

# Southern Africa Labour and Development Research Unit



## The Intergenerational Transmission of Depression in South African Adolescents

*by*

*Katherine Eyal and Justine Burns*

## About the Author(s) and Acknowledgments

Dr Katherine Eyal PhD: School of Economics, University of Cape Town

Professor Justine Burns PhD: School of Economics, University of Cape Town

Correspondence to: Dr Katherine Eyal, School of Economics, University of Cape Town, Private Bag X3 Rondebosch 7701, Cape Town, South Africa, katherine.eyal@uct.ac.za, +27 21 650-5238.

## Recommended citation

Eyal, K., burns, J. (2017). The Intergenerational Transmission of Depression in South African Adolescents. A Southern Africa Labour and Development Research Unit Working Paper Number 200. Cape Town: SALDRU, University of Cape Town

---

ISBN: 978-1-928281-61-0

© Southern Africa Labour and Development Research Unit, UCT, 2017

Working Papers can be downloaded in Adobe Acrobat format from [www.saldru.uct.ac.za](http://www.saldru.uct.ac.za).

Printed copies of Working Papers are available for R25.00 each plus vat and postage charges.

Orders may be directed to:

The Senior Administrative Officer, SALDRU, University of Cape Town, Private Bag, Rondebosch, 7701,

Tel: (021) 650 1808, Fax: (021) 650 5697, Email: [tania.hendricks@uct.ac.za](mailto:tania.hendricks@uct.ac.za)

# The Intergenerational Transmission of Depression in South African Adolescents

Katherine Eyal and Justine Burns\*

February 1, 2017

## Summary

**Background:** Nationally representative data to measure mental health is rare in South Africa. Estimates of the size of the intergenerational transmission of depression in Africa, and in South Africa, are not numerous, in particular using recent nationally representative data, or in the adolescent sample. South Africa has high rates of depression compared to other countries, in particular among adolescents. Very little mental health treatment is available to adolescents, and the results of poor mental health during adolescence are many - including earlier child bearing, poor education, higher levels of HIV infection and low rates of future employment, among others.

**Methods:** Using the South African National Income Dynamics Survey, a nationally representative panel data set, we estimate the size of the intergenerational transmission of depression, in particular among adolescents. The CES-D 10 score is used to determine the presence of depression among individuals.

**Findings:** We find that the size of the intergenerational transmission coefficient is large. On average, 17% of South African teenagers suffer from depression. This figure increases to approximately 50% for teens whose parents suffer from depression. In addition, the direction of causality appears to run strongly from parent to child, and the mental health of parents in the current period is the most important determinant of teen mental health, as opposed to the mental health of parents in previous time periods.

**Interpretation:** Untreated mental illness in parents results in significantly higher levels of mental illness in teens. Increased detection and treatment is important to prevent poor outcomes in later years.

**Funding:** None.

**Copyright:** © The Author(s). This is an Open Access article under the CC BY-NC-ND license.

## Introduction

One third of South Africans will suffer from a mental disorder in their lifetime<sup>1-3</sup>, and this burden of disease has been rising since 1990<sup>4</sup>. Rates of mental illness are higher in South Africa than many other countries<sup>3,5,6</sup>, in particular among women<sup>7</sup>, and adolescents<sup>2</sup>. Economic inequality has been

linked to higher levels of mental illness, and South Africa is one of the most unequal countries in the world<sup>8</sup>.

Children in South Africa live in particularly adverse conditions, with high rates of tuberculosis and HIV, poor nutrition and a high likelihood of missing or deceased parents<sup>9</sup>. Estimates of teen depression range between 13 and 17%<sup>2,9,10</sup>. Adolescents also struggle to gain access to treatment. Less than 2% of South African facilities providing mental health services are dedicated to teens and children<sup>11</sup>.

The correlates of depression in both parents and children are multifold, in particular in South Africa. Rates of depression are higher among women<sup>12,13</sup>, the unmarried<sup>3</sup>, older individuals<sup>13</sup>, those with

---

\*Affiliations: School of Economics, University of Cape Town (Dr Katherine Eyal PhD, Professor Justine Burns PhD). Correspondence to: Dr Katherine Eyal, School of Economics, University of Cape Town, Private Bag X3 Rondebosch 7701, Cape Town, South Africa, katherine.eyal@uct.ac.za, +27 21 650-5238.

poor education or poor physical health, people of colour<sup>9,13</sup>, lower socio-economic status and financial stress, living in larger households and in rural areas, and in particular among those with a family history of depression<sup>9</sup>. These results may not cause concern were levels of maternal depression to be low, or if maternal mental health was not linked strongly to child outcomes. Unfortunately the literature suggests that both of these assumptions are untrue. Mothers in South Africa have high levels of depression<sup>12</sup>, and in many countries around the world, and in South Africa, the connection between maternal depression and child outcomes is highly significant<sup>12,14–20</sup>.

The consequences of untreated mental illness are profound<sup>21,22</sup>. These costs include those of treatment, caregiving<sup>12</sup>, reduced earnings and productivity<sup>21,23</sup>, the co-morbidity of many serious diseases<sup>1</sup>, and worsened physical health in general<sup>22</sup>. Public health research in the mental health area has been neglected, both world wide, and in Africa and South Africa in particular<sup>1,10,22</sup>, and in particular among teens. There is a lack of research in lower and middle income countries on the complicated link which exists between mental illness and many of the millenium development goals, such as female empowerment, child development and mortality, HIV/AIDS, poverty, and others<sup>1,12,22,25</sup>, despite the large contribution of mental illness to the global burden of disease<sup>2</sup>, and this link is also largely ignored by government and community based organisations in South Africa<sup>26</sup>.

From the international literature, we see that the size of the intergenerational transmission (IGT) effect varies across countries, but is never small<sup>14–18,27</sup>. Rates of depression among the children of depressed mothers have been seen to be three to four times higher in Australia<sup>20,28</sup>, 1.3 times higher in America<sup>29</sup>, five times higher in Denmark<sup>30</sup>, and twice as high in a sample of Australian teens<sup>31</sup>, than the rates among children whose parents are not depressed. Depression rates for those with any first degree relative suffering from depression have been observed to be nearly three times the normal rate of depression<sup>32</sup>. The probability of suffering from depression is also higher the younger the child is when the mother’s depression manifests<sup>16,20,33,34</sup>,

The literature regarding estimates of the severity of parent-child transmission of depression in Africa and South Africa is singularly scarce<sup>29,30,35,36</sup>, de-

spite a world wide<sup>3</sup> and South African literature on the many negative consequences of untreated mental illness in mothers on key child outcomes such as nutrition, diarrhoeal disease, vaccination rates, and breastfeeding<sup>1,12,14–19,22,37</sup>, and in particular on child mental health<sup>20,29,30,32</sup>. In particular, no South African studies using nationally representative data are known to the authors of this paper.

Around the world<sup>4</sup>, depressed teens are more likely to engage in risky behaviours<sup>10,38,42</sup>, to have lowered educational achievement, worse physical health and higher rates of early child bearing. Mental health problems are among the leading burden of disease for adolescents<sup>38,43</sup> and young adults<sup>8,44</sup>, and are particularly problematic, as poor mental health in adolescence can lead to long term consequences, due to the formative nature of this period<sup>38,45–47</sup>. In particular, girls often have significantly higher rates of depression than boys<sup>10,16</sup>.

Very few South African papers have examined the relationship between maternal mental health and child outcomes<sup>36</sup>, let alone teen and adult outcomes. This paper investigates the size of the intergenerational transmission of depression in South Africa, using a nationally representative data set, and finds a large and significant effect. Depression in parents is the single largest determinant of teenage mental health.

## Methods

### Data

Data on the prevalence of mental illness in South Africa is lacking, particularly nationally representative data which links mental illness to its key determinants, both demographic and socio-economic factors<sup>6,13,48</sup>. The last nationally representative survey of psychiatric disorders is the South African Stress and Health Study, which was conducted between 2001 and 2002<sup>3,48</sup>. The data used in this paper is the National Income Dynamics Survey (NIDS), which began in 2008, and is collected approximately every two years<sup>49</sup>. The NIDS is the first nationally representative panel survey of its kind in South Africa, and was undertaken to measure welfare over time, with a focus on income, assets and expenditure, and a rich set of demographic variables<sup>50</sup>. The NIDS provides valuable opportunities for research in the mental health area, due to

<sup>1</sup>These include HIV<sup>24</sup>, obesity, hypertension, strokes<sup>22</sup>, substance abuse and others<sup>8</sup>

<sup>2</sup>Mental illness constituted 14% of the global burden of disease in 2007<sup>22</sup>, and is forecasted to be the second highest cause of health disability by 2020<sup>8</sup>.

<sup>3</sup>These effects of maternal mental illness have been found in Pakistan, India, Vietnam, Barbados and other countries<sup>22</sup>.

<sup>4</sup>These negative outcomes have been observed among depressed youth in Malawi, America, the United Kingdom, Canada, New Zealand, and Australia<sup>14,20,38–41</sup>.

the inclusion of an emotional health module in the survey<sup>50</sup>.

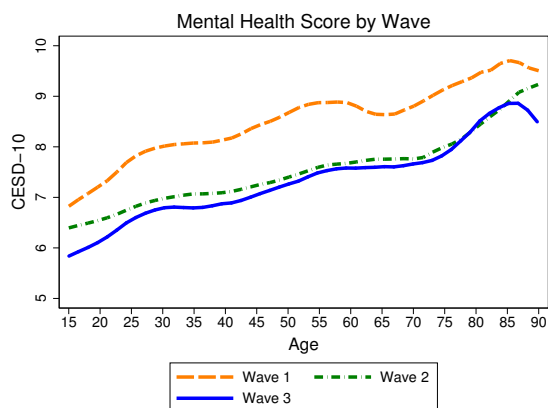
## Measuring Depression

Empirical work is often performed by researchers who are not familiar with the Diagnostic and Statistical Manual-V, the most common references for mental illness diagnosis<sup>51</sup>, and do not specialise in medicine or psychiatry in particular. Simple psychometric scales are often used, due to the ease with which they can be administered and interpreted, by fieldworkers in particular<sup>8,52</sup>. The Center for Epidemiological Studies Short Depression Scale (CES-D 10) is a short self-reported scale which is a screening instrument designed to diagnose and classify the severity of depression<sup>52</sup>.

## Calculating the CES-D 10

The CES-D 10 consists of ten questions, with four possible answers, regarding a range of emotional behaviours<sup>5</sup> and the number of times they have been exhibited in the past week. The final score ranges from 0-30. A score of ten or above indicates the presence of mild to significant depression<sup>36,52</sup>. Figure 1 shows the distribution of the CES-D 10 over age for each of the waves. CES-D 10 levels display an upward pattern indicating depression increases as people age.

Figure 1



## Validation

A problem within this field of study is a lack of commonality in the measures used to measure emotional health<sup>53</sup>. Life satisfaction, depression (measured through a number of instruments), anxiety,

<sup>5</sup>The questions cover topics relating to depression such as feelings of fear, loneliness, sleep disturbance, depression, anxiety, lack of concentration or energy, and two positively phrased questions about feelings of happiness and hope.

stress, resilience, and self perceived health are but some of the many options available to researchers to measure psychological health. The majority of mental health screening instruments (including the CES-D 10) are created in developed countries, where individuals face a widely different set of challenges to those living in lower income countries<sup>53</sup>, and may have very dis-similar cultures<sup>30</sup>. The translation of the CES-D 10 questions to other languages may also lose something of the essence of the original questions<sup>52</sup>. The idioms used to describe depression in different languages and cultures are important<sup>8,48</sup>, and differences across different societies may make comparisons difficult<sup>54</sup>.

In South Africa, the CES-D 10 score is widely used and has been verified for use as an initial screening tool<sup>55-58</sup>. The score has been found to be consistent both internally, and in repeated testing, in other countries and in South Africa<sup>46,56</sup>. It is also consistent when compared to shorter and longer versions of the same questionnaire. In addition, sensitivity testing using other threshold values to determine depression, as opposed to the standard cut-off of ten, yields similar results<sup>46</sup>. The CES-D 10 measures well in diagnosis when compared to other diagnostic scales commonly used, such as the Rockliff Depression Rating scale, the Hamilton, the Edinburgh and others<sup>52,59</sup>.

If the questions for the CES-D 10 scale are answered with greater ease in low stigma communities, the measured prevalence is likely to be closer to the true measure than in communities where stigma is higher, such as African communities<sup>21,60</sup>. However, one advantage to the CES-D 10 score is that it succeeds in asking questions about mental health without explicitly mentioning the names of any psychiatric illnesses, which can mitigate the effect high levels of stigma could have on data quality. Despite the high levels of depression observed in the NIDS (in African communities in particular), other questions in the survey which specifically ask about mental illnesses have extremely low rates of response, and even lower numbers who actually answer in the positive to these questions. The rates of response for the CES-D 10 are high, both among teens and mothers, and do not differ significantly by location, income levels, maternal mental health or age.

In Table 1, the correlation between the CES-D 10 and some measures of positive and negative feeling in Waves one, two, and three are presented. Higher values of the CES-D 10 score are displayed among individuals who have suffered negative events such as a death in the family, or negative perceptions, such as being in a state of poor health, or who have parents who are depressed. Individuals who are more optimistic or happy, or who feel more life satisfaction have lower CES-D 10 scores, as seen

by negative correlations with the CES-D 10. A measure of Chronbach’s alpha, a measure of internal consistency for a psychometric scale<sup>61</sup>, for the CES-D 10 between Waves one to three is between 77 and 67% (70 is often taken as a the cut-off for a reliable scale). In addition to these checks, we calculate (but do not report here) and find positive correlations between the eight negatively phrased individual component questions of the CES-D 10 score.

## Summary Statistics

Table 2 presents descriptive statistics for teens, differentiated by mental health status. Depressed teens are significantly less likely to be enrolled in school, and are less likely to be beneficiaries of the South African child support grant, an unconditional cash transfer. Depressed teens are much more likely to have mothers, fathers or siblings who are depressed, to have parents who have been depressed for a number of years, and to live in households with a larger number of depressed individuals. These differences are large and significant; for example, 75% of depressed teens have depressed mothers, compared to only 20 percent of teens who are not depressed. Rates of depression do not differ significantly by gender.

Figure 2 shows the strongly positive relationship between parent and teen mental health, by gender of the teen. When parental CES-D 10 score is lower, the rates of depression of boys and girls do not differ. However, as the mental health of parents worsens (as seen in higher CES-D 10 scores), teen girls start to have significantly higher rates of depression than boys. Very high rates of teen depression (as much as 70%) are seen at the higher levels of parental depression.

## Theoretical Framework

Mental health transmission is related to genetic and environmental factors<sup>16</sup>. Children may have a strong genetic predisposition to depression, but in the absence of environmental stressors (financial, domestic or others<sup>16,28</sup>), this may not manifest as worsened mental health. Conversely, children may suffer from depression even without a genetic predisposition, if they are subject to the same negative environmental factors which have impacted negatively on parental mental health<sup>16</sup>. In addition to current stressors, high stress in childhood (or even gestation<sup>62</sup>) can impact strongly on adult characteristics such as resilience in the face of stress, or mental health.

A limited number of studies of the intergenerational transmission of depression<sup>30</sup>, or health status<sup>29</sup> are to be found in the international and

South African literature, owing partly to data constraints<sup>35</sup>. The intergenerational transmission of characteristics such as education, socio-economic measures (including inequality, earnings and others) the intelligence quotient (IQ), and parenting have been investigated in the international literature<sup>35,63–66</sup>. Different models are employed, such as regression<sup>6</sup> to the mean<sup>63,67</sup>, models which decompose intergenerational transmission into genetic and environmental components<sup>65</sup> (although which require strict assumptions and very specific data), health production functions which also allow for the separation of nature versus nurture factors<sup>68</sup>, and others.

Very many studies do not try to disentangle the genetic versus environmental factors in transmission<sup>66</sup>. Estimation using twin data is one attempt to do so<sup>63</sup>, however often such data is not available, and the extent to which these results may be generalised is unclear<sup>64</sup>. Another method is to control for past parental mental health as well as current. The former may imply a chronic condition related to genetic factors, and the latter, situational factors which affect parents and children simultaneously. However, it is impossible to ascribe either coefficient definitively to genetic or environmental factors, given the persistence of both stressors and poor health over time.

The following model, similar to others in the literature<sup>29,68</sup>, may be used to estimate the size of the intergenerational mental health transmission effect.

$$MH_i = f(X_i, HH_h, C_c, P_p, PD_p) \quad (1)$$

The  $X_i$  are individual characteristics such as age, gender, health, education level, race, marital status, nationality, orphan status, perceived social status, self esteem and loneliness<sup>3,6,56</sup> and many more. For parents, number and age of children is also an important determinant of mental health (although no consensus exists regarding the direction of these effects). For women, the recent birth of a child, and the resultant life and hormonal changes are also factors in depression. The  $C_c$  refer to community factors, such as community size, access to services or transport, levels of safety or social cohesion<sup>69</sup>, among others. The  $HH_h$  refer to household characteristics such as household income, location, size, composition (i.e. pensioners, children, working or unemployed adults), whether the household has suffered any recent income shocks, or deaths, and the overall health of all the household members (including mental health). The  $P_p$  refer to

<sup>6</sup>The model predicts the children of parents with severe mental illness will present with mental illness which is not as severe, and children of parents presenting with very little or no mental illness will present with higher levels of mental illness<sup>67</sup>.

Table 1

CES-D 10 Validation: Correlations			
	Wave 1	Wave 2	Wave 3
Death of a Family Member	0.06	0.05	0.04
Happier than Ten Years Ago	-0.18	-0.21	-0.23
Life Satisfaction	-0.20	-0.19	-0.27
Poor Health	0.23	0.18	0.17
Optimistic about the Future 2 Years from Now	0.04	-0.05	-0.05
Optimistic about the Future 5 Years from Now	0.02	-0.05	-0.12
Household Experienced a Negative Income Shock	0.00	0.03	-0.03
Mother is Depressed	0.32	0.44	0.44
Father is Depressed	0.33	0.42	0.44
<i>CES-D 10 Component Variables</i>			
Respondent was unusually bothered	0.51	0.43	0.41
Respondent had trouble keeping their mind on what they were doing	0.55	0.45	0.48
Respondent felt depressed	0.58	0.49	0.50
Respondent felt that everything was an effort	0.40	0.31	0.30
Respondent's sleep was restless	0.52	0.46	0.43
Respondent felt hopeful about the future	-0.15	-0.19	-0.32
Respondent felt fearful	0.50	0.48	0.43
Respondent was happy	-0.33	-0.35	-0.43
Respondent could not get going	0.53	0.47	0.42
Respondent felt lonely	0.49	0.45	0.42
Chronbach's Alpha: CES-D 10	0.77	0.73	0.67
Chronbach's Alpha: CES-D 8	0.84	0.80	0.78

This table reports correlations between each of the measures of mental health, and a number of outcomes either representing an individual's mental health and general welfare, or likely to impact on their mental health and welfare. Data from the National Income Dynamics Survey.

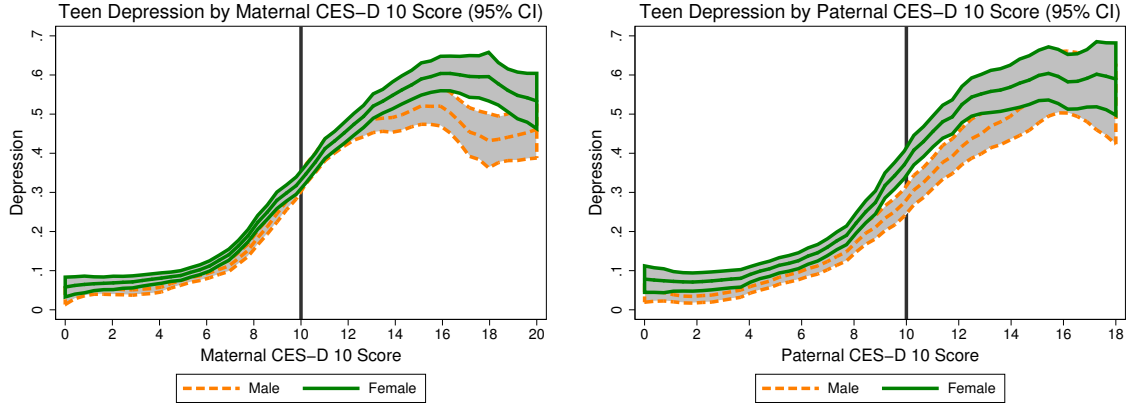
Table 2

Individual Descriptive Statistics by Depression Status in Wave 3 (15-19 Year Olds)				
Variable	All	Depressed		Not Depressed
Age	17.0	17.1	*	16.9
Female	0.50	0.57		0.51
CSG Beneficiary	0.31	0.29	**	0.36
Mother's Education	7.08	6.93		7.16
Mother is Resident in the HH	0.75	0.72		0.74
Father's Education	6.34	6.04		6.45
Father is Resident in the HH	0.44	0.42		0.42
Smokes or Drinks	0.08	0.12		0.07
CES D-10*	5.96	12.6	***	4.41
Level of Life Satisfaction (1-10, 10 is very satisfied)	4.62	3.53	***	4.87
In Poor Health (Self-Perceived)	0.03	0.01		0.02
Became Depressed in Wave 3	0.18	0.81	***	0.00
Mother is Depressed (CES-D 10 > 10)	0.30	0.75	***	0.20
Number of Waves the Mother is Depressed	1.06	1.60	***	0.96
Father is Depressed (CES-D 10 > 10)	0.28	0.72	***	0.20
Number of Waves the Father is Depressed	0.83	1.24	***	0.79
Either Parent is Depressed	0.35	0.66	***	0.25
A Sibling is Depressed	0.12	0.32	***	0.08
Enrolled	0.82	0.75	**	0.83
Years of Completed Education	8.77	8.79		8.82
Household Size	5.86	5.77		5.82
Rural	0.52	0.53		0.52
Household Income	4,359	3,452		4,358
Household Grant Income	1,425	1,352		1,398
Number of Children in HH	2.73	2.69		2.74
Number of Pensioners in HH	0.43	0.41		0.42
Number of Depressed Individuals in the Household	0.83	2.75	***	0.40
Number of Depressed Teens in the Household	0.24	1.22	***	0.02
Household has a Depressed Individual (Excluding Self)	0.38	0.80	***	0.28
Number of CSG Recipients in HH	1.93	1.89		2.01
Number of Observations	3,119	499		2,232

Descriptive Statistics of teens who suffer from depression or do not suffer from depression, for a sample of means test eligible Coloured and African teens between the ages of fifteen and nineteen in Wave 3 of the National Income Dynamics Survey Data. \*The CES-D 10 is a scale used to measure depression. It ranges from zero to thirty, where zero is a complete lack of depressive symptoms, and thirty is the maximum level of depressive symptoms (Radloff 1977). Estimates presented are weighted using the Wave 3 sample weights. Significant differences are starred. \* implies p value < 0.10, \*\* implies p value < 0.05, and \*\*\* implies p value < 0.01.



Figure 2: Teen and Parental Depression



parental characteristics such as health, age, labour market status and education, which are more important the younger the individual is<sup>33</sup>.  $PD_p$  is a measure of parental depression. The strength of the relationship between  $PD_p$  and  $MH_i$  reflects the strength of the mental health transmission from parent to child. Household surveys such as the NIDS tend to focus on socio-economic and sociological factors<sup>8,16</sup>, and thus preclude the inclusion of other biological or neurological determinants of depression in the model. In the results below, those characteristics for which the NIDS collects data will be included in the model estimates.

## Results

### Estimation

Table 3 presents ordinary least squares estimates of Equation 1. Columns (1) and (4) of Table 3 show the effect of parental depression on own depression, excluding any control variables. The effect size is large, at approximately 33 percentage points, and highly significant. The addition of extra control variables in Columns (2), (3), (5) and (6) changes the coefficient size and significance very little. Parental depression data can only be collected of resident household members, and the markedly smaller percentage of fathers who are resident compared to mothers (89% versus 45 - see the lower panel of the table for these figures) results in the much smaller sample observed in Columns (4) through (6).

Having a mother who is economically active in the labour force lowers the probability of depression by five percentage points, a relatively large effect. Having the other parent resident has no significant impact on teen depression. Female teens are very slightly more likely to suffer from depression than male teens. Coloured teens have better mental health than African teens. Living in a house-

hold with a pensioner is associated with lower levels of depression in the maternal depression sample. None of the teen characteristics in the fathers resident sample are significant. This sample is clearly different in characteristics to the sample of teens with a resident mother, although average teen depression levels are the same in both samples.

### Sub-Sample Analysis

The estimates in Columns (3) and (6) of Table 3 are replicated in Table 4 for a number of sub-samples, and the coefficient on parental depression is reported, for sons and daughters. The majority of these coefficients are significant at the one% level, and are substantial in size, at above 30 percentage points in many of the samples. The size of inter-generational transmission is significantly larger for daughters than sons in the vast majority of samples, although greater variability is seen in the effect size for boys.

Table 5 contains estimates of familial and household depression transmission in a number of samples. Again, these transmission coefficients are large and significant. Female teens in particular have a higher likelihood of suffering from depression if they have a sibling or parent who is depressed, as do individuals living in female headed households. In Columns (4) and (9) of Table 6 these estimates are performed again, restricted to the sample where the other parent is also depressed. The levels of teen depression in these samples are very high - 37 and 44% in the mother and father depression samples respectively. In these estimates the sample size is very low (94 and 89 individuals respectively), and the significance and pattern of the main coefficients of interest are very different. The inter-generational transmission coefficient is insignificant for the first time, which indicates that the effect of two depressed parents on a teen's mental health is not additive. A last sample is investigated in

Table 3

Intergenerational Transmission of Mental Health: Determinants of Child Depression						
	Child is Depressed					
	Mother			Father		
	(1)	(2)	(3)	(4)	(5)	(6)
Parent is Depressed	0.34***	0.32***	0.32***	0.33***	0.30***	0.28***
Other Parent Resident			-0.00			0.00
Parent's Education		0.01*	0.01***		0.00	0.00
Parent is Economically Active		-0.05**	-0.05**		-0.01	-0.01
Age in Years		0.01	0.02		0.01	0.01
Female		0.03*	0.04*		0.02	0.02
Years of Attained Education		-0.00	-0.01		-0.00	0.00
Coloured		-0.11**	-0.08		-0.05	-0.05
Log of Household Income		0.03*	0.01		0.01	-0.01
Pensioner Household		-0.07**	-0.06**		-0.02	-0.03
Household Size		0.00	0.01		0.00	0.00
Rural		0.01	-0.00		0.05	0.03
Dependent Variable Mean		0.17			0.17	
Other Parent Resident Mean		0.45			0.89	
Number of Observations	1325	1320	936	459	457	423
F stat	112.1	9.091	7.124	35.50	3.488	2.969
Adjusted R-squared	0.167	0.203	0.222	0.169	0.209	0.190

Ordinary least squares estimates are calculated to measure the impact of parental depression on child depression. A child is depressed if they have a CES-D 10 score of 10 or higher. The CES-D 10 score is a measure of depression, scaled between zero and thirty, where a higher score indicates higher levels of depression. The sample consists of African and Coloured teens between the ages of fifteen and nineteen who are means test eligible for the child support grant in Wave 3 of the National Income Dynamics Survey. A full set of province dummies is included in specifications (2) and (4). Robust standard errors are reported, corrected for clustering. \* implies p value < 0.10, \*\* implies p value < 0.05, and \*\*\* implies p value < 0.01.

Table 4

Intergenerational Transmission Effect Sizes: Gendered Sub-Samples								
Samples	Impact of a Depressed Mother			Impact of a Depressed Father				
	All	Daughter	Son	All	Daughter	Son		
All: Effect, Sample Size	0.36	1,274	0.40	0.31	0.32	640	0.41	0.21
African	0.33	800	0.35	0.30	0.28	355	0.36	0.20
Coloured	0.30	136	0.30	0.29	0.30	68	0.36	0.17
Means Test Eligible	0.32	936	0.35	0.30	0.28	423	0.35	0.19
15 Year Olds	0.39	212	0.42	0.38	0.21	90	0.53	0.00
16 Year Olds	0.35	223	0.43	0.28	0.29	103	0.25	0.43
17 Year Olds	0.14	182	0.15	0.12	0.22	92	0.30	0.13
18 Year Olds	0.39	175	0.43	0.34	0.40	73	0.31	0.47
19 Year Olds	0.39	144	0.53	0.32	0.24	65	0.33	0.16
Pensioner Household	0.27	205	0.26	0.27	0.26	105	0.33	-0.01
CSG Household	0.30	820	0.35	0.27	0.26	358	0.34	0.16
Pension and CSG Household	0.26	188	0.26	0.24	0.26	93	0.34	-0.01
Poorest Household	0.30	269	0.30	0.28	0.14	139	0.26	0.06
Other Parent Resident	0.33	422	0.34	0.32	0.27	376	0.33	0.19

This table contains the intergenerational mental health transmission coefficient (for mothers and fathers) replicated for specific sub-samples, for sons and daughters. In the means test eligible sample, having a depressed mother raises the probability of a child being depressed by thirty-two percentage points, in a sample of 936 teens. Significance levels are not reported, as except for a very few select sub-samples (with small sample sizes), the coefficient is always significant at the 1% level. Mean depression values in these sub-samples range from fourteen to twenty-two percent.

Columns (5) and (10) of Table 6, that of the teens who report having a sibling who is depressed. Teen depression is very high if a sibling is depressed - approximately 50%. In addition, the maternal intergenerational transmission effect is very large and significant, at 41%, implying that a teen who has a depressed mother and depressed sibling will with almost certainty be depressed.

## The Effect of Time

The chronic and episodic nature of depression implies that a time dimension is also important when estimating the intergenerational transmission effect. Figure 3 presents average depression in Wave three graphed as a function of maternal CES-D 10 in the current and previous waves, for a full sample of individuals from age 15 to 60.

Figure 3 shows an increasing relationship between concurrent individual and parental depression in Wave three (as evidenced by the upward sloping curve in both figures). The line for Wave two shows the person's depression in Wave three, now graphed as a function of the parent's CES-D 10 score in Wave two. This line is flat, indicating that the person's mental health in Wave three is unrelated to their parent's mental health in Wave two. Similarly, mental health in Wave three is unrelated to parental mental health in Wave one. This figure implies it is the mental health of the parent in the current period which matters for a child's depression, rather than in previous periods.

Table 7 contains the average levels of depression in the African and Coloured population for teenagers aged 15 to 19, and their mothers or fathers, in a number of transmission matrices. Each cross tabulation is performed in reference to the mental health of the individual in question in Wave one. For example, it can be seen that in a sample of 1,927 teenagers in Wave two, of those who report being depressed in Wave one, 20% of these adolescents also report being depressed in Wave two, and the rates of depression in Wave two for teens do not differ significantly by whether or not they were depressed in Wave one, as shown by the p-value of 0.48. Of the 762 teens in Wave two, 19% of those whose fathers were depressed in Wave one are themselves depressed in Wave two, and this difference is significant: the p-value is 0.05.

Table 7 shows that teenagers in Wave two and Wave three have similar depression levels of approximately 20% no matter their mental health in Wave one. Teen depression does not appear to be persistent over time. Mothers and fathers are seen to impact largely on the mental health of teenagers in the current wave. In Wave one, 33% of teens who have depressed mothers are themselves depressed, compared to only 14% of teens whose mothers are

not depressed, and this difference is significant at the 1% level. Similar patterns are seen for teens who have depressed fathers in Wave one. These effects persist to Wave two, but by Wave three the rates of depression in teens are the same no matter the mental health status of the parent in Wave one.

Establishing the direction of causality is difficult in parent-child mental health transmission<sup>70</sup>. It may seem more likely that the direction of the causality runs from parent to child rather than in the reverse<sup>34</sup>, implying genetic inheritance has a larger impact than situational stress suffered by parents due to a child's illness. The bottom three panels of Table 7 show the mean depression levels among mothers and fathers, dependant on the mental health of their children in Wave one, and the persistence of mothers' own depression from Wave one. Maternal depression persists across the waves, although both parents suffer from high rates of depression, no matter their initial state of mental health in Wave one. Mothers and fathers who have depressed children in Wave one have very high contemporaneous rates of depression (more than 60% for both parents), although these differences fade, until in Wave three they are no longer significant. These differences provide no solid evidence that the causality of the intergenerational transmission effect runs from children to parents. Solving the simultaneity problem is complex, and requires more than the simple uni-variate analysis used here, but is beyond the scope of this paper.

## Discussion

Differential attrition rates between people who suffer from depression and those who do not will cause bias. The rates of attrition (excluding death) between all waves are not significantly different between individuals who are depressed (or whose parents are depressed) and those who are not, for both adults and teens, according with other literature<sup>71</sup>. In addition, our estimates control for the variables used to create the sample weights, which should ameliorate some sample selection. If sample selection exists, it is more likely to be related to mortality/morbidity, and the inability to locate the individual, rather than refusal to participate in the survey.

Other sample selection concerns include the fact that the samples used consist only of resident household members. Non-resident household members (who migrate for a number of reasons) may differ in characteristics<sup>35</sup> to household residents. Unfortunately there is no solution to this in the NIDS, and any conclusions drawn from these results must take this into account. However, those who have left the household may well have done so in search of work<sup>72</sup>, and are less likely to suffer from depres-

Table 5

Determinants of Teen Depression by Type of Depressed Relation					
	All	Means Test Eligible	Female	African	Female HH Head
CSG Beneficiary	0.01	0.01	0.03	0.02	0.03
Mother is Depressed	0.43 ***	0.42 ***	0.49 ***	0.44 ***	0.47 ***
Depressed Mother*CSG Beneficiary	-0.18 ***	-0.19 ***	-0.20 ***	-0.18 ***	-0.21 ***
CSG Beneficiary	-0.04	-0.04	-0.04	-0.05	-0.07
Father is Depressed	0.40 ***	0.39 ***	0.49 ***	0.41 ***	0.53 ***
Depressed Father*CSG Beneficiary	-0.25 ***	-0.26 ***	-0.23 **	-0.25 ***	-0.41 ***
CSG Beneficiary	0.01	0.02	0.02	0.01	0.02
Any Parent is Depressed	0.38 ***	0.38 ***	0.45 ***	0.39 ***	0.43 ***
Depressed Parent*CSG Beneficiary	-0.16 ***	-0.19 ***	-0.18 ***	-0.16 ***	-0.19 ***
CSG Beneficiary	-0.03	-0.04	-0.02	-0.04	-0.02
Sibling is Depressed	0.41 ***	0.36 ***	0.51 ***	0.37 ***	0.42 ***
Depressed Sibling*CSG Beneficiary	-0.08	-0.06	-0.03	-0.03	-0.15 *
CSG Beneficiary	0.00	0.01	0.00	0.00	0.01
HH Member is Depressed	0.32 ***	0.33 ***	0.37 ***	0.33 ***	0.37 ***
Depressed HH Member*CSG Beneficiary	-0.12 ***	-0.15 ***	-0.12 *	-0.12 ***	-0.13 ***

This table presents estimates which measure the strength of the impact of a depressed relative on a depression status, in a number of sub-samples. Each specification differs by the inclusion of a term indicating which person is depressed, and the accompanying interaction term with CSG receipt. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. All specifications include a full set of individual and household characteristics, and province dummies. African and Coloured teenagers between the ages of fifteen and nineteen constitute the sample using data from Wave 3 of the National Income Dynamics Survey. \* implies p value < 0.10, \*\* implies p value < 0.05, and \*\*\* implies p value < 0.01

Table 6

Intergenerational Transmission of Mental Health: Determinants of Child Depression										
Other Parent	Maternal Depression Transmission					Paternal Depression Transmission				
	All	All	Father is Resident	Father is Depressed	Sibling is Depressed	All	All	Mother is Resident	Mother is Depressed	Sibling is Depressed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Parent is Depressed	0.32***	0.42***	0.45***	0.25	0.41***	0.27***	0.39***	0.36***	0.11	0.10
CSG Receipt	-0.05	0.01	0.00	-0.31**	0.05	-0.12**	-0.04	-0.04	-0.48***	0.07
CSG Receipt*Parent is Depressed		-0.19***	-0.27***	-0.12	-0.38**		-0.26***	-0.22**	0.01	-0.33
Other Parent Resident	0.00	0.00			0.11	0.01	0.01			0.32*
Parent's Education	0.01***	0.01***	0.01	0.00	0.02	0.00	0.00	0.01	0.02	0.00
Parent is Economically Active	-0.05**	-0.05*	-0.07*	-0.18	0.03	-0.01	0.01	0.00	-0.06	0.17
Age in Years	0.00	0.01	0.01	-0.05	-0.02	-0.01	-0.01	-0.01	-0.08	-0.02
Female	0.04*	0.04**	0.03	0.10	0.15*	0.02	0.03	0.02	0.08	0.22
Years of Attained Education	-0.01	-0.01	0.00	-0.02	0.02	0.00	0.00	0.00	0.00	0.00
Coloured	-0.09*	-0.08*	-0.09	0.19	0.01	-0.05	-0.06	-0.07	-0.30	0.55
Log of Household Income	0.01	0.02	0.02	-0.1	-0.03	-0.01	-0.01	-0.03	-0.09	-0.07
Pensioner Household	-0.06*	-0.06**	-0.09**	-0.31**	0.05	-0.03	-0.01	-0.03	-0.20	0.03
Household Size	0.01	0.01	0.01	0.02	-0.01	0.00	0.00	0.01	0.04	0.00
Rural	0.00	0.00	-0.02	-0.04	0.19*	0.04	0.04	0.05	-0.06	-0.05
Dependent Variable Mean	0.16	0.16	0.16	0.37	0.49	0.16	0.16	0.16	0.44	0.53
Other Parent Resident Mean	0.45	0.45	1.00	1.00	0.52	0.89	0.89	1.00	1.00	0.92
Number of Observations	936	936	422	94	146	423	423	376	89	79
F stat	6.9	7.0	4.0	-	-	2.9	3.0	2.9	-	-
Adjusted R-squared	0.23	0.24	0.27	0.42	0.37	0.21	0.23	0.22	0.32	0.49

Ordinary least squares estimates are estimated to measure the impact of parental depression on child depression, and the interaction between child support grant receipt and parental depression. The sample consists of African and Coloured teens between the ages of fifteen and nineteen who are means test eligible for the child support grant in Wave 3 of the National Income Dynamics Survey. A full set of province dummies is included in all specifications. \* implies p value < 0.10, \*\* implies p value < 0.05, and \*\*\* implies p value < 0.01.

Figure 3

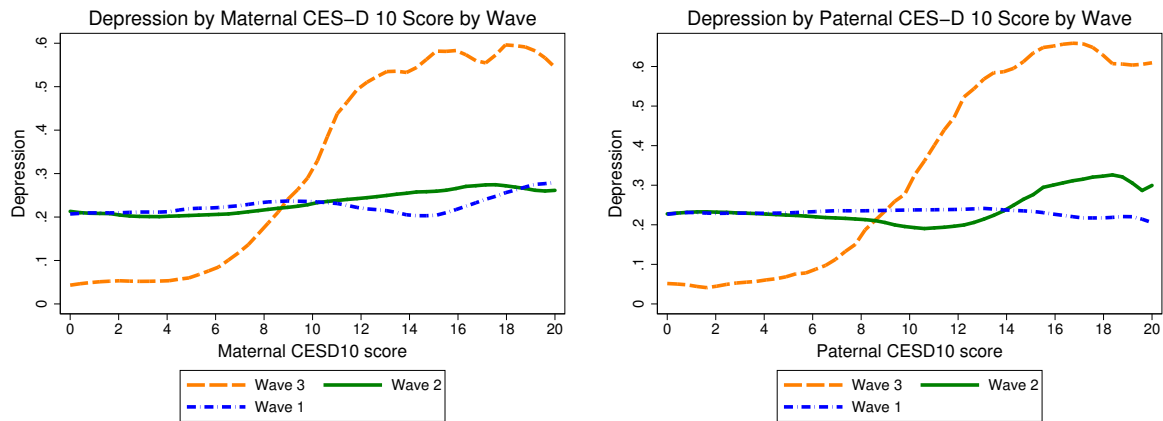


Table 7

Transmission Matrices: Teen and Parental Depression Persistence over Time							
		Teenager Depression Status by Wave					
		Wave 1		Wave 2		Wave 3	
		No	Yes	No	Yes	No	Yes
Teen is depressed in Wave 1	No	1.00	0.00	0.81	0.19	0.78	0.22
	Yes	0.00	1.00	0.80	0.20	0.80	0.20
n, p-value		2,600		1,927	0.48	1,795	0.51
Mother is depressed in Wave 1	No	0.86	0.14	0.83	0.17	0.80	0.20
	Yes	0.67	0.33	0.79	0.21	0.81	0.19
n, p-value		1,446	0.00	1,974	0.04	2,430	0.83
Father is depressed in Wave 1	No	0.87	0.13	0.87	0.13	0.80	0.20
	Yes	0.66	0.34	0.81	0.19	0.80	0.20
n, p-value		584	0.00	762	0.05	957	0.91
		Maternal Depression Status by Wave					
		Wave 1		Wave 2		Wave 3	
		No	Yes	No	Yes	No	Yes
Self (mother) is depressed in Wave 1	No	1.00	0.00	0.75	0.25	0.74	0.26
	Yes	0.00	1.00	0.71	0.29	0.69	0.31
n, p-value		7,684		5,849	0.00	5,479	0.00
		Maternal Depression Status by Wave					
		Wave 1		Wave 2		Wave 3	
		No	Yes	No	Yes	No	Yes
Child is depressed in Wave 1	No	0.59	0.41	0.71	0.29	0.71	0.29
	Yes	0.33	0.67	0.78	0.22	0.70	0.30
n, p-value		1,446	0.00	1,246	0.03	1,099	0.75
		Paternal Depression Status by Wave					
		Wave 1		Wave 2		Wave 3	
		No	Yes	No	Yes	No	Yes
Child is depressed in Wave 1	No	0.69	0.31	0.80	0.20	0.74	0.26
	Yes	0.40	0.60	0.80	0.20	0.76	0.24
n, p-value		584	0.00	519	0.99	419	0.68

This table contains the average levels of depression in the African and Coloured population for teenagers aged fifteen to nineteen, or the mothers who are aged fifteen to nineteen in Wave 1 of the NIDS, by own depression status in Waves 2 and 3, and by mother and father depression status. The sample size for each cross tabulation, and the p value when checking for significant differences between the two variables are reported. For example, when checking to see if mean teen depression in Wave 2 differs by Wave 1 teen depression status, a p-value of 0.48 is found, implying there are no significant differences.

sion than those remaining in the household. Were those members to be present in the household, average household depression levels would be lower, and the size of the intergenerational transmission effect could also be lower. However, the size of the effect is considerable, and very stable to the inclusion of various controls, thus it may be less likely to differ greatly from a sample which includes all household members.

Missing data (due to non-response or absence) for either maternal or paternal depression also impacts on the size of the sample available. After controlling for missing data, no large impact is observed on the size of the IGT coefficient, or the sample size of our estimates.

That household surveys are collected at regular periods, and depression is episodic, may mean that certain individuals may not be recorded as suffering from depression, if they are between episodes at the time of data collection. This is an issue the measurement of any chronic disease with periods of remission will suffer from. The large samples available for analysis help to ameliorate the issue somewhat.

The estimates are also performed using CES-D 10, life satisfaction, and the components of the CES-D 10 score in place of the depression variable, and quantitatively similar results are found.

## Conclusions

This paper investigates the size of the intergenerational transmission of depression among older adolescents in South Africa using a nationally representative panel data set. Parental depression is found to be the largest single determinant of teenage mental health, which is highly significant in all samples. On average, 17% of South African teenagers suffer from depression. This figure increases to approximately 50% for teens whose parents suffer from depression, and in certain samples the probability is even higher.

Examining the time dimension of this transmission effect shows that it is current parental mental health which matters most for teen mental health, implying that environmental factors are possibly more important than genetic ones in determining whether depression is present in children or not. Investigating the direction of causality between child and parent mental health yields some evidence that parental mental health is much more likely to impact on child mental health than the reverse.

## Contributors

Dr Katherine Eyal PhD, Professor Justine Burns PhD

## Acknowledgements

### Declaration of interests

We declare no competing interests.

## References

- 1 Lund C. Poverty and mental health: a review of practice and policies. *Neuropsychiatry*. 2012;2(3):213–219.
- 2 Myer L, Stein DJ, Jackson PB, Herman AA, Seedat S, Williams DR. Impact of common mental disorders during childhood and adolescence on secondary school completion. *SAMJ: South African Medical Journal*. 2009;99(5):354–356.
- 3 Herman AA, Stein DJ, Seedat S, Heeringa SG, Moomal H, Williams DR. The South African Stress and Health (SASH) study: 12-month and lifetime prevalence of common mental disorders. *SAMJ: South African Medical Journal*. 2009;99(5):339–344.
- 4 Jack H, Wagner RG, Petersen I, Thom R, Newton CR, Stein A, et al. Closing the mental health treatment gap in South Africa: a review of costs and cost-effectiveness. *Global Health Action*. 2014;7.
- 5 Lester D, Akande A. Patterns of depression in Xhosa and Yoruba students. *The Journal of Social Psychology*. 1997;137(6):782–783.
- 6 Ardington C, Case A. Interactions between mental health and socioeconomic status in the South African National Income Dynamics Study. *Studies in Economics and Econometrics*. 2010;34(3):69–85.
- 7 Moultrie A, Kleintjes S. Women’s mental health in South Africa: women’s health. *South African Health Review*. 2006;p. 347–366.
- 8 Blas E, Kurup AS. Equity, social determinants and public health programmes. *World Health Organization*; 2010.
- 9 Eyal K. Follow the child: the effect of an unconditional cash transfer on adolescent human capital and mental health. *University of Cape Town*; 2016.
- 10 Plüddemann A, Morojele N, Myers B, Townsend L, Lombard CJ, Williams PP, et al. The prevalence of risk for mental health problems among high school students in the Western Cape Province, South Africa. *South African Journal of Psychology*. 2014;p. 30–35.

- 11 Lund C, Kleintjes S, Kakuma R, Flisher AJ. Public sector mental health systems in South Africa: inter-provincial comparisons and policy implications. *Social Psychiatry and Psychiatric Epidemiology*. 2010;45(3):393–404.
- 12 Chhagan MK, Mellins CA, Kauchali S, Craib MH, Taylor M, Kvalsvig JD, et al. Mental health disorders among caregivers of preschool children in the Asenze Study in KwaZulu-Natal, South Africa. *Maternal and Child Health Journal*. 2014;18(1):191–199.
- 13 Ardington C, Case A. Health: analysis of the NIDS Wave 1 Dataset Discussion Paper no. 2. Southern Africa Labour and Development Research Unit Cape Town; 2009.
- 14 Currie J, Stabile M. Mental health in childhood and human capital. *National Bureau of Economic Research*; 2007. 13217.
- 15 Victora C, Adair L, Fall C, Hallal P, Martorell R, Richter L, et al. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet*. 2008;371(9609):302.
- 16 Ensminger ME, Hanson SG, Riley AW, Juon HS. Maternal psychological distress: Adult sons' and daughters' mental health and educational attainment. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2003;42(9):1108–1115.
- 17 Currie J, Almond D. Human capital development before age five. *Handbook of Labor Economics*. 2011;4:1315–1486.
- 18 Frank RG, Meara E. The effect of maternal depression and substance abuse on child human capital development. *National Bureau of Economic Research*; 2009.
- 19 Ozer EJ, Fernald LC, Weber A, Flynn EP, VanderWeele TJ. Does alleviating poverty affect mothers' depressive symptoms? A quasi-experimental investigation of Mexico's Oportunidades programme. *International Journal of Epidemiology*. 2011;p. dyr103.
- 20 Hammen C, Brennan PA, Le Brocque R. Youth depression and early childrearing: stress generation and intergenerational transmission of depression. *Journal of Consulting and Clinical Psychology*. 2011;79(3):353.
- 21 Hugo CJ, Boshoff DE, Traut A, Zungu-Dirwayi N, Stein DJ. Community attitudes toward and knowledge of mental illness in South Africa. *Social Psychiatry and Psychiatric Epidemiology*. 2003;38(12):715–719.
- 22 Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, et al. No health without mental health. *The Lancet*. 2007;370(9590):859 – 877.
- 23 Sapolsky RM. The possibility of neurotoxicity in the hippocampus in major depression: a primer on neuron death. *Biological Psychiatry*. 2000;48(8):755–765.
- 24 Bhana A, Mellins CA, Petersen I, Alicea S, Myeza N, Holst H, et al. The VUKA family program: piloting a family-based psychosocial intervention to promote health and mental health among HIV infected early adolescents in South Africa. *AIDS Care*. 2014;26(1):1–11.
- 25 Tsai AC, Tomlinson M. Mental health spillovers and the Millennium Development Goals: the case of perinatal depression in Khayelitsha, South Africa. *Journal of Global Health*. 2012;2(1):27.
- 26 Marais L, Sharp C, Pappin M, Rani K, Skinner D, Lenka M, et al. Community-based mental health support for orphans and vulnerable children in South Africa: a triangulation study. *Vulnerable Children and Youth Studies*. 2014;9(2):151–158.
- 27 Weissman MM. Children of depressed parents - a public health opportunity. *JAMA Psychiatry*. 2016;73(3):197–198.
- 28 Hammen C, Hazel NA, Brennan PA, Najman J. Intergenerational transmission and continuity of stress and depression: depressed women and their offspring in 20 years of follow-up. *Psychological Medicine*. 2012;42(05):931–942.
- 29 Akbulut M, Kugler AD. Inter-generational transmission of health status in the US among natives and immigrants. *Mimeo (University of Houston)*; 2007.
- 30 Strauss J, Thomas D. Health over the life course. *Handbook of Development Economics*. 2007;4:3375–3474.
- 31 Hammen C, Brennan PA, Shih JH. Family discord and stress predictors of depression and other disorders in adolescent children of depressed and nondepressed women. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2004;43(8):994–1002.
- 32 Sullivan PF, Neale MC, Kendler KS. Genetic epidemiology of major depression: review and meta-analysis. *American Journal of Psychiatry*. 2000;.
- 33 Kessler RC, Amminger GP, Aguilar-Gaxiola S, Alonso J, Lee S, Ustun TB. Age of onset of



- mental disorders: a review of recent literature. *Current Opinion in Psychiatry*. 2007;20(4):359.
- 34 Garber J, Cole DA. Intergenerational transmission of depression: A launch and grow model of change across adolescence. *Development and Psychopathology*. 2010;22(04):819–830.
- 35 Burns J, Keswell M. Inheriting the future: intergenerational persistence of educational status in KwaZulu-Natal, South Africa. *Economic History of Developing Regions*. 2012;27(1):150–175.
- 36 Tomita A, Labys CA, Burns JK. Depressive symptoms prior to pregnancy and infant low birth weight in South Africa. *Maternal and Child Health Journal*. 2015;19(10):2179–2186.
- 37 Skeen S, Tomlinson M, Macedo A, Croome N, Sherr L. Mental health of carers of children affected by HIV attending community-based programmes in South Africa and Malawi. *AIDS Care*. 2014;26(sup1):S11–S20.
- 38 Baird S, De Hoop J, Özler B. Income shocks and adolescent mental health. *Journal of Human Resources*. 2013;48(2):370–403.
- 39 Anderson KG, Case A, Lam D. Causes and consequences of schooling outcomes in South Africa: evidence from survey data. *Social Dynamics*. 2001;27(1):37–59.
- 40 Beecham J. Annual Research Review: child and adolescent mental health interventions: a review of progress in economic studies across different disorders. *Journal of Child Psychology and Psychiatry*. 2014;55(6):714–732.
- 41 Anderson DM, Cesur R, Tekin E. Youth depression and future criminal behavior. *National Bureau of Economic Research*; 2012. 18656.
- 42 Resnick MD, Catalano RF, Sawyer SM, Viner R, Patton GC. Seizing the opportunities of adolescent health. *The Lancet*. 2012;379(9826):1564 – 1567.
- 43 Li X, Phillips MR, Zhang Y, Xu D, Yang G. Risk factors for suicide in China’s youth: a case-control study. *Psychological Medicine*. 2008;38(03):397–406.
- 44 Miech RA, Caspi A, Moffitt TE, Wright BRE, Silva PA. Low socioeconomic status and mental disorders: a longitudinal study of selection and causation during young adulthood. *American Journal of Sociology*. 1999;104(4):1096–1131.
- 45 Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, Fatusi A, et al. Adolescence and the social determinants of health. *The Lancet*. 2012;379(9826):1641 – 1652. Available from: <http://www.sciencedirect.com/science/article/pii/S0140673612601494>.
- 46 Kilburn K, Thirumurthy H, Halpern CT, Pettifor A, Handa S. Effects of a Large-Scale Unconditional Cash Transfer Program on Mental Health Outcomes of Young People in Kenya. *Journal of Adolescent Health*. 2015;.
- 47 WHO. Global health risks: mortality and burden of disease attributable to selected major risks. *World Health Organization*; 2009.
- 48 Tomlinson M, Grimsrud AT, Stein DJ, Williams DR, Myer L. The epidemiology of major depression in South Africa: results from the South African Stress and Health Study. *SAMJ: South African Medical Journal*. 2009;99(5):368–373.
- 49 SALDRU. National Income Dynamics Study 2012, Wave 3, Southern Africa Labour and Development Research Unit.; 2013. [dataset]. Version 1.0. Cape Town: Southern Africa Labour and Development Research Unit [producer], 2013. Cape Town: DataFirst [distributor].
- 50 Brown M, Daniels RC, De Villiers L, Leibbrandt M, Woolard I. National Income Dynamics Study Wave 2 User Manual; 2013. Cape Town: Southern Africa Labour and Development Research Unit.
- 51 American Psychiatric Association. Diagnostic and statistical manual of mental disorders: (5th Edition). Arlington: American Psychiatric Publishing. 2015;.
- 52 Radloff LS. The CES-D scale a self-report depression scale for research in the general population. *Applied Psychological Measurement*. 1977;1(3):385–401.
- 53 Samuels F, Stavropoulou M. ‘Being able to breathe again’: the effects of cash transfer programmes on psychosocial wellbeing. *The Journal of Development Studies*. 2016;p. 1–16.
- 54 Ellis G Christopher. Cross-cultural aspects of depression in general practice: clinical practice: SAMJ forum. *South African Medical Journal*. 2003;93(5):p–342.
- 55 Johnes G, Johnes J. *International Handbook on the Economics of Education*. Edward Elgar Publishing; 2004.
- 56 Hamad R, Fernald L, Karlan D, Zinman J. Social and economic correlates of depressive symptoms and perceived stress in South African adults. *Journal of Epidemiology and Community Health*. 2008;62(6):538–544.

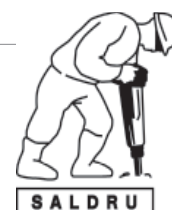
- 57 Pretorius TB. Cross-cultural application of the Center for Epidemiological Studies Depression Scale: a study of black South African students. *Psychological Reports*. 1991;69(3f):1179–1185.
- 58 Myer L, Smit J, Roux LL, Parker S, Stein DJ, Seedat S. Common mental disorders among HIV-infected individuals in South Africa: prevalence, predictors, and validation of brief psychiatric rating scales. *AIDS Patient Care and STDs*. 2008;22(2):147–158.
- 59 Das J, Do QT, Friedman J, McKenzie D, Scott K. Mental health and poverty in developing countries: revisiting the relationship. *Social Science and Medicine*. 2007;65(3):467 – 480.
- 60 Sorsdahl KR, Stein DJ. Knowledge of and stigma associated with mental disorders in a South African community sample. *The Journal of Nervous and Mental Disease*. 2010;198(10):742–747.
- 61 Santos JRA. Cronbach’s alpha: a tool for assessing the reliability of scales. *Journal of Extension*. 1999;37(2):1–5.
- 62 Roy A, Campbell MK. A unifying framework for depression: bridging the major biological and psychosocial theories through stress. *Clinical & Investigative Medicine*. 2013;36(4):E170–E190.
- 63 Bowles S, Gintis H. The inheritance of inequality. *The Journal of Economic Perspectives*. 2002;16(3):3–30.
- 64 Erikson R, Goldthorpe JH. Intergenerational inequality: a sociological perspective. *The Journal of Economic Perspectives*. 2002;16(3):31–44.
- 65 Bowles S, Nelson VI. The “inheritance of IQ” and the intergenerational reproduction of economic inequality. *The Review of Economics and Statistics*. 1974;p. 39–51.
- 66 Van Ijzendoorn MH. Intergenerational transmission of parenting: a review of studies in nonclinical populations. *Developmental Review*. 1992;12(1):76–99.
- 67 Galton F. Regression towards mediocrity in hereditary stature. *The Journal of the Anthropological Institute of Great Britain and Ireland*. 1886;15:246–263.
- 68 Thompson O. Genetic mechanisms in the intergenerational transmission of health. *Journal of Health Economics*. 2014;35:132–146.
- 69 Tomita A, Burns JK. A multilevel analysis of association between neighborhood social capital and depression: evidence from the first South African National Income Dynamics Study. *Journal of Affective Disorders*. 2013;144(1):101–105.
- 70 Godlonton S, Keswell M. The impact of health on poverty: evidence from the South African integrated family survey. *South African Journal of Economics*. 2005;73(1):133–148.
- 71 de Graaf R, Bijl RV, Smit F, Ravelli A, Vollebergh WA. Psychiatric and sociodemographic predictors of attrition in a longitudinal study The Netherlands Mental Health Survey and Incidence Study (NEMESIS). *American Journal of Epidemiology*. 2000;152(11):1039–1047.
- 72 Case A, Deaton A. Large cash transfers to the elderly in South Africa. *The Economic Journal*. 1998;108(450):1330–1361.

# southern africa labour and development research unit

---

The Southern Africa Labour and Development Research Unit (SALDRU) conducts research directed at improving the well-being of South Africa's poor. It was established in 1975. Over the next two decades the unit's research played a central role in documenting the human costs of apartheid. Key projects from this period included the Farm Labour Conference (1976), the Economics of Health Care Conference (1978), and the Second Carnegie Enquiry into Poverty and Development in South Africa (1983-86). At the urging of the African National Congress, from 1992-1994 SALDRU and the World Bank coordinated the Project for Statistics on Living Standards and Development (PSLSD). This project provide baseline data for the implementation of post-apartheid socio-economic policies through South Africa's first non-racial national sample survey.

In the post-apartheid period, SALDRU has continued to gather data and conduct research directed at informing and assessing anti-poverty policy. In line with its historical contribution, SALDRU's researchers continue to conduct research detailing changing patterns of well-being in South Africa and assessing the impact of government policy on the poor. Current research work falls into the following research themes: post-apartheid poverty; employment and migration dynamics; family support structures in an era of rapid social change; public works and public infrastructure programmes, financial strategies of the poor; common property resources and the poor. Key survey projects include the Langeberg Integrated Family Survey (1999), the Khayelitsha/Mitchell's Plain Survey (2000), the ongoing Cape Area Panel Study (2001-) and the Financial Diaries Project.



[www.saldru.uct.ac.za](http://www.saldru.uct.ac.za)

Level 3, School of Economics Building, Middle Campus, University of Cape Town  
Private Bag, Rondebosch 7701, Cape Town, South Africa

Tel: +27 (0)21 650 5696

Fax: +27 (0) 21 650 5797

Web: [www.saldru.uct.ac.za](http://www.saldru.uct.ac.za)

