance use among parents/caregivers was associated with one indirect mediation pathway: reduction in parental depression. At the follow-up test (5–9 months), the PLH intervention had contributed to a reduction in parental depression (β = –.255; 95% CI = –11 to .01; *P* < .001). There was no association between parenting stress or family poverty and the effect of PLH intervention on parental substance use. Essentially, parenting stress and family poverty did not serve as mediators in the association between the PLH intervention and reduced parental substance use. Furthermore, parenting stress, parental depression and family poverty were not mediators in the effect of the PLH intervention on adolescent substance use.

**Discussion**

The current study investigated the role of parental depression, parenting stress and family poverty as potential mediators of the PLH parenting programme in reduction of substance use among parents/caregivers and their children in South Africa. The findings of the study contribute to understanding the mechanism behind the reduction of substance use among parents by showing that reduction in parental depression served as a mediator between the PLH intervention effect and parental substance use. Consequently, improving parental mental health by reducing depression contributed to a reduction in substance use among parents/caregivers. This mediation process is understandable in light of Agnew’s General Strain Theory [37], according to which, substance use among adults is a coping mechanism to relieve negative feelings such as stress, frustration and depression. With limited support and skills, parents may resort to substance use to escape their pain and negative feelings and to cope with the problems they face. This study’s findings suggest that PLH intervention provides parents with skills and support that help them to cope in effective ways and to avoid ineffective coping mechanisms such as problematic alcohol and drug use. In addition, the PLH intervention served as a supportive environment for vulnerable parents, which contributed positively to their mental health by providing emotional and instrumental support as part of the intervention (such as stress-reduction activities that included deep-breath awareness activities and body relaxation exercises in which participants gave attention to each part of their body). This finding is consistent with previous studies showing that mindfulness practices, which can reduce depressive symptoms, are effective approaches in reducing substance use [38]. One explanation for the effectiveness of mindfulness practices in reducing substance use is that these practices increase awareness of physical, emotional, and cognitive states, which may contribute to a decrease in the need to alleviate feelings of discomfort with substance use and may encourage more mindful ways to cope with emotional difficulties [39].

Contrary to our hypotheses, the findings of this study showed that parenting stress and family poverty did not serve as mediators of the PLH intervention on reduction in substance use among parents/caregivers. Based on the findings, we concluded that improvement in household economic status and reduction in parenting stress levels do not necessarily contribute to a reduction in substance use among parents/caregivers but that parents’ mental health – specifically, reduction in depressive symptoms – does have an influence on substance-use reduction among parents/caregivers.

Furthermore, the study’s findings did not show an association between the potential mediators (parental mental health, parenting stress, and poverty) and a reduction in substance use among adolescents. It seems that parental factors (parental mental health and parenting stress) and familial factors (family poverty) cannot explain reductions in substance use among adolescents. It is recommended that future studies investigate potential pathways for reducing substance use among adolescents, particularly variables related to the child, such as adolescents’ mental health.

To the best of our knowledge, the current study is among the first to investigate mediation pathways for reduction in substance use among parents and their children in low- to middle-income countries. The findings indicate that parental intervention has a significant effect on high-risk behaviours, such as substance use, among parents and their children, and on parental mental health, notwithstanding family vulnerability. Strengths of the study include the pragmatic randomized trial method, which provides high external validity. Furthermore, standardized measurement and intention-to-treat were used.

However, limitations also need to be acknowledged. First, mediation analyses were conducted at one time point only (after 5–9 months of follow-up). Although a 1-month follow-up was conducted, it was not included in the mediation analyses. Mediators were measured not at the 1-month follow-up, but at the 5- to 9-month follow-up only.

A longer-term follow-up with multiple postintervention assessments would have enabled us to examine potential effects and potential reverse causality between parental depression and reduction of parental substance use. Hence, future studies should conduct mediation analyses at more than one point in time, which would enable the hypothesized mediator to be measured before the outcome. Second, based on the findings of the study, causal inferences of intervention components cannot be drawn. The findings of the study suggest that improvement in parental mental health (less depression) mediates parental substance use. However, we cannot recognize which intervention components are responsible for this mediation effect. Therefore, it is recommended that future studies use other methods of identifying essential components, such as relaxation and skills for coping with negative feelings, which might provide further insight into active core ingredients for parenting programs. This includes evidence from randomized micro-trials on the efficacy of discrete parenting techniques [40] and factorial experiment trials that test different components in relation to each other [41]. Furthermore, the reliability of the substance-use and poverty measurements was low. The substance-use measurement (AUDIT) did not measure a construct, but, rather, the use of different forms of substances that might not be related, and therefore, we did not expect a high value of Cronbach α. However, based on previous studies, the AUDIT measurement is widely used in general populations as a method to measure substance use, and it is suggested as a reliable measurement [42]. Similarly, the family poverty scale measured different aspects of family necessities (food, electricity, clothing and transport) and not a construct. This may explain the low reliability value.

**Conclusions**

The findings of the current study emphasize the importance of understanding the challenges vulnerable families face that negatively affect their mental health and increase the likelihood of involvement in high-risk behaviours such as substance use. These findings highlight the need to create supportive environments and systems for parents who suffer from emotional strain and mental health problems. Professionals need to adopt an empathic approach toward vulnerable families, which would contribute to better understanding their needs and challenges and to building effective psychosocial interventions and prevention programs that target families at risk.

The current study contributes to filling the gap in knowledge about parenting interventions that are effective in reducing high-risk behaviours among parents of adolescents in vulnerable communities. Nevertheless, we recommend that future research examines the mechanism of reducing substance use among parents/caregivers in other settings in low- and middle-income countries.

**Abbreviations**

**AUDIT:** Alcohol Use Disorders Identification Test

**CFI:** Comparative Fit Index

**NGO:** non-governmental organisation

**PLH:** Parenting for Lifelong Health

**RMSEA:** root mean standard error of approximation

**SEM:** structural equation model

**WHO:** World Health Organization

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**Table 1**Baseline and follow-up characteristics for intervention and control groups

|  |  |  |
| --- | --- | --- |
|  | **Baseline** **Mean (SD)** | **Follow-Up** **Mean (SD)** |
| **Variable**  | **Treatment** | **Control** | **Treatment** | **Control** |
| **Parental substance use**  | 0.44(.85) | 0.56(.93) | 0.34\*(0.75) | 0.60(1.02) |
| **Adolescent substance use**  | 0.60(1.08) | 0.65(1.12) | 0.14\* (0.44) | 0.27(0.71) |
| **Parental depression**  | 23.13(11.79) | 24.90(12.08) | 11.30\*(9.78) | 16.82(11.13) |
| **Parenting stress**  | 33.13(8.68) | 33.39(8.18) | 23.75\*(8.24) | 27.05(7.32) |
| **Family poverty**  | 0.04 (1.68) | -.004 (1.64) | 0.29 (1.60)\* | -0.28 (1.49) |
| **N** | 270 | 282 | 264 | 278 |

\*Statistically significant differences in means between the treatment and control groups at *P* < .05.

**Table 2** Pearson correlations of study variables (N = 548)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | 1 | 2 | 3 | 4 | 5 |
| 1. Parental substance use
 | 1 |  |  |  |  |
| 1. Teen substance use
 | .174\* | 1 |  |  |  |
| 1. Parental depression
 | .266\*\* | .009 | 1 |  |  |
| 1. Parenting stress
 | .117\*\* | .170\*\* | .266\*\* | 1 |  |
| 1. Family poverty
 | -.029 | -.024 | -.111\* | -.169\*\* | 1 |

\*P < .05.

\*\*P < .000.

**Table 3**Total, direct and indirect effects of mediators on substance use among parents and teens

|  |  |  |
| --- | --- | --- |
|  | **Parental substance use** | **Teen substance use** |
| **Mediators** | **Total Effect** | **Direct Effect** | **Indirect Effect** | **Total Effect** | **Direct Effect** | **Indirect Effect** |
| 1. Parental depression
 | -.246[-.39,-.10] | -.201[-.35,-.05] | -.044[-.11,-.01] | -.138[-.24,-.03] | -.149[-.25,-.04] | -.011[-.01,.03] |
| 1. Family poverty
 | -.205[-.33,-.07] | -.208[-.39,-.09] | .001[-.03,.03] | -.138[-.24,-.03] | -.139[-.24,-.03] | .000[-.02,.02] |
| 1. Parenting stress
 | -.250[-.40,-.09] | -.217[-.37,-.06] | -.033[-.07,-.00] | -.120[-.22,-.02] | -.083[-.18,.01] | -.037[-.06,-.01] |

PLH intervention group

Parental depression

Parenting stress

Family poverty

Parental substance use

Adolescent substance use

-.151\*\*

n.s.

-.255\*

.236\*

n.s.

-.288\*

n.s.

**Fig. 1**Study model and structural equation model results

Note: All the paths were predicted; those represented by a dotted line were not statistically significant (χ2 = 396.28; df = 159; *P* < .000; comparative fit index = .904; root mean standard error of approximation = .049). The mediators and outcome were measured at the same time point (the follow-up test at 5-9 months).

\**P* < .00.

\*\**P* < .050.

**Declarations**

**Ethics approval and consent to participate**

Ethical protocols were approved by the Faculty of Humanities Ethics Review Committee, University of Cape Town (PSY2014-001) and the Social Sciences and Humanities Inter-divisional Research Ethics Committee, University of Oxford (SSD/CUREC2/11-40), the European Research Council (ERC-2012-StG 313421-PACCASA) and South African provincial Departments of Social Development and Basic Education. The study and all methods were performed in accordance with the Declaration of Helsinki. Consent for participation was obtained. Written voluntary informed consent was obtained from all participants (parents and adolescents), and consent procedures were read aloud for those with limited literacy. Confidentiality was maintained, except if participants were at risk of significant harm or request assistance.

**Availability of data and materials**

Sinovuyo Teen manuals and programme materials will be made freely available online, and UNICEF has sponsored free printed versions. All research materials (i.e., questionnaires, study process materials and a qualitative toolkit) will be made freely available on the UNICEF and WHO websites. The study data will be made available on open-access websites such as the South African Data Archive and the European Clinical Trials database.Further information about the protocol study is available at https://doi.org/10.1186/s13063-016-1452-8.

**Competing interests**

LC and JML are co-developers of the PLH for Adolescents programs, which are licensed under a Creative Commons 4.0 Non-commercial No Derivatives license. JML is also the Executive Director of Clowns without Borders South Africa, a non-profit institution responsible for the dissemination of the program. JML also receives occasional fees for providing training and supervision to facilitators and coaches. JML and LC have participated (and are participating) in a number of research studies involving the programme as investigators, and the Universities of Oxford, Glasgow and Cape Town receive research funding for these. Conflict is avoided by declaring these potential conflicts of interest and by conducting and disseminating rigorous, transparent and impartial evaluation research on both this and other similar parenting programs. AM, FM, JD, YS and OG have no competing interests or other interests that might be perceived to influence the results of the study. No profit or financial gain will be made from this programme.

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**Authors’ contributions**

AM contributed to the conception, design and statistical analyses and drafted the manuscript for publication. LC contributed to revising critically for important intellectual content of the manuscript. LC, YS, JML and FM contributed to conceptualizing, designing and implementing the experiment. All authors provided feedback and approved the final manuscript.

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