Follow the Child:
The Effect of an Unconditional Cash Transfer on Adolescent Human Capital and Mental Health

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Dedication

In 2006, newly-married, having finished my Master's degree, living in Israel for the first time and not allowed to work, you promised me; "What's mine, is yours". Through all of these years, you have kept your word. Now it is my turn to say the same to you,

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Abstract

In company with many other developing countries in the 1990s, South Africa introduced an unconditional cash transfer program for children, which had more than eleven million beneficiaries in 2014. The evaluation of similar cash transfer programs is a widely researched space, however much of the literature focuses on younger children, and outcomes which are both short term, and tangible, such as school enrolment or physical health. Limited research has been conducted on the impact of cash transfers on adolescents and their caregivers, and in particular there is a scarcity of studies on the impact of transfers on the mental health of recipients. This thesis exploits exogenous variation in grant receipt to estimate the current and cumulative grant impacts on the educational and mental health outcomes of teenagers, and the channels through which these effects may take place. The grant is found to have large positive effects on teen enrolment, yet no gains in human capital achievement are seen. The mental health of adolescents is also an under studied area, both domestically and internationally, with few, if any studies performed on the impact of cash transfers on the intergenerational transmission of depression (the single largest determinant of adolescent mental health). This thesis finds that the child support grant largely reduces the impact of a depressed parent on teen mental health, and in particular the grant minimises the considerable negative effect of depressed fathers on teens. There is a literature which suggests that these improvements in teen welfare may stem from improved female bargaining power, which directs more resources to child specific needs, or improved maternal mental health, which improves the parenting and environment experienced by the teen, encouraging both educational achievement and better mental health. Despite this, investigation reveals that the grant has no positive effect on maternal mental health, and if an effect exists for maternal bargaining power, it is very small. This is likely to be due to the relatively modest size of the transfer. This is unfortunate, as this work finds that maternal mental illness has a significant negative impact on teen human capital attainment.

Table of Contents

List of Figures

List of Tables

Abbreviations

CCT ..... Conditional Cash Transfer

CSG ..... Child Support Grant

DID ..... Difference-in-Differences

DSD ..... Department of Social Development

IGT ..... Intergenerational transmission

MDD ..... Major Depressive Disorder

NIDS ..... National Income Dynamics Survey

PWD ..... Person with Depression

RCT ..... Randomised Controlled Trial

SAPS ..... South African Police Services

SASSA ..... South African Social Security Agency

SES ..... Socio-Economic Status

UCT ..... Unconditional Cash Transfer

WHO ..... World Health Organization

1 The Last, The Least, The Littlest

> Any society, any nation, is judged on the basis of how it treats its weakest members – the last, the least, the littlest[1].

1.1 Cash Transfers in The Developing World

Many social security programs have been introduced in developing countries in the past two decades, including Brazil, Pakistan, Columbia, Ecuador, Mexico and others (Adato et al. 2000, Filmer & Schady 2011, Baird et al. 2009, De Brauw & Hoddinott 2011). A large number of program evaluations have found positive impacts of cash transfers on household poverty and the education, health and nutritional status of children (Adato & Bassett 2009, Adato et al. 2000, Baird, Chirwa, De Hoop & Özler 2014, Attanasio & Lechene 2002). These welfare programs have enabled individuals to undertake high uncertainty activities such as job search (Samson et al. 2004), although in other studies the effects on labour supply have been mixed (Leibbrandt et al. 2013). Cash transfers have been seen to be especially important for the welfare of women and girls (Baird, Chirwa, De Hoop & Özler 2014, Amarante et al. 2011).

South Africa's first democratically elected government in 1994 inherited a country rife with social problems. A large proportion of adults were unemployed, and poverty levels were high (Case & Deaton 1998). One of the welfare improvement programs put in place by the government was a social security system, intended as a direct poverty alleviation tool to help those most in need (Department of Social Development 2011). There has been extensive growth in the reach of this public assistance program, with spending on social assistance in South Africa in 2010 constituting 3.5 percent of gross domestic product (Woolard & Leibbrandt 2010). The majority of grants distributed are old age pensions, disability and foster grants, and the child support grant (CSG), the program with the largest number of beneficiaries (Woolard et al. 2012). This particular grant is available to all age and means test eligible children (Department of Social Development 2012). As such, the child support grant is a major exogenous cash transfer, and the evaluation of its effects forms the focus of this thesis.

[1] Cardinal Roger Mahony, In a 1998 letter, Creating a Culture of Life.

Much has already been written about the positive relationship in South Africa between child support grant receipt and child nutrition and development[2], and the reduction in incidences of illness, and child labour (Budlender et al. 2008, Samson et al. 2008, Williams 2007, Aguero et al. 2009, Budlender & Woolard 2006, Hochfeld 2013, Boler 2007, Samson et al. 2004, Department of Social Development 2012). Promising poverty alleviation effects have been seen in grant recipients (Samson et al. 2004, Triegaardt 2005, Leibbrandt et al. 2010). Improvements have even been seen in the welfare of household members in recipient households who do not receive the grant themselves (Budlender & Woolard 2006). It is clear that the consequences of being excluded from receipt can be large.

1.2 Contribution

Much of the academic literature which seeks to measure the impact of child grants has focused on younger children, while a much smaller part analyses the effects on older children (Amarante et al. 2011, Baez & Camacho 2011), and their mothers (Behrman et al. 2011). In a considerable quantity of the cash transfer program evaluation literature only short term outcomes are assessed, such as school enrolment or attendance, or the state of physical health (Saavedra & Garcia 2013, Barham et al. 2013, Baird, Ferreira, Özler & Woolcock 2014), leaving the cumulative effects of cash transfers largely unexamined (Saavedra & Garcia 2013, Barham et al. 2013, Baird, Ferreira, Özler & Woolcock 2014). In a meta-review of early childhood interventions, including cash transfers, Nores & Barnett (2010) find only two papers which measure the impact of these early childhood interventions on adult outcomes. While general agreement exists in the literature of the benefits of early intervention for children for their cognitive, schooling and other developmental outcomes (Nores & Barnett 2010), knowing whether these benefits are sustained in the long term is important.

This tendency towards short term immediate assessments is partly due to the fact that many of these programs are implemented as randomised controlled trials (RCTs), which are very often only evaluated in the short term (Baird, Ferreira, Özler & Woolcock 2014). By economic necessity, these trials are often limited to smaller samples, and can suffer from high attrition (Baird, Ferreira, Özler & Woolcock 2014). The result is that the program evaluation conclusions may be less generalisable (Kilburn et al. 2015).

[2]As seen in weight and height z scores.

A constraint in the evaluation of the impact of South Africa's social security system is the fact that these programs were not implemented in a randomised fashion (Aguero et al. 2006), and thus it cannot be assumed de facto that causal effects have been identified. This leaves researchers to use a number of techniques to attempt to ascertain the true impact of these transfers. The non-systematic pattern of roll-out in the CSG, with its unanticipated extensions in both the age-limit and the means test threshold (discussed in further detail in Chapter 2), provides opportunities for a quasi-experimental method of evaluation. These changes have not been investigated in depth by researchers.

This thesis seeks to bridge some of the gaps in this limited body of existing literature, through an evaluation of the effect of the child support grant on the mental health and educational outcomes of both mothers and older adolescents, two groups neglected in the existing cash transfer research (Baird et al. 2011, Chhagan et al. 2014, Ozer et al. 2011). Using the exogenous variation in both age eligibility and potential exposure to the grant, the cumulative and current effects of grant receipt on beneficiaries[3] and recipients are estimated. One outcome that is likely to show the results of the long-term effect of grant receipt is the number of years of schooling attained by those in receipt of the grant for the better part, or the entirety of their lives. Another under-researched outcome likely to be impacted by grant receipt is the mental health of both beneficiaries (Samuels & Stavropoulou 2016, Lund 2012, Fenn et al. 2014, Case 2004, Hamad et al. 2008, Baird et al. 2013) and their caregivers (Chhagan et al. 2014, Ozer et al. 2011). Improvements in mental health can result from the elimination of food insecurity (Plagerson et al. 2011) and in general a reduction of financial stress among mothers (Baird et al. 2013), the ability to afford schooling costs and health care (Wolf et al. 2013), or increased female bargaining power which results in higher spending on items which improve child welfare and adds to women's sense of agency (Plagerson et al. 2011, Hochfeld 2013).

The consequences of untreated mental illness are profound (Hugo et al. 2003, Prince et al. 2007), and research in this area has been neglected, both world wide, and in Africa and South Africa in particular (Plüddemann et al. 2014). Previous research has shown that South Africa has high levels of depression compared to other countries (Lester & Akande 1997, Ardington & Case 2010, Herman et al. 2009), in particular among women

[3]As in much of the literature which evaluates the impact of the child support grant, adult caregivers who receive the grant on behalf of children will be referred to in this thesis as CSG recipients, while the children for whom the grant is intended will be referred to as CSG beneficiaries.

(Moultrie & Kleintjes 2006), and adolescents (Myer et al. 2009). The literature regarding estimates of the severity of parent-child transmission of depression in Africa is singularly scarce, despite a world wide and South African literature on the many negative consequences of untreated mental illness in mothers on child outcomes (Currie & Stabile 2007, Victora et al. 2008, Ensminger et al. 2003, Currie & Almond 2011, Frank & Meara 2009, Chhagan et al. 2014, Skeen et al. 2014, Ozer et al. 2011), and in particular on child mental health (Akbulut & Kugler 2007, Hammen et al. 2011, Strauss & Thomas 2007, Sullivan et al. 2000).

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 (Tomlinson et al. 2009, Ardington & Case 2009). The last nationally representative survey of psychiatric disorders is the South African Stress and Health Study, which was conducted between 2001 and 2002 (Herman et al. 2009). The data used in this thesis is the National Income Dynamics Survey (NIDS), a panel survey first undertaken in 2008 and repeated every two years (SALDRU 2013). The NIDS provides valuable opportunities for research in this area, due to the inclusion of an emotional health module in the survey, as well as a rich set of questions on income and welfare measures, including child support grant receipt (Brown et al. 2013). The data is particularly valuable due to its longitudinal nature, and the fact that it is nationally representative. Limited research has used the NIDS to examine the interaction of mental illness and child support grant receipt in South Africa, which is one of the foci of this thesis.

Some positive impacts originating from the child support grant are found. Current CSG receipt in older teens has a positive and large impact on school enrolment, as does the cumulative duration of receipt. CSG beneficiaries have enrolment rates a minimum of ten percent higher than non-beneficiaries, which is a substantial increase given the pre-existing high rates of enrolment among older South African teens of eighty-one percent. An extra ten years of receipt can raise enrolment rates by more than fifteen percent. However, this work finds that years of schooling among older teens who receive the grant are no different to those who do not. In addition, longer potential duration of receipt is not found to be associated with any increase in human capital achievement in adolescents, despite the use of a number of techniques to identify the grant effect. Another outcome

predicted to be impacted on by cash transfer receipt is maternal bargaining power (Ambler 2013), and increased maternal bargaining power is known to be beneficial for children (Doss 2013). This thesis seeks to contribute a small part to the intra-household allocation literature in South Africa with the preliminary finding that bargaining power does not seem to rise after the child support grant is received.

Despite the common finding in the literature of an improvement in maternal mental health on grant receipt, this not observed in the NIDS data. This is unfortunate, as a negative effect of untreated maternal depression on teen educational attainment is revealed in this analysis. In addition, the intergenerational transmission of depression is shown to be particularly large. A positive finding is that grant receipt works to reduce the size of the intergenerational transmission effect, and in particular the CSG mitigates the large negative effects of mental illness transmitted from depressed fathers to their adolescent children. Very little research has been performed into the effect of cash transfers on the intergenerational transmission of depression, and no recent study has estimated the size and nature of the intergenerational transmission effect in South Africa using nationally representative data.

This thesis is organised as follows. Chapter 3 investigates the relationship between CSG receipt and the enrolment and years of schooling of older teens. Chapter 4 investigates another important teen outcome, that of mental health, and its relationship to grant receipt. The chapter estimates the size of the intergenerational transmission of depression effect, and investigates the mitigating impact that grant receipt has on this negative effect. In Chapter 5, the analysis turns towards recipients, and examines two outcomes which the grant could be affecting, namely maternal mental health and maternal bargaining power. In addition, the impact of maternal depression on adolescent education is investigated. Chapter 6 concludes.

As the child support grant is central to this thesis, it is important to have a thorough understanding of the history and details of the program's implementation, and the exogenous variation in the grant roll-out over time. This is discussed in Chapter 2.

2 It Takes a Grant to Raise a Child

> Anyone who has struggled with poverty knows how extremely expensive it is to be poor[4].

2.1 The Life of a Child in South Africa

Following the Lund Commission in 1996, the inefficient and inequitably distributed state maintenance grant was phased out for 400 000 beneficiaries, and South Africa's child support grant was introduced in April 1998 (Heinrich et al. 2012). The grant was intended to reduce racial and gender income inequality, effectively target poor children no matter their household status, and improve nutrition in the critical early years of childhood (Lund 2008). The program began with the intention of covering children in the poorest thirty percent of households (Aguero et al. 2006).

That extra income could prove meaningful to these households is not in doubt. A large proportion of South Africa's children grow up in extreme circumstances, with exceptionally unfavourable living conditions and limited access to health care and education (Budlender & Lund 2011). More than a quarter of children in 2010 did not have adequate housing, water or sanitation (Hall & Woolard 2012). High levels of unemployment[5] and poverty are common in the population (Case & Deaton 1998, Klasen & Woolard 2009), as well as particularly high levels of inequality (Blas & Kurup 2010). Using a conservative poverty measure[6], sixty percent of South Africa's children could be classified as poor in 2010 (Hall & Woolard 2012). African incomes are much smaller than those of Whites, due in no small part to the policies of the government in power prior to 1994[7] (Case & Deaton 1998). Three generation or "skip" generation[8] households are frequently observed in the population (Djebbari & Mayrand 2011), and often these households are supported by a single state pension (Duflo 2003, Case & Deaton 1998). As a legacy of apartheid policies, migration for the purposes of job search is common (Klasen & Woolard 2009, Case & Deaton 1998), and the effects of this migration are seen in the

[4] James Baldwin.

[5] The level of broad unemployment, which includes discouraged workers who have ceased to look for work, was forty-one percent in 2004 (Klasen & Woolard 2009).

[6] Individuals living on less than R575 per month in 2010 were considered poor.

[7] African households in 1993 earned a tenth of the earnings of White households (Case & Deaton 1998).

[8] These are households skipping a generation: missing mothers and fathers, and containing only children and grandparents.

fact that children in up to half of all households do not have a father present (Djebbari & Mayrand 2011), and a third of children do not live in a household with a wage earner (Altman et al. 2014). High levels of tuberculosis and HIV are prevalent in the population (Hall & Woolard 2012), and the HIV/AIDS epidemic has resulted in a high proportion of orphans[9] in the population (Case & Ardington 2006).

These adverse conditions impact on a number of key child outcomes, including nutritional status (Ardington & Case 2009), education (Branson et al. 2012), and mental health (Ardington & Case 2010), to name a few. Seventeen percent of children live in households where they sometimes or regularly go hungry (Altman et al. 2014). More than a third of sixteen to seventeen-year-olds have not completed grade nine, and grade repetition is common (Branson et al. 2012). Over fifty percent of youth aged eighteen to twenty-four are neither working nor enrolled in school or tertiary education (Altman et al. 2014). A large proportion of youth (thirty-eight percent) who leave school cite lack of funds to continue as the major reason for their departure (Altman et al. 2014). More than fifteen percent of teens are depressed, and this depression is seen in conjunction with higher levels of risky behaviour and worsened educational attainment (Myer et al. 2009).

It is in this context that the child support grant is distributed. Woolard & Leibbrandt (2010) estimate that in the absence of government grants, the depth of extreme poverty[10] in households would increase two-fold. The depth of need is shown in the high levels of take-up: in 2010, sixty-two percent of age eligible children were receiving the grant (Woolard et al. 2012), and this figure is expected to continue to rise (Woolard & Leibbrandt 2010).

2.2 CSG Beneficiaries and Recipients: Who are They?

A great deal is known about the nature of South African child support grant beneficiaries and recipients. Recipient households are likely to be larger, have lower income but higher levels of grant income (Department of Social Development 2012), have members who are less educated, have fewer assets and employed members, and are more likely to be situated in rural areas (Budlender et al. 2008, Aguero et al. 2009, Hunter & Adato 2007*a*, Delany 2008). Recipients are overwhelmingly African and female (Delany 2008). Households

[9]Case & Ardington (2006) find rates of orphanage (whether maternal, paternal or both) of thirteen percent of all South African children in 2001. A quarter of all children do not live with either biological parent (Djebbari & Mayrand 2011)

[10]Measured as per capita income under a hundred and twenty-one US dollars per month.

with child support grant beneficiaries as members are also likely to receive pension and disability grants (Patel 2012, Department of Social Development 2012). Rates of receipt are lower for orphans[11] (Leibbrandt et al. 2010, McEwen et al. 2009, Case & Ardington 2006), and are higher among the very poor (Case et al. 2005).

A concern may exist regarding unforeseen negative impacts of grant receipt. Household formation may change in ways which do not benefit the original household members, such as an influx of unemployed members (Hamoudi & Thomas 2014), and some evidence has been found to support this hypothesis (Samson et al. 2004, Klasen & Woolard 2009). In addition, individuals living with grant recipients may choose not to leave the households, and thus may remain in areas with high unemployment (Klasen & Woolard 2009). However, not all household configuration can be attributed to grant receipt: three generation households were a common phenomenon among Africans prior to the start of pension and other grant programs (Case & Deaton 1998). Grants have been seen to fund job search (Samson et al. 2004), and grants such as the pension have been found to not raise the reservation wages of other household members (Klasen & Woolard 2009). Child support grant receipt (which lowers the cost of raising a child) has resulted in more children staying with their biological parents rather than being fostered out to work for kin households (Djebbari & Mayrand 2011). This can be regarded as a positive development, although in certain cases fostering does improve the welfare of children, for example when children are fostered out to improve the quality of schools available to them (Djebbari & Mayrand 2011). Households may be becoming less reliant on external funds, as evidenced by a drop in remittances to households after receipt begins (Hunter & Adato 2007*a*). It is possible that were social security programs created with more reach, unfortunate household formation could be prevented (Samson et al. 2004).

Some have argued that grant receipt may increase the bargaining power of mothers (Ambler 2013, Richards et al. 2013). The additional income may reduce a woman's reliance on spousal income, and thus improve her fall back position (Quisumbing & Maluccio 2003). There is a key reason that female grant receipt may positively impact children. Empirically, women have been seen to spend more on children's health, nutrition and education, compared to the greater spending on personal consumption observed among men, both internationally (Lundberg & Pollak 1996, Quisumbing & de La Brière

[11]For maternal orphans in particular.

2000, Alderman et al. 1995, Thomas 1990, Quisumbing & Maluccio 2003) and in South Africa (Case & Deaton 1998, Duflo 2003, Rogan 2013, Delany 2008, Yamauchi 2008). The strength of the grant impact depends on the degree of income pooling in households. In South Africa, evidence has been found to reject the income pooling hypothesis, for both the child support grant (Delany 2008), and the old age pension (Duflo 2000), suggesting that these cash transfers may well improve child outcomes, as women will be more able to afford items which benefit children.

2.3 Program Implementation

2.3.1 Age and Benefit Amount Changes

Table 1 contains a summary of grant extension and amount details from 1998 to the current period. By 2000 the grant was being distributed to the primary caregivers of income eligible children below the age of seven.

Table 1

The South African Child Support Grant Roll-Out
Dates and Amounts of Receipt and Eligibility

Year	Month	Amount	Age Limit	Single Caregiver Means Test
1998	October	R 100	7	R 1,100
1999	July	R 100	7	R 1,100
2000	July	R 100	7	R 1,100
2001	July	R 110	7	R 1,100
2002	April	R 130	7	R 1,100
2002	October	R 140	7	R 1,100
2003	April	R 160	9	R 1,100
2004	April	R 170	11	R 1,100
2005	April	R 180	14	R 1,100
2006	April	R 190	14	R 1,100
2007	April	R 200	14	R 1,100
2008	April	R 210	14	R 1,100
2008	October	R 230	14	R 2,300
2009	January	R 240	15	R 2,400
2010	April	R 250	16	R 2,500
2011	April	R 260	17	R 2,600
2012	January	R 280	18	R 2,800
2013	April	R 290	18	R 2,900
2014	April	R 310	18	R 3,100
2014	October	R 320	18	R 3,200
2015	April	R 330	18	R 3,300

This table contains the details of the dates and amounts of the child support grant roll-out over the years since 1998. The age limit referred to is the upper age limit, for e.g. in 2011, children aged 16 and under could receive the grant. In 2008, the means test was changed to 10 times the grant amount, i.e. in 2009 when the monthly grant amount was R240, the means test was R2,400. For married couples, the means test amount is exactly double the single means test level at R4,800 per month. Between 1998 and the beginning of 2008, the means test amount was set at R1,100 in urban areas, and R800 in rural areas. At the end of 2008 an identical threshold was put into place for both rural and urban areas. Source: National Treasury Reports.

Receipt was subject to a means test which was initially based on household income,

and then on caregiver income (Woolard & Leibbrandt 2010). The means test amount was doubled for married caregivers, and proof was required of non-support from fathers if the recipient reported their status as single (Budlender et al. 2005). Initial take-up was estimated at only ten percent of potential beneficiaries in the year 2000. However, this figure increased significantly in the years post 2000. The grant amount in and of itself is modest[12], and it is also not large in comparison to the old age pension, and the disability and foster grants[13]. Nonetheless, given the low average per capita incomes in South Africa, it may still form a significant portion of a household's monthly income. In 2010, a child support grant amounted to forty percent of median monthly per capita income (Woolard & Leibbrandt 2010). The number of beneficiaries is high, and has grown at a rate of approximately 7.5 percent a year (South African Treasury Report 2011). Over thirteen million children received the grant in 2013 (Hochfeld 2013). Caregiver receipt is very much related to gender: in 2008 an estimated ninety-six percent of recipients were women (Patel 2012).

Between program inception in 1998 and the year 2012, the age threshold[14] was increased a number of times, with these changes occurring at irregular intervals. The initial age cut-off of seven in 1998 was kept constant until 2003, at which point the threshold value was changed to nine years of age. Subsequent changes took place in 2004 (to eleven years of age), 2005 (fourteen years), and from 2009 the age limit increased every year by one year, until the threshold finally reached the age of eighteen in January 2012, where it has remained ever since. A large amendment also took place in 2008 when the means test, which had remained constant since 1998, was increased from R1,100 to R2,300, ten times the grant amount in that year. Grant receipt has risen, and by 2008, reported receipt was approximately sixty percent of all age-eligible children under the age of fifteen (McEwen et al. 2009), implying even higher take-up among children who are both age and income eligible.

The irregular pattern of extension in the grant resulted in certain children losing receipt having aged out of the system, and then in a following year, becoming age-eligible to receive the grant again, due to another expansion in the age threshold. These individuals thus could have had only interrupted receipt to the grant, if they did receive

[12]A child support grant beneficiary received 280 rand per month in 2012, approximately twenty-six US dollars.

[13]The old age pension was approximately 1,200 rand (110 US dollars) in 2012.

[14]The age threshold refers to the age at which receipt ceases.

the grant at all. Those born after 1995 have the potential for uninterrupted receipt, and those before have their receipt interrupted with certainty.

Initially many infrastructure problems plagued the roll-out of the child support grant (Hunter 2004, Hunter & Adato 2007*b*, Budlender et al. 2005, Aguero et al. 2009, Goudge et al. 2009, Delany 2008). Knowledge was widespread regarding the grant's existence, but the exact details of how to apply, and who could apply were not widely known (Hunter & Adato 2007*a*, Hunter & Adato 2007*b*). Non-biological caregivers found it difficult to successfully apply for the grant (Delany 2008). The majority of caregivers were recorded as the mother, even if the mother was non-resident, possibly due to fear of an unsuccessful application (Aguero et al. 2009). Many cited lack of documentation as the reason for unsuccessful application (Goudge et al. 2009, Leibbrandt et al. 2010, McEwen et al. 2009, Delany 2008). Those not reporting any income, or who have become unemployed in the past three years, were (and still are) required to submit an affidavit to that effect, including details of their sources of financial support (Hall & Monson 2006). The time cost of an application was initially estimated at eight full hours (Budlender et al. 2005, Hunter 2004), and a successful applicant in 2003 could wait for three months or more until receipt began. Administrative processes have improved, but the time and money costs of application are still a consideration when eligible caregivers contemplate applying for the grant or not, especially if the document requirements are onerous, or the travel costs involved are high (Department of Social Development 2011, Department of Social Development 2012).

Grant rejections are rare (Hall & Monson 2006), but many people may never apply if they have the perception that they will not classify on income grounds, or that they will not be able to provide the required documents. The document requirements are also not consistently applied in all South African Social Security Agency (SASSA) offices (Hall & Monson 2006), further complicating the application process, and potentially reducing the number of applicants. In addition, many eligible applicants may not have applied for receipt, due to the artificially low and non-inflation-adjusted means test amount prior to 2008 (Budlender et al. 2005). The unchanging threshold value has reinforced the perception of an overly strict means test, which has discouraged application in eligible candidates (Department of Social Development 2012). One-tenth of eligible caregivers interviewed in NIDS Wave 1 did not apply for the grant due to a belief that their incomes

were too high (Department of Social Development 2012), and this figure rises to seventeen percent in Wave 2 (Woolard & Buthelezi 2012). Incorrect beliefs about receipt exist, such as that being employed makes one ineligible, or that the means test amount has not risen from previous years (Department of Social Development 2011).

2.3.2 Conditionality

Unconditional cash transfer programs like the child support grant are common in African countries (Baird, Ferreira, Özler & Woolcock 2014). Whether continued receipt in a transfer program has conditions attached to it or not has been seen to matter for outcomes (Baird, Ferreira, Özler & Woolcock 2014, Paxson & Schady 2010). In many programs receipt is conditioned on proof of school enrolment of the beneficiary. Conditional programs with very strict conditions and effective monitoring have shown much larger effects in school enrolment and attendance (De Janvry et al. 2006, Baird, Ferreira, Özler & Woolcock 2014, Amarante et al. 2011), but very little effect on test scores and years of schooling attained (Wolf et al. 2013).

Initially the grant was tied to a number of onerous conditions, including proof of vaccination and participation in various development programs, and the documents showing proof of income or lack thereof (Woolard & Leibbrandt 2010, Department of Social Development 2012). This led to very low take-up in the first year, of under twenty-two thousand beneficiaries. As many of these requirements discriminated against those already in need who lacked access to health care, and other services, the requirements were dropped in 1999 (Heinrich et al. 2012).

When the program began, receipt was not conditioned on school enrolment, due to the existing high levels of enrolment in the South African school going population (Heinrich et al. 2012). However, in January 2010 grant receipt was formally conditioned on school enrolment, with new applicants being required to bring report cards (where applicable) of children to the Department of Social Development (DSD) offices on application (Department of Social Development 2012). However these conditions were not implemented consistently (Patel 2012). Failure to supply a report card is intended to result in a social worker being sent to the household to put in place steps to ensure the child is enrolled, and to provide necessary support to the household to ensure this happens. Actual discontinuation of receipt is viewed as a last resort, and anecdotally, this condition is not

applied consistently for existing beneficiaries, only for new applicants who are generally younger and less likely to be school going age (Department of Social Development 2012). However, potential recipients are often unable to access the grant due to additional (illegal) requirements for documentation, such as clinic cards, photos, or letters from a child's school, on top of the normal legal requirements (Hall & Monson 2006), and this fact is not clear when survey data is collected about potential recipients.

By 2016, the official conditions by which a child was eligible for the child support grant, as stated by the South African Social Security Agency, did not include proof of school enrolment or attendance (SASSA 2016). A reason that the perception may remain that receipt is conditional on school enrolment is that in the absence of official identification for the child, the caregiver may submit a number of alternative documents[15] to prove the existence of the child, one of which is a school report card.

The shortage of social workers, and the already close to a hundred percent enrolment rates of younger children imply that even if it is being applied at a local level, the school enrolment condition can still be considered a very soft condition (Woolard & Leibbrandt 2010). Given the available information, the child support grant is effectively considered an unconditional grant by researchers (Samson et al. 2008, Baird, Ferreira, Özler & Woolcock 2014).

However, grant receipt is subject to a means test. The administrative cost of administering a means test can be high (Budlender et al. 2005), or of checking conditions such as school enrolment (De Brauw & Hoddinott 2011). There is a paucity of data measuring these costs (Baird, Ferreira, Özler & Woolcock 2014) in many countries. In South Africa in 2006, the administrative cost of administering the means test was calculated to be approximately 170 million rand in 2005 to the Department of Social Development, and a minimum of twenty-four million rand to the South African Police Services (SAPS), who provide affidavits when documents are not available (Hall & Monson 2006). These figures did not include the administrative costs of fraud detection. The time cost to applicants may also be high (Budlender et al. 2005).

Despite the potentially higher cost, a means test which actually takes into account household characteristics may be more likely to target the beneficiaries who are most in

[15]Many other documents are also acceptable as identification for the child if the child lacks an identity document (ID) including: birth certificate, school report, road to health clinic card, baptismal certificate, proof of ID application from the Department of Home Affairs, a sworn statement by a reputable person who knows the child, and an affidavit from a commissioner of oaths (SASSA 2016).

need[16] (Adato & Bassett 2009, Baez & Camacho 2011). In South Africa, household size is not taken into account when potential recipients apply for the grant.

2.4 Data and Descriptive Statistics

This thesis uses the first three waves of the South African National Income Dynamics Survey (NIDS), with a special focus on Wave 3 (Brown et al. 2013, SALDRU 2013). The emphasis on this wave is due to the specific timing of the changes in CSG receipt which can be observed in 2012, and the fact that in 2012 the highest variation in potential duration of receipt is present in beneficiaries who are interviewed.

The NIDS is the first 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 (Brown et al. 2013). Survey waves have been collected approximately every two years since 2008. In Wave 3 (2012), 10,241 households were surveyed, comprising over 38,000 individuals. NIDS has an adult and child questionnaire (as well as other household questionnaires), collected for individuals fifteen years old and above, or younger than fifteen.

Data sets collected prior to the NIDS struggled with issues of poor data quality on caregiver relationships to beneficiaries, and individual receipt (Budlender & Woolard 2006, Budlender et al. 2005, Williams 2007). The rich and precise nature of the data collected on child support grant beneficiaries and recipients, and the fortuitous timing of data collection over periods of change in the grant's eligibility rules make the NIDS an ideal data set to investigate the impact of grant receipt on any outcomes. The following section examines the patterns in receipt evident in the data in Waves 1 to 3.

2.4.1 Patterns in Receipt

Patterns of receipt by age can be seen in Figure 1 for each wave of the NIDS. Receipt after birth is usually low (just over forty percent in 2012 for children under a year), but climbs after the first year, reaching values of just under eighty percent for younger age-eligible children in Wave 3.

The first set of changes of interest to this thesis occurred over the years 2008 to

[16] In Colombia, a household survey instrument (*Sisben*) was used to determine the beneficiaries most in need, through the creation of an index incorporating an array of household characteristics, and this index was then used to determine program receipt (Baez & Camacho 2011). A similar strategy to develop a family based means test has been used in Ecuador (Paxson & Schady 2010).

Figure 1

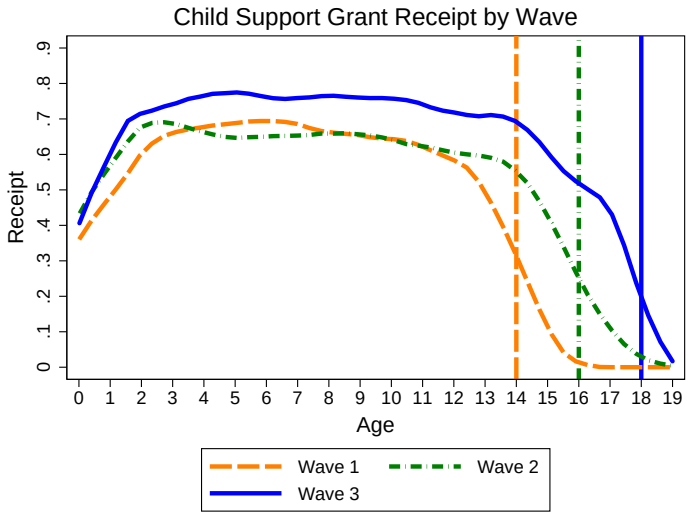


Figure 1 shows average child support grant receipt by age category, and wave. The vertical lines show the CSG age threshold beyond which the child is ineligible for the child support grant. Data: National Income Dynamics Survey.

2012. The age threshold was increased from fourteen in 2008, to sixteen in 2010, and to eighteen in 2012. The increase in receipt among older children affected by the change is clearly apparent in Figure 1 in the rightward expansion of the receipt curve in Waves 2 and 3. If one takes a sample of fifteen-year-olds for example, their rates of receipt have clearly increased in each wave. In 2008, teens aged fifteen were not eligible for the grant, and thus very low rates of receipt are recorded for them in the data. By 2010, the age threshold was increased to sixteen, and the rates of receipt increased for fifteen-year-olds in Wave 2, to approximately thirty percent. By Wave 3 on the order of sixty percent of fifteen-year-olds report receipt.

The data also displays some non-zero rates of receipt in age categories which should not be eligible for the grant. For example, positive figures for receipt for children above the age threshold are seen in both 2008 and 2010. Potential administrative error or age recollection errors are some explanation for this anomaly. Data for Wave 2 was collected in two phases, in 2010 and 2011, when the age limit was sixteen and seventeen respectively. This is a partial explanation for the non-zero percentage of sixteen-year-olds reporting receipt in Wave 2, although inclusion errors among this age group are reported in the first phase of data collection in 2010 as well.

Some of the older children (above the age of fifteen) have never received the grant,

or may have only received it for some small proportion of their lives, and thus take-up in this group is not expected to be as high as those in the younger age brackets. The pattern of expansion is unlikely to create many new or late entries into receipt by older children[17]. Those that simply age through the system should have similarly large rates of receipt as younger children in 2012, and they do[18]. Receipt predictably declines the closer one approaches to the age limit, and there is a sharp cut-off on either side of the age limit in each year.

2.4.2 Descriptive Statistics of Beneficiaries

Table 2 presents sample means for all children aged eighteen or under in Wave 3, and for child support grant beneficiaries and non-beneficiaries, with significant differences marked with stars. From this point on, the analysis in this thesis focuses on Wave 3. It is in this sample that the NIDS first reports child support grant receipt for older teens in substantial rates, and in which both potential duration of receipt, and average rates of receipt are at their highest. Further motivation for the choice of this sample is given in the identification section which follows the end of this section.

Average age in the sample is approximately nine years of age, while the average years of schooling attained is just under 3.5 years. More than eighty percent of mothers are resident in the household, and average maternal education is just under ten years. CSG receipt in this sample is high at just under sixty percent[19] (with an average number of beneficiaries per household of 1.38). The average duration[20] of grant receipt is 5.43 years. Mean household size is 4.88, and mean household grant income is 1,216 rand.

Seventeen percent of individuals aged fifteen and older suffer from depression[21].

[17]The parents of older children may not bother to register for only one or two potential years of receipt, especially if these changes occurred during the early years (the early 2000s) when information was lacking regarding grant eligibility and application processes (Department of Social Development 2011).

[18]For example, sixty-six percent of thirteen-year-olds are receiving the grant in 2012, compared to sixty-five percent of ten-year-olds.

[19]Mothers or other caregivers answer questions about child support grant receipt for children below fifteen; however, these questions are asked directly of those aged fifteen and above. Data comparability and quality does not seem to suffer for this slight difference - as seen in Figure 1, the pattern of receipt recorded for older teens agrees with the patterns seen in younger teens in the previous waves.

[20]Duration of receipt data is unfortunately collected only for those who are under fifteen years of age and currently receiving the grant.

[21]The NIDS only collects depression data for individuals aged fifteen or older. Depression is calculated using the CES-D 10 score, which stands for Center for Epidemiologic Studies Short Depression Scale (Radloff 1977). This score is calculated to be used as a measure of emotional health, and mostly measures depressive symptoms. The scale is between zero and thirty, with higher values representing higher levels of mental distress. A cut-off score of ten or above indicates mild to significant depression. The scale has been validated for use in South Africa (Myer et al. 2008), and is discussed in greater detail in Chapter 3.

Table 2

Individual Descriptive Statistics by CSG Beneficiary Status Children Aged from Birth to Eighteen				
Variable	All	CSG Beneficiary		Non Beneficiary
Age	9.05	8.04	***	10.5
Female	0.50	0.50		0.50
Total Spending on Education (2011)	2,123	837	***	3,956
Income Eligible for the CSG	0.74	0.89	***	0.52
Mother's Education	9.75	9.17	***	10.6
Mother is Resident in the HH	0.82	0.81	*	0.83
CES D-10§ (collected if age >= fifteen years)	5.71	5.69		5.72
Depressed (CES-D 10 > 10)	0.17	0.16		0.18
Mother is Depressed	0.25	0.27	**	0.21
Father is Depressed	0.22	0.24		0.21
Enrolled	0.96	0.99	***	0.92
Years of Completed Education	3.47	2.63	***	4.66
African	0.84	0.92	***	0.72
Coloured	0.09	0.06	***	0.12
Indian/Asian	0.02	0.01	***	0.04
White	0.06	0.01	***	0.12
CSG Beneficiary	0.59	1.00		0.00
Duration of CSG Receipt	5.43	5.43		---
Household Size	4.88	5.15	***	4.54
Rural	0.39	0.48	***	0.28
Household Income	8,135	4,226	***	13,166
Household Grant Income	1,216	1,191		1,302
Number of Children in HH	2.22	2.47	***	1.90
Number of Pensioners	0.34	0.37	**	0.30
Number of CSG Recipients in Household	1.38	2.18	***	0.36
Number of Observations	15,490	9,249		6,241

This table presents mean values and significance tests of differences in individual characteristics between beneficiaries and non-beneficiaries. The sample used is that of children aged from birth to eighteen in Wave 3 of the National Income Dynamics Survey. Weighted estimates are used, using the Wave 3 sample weights. **§** - the CES-D 10 score is a measure of mental health, with values ranging between zero and thirty, with higher values indicating greater levels of mental distress. Depression is calculated as a CES-D 10 score of ten or more (Radloff, 1977). Depression and CES-D 10 data are collected only for individuals aged fifteen or higher. Significant differences are starred. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

In addition, more than twenty percent of children have mothers (or fathers) who suffer from depression. Previous patterns discussed in the literature are confirmed in Table 2 regarding differences[22] by beneficiary status. In 2012, child support grant beneficiaries were significantly younger than non-beneficiaries, and correspondingly had achieved fewer years of schooling. Beneficiaries live in households with more children, and significantly lower household income, and are much more likely to be located in rural areas. Household grant income does not differ significantly across beneficiaries and non-beneficiaries. Differences are seen in two outcomes of interest, enrolment and mental health. Enrolment is significantly higher for child support grant beneficiaries. Although the mothers of child support grant beneficiaries are significantly more likely to suffer from depression than mothers of non-beneficiaries, CSG beneficiaries themselves do not suffer from depression at rates higher than non-beneficiaries.

The next section discusses the identification strategies which will be used in this thesis to estimate the impact of grant receipt on certain child and mother outcomes.

2.5 Identification

2.5.1 Is the Means Test Applied?

A key determinant of receipt is clearly whether or not the means test is applied when potential recipients apply for the grant. Presuming successful implementation of the means test threshold at SASSA offices, any analysis of the effect of receipt is best done in the means test eligible sample, as those who have incomes sufficiently above the threshold are likely to be different in characteristics to those below. These differences may include those obviously related to having higher incomes, but also related to their level of knowledge about the grant application process. If the means test is not consistently applied, this fact should be taken into account by including controls for the individual and household characteristics which also determine receipt, including income measures.

The income sources reported in the NIDS allow the calculation of an adult level means test variable, which indicates whether the child's caregiver qualifies for the grant according to the means test[23]. The NIDS collects and reports many income sources, including those

[22]The majority of these differences are significant at the one percent level.

[23]The caregiver is assumed to be the mother (for younger children this is very likely), and if she is not present, caregiver status is assigned through a process of considering grandparents, household heads, fathers if mothers are absent, and if none of the above are present, the oldest woman is designated as the caregiver. This process follows that in Budlender et al. (2005) and Woolard & Buthelezi (2012), and

Figure 2

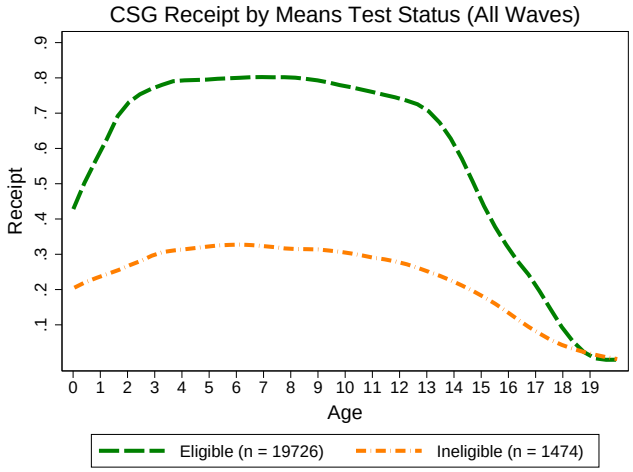


Figure 2 shows child support grant receipt by means test eligibility status. Data: National Income Dynamics Survey.

from formal and casual wage labour, self employment, remittance income, government grants, private pensions, and rental or profit (Chinhema et al. 2016). All these sources of income are summed, excluding any government grant sources, as these are not considered when the means test threshold is applied to any applicant. A dual income variable can be created which reflects the joint income of a married woman and her spouse. Only income from an officially married spouse, and not a common law spouse, is meant to be taken into account during the application process[24].

The difference between the intended and actual implementation of the child support grant by the Department of Social Development can be large (Hall & Monson 2006). With any program, there will always be recipients who in actual fact do not qualify (errors of inclusion), or non-recipients who do qualify (errors of exclusion[25]). Figure 2 graphs average child support grant receipt by age, for means test eligible and ineligible individuals, with the supposition that the latter should be low.

The graph shows that while the calculated measure does very well at classifying individuals, there is still non-zero grant receipt recorded for those who do not qualify as means test eligible[26] according to the data. However, rates of receipt, and the absolute

is also modified using the NIDS supplied data for caregiver identity.

[24]Hall & Monson (2006) report inconsistent application of this rule, with certain offices requiring proof of customary marriages, and others not.

[25]Woolard & Buthelezi (2012) find that a full twenty-six percent of age and income eligible children in 2010 are not receiving the grant.

[26]In Wave 2, an estimated three hundred thousand beneficiaries are found to be receiving the grant despite not being means test eligible (Woolard & Buthelezi 2012).

number of recipients in the means test eligible sample are much higher than in the sample of those classified as income ineligible[27].

Figure 3

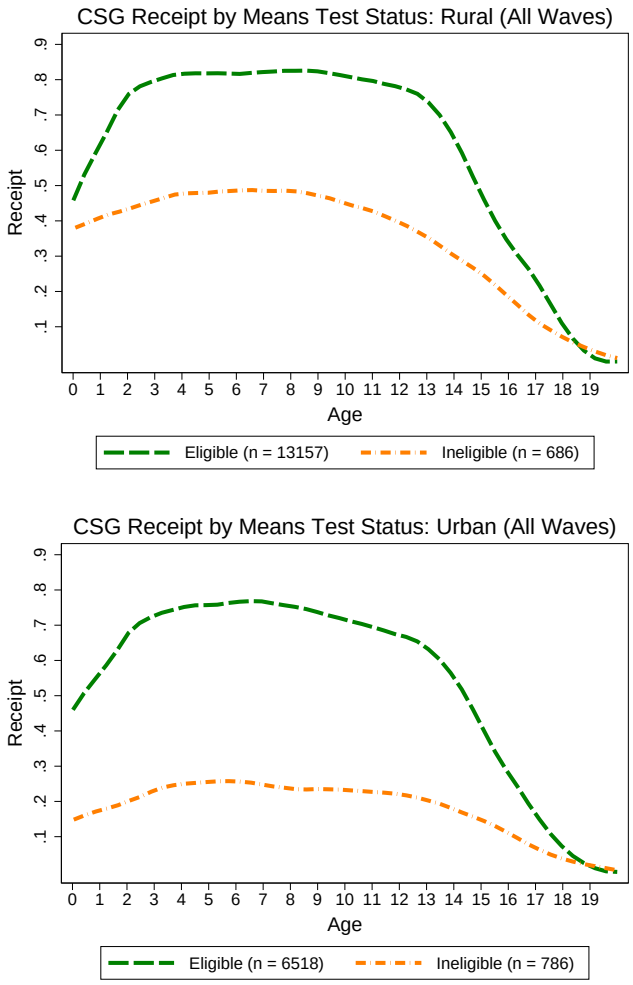


Figure 3 shows child support grant receipt by means test eligibility status in rural and urban areas. Data: National Income Dynamics Survey.

Errors of inclusion are even more common in rural areas, as seen in Figure 3. It is probable that individuals may understate their actual income in order to qualify for the grant, which would result in incomes reported to SASSA that are lower than those recorded in the NIDS, which is a more neutral, and non-government affiliated collector of data. Corruption at SASSA offices may also explain some of the non-zero rates of receipt among income ineligible individuals (Case & Deaton 1998). Another explanation is that customary marriages are recognised in some areas (although they are not meant

[27]Seventy percent of thirteen-year-olds classified as eligible are grant beneficiaries (19,726 children), and only twenty-five percent of ineligible individuals (1,474 children).

to be), and the means test is applied using joint income which includes the income of the common-law spouse (Hall & Monson 2006), unlike the calculation used in this analysis.

This implies that under-reporting of income happens in these regions to an even greater extent. Prior to 2008, mis-classification by the Department of Social Development of urban informal areas as rural was common (Hall & Monson 2006), implying a stricter (lower) means test threshold was applied than intended.

Another test of the reliability of the means test measure is to graph receipt (among adults and children), against caregiver income, with the expectation that receipt should fall at the means test threshold value. Receipt is graphed in Wave 3 for a sample of married and unmarried women aged twenty to forty-five who have one child, whose means test eligibility is determined by joint or single income respectively (see Figure 4).

Figure 4

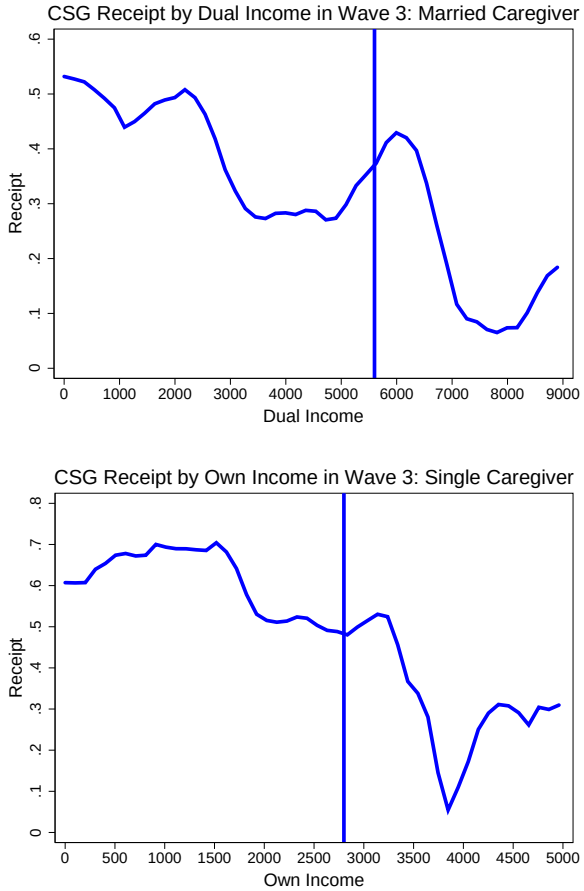


Figure 4 shows child support grant receipt by joint income for married female caregivers, and by own income for single female caregivers, aged 20 to 45 years old in Wave 3 who have one child. Data: National Income Dynamics Survey.

This sample is chosen to attempt to limit the sample to those whose patterns of receipt

are more likely to adhere to the expected means test threshold, without the confounding presence of other children[28].

Rates of receipt do fall after the threshold value, but do not diminish to zero. This corresponds to the non-zero rates of receipt seen in the means test ineligible sample earlier. In addition, the drop in receipt happens a little after the means test threshold, and not exactly at the threshold, indicating the presence of some inclusion errors around the income threshold value, for the reasons mentioned previously. Receipt may not fall sharply at the means test threshold in this sample if those reporting grant receipt applied for the grant a long time ago, and whose incomes have subsequently changed. In addition, both curves have some variability in the right tail end of the income distribution, where both graphs have an upward slanting portion. These portions of the graphs reflect inclusion areas, the rates of which are not extremely large in the married caregiver sample (at approximately ten percentage points), compared to the high variability in receipt in this sample, with values between approximately zero and fifty-three percent. However, more errors of inclusion are seen in the single caregiver sample. This is not a large concern, as these individuals at the top end of the income distribution will not form a large part of the analysis, due to their much higher incomes. It is the sharp drop around the means test threshold which is most important, and including the expected fuzziness due to errors in income reporting, this pattern is indeed present.

Another sample may help to further test reliability of the means test using the same method. A similar graphical analysis is conducted for a sample of very young children, aged two and below, who have single caregivers (see Figure 5). The sample is selected because any child support grant application for the child would have occurred recently, and thus receipt ought to adhere more closely to the expected pattern of a sharp drop-off at the means test threshold. Receipt declines, as expected, with caregiver income. A small spike is present after the means test value, amount to a difference of just over ten percentage points in rates of receipt, and occurring within about five hundred rand of the means test value, which again can probably be attributed to the inclusion errors discussed previously. However, thereafter receipt declines fairly steeply as expected.

The discrepancy between income reported when applying for the grant, and the income sources reported in the NIDS necessitates the inclusion of controls for household

[28]When these graphs are replicated for a sample of mothers with more than one child, the results are qualitatively similar.

Figure 5

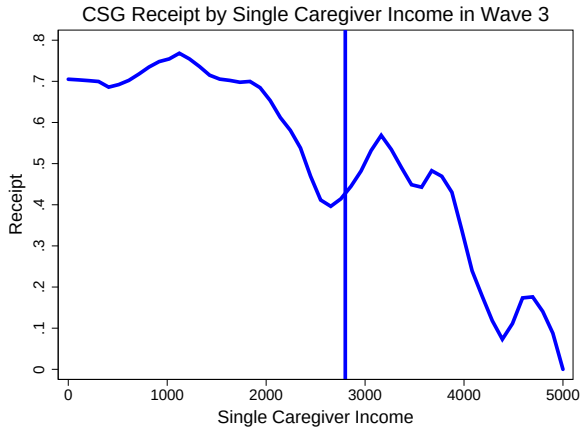


Figure 5 shows child support grant receipt for a sample of children aged two and below who have single caregivers, by caregiver income. Data: National Income Dynamics Survey.

income in any estimates of grant impact, to mitigate the potential impact of misclassification. In the following chapters, estimates are performed mostly on the means test eligible sample, including the relevant controls mentioned previously which are related to mean test eligibility, and where appropriate re-estimated using the full sample. A high proportion of children are income eligible for the grant - seventy-four percent of children aged under eighteen are income eligible (see Table 2), which lends weight to the use of this sample. The next section discusses the issues present when attempting to identify the impact of a non-randomly allocated program such as the child support grant, and the strategies that will be used to aid in this identification.

2.5.2 Endogeneity

By nature, the estimation of any grant effect is likely to be confounded by the presence of endogeneity. The standard conclusion arising from the literature, which is confirmed in Table 2, is that child support grant beneficiaries are different to non-beneficiaries. No large scale randomised controlled trials have been conducted in South Africa to evaluate the impacts of the child support grant. Researchers have attempted to deal with the endogeneity of grant receipt in various ways. Many controls are usually included in estimations, such as age, gender, race, years of education, household income, maternal characteristics and many others, in a bid to reduce omitted variable bias. Other studies use matching methods, constructed control groups, difference-in-difference

(DID) estimates, regression discontinuity[29] methods or panel data methods, to identify the effect of receipt (Coetzee 2013, Department of Social Development 2012, Samson et al. 2008, Aguero et al. 2009, Case et al. 2005, Ranchhod 2006, Williams 2007, Djebbari & Mayrand 2011, Ranchhod 2006). Aguero et al. (2009) use continuous treatment estimation strategies during the first three years of life, conditioning on a measure for "eagerness" of the mother[30]. As with any program which is non-randomly allocated, the South African literature must be evaluated with care before concluding that true causal impacts have been measured.

Apart from the inclusion of key determinants when evaluating grant effect, other identification strategies are possible. A number of different approaches are utilised.

(i) The first strategy is to limit estimation of the grant effect to a more homogeneous sample most likely to contain beneficiaries, such as a means test eligible sample of only Coloured and African beneficiaries. These are two groups more similar in characteristics to each other than to Whites, who in contrast have much higher household incomes and correspondingly lower rates of receipt.

(ii) Another strategy is to find a sample where exogenous variation in receipt is more likely to be present, due to the pattern of roll-out of the grant. This is possible in the sample of older teenagers in Wave 3, who experienced the random increase in the age threshold to eighteen in the year 2012. The age of a teenager born in 1997 is seventeen in 2012, implying the teen is eligible for CSG receipt, whereas a teen with a birth year of 1996 is eighteen, and thus cannot be a beneficiary. It is possible to compare individuals just on either side of the age threshold, who are very similar in characteristics, except for the variation in their grant receipt. This variation is mostly exogenous, relating as it does only to the unanticipated change in age threshold, and not to any individual characteristics. Some portion of grant receipt will still be related to individual characteristics, and these are controlled for in all analysis.

(iii) The third strategy is to make use of the random differences in duration of receipt,

[29]These effects may reflect a simultaneity problem and it is not clear that households on either side of the discontinuity point are similar in characteristics.

[30]The authors measure eagerness as how long it takes a mother to apply for the grant, relative to the average time of application. The measure also proxies for other maternal characteristics, and can in general be referred to as a measure of mother "quality".

in a sample with the greatest amount of variation. For example, due to the roll-out extension pattern, seventeen and eighteen-year-old teens in 2012 have had thirteen and six years of potential grant exposure each, a difference of seven years. This large difference in potential exposure to the grant is exogenous, and determined entirely by birth year, and no other individual characteristics. In teens aged fifteen and above in 2012, potential duration of receipt is highly variable, ranging between three and fourteen years. This is a large amount of variation, and helps to determine the sample choice for further analysis. This is discussed in more detail further in this chapter.

The NIDS collects information about the length of time that the individual has actually received the CSG for, which could possibly be used as a measure of grant receipt. There are a number of limitations to this data however. It is only collected for children who are currently child support grant beneficiaries, despite the fact that current non-beneficiaries may well have received the CSG in the past. In addition, the data is only collected for those in the child questionnaire, and thus no data on duration exists for teens aged fifteen and upwards. The data collected is also of poor quality. In Wave 3, data is collected on child support grant beneficiary status for 16,226 individuals. Of these, 9,249 are current beneficiaries. Those reporting their duration of receipt in years number 6,545, and only 4,884 report months of duration in addition to years. The last, and arguably most important draw-back to using reported duration of grant receipt to estimate grant impact (were it even available for beneficiaries and former beneficiaries), is that it suffers from the same endogeneity concerns as the current CSG receipt variable does. Those reporting longer duration of receipt are likely to be different in important ways to those reporting shorter, or no duration of receipt. Any estimates including duration of receipt would suffer from omitted variable bias if these underlying differences are not controlled for.

Potential duration is another possible measure of grant receipt which displays more promise in the identification of the grant impact. There is large variation in not only actual, but also potential duration of receipt between older and younger children, due to the unanticipated changes in the age threshold. Potential duration[31] is calculated

[31] A simplifying assumption is used for the calculation of potential duration. Potential duration equals age plus one in this framework. A child under the age of one is considered to have been exposed for one year, and so on.

Figure 6

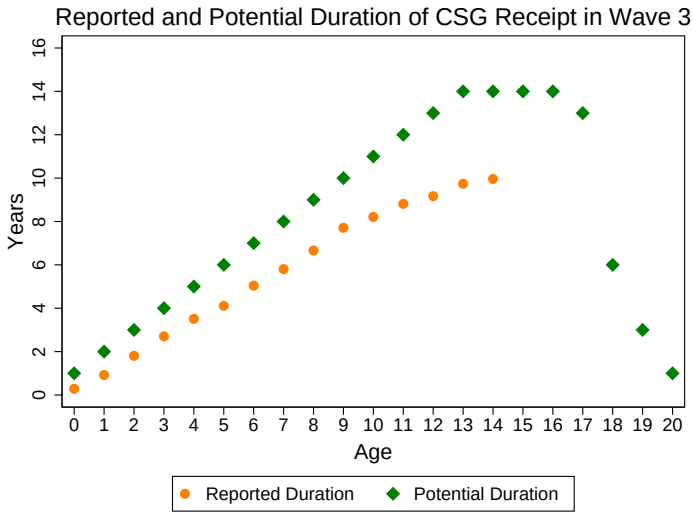


Figure 6 plots average years of exposure to the grant (potential duration), and average reported duration of receipt (collected only for those aged below fifteen) by age, in Wave 3 of the NIDS. Potential duration of receipt increases linearly with age until age thirteen, at which point the particular pattern of expansion of CSG receipt to older children results in an uneven pattern of potential duration of receipt. Data: National Income Dynamics Survey.

according to the individual's birth date, and reflects the number of years of potential CSG receipt, given the roll-out of the age thresholds. Figure 6 plots average reported duration, and potential duration of exposure to the grant.

Potential duration of receipt increases linearly with age until age thirteen, to a maximum of fourteen years of exposure, and then declines rapidly for children older than sixteen. Some children have had the potential to receive the grant for a large percentage, or even all of their lives[32], while older children may have only been eligible for a small portion of their lives, and in addition their receipt may have been interrupted. In the sample of teens aged fifteen to nineteen, potential duration varies sharply between three and fourteen years.

Reported CSG duration data does display similar patterns to potential duration, as seen in Figure 6. However, the poor quality of the data suggests estimation using potential duration may be recommended instead. An even stronger argument for doing so is that using potential duration solves the omitted variable bias issues which arise from using the true reported duration figures, as variation in potential duration of receipt reflects

[32]In 2012, sixteen-year-olds have had fourteen potentially uninterrupted years of exposure, while nineteen-year-olds have had potential interrupted exposure for only three years, a much smaller proportion of life exposed.

the exogenous nature of the roll-out, and is not related to any individual characteristics.

Figure 6 shows that a sharp drop-off in potential duration of receipt occurs in the sample aged fifteen to nineteen. It is possible that grant receipt in this sample (especially the means test eligible sample) is conditionally random. In this sample, the identification of the grant receipt coefficient arises from two comparisons. Teens just above and below the age threshold are compared, and beneficiaries and non-beneficiaries of the same age are compared. The first comparison appears valid, as except for an expected one year difference in age (and the accompanying differences in education level, maternal age, maternal education, which can be controlled for), those above and below the threshold should not differ substantively in individual characteristics.

2.5.3 Significance Tests

Significance tests of differences in mean characteristics are performed in a number of age-defined samples, and the results can be seen in Table 3. The base sample in Table 3 is the fifteen to nineteen-year-old population of African and Coloured teenagers who are means test eligible for the grant. These teens record the most variation in grant receipt, and their age also allows the best estimation of the cumulative effects of grant receipt.

For fifteen and sixteen-year-olds, beneficiaries do not differ in a host of characteristics, including gender, race, maternal characteristics (maternal age, education, labour market status, residence in the household, depression level), paternal characteristics (paternal residence in the household and depression level), household characteristics (household income, size, number of children, pensioner present in household, and whether the household is regarded as being on the bottom income step by any household member).

Certain outcomes (of interest to this thesis) have positive and significant associations with grant receipt. Again, beneficiaries are much more likely to be enrolled, are less likely to be depressed and have lower CES-D 10 scores, and in three of the five age samples considered have significantly higher levels of life satisfaction than non-beneficiaries. There is no significant difference in years of schooling by beneficiary status, except in the seventeen to eighteen-year-old sample. Non-beneficiaries have slightly higher average years of schooling than beneficiaries in this sample, which may be a simple age effect.

More significant differences in individual characteristics exist in the seventeen to eighteen-year-old sample. Many of these differences are obviously related to the difference

Table 3

Balancing Checks: Comparison of Means in the Means Test Eligible Sample in Wave 3														
	Age 15			Age 16			Age 17			Ages 15-17			Ages 17-18		
Receive CSG?	Yes	No		Yes	No		Yes	No		Yes	No		Yes	No	
Age	15.0	15.0		16.0	16.0		17.0	17.0		15.9	16.2	***	17.0	18.0	***
Female	0.50	0.52		0.50	0.53		0.46	0.44		0.49	0.49		0.47	0.53	
Coloured	0.04	0.09		0.04	0.08		0.04	0.08	*	0.04	0.08	**	0.05	0.06	**
African	0.96	0.91		0.96	0.92		0.96	0.92	*	0.96	0.92	**	0.93	0.94	**
Mother's Education	7.36	7.38		6.72	7.42		6.56	7.76	***	6.91	7.57	**	6.83	6.82	**
Mother's Age	42.2	43.6		44.6	45.8		43.9	45.1		43.5	45.0	*	44.0	46.6	***
Mother Economically Active	0.62	0.60		0.59	0.62		0.65	0.58		0.61	0.60		0.61	0.59	
Mother Resident in HH	0.79	0.74		0.83	0.74		0.79	0.66	**	0.81	0.70	***	0.78	0.67	*
Father Resident in HH	0.35	0.31		0.39	0.32		0.50	0.39		0.40	0.35		0.54	0.33	***
Years of Education	7.47	7.26		8.09	8.12		8.80	8.73		8.06	8.16		8.86	9.52	***
Enrolled	0.98	0.87	***	0.96	0.89	**	0.92	0.86	*	0.96	0.87	***	0.93	0.75	***
Depressed	0.13	0.23	**	0.18	0.19	**	0.16	0.21	**	0.16	0.21	*	0.17	0.19	*
CES-D 10	5.03	6.44	***	5.95	6.02	***	5.91	5.94	***	5.61	6.09	*	5.99	6.00	*
Mother is Depressed	0.31	0.29		0.21	0.23		0.35	0.38		0.29	0.31		0.34	0.32	
Father is Depressed	0.22	0.31		0.27	0.36		0.19	0.33		0.23	0.33		0.14	0.39	**
In Poor Health	0.00	0.03		0.02	0.03		0.06	0.05		0.02	0.04		0.05	0.03	
Life Satisfaction (1-10)	4.75	4.97		4.58	4.01	*	4.60	4.66	*	4.65	4.54	*	4.59	4.55	*
Rural	0.61	0.54		0.67	0.49	**	0.53	0.57	**	0.59	0.54	*	0.51	0.56	*
Household Income	3,081	10,311		3,526	3,733		3,295	4,620	*	3,273	5,913	*	3,649	3,474	*
Household Grant Income	1,497	1,834	*	1,554	1,664	*	1,588	1,464	*	1,490	1,546	*	1,540	1,409	*
Total Spending on Education	1,782	2,695		2,083	3,220	**	2,150	3,594	*	1,991	3,242	***	2,275	3,089	***
Household Size	6.11	6.68		6.63	6.63		5.96	6.39		6.09	6.27		5.93	6.19	
Number of Children in HH	3.39	3.37		3.53	3.29		3.20	3.37		3.24	3.15		3.12	2.37	***
Pension Household	0.28	0.34		0.26	0.28		0.23	0.29		0.25	0.29		0.22	0.24	
Poorest Household	0.32	0.32		0.30	0.24		0.23	0.28		0.28	0.27		0.20	0.20	
Optimistic 2 Years From Now	0.67	0.61		0.65	0.57		0.72	0.69		0.68	0.63		0.70	0.72	
Optimistic 5 Years From Now	0.86	0.82		0.81	0.87		0.93	0.87	*	0.86	0.86	*	0.90	0.89	*
Number of Observations	348	228		337	251		252	349		937	828		278	623	

This table presents a test of mean differences between recipients and non-recipients in 5 samples. The sample used is that of African and Coloured teens aged fifteen to nineteen in Wave 3 of the National Income Dynamics Survey who are means test eligible for the child support grant. Weighted estimates are used. In Wave 3, individuals aged eighteen and above are age ineligible for the child support grant. Significant differences are starred. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

in age: eighteen-year-olds live in households with fewer children (children are more likely to leave the household the older they are), and have older mothers with correspondingly higher maternal education, and higher levels of education (and a lower probability of being enrolled). They are also significantly more likely to have either parent resident in the household, and less likely to have a father who is depressed[33].

Attitudes regarding the income level of the household at the date of interview, and two and five years from the interview date are also examined in Table 3. An income step measure is contained in the NIDS data, which asks survey participants to report which step they believe their household to be on, where one is poorest and six is richest. The poorest household variable reflects whether anyone in the household considers the household to be on the bottom income step. The optimism variables measure whether an individual believes that the household will be on a higher income step either two or five years from now. No significant differences are recorded in the self perceived poorest household variable, or the level of optimism regarding the household's prospects two years from now. Individuals do start to differ in their levels of optimism regarding the household's situation in five years from now, although these differences are very small[34]. These results indicate that levels of optimism do not differ in a meaningful way between beneficiaries and non-beneficiaries.

Turning to income measures, the table reports tests of significance of household income, grant income, and educational spending. Household grant income is significantly different across all age samples, yet the differences are not large, do not display a consistent pattern, and the differences are only significant at the ten percent level. Total educational spending is significantly different (significance ranges from one to ten percent, depending on the sample) for all age groups except for fifteen-year-olds, where higher spending is recorded for non-beneficiaries. Household income begins to differ in the older samples, although only at the ten percent level.

The differences in the mean of household income for fifteen-year-olds beneficiaries and non-beneficiaries is very high, despite their lack of significance. This can be seen in Figure 7, which graphs household income by beneficiary status for all fifteen-year-olds, reporting a ninety-five percent confidence interval on the average household income

[33]However, the sample of fathers reporting depression data is very small.

[34]The significant differences are zero, one and three percentage points, with very high levels of optimism recorded: eighty-six, eighty-nine and eighty-seven percent

recorded for non-beneficiaries.

Figure 7

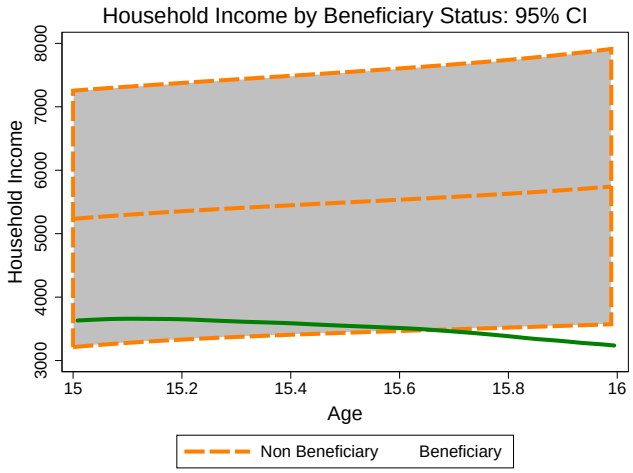


Figure 7 shows average household income by beneficiary status for fifteen-year-olds in Wave 3, with a ninety-five percent confidence interval displayed for non-beneficiaries. Data: National Income Dynamics Survey.

The insignificance of these rather large differences arises due to a high variance in household income among non-beneficiaries (as seen by the overlapping confidence intervals), which is also expected given the relatively small size of this sample.

In all age samples except for fifteen-year-olds, beneficiaries and non-beneficiaries have significantly different means for residence in a rural area, although no clear pattern in these differences can be observed. It is advisable to control for any potential determinants of the outcomes in question, even if no significant differences between controlled and uncontrolled estimates are expected, on the assumption of a valid identification strategy (Imbens & Lemieux 2008). All regression analysis in the following chapters includes an appropriate sub-set of the relevant covariates in Table 3 as control variables, in particular those displaying significant differences by beneficiary status. Including these controls may both improve the precision of the estimates, and control for any sample selection caused by observing individuals further away from the age or income threshold values (Imbens & Lemieux 2008).

In the younger teen samples, particularly among fifteen and sixteen-year-olds, very few significant differences are seen. This implies that in these samples, possibly grant receipt is more likely to be exogenous, and thus unrelated to most personal characteristics. Why might beneficiaries and non-beneficiaries not differ in their observable characteristics in

this sample? Firstly, the unanticipated extension of the age limit adds a high degree of exogenous variation to receipt along the age eligibility margin. Secondly, concerns of endogeneity may be lower for older children compared to younger children. Low rates of receipt for younger infants may well be due to a lack of the maternal eagerness discussed by Aguero et al. (2009), and mothers who delay applying for the grant may also impact negatively on their children's school enrolment or performance in other ways. However, older children have much higher rates of receipt, and by the age of fifteen it is more likely that the eagerness effect may have receded as an important factor, as no extra effort is needed to ensure the continued grant receipt of older children. Children simply age through the system and continue as recipients[35]. Eagerness could nonetheless be a proxy for family preferences regarding education, which may confound estimation. Controls for parental education are included to eliminate this potentially confounding effect.

This discussion has motivated the use of certain samples, and measures of receipt, which are more likely to aid in the identification of the effect of grant receipt. The sample used in all of the analysis in this thesis is that of African and Coloured teenagers between the ages of fifteen and nineteen in Wave 3, who are means test eligible for the grant. These teens display the most variation in grant receipt, and their more advanced age allows the estimation of the cumulative effects of grant receipt. They also display sufficient variation in the outcomes of interest in this thesis, namely educational achievement and mental health, and have been an under-studied population.

Chapter 3 investigates the relationship between CSG receipt and the enrolment and years of schooling of older teens.

[35]A very similar pattern of receipt is seen in children as they age (see Figure 1). Thirteen-year-olds in Wave 1 are fifteen in Wave 2, and seventeen in Wave 3. Their respective rates of receipt are fifty-five percent, fifty-four percent and forty-six percent, which implies no large changes in receipt occurred for older children.

3 More Than Just a Black-Board

> ...Inferior schools are enemies of the sense of wonder. It is easier and less expensive in the long run to prevent a loss of imagination by providing adequate nutrition, housing, medical care, and schooling than it is to try to restore that loss[36].

3.1 Adolescent Education and the Child Support Grant

Many cash transfer programs in developing countries are implemented with the specific aim of improving educational outcomes, and receipt is very often conditioned explicitly on school enrolment (Baird, Ferreira, Özler & Woolcock 2014). In South Africa, children are required to begin school in the year they turn seven, and may leave in the year they turn fifteen, or reach the ninth grade, whichever comes first (Fleisch et al. 2012). Unlike many other developing countries, South Africa does not suffer from low levels of enrolment at the primary school levels, with very high levels of enrolment observed until children reach the legal school leaving age of fifteen (Case & Deaton 1999). Thereafter more variability in school enrolment is present. As noted in Chapter 2, receipt of the child support grant is not conditioned on school enrolment in practise, and the majority of researchers study the grant as an unconditional cash transfer (Samson et al. 2008).

This chapter examines the impact of grant receipt on enrolment and years of schooling, using the identification strategies described in Chapter 2. As in other countries which record high enrolment at the primary level, examining the impact of receipt on primary school enrolment in South Africa is not a meaningful exercise, unless it is at the very young ages of six or seven where some slight delays in enrolment are observed (Adato & Bassett 2012, Case & Deaton 1999). The analysis in this chapter differs from much of the cash transfer and schooling literature, with a focus on enrolment and educational achievement among older adolescents, and not at the primary school level (Rawlings & Rubio 2005).

Many studies exist which examine the impact of transfers on enrolment in particular, in countries such as Brazil, Pakistan, Columbia, Mexico, Ecuador and others (Baird, Ferreira, Özler & Woolcock 2014, Adato et al. 2000, Filmer & Schady 2011, Baird et al. 2009, De Brauw & Hoddinott 2011, Schady & Araujo 2006). In a randomised

[36] Margaret Geller.

experiment in Ecuador, cash transfers are estimated to increase school attendance by ten percentage points (Schady & Araujo 2006), which is considered a large effect. In Mexico, conditional cash transfer programs have been found to be more effective than unconditional programs at improving enrolment, especially at the transition to lower secondary school (De Brauw & Hoddinott 2011). Even a very modest cash transfer can raise enrolment rates substantially, as observed in Cambodia (Filmer & Schady 2011).

In South Africa, the child support grant has been associated with increased grade repetition, although some positive effects of receipt on attendance or enrolment have been found, even for co-resident non-recipient children[37] (Budlender & Woolard 2006, Fleisch et al. 2012). In KwaZulu-Natal, a large province of South Africa, neither pension nor CSG receipt have been found to affect primary school completion rates (Boler 2007). Cash grants can mitigate or entirely cancel out the negative effect of being an orphan on educational outcomes (Boler 2007, Case & Ardington 2006, Timaeus & Boler 2007).

Turning to older teens, one finds a more limited literature. In a randomised controlled trial with a sample of older Malawian teenagers, Baird et al. (2011) find that cash transfers can be successful at preventing school drop-out[38] and teen marriage and pregnancy (a key issue which impacts school attendance). In Columbia, conditional cash transfers have been associated with higher rates of enrolment for teenagers (Barrera-Osorio et al. 2011), and similar results are found in Mexico and Brazil, with additional effects of higher educational attainment for those with longer exposure to cash transfer programs (Behrman et al. 2009, Schaffland 2014). No such effects have been found in teens in Uruguay however (Amarante et al. 2011). In South Africa, a relatively recent survey by the Department of Social Development in 2012 observed an association between grant receipt and lower absenteeism among adolescent boys (Department of Social Development 2012).

The literature on education shows that the determinants of schooling performance in South African and internationally are many and varied. Important school level determinants are school quality, distance to school, pupil teacher ratios, no fee status, class size, and the age distribution of one's peers (Cascio & Schanzenbach 2007, Angrist & Lavy 1999). In terms of individual characteristics, these include gender, race[39],

[37]However Williams (2007) do not find these co-resident effects.

[38]As expected, conditional cash transfers are seen to have a larger impact on attendance than unconditional (Baird et al. 2011).

[39]African and Coloured teenagers in South Africa have lower enrolment rates than Whites and In-

household socio-economic status, the cost of school fees, uniforms and books, parental educational achievements, home language and proficiency in English, household size and expenditure, rural or urban location and province (Case & Deaton 1999, van der Berg 2008, Lam et al. 2011). Others less frequently cited include being born in a foreign country, orphanhood, domestic migration, and disability status (Fleisch et al. 2012, Case & Ardington 2006), and physical and mental health (Fleisch et al. 2012, Baird et al. 2013).

Around the world, an inability to meet schooling costs is associated with drop-out, particularly in developing countries (Baird, Ferreira, Özler & Woolcock 2014, Naong 2013), and South Africa is no exception (Altman et al. 2014). Looking in the NIDS, in 2012, fifty percent of potential school-goers between the ages of fifteen and nineteen who were not enrolled in 2011 cited reasons of either not being able to afford to go to school, or current engagement in job search. A further thirteen percent cited pregnancy or having a child as the reason for non-enrolment. Only one in ten potential school-goers in Wave 3 of the NIDS do not enrol because of disinterest, and a very low percentage of those not enrolled cite current employment in 2012, or having finished education as the reason. In addition, those households in the NIDS receiving the child support grant in 2012 had equivalent schooling expenditures to non-recipient households, implying that the CSG may be instrumental in bringing these households' educational spending up to par with non-beneficiary households. Knowledge of the CSG is high among teens themselves, and adolescent awareness is an important determinant of receipt (Department of Social Development 2012).

A question is whether the CSG can be expected to have a meaningful impact on adolescent educational success, given the relatively modest grant amount. In 2011, mean annual educational expenditure for the bottom three household income quintiles was approximately 1,350 rand (Branson et al. 2013), however, the total CSG amount received per child in that year was 3,120 rand. Total average education spending per child in the CSG means test eligible sample was even lower at 820 rand in 2011. Grant income may be large enough to have a significant effect on school enrolment if the costs of schooling are an important factor in the enrolment decision.

A quarter of twelfth-grade teenagers in Johannesburg travel further than ten kilometres to school, usually to better quality and more expensive schools than local alternatives,

dian/Asian teens, in particular Coloured boys (Case & Yogo 1999).

despite having available schools on average only 0.4 kilometres away (de Kadt et al. 2014). The grant may be financing enrolment among older teens at better schools, by covering one aspect of school costs, namely transport[40].

3.2 Theoretical Framework

Teen enrolment reflects the preferences of both parents *and* teens. After the minimum school leaving age is reached, enrolment becomes a choice. The decision to enrol can be viewed as either a current consumption decision, or an investment decision. The investment decision compares the net present benefits and costs of education. Investment takes place if the expected rate of return is greater than some available rate of interest (Becker 1964, Campbell & Siegel 1967, Mincer 1958, Mincer & Polacheck 1974). Assuming zero costs to schooling, the individual maximises

$$V_n = a_n \int_n^l (e^{-rt})dt$$

where t is time in years, a_n are annual earnings, V_n is the present value of life earnings before enrolment, and r is the discount rate (Mincer 1958).

In the consumption framework, education can be regarded as a durable good which gives both current consumption benefits (which are often difficult to measure), and future services. The demand for education Q_d is dependent on a large number of factors.

$$Q_d = f(X_i, HH_h, S_s)$$

The X_i are individual characteristics, such as expected future earnings, education already obtained, motivation, health, innate ability, ethnicity and gender (Schultz 1961, Johnes & Johnes 2004). The S_s include school characteristics such as the direct costs of schooling[41], school quality and others (Case & Deaton 1999). The HH_h include family characteristics and socio-economic factors (Freeman 1987, Hanushek et al. 2011). Another determinant of education demand is the level of consumer prices. A rise in consumer prices relative to the costs of education implies the purchase of education for its future benefits is cheaper, and thus an individual would substitute future enrolment for current consumption (Campbell

[40]Transport costs made up a fifth of total education costs in 2011 (NIDS Wave 3).

[41]Including school fees, books, uniforms, transport and others (Becker 1964). Campbell & Siegel (1967) find that education prices and income levels explain a significantly high proportion of the variation in tertiary education demand in the United States between 1919 and 1964.

& Siegel 1967).

The opportunity costs of school enrolment are an important consideration[42] of the school attendance decision (Becker 1964). When adolescents do not attend school, they may work on family farms, or in the home (Schultz 1961, Amarante et al. 2011), thus their enrolment has an opportunity cost to the family, but which may be difficult to estimate or measure (Campbell & Siegel 1967). These costs are proportional to the number of years of school already attained (Freeman 1987), but the anticipated benefits of enrolment rise the closer the individual is to school completion[43]. In both the investment and consumption models, cash transfers, by lowering the direct, and indirect (opportunity) costs of education (compared to an alternative investment, or wage income), imply an increased demand for education (Hochfeld 2013).

The demand for enrolment is a derived demand, stemming from the demand for education (the desire to invest in human capital). Many of the factors which determine educational attainment are also important in the enrolment decision, and may have similar direction effects in both models.

School characteristics (such as cost or quality) clearly cannot enter into enrolment models directly, as those not enrolled have missing data for these variables (although it may be possible to infer some information from the characteristics of schools attended by siblings). Average school quality in the surrounding area[44] may also serve as a proxy for school characteristics, but this may be a poor proxy depending on how strongly enrolment is related to household formation and potential migration.

A caveat is necessary when estimating enrolment or attainment models. One may have only poor measures of crucial determinants such as ability, family tastes for education, and school characteristics. On balance, including proxies for these variables to prevent omitted variable bias may be better than the possible (due to non-random error) inconsistency, bias and loss of significance associated with measurement error of the true variables, especially if these variables are not the main independent variables of interest (Cohn &

[42]A teenager contemplates enrolment or employment, where the prospect of the latter is uncertain. Opportunity costs for teens are lower than that of older workers, given low teen employment rates, and lower expected salaries.

[43]This is observed in South Africa, where the rates of return to education rise steeply after matriculation (Finn et al. 2015).

[44]When considering truancy rates, and thus in reverse, determinants of enrolment or attendance, Johnes & Johnes (2004) cite as important summary factors the characteristics of pupils themselves, schools, peers, family, and location. A truancy model allows one to include direct qualities of schools, as researchers have knowledge of which school the child is playing truant from.

Geske 1990). If sufficiently large variation occurs in the true variables, measurement error may be less of a concern. However, if the estimates of variables which are by necessity included in models as proxies do not emerge as significant, it cannot necessarily be concluded that the true variables have no impact on attainment or enrolment (Cohn & Geske 1990).

Educational outcomes can be measured in a variety of ways. These include stock variables such as years of schooling attained, senior certificate attainment, grade progression (including repetition or skipping), and standardised test scores (Case & Deaton 1999, van der Berg 2008, Lam et al. 2011), and short-term measures such as yearly school enrolment or daily attendance (and the reverse, drop-out and days of school missed). The stock variables are cumulative measures, which are by nature path dependent, and reflect the results of early investments, as well as current ones into human capital (Aguero et al. 2006), while the short-term measures are more likely to be influenced by one's current situation, whether financial or otherwise.

This chapter focuses on two teen outcomes: current enrolment, and the number of years of schooling attained, and investigates the relationship between these outcomes and grant receipt. For the reasons mentioned earlier, it is more likely that if such a relationship exists, it would manifest with years of receipt related to the cumulative years of schooling measure, and current receipt to the current enrolment decision.

The next section turns to descriptive statistics of a sample of older teens.

3.3 Descriptive Statistics

Individual characteristics are tested for significant differences in means by beneficiary status in Table 4, replicating the analysis in Chapter 2[45], for a sample of older teenagers, using Wave 3 of the NIDS. The restriction to Wave 3, as noted before, is due to the pattern of roll-out of the grant, and to the pattern of enrolment in this sample. In 2008, the age limit of fourteen precludes the examination of grant impact for this sample, as there are no beneficiaries older than fourteen. In 2010, although there are older teens who do receive the grant, the rate of receipt is low in this age group, in part due to the relatively recent expansion of the grant in 2010.

[45]See Table 2.

Table 4

Individual Descriptive Statistics by CSG Beneficiary Status Fifteen to Nineteen Year Olds				
Variable	All	CSG Beneficiary		Non Beneficiary
Age	16.9	15.9	***	17.3
Female	0.50	0.49		0.50
Total Spending on Education (2011)	2,935	833	***	3,903
Income Eligible for the CSG	0.71	0.90	***	0.65
Mother's Education	8.35	7.18	***	8.8
Mother is Resident in the HH	0.78	0.78		0.78
CES D-10*	5.78	5.69		5.82
Depressed (CES-D 10 > 10)	0.18	0.16		0.18
Mother is Depressed	0.24	0.28	*	0.23
Father is Depressed	0.26	0.22		0.28
Enrolled	0.83	0.96	***	0.78
Years of Completed Education	8.95	8.09	***	9.24
African	0.83	0.94	***	0.80
Coloured	0.09	0.04	***	0.10
Indian/Asian	0.02	0.01	*	0.02
White	0.06	0.01	***	0.08
CSG Beneficiary	0.25	1.00	***	0.00
Duration of CSG Receipt	10.5	10.5		
Household Size	5.54	5.86	**	5.42
Rural	0.44	0.55	***	0.41
Household Income	8,483	3,686	***	10,163
Household Grant Income	1,390	1,445		1,356
Number of Children in HH	2.48	3.13	***	2.25
Number of Pensioners in HH	0.38	0.40		0.38
Number of CSG Recipients in HH	1.52	2.84	***	1.06
# Observations	4,051	1,063		2,988

This table presents descriptive statistics for child support grant beneficiaries and non-beneficiaries, and tests of significance by beneficiary status. The sample consists of teenagers aged fifteen to nineteen in the National Income Dynamics Survey, Wave 3. Estimates presented are weighted using the sample weights from Wave 3. Significant differences are starred. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

It is only in 2012 that significant numbers of teens aged above fifteen receive the child support grant, and only in this older sample is variation in enrolment seen. The sample of interest is Coloured or African fifteen to nineteen-year-olds. This group reports high rates of CSG receipt in comparison to other population groups.

As in Chapter 2 (see Table 2), clear and significant differences between beneficiaries and non-beneficiaries in many key characteristics are recorded. In this sample CSG beneficiaries are seen to be significantly younger and more likely to live in rural areas, and in households with more children and more CSG beneficiaries. Certain differences clearly arise due to the younger age of beneficiaries, such as a higher probability of being enrolled, lower years of schooling both in these teens and their mothers, and a larger number of children and recipients in the household. As expected, beneficiaries are more likely to be income eligible for the grant and to be poorer (as seen in lower household income and household educational spending). The mothers of beneficiaries are slightly more likely to be depressed, although beneficiaries themselves do not differ by mental health status to non-beneficiaries. These differences inform the choice of control variables in the estimates that follow. The next section examines the patterns in the two educational outcomes of interest to this thesis.

3.4 Patterns in Enrolment and Years of Schooling

Patterns of enrolment[46] in each wave of the NIDS can be seen in Figure 8. Enrolment is indeed more variable after age fifteen[47], as expected. In 2012 (Wave 3), thirteen-year-olds have close to a hundred percent enrolment, while approximately eighty-seven percent of eighteen-year-olds are enrolled. Despite the minimum school leaving age of fifteen, enrolment does not begin to fall sharply at that point, but rather begins to decline steeply before the age of eighteen in both Waves 1 and 3.

Enrolment dips between Wave 1 and 2 for older teens, and rises back to its original levels in Wave 3. This rather perplexing result has been documented in other research papers (Branson et al. 2013), and implies caution should be taken in any dynamic analysis of enrolment between waves (as no specific systemic reason is present to account for this change in enrolment between waves).

[46]The vertical line denotes the legal minimum school leaving age of fifteen.
[47]Enrolment in this group also refers to post-school education.

Figure 8

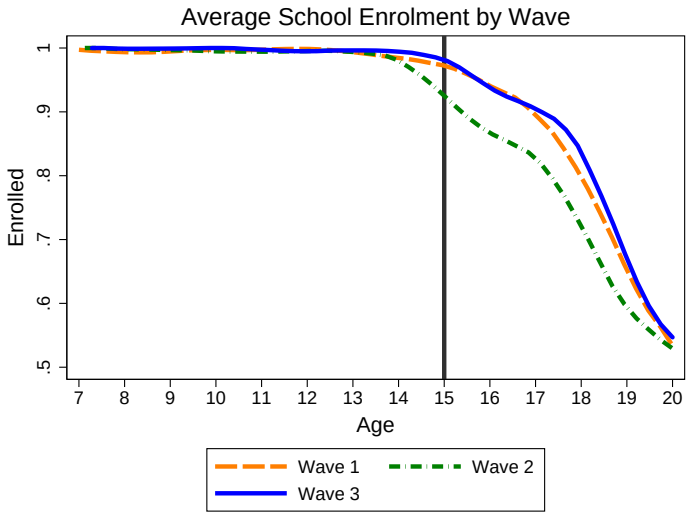


Figure 8 shows average school enrolment by age category and wave. The vertical line shows the legal minimum school leaving age of fifteen. Data: National Income Dynamics Survey.

Figure 9 graphs average school enrolment by grant beneficiary status in Wave 3. After the school leaving age, CSG beneficiaries have enrolment rates significantly higher than non-beneficiaries. Figure 10 shows the patterns in average years of schooling attained, by beneficiary status. Beneficiaries obtain approximately half a year of schooling less than non-beneficiaries by age eighteen, and this is significant in this uni-variate analysis. The pattern observed indicates that estimates of the CSG effect on years of schooling achieved may emerge as negative, especially if the endogeneity of grant receipt has not been accounted for. It is possible that teens are more likely to be enrolled, but have managed to complete fewer years of schooling, although this needs to be examined further in multi-variate analysis which takes into account the endogeneity of grant receipt.

Figure 9

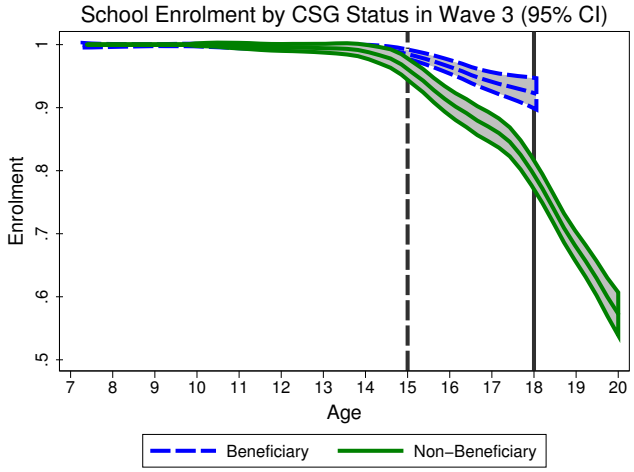


Figure 9 shows average school enrolment by age and beneficiary status, in Wave 3, with ninety-five percent confidence intervals. The solid vertical line represents the cut-off age for grant receipt at age eighteen, and the vertical dashed line the legal minimum school leaving age of fifteen. Data: National Income Dynamics Survey.

Figure 10

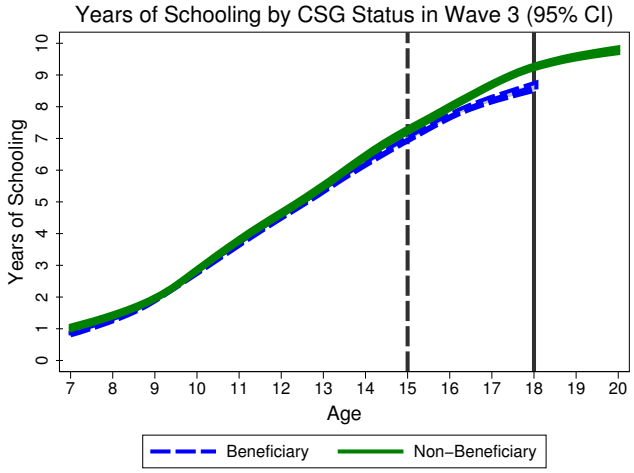


Figure 10 shows average years of schooling achieved by age category and beneficiary status, in Wave 3, with ninety-five percent confidence intervals. The solid vertical line represents the cut-off age for grant receipt at age eighteen, and the dashed vertical line the legal minimum school leaving age of fifteen. Data: National Income Dynamics Survey.

The next section presents the results of estimates of the grant impact on these two outcomes, using both parametric and non-parametric techniques.

3.5 Methodology and Estimation

3.5.1 Parametric Estimation

Three specifications are used, estimated with enrolment and years of schooling as dependent variables, and motivated by the identification strategies discussed in Chapter 2. The first is multiple linear regression, and the main determinant of interest is actual child support grant receipt. Model (1) is as follows:

$$Y_i = \beta_0 + \beta CSG_i + \alpha X_i + \gamma HH_h + \epsilon G_g + u_i \tag{1}$$

Y_i reflects the enrolment or attainment outcome variable for individual i, in household h, and geographical area g. CSG_i reflects actual receipt, X_i includes age, gender, mother's education, a binary variable for race, maternal presence in the household and other important individual characteristics. HH_h is a vector of household characteristics including the log of household income and spending on education, and household size. G_g includes geographical controls, including binary variables for the provinces, and an indicator of living in a rural area. u_i represents the regression error.

The combination of the large fall in grant receipt around the age eligibility limit for those in the means test sample, and the presence of some inclusion errors, lends itself to estimation of the grant effect using a fuzzy regression discontinuity design (Imbens & Lemieux 2008). This motivates the introduction of Model (2), a two-stage least-squares (2SLS) estimation, where CSG_i is instrumented for with a binary variable which indicates age eligibility[48], $Elig_i$. This strategy is not unique, especially in the South African literature, where age eligibility, a change in age eligibility, or the number of age-eligible individuals in a household have all been used to instrument for the receipt of either the pension or child support grant (Samson et al. 2004, Duflo 2003, Abel 2013, Bertrand, Sendhil & Miller 2003). In Wave 3, in the fifteen to nineteen-year-old sample, $Elig$ is one for those aged fifteen to seventeen, and zero for those aged eighteen and nineteen.

[48]It is possible to create a variable which reflects full eligibility for the grant from both an age and income perspective. A means test binary variable is used in this analysis to restrict the main sample, and as seen in Table 2 in Chapter 2, eighty-nine percent of CSG recipients qualify as income eligible according to the calculated variable, indicating this calculation is fairly accurate. A similar figure of ninety percent of teens aged fifteen to nineteen qualify as income eligible - see Table 4. However given the much higher precision in age data compared to income data, and the difficulty in ensuring the dual income variable for both parents is calculated correctly, for the analysis in this thesis the choice is made to restrict the sample to means test eligible teens (as calculated using reported maternal and paternal income data). Age eligibility is then used as the only instrument for actual CSG receipt, and household income is controlled for to further improve the precision of any estimates of grant impact.

A valid instrumental variables (IV) strategy also requires an exclusion restriction to hold, which is that the instrument is randomly assigned, i.e. $Cov(Elig_i, u_i) = 0$. The assumption in this analysis is that of conditional random assignment, i.e. after controlling for age[49] in the fifteen to nineteen-year-old sample, eligibility is exogenous. In Wave 3, due to the staggered roll-out of the CSG to older teens, age eligibility is conceivably random.

Comparison between seventeen-year-olds in 2010 and 2012 also aids in understanding the choice of age eligibility in 2012 as the instrument for CSG receipt. Seventeen-year-olds in 2010 should be fairly similar in characteristics to seventeen-year-olds in 2012 (excluding natural differences due to time trends), and yet seventeen-year-olds in 2012 could access the grant, whereas those in 2010 could not. This implies that random differences in a teen's year of birth could cause large differences in the probability of receipt. Another comparison may also assist in understanding. To be under the age of eighteen in 2012, and thus age-eligible, or to be aged eighteen and over, is exogenous. The age limit happens to be eighteen in 2012, it could also have been seventeen or sixteen as in previous years. In addition, individuals are unable to manipulate the age variable which determines eligibility, implying again that after conditioning for age in the fifteen to nineteen-year-old sample, the instrument is unlikely to be related to a teen's educational outcomes, except through its influence on CSG receipt.

The second requirement for a successful instrumental variables estimation is that of a valid first stage, i.e. $Cov(CSG_i, Elig_i) \neq 0$. The first stage estimates seen in Table 5 show that age-eligible teens are found to have a far higher probability of receipt than ineligible teens: in fact forty-six percentage points higher, which lends weight to the assumption that $Elig_i$ is a plausible instrument for CSG_i. The last assumption required for successful estimation is the monotonicity condition, which requires that no individual is excluded from grant receipt by being age-eligible[50] - a trivial assumption given the CSG allocation rules (Angrist & Pischke 2008).

If these three assumptions are met, the IV coefficient can be interpreted as the local average treatment effect (LATE), i.e. the causal effect of grant receipt on those who do

[49]The assumption is that assignment to treatment is random, conditional on age. It is necessary to account for age differences in enrolment, in particular the downward trend in enrolment for older children.

[50]I.e. that the instrument works in only one direction: eligibility only serves to raise the probability of receipt, and never to reduce it.

respond[51] to age eligibility by ensuring they receive the grant (Angrist & Pischke 2008). In addition, if the instrumental variable is defined such that it rules out the existence of either "always takers" or "never takers", as defined[52] in Angrist & Pischke (2008), then the local average treatment effect can also be interpreted as the average treatment effect. Due to the systems used by SASSA to implement distribution of the grant, there cannot be what Angrist & Pischke (2008) refer to as "always takers" for the CSG. As seen in the data (see Figure 1 in Chapter 2), age ineligibility precludes receipt with certainty. Thus the LATE is also the average treatment effect[53] (ATE) on the treated[54], a fact which supports the external validity of these results. This measure of the average treatment effect can be seen in the estimates in Table 5, which reports the first and second stage estimates for enrolment and years of schooling from Model (2). The results suggest the existence of a strong first stage, and show that CSG receipt is associated with a significantly higher probability of being enrolled, of twelve percentage points.

The exclusion restriction for heterogeneous treatment effects presupposes that there is one unique channel through which eligibility operates on enrolment. Were the instrumental variables results to be examined around the age of fifteen, it would not be possible to attribute any changes in enrolment conclusively to changes in grant receipt, as a large drop-off in enrolment is expected at the age when teens are legally allowed to leave school for the first time. Fortunately the grant age threshold of eighteen in 2012 is sufficiently far from the minimum compulsory school leaving age of fifteen, implying the two effects of grant receipt and being legally allowed to leave school ought not to be related. Moreover, a major drop in enrolment does *not* occur immediately after the age of fifteen, but rather occurs after the age limit for the CSG is reached[55], thus further ruling out this potentially confounding effect. In addition, the coefficients are similar in size and significance in the instrumental variables estimates if other variables are included or excluded[56], which provides further evidence to imply the instrument is acting through

[51] Those who if age-eligible would make sure to receive the grant, with certainty.

[52] Always takers access the grant no matter their age eligibility status, and never takers never take the treatment (access the grant) no matter their age eligibility status.

[53] Presuming this effect is homogeneous (Angrist & Pischke 2008).

[54] As the ATE is a weighted average of the effects on always takers and compliers, and there are no always takers.

[55] See Figure 8.

[56] In additional regressions (not reported here), if all control variables are excluded, the coefficient on age eligibility in the first stage is 0.59, and the impact of CSG receipt on enrolment is estimated at 0.43, significant at the one percent level.

Table 5

Instrumental Variables Estimates: Enrolment and Years of Schooling				
Dependent Variable	CSG	Enrolment	CSG	Schooling
Stage	(1)	(2)	(1)	(2)
CSG Receipt		0.12 **		0.03
Age in Years	-0.08 ***	-0.10 ***	-0.08 ***	0.67 ***
Female	0.01	-0.04 **	0.01	0.66 ***
CES D-10 X 10	-0.01 **	-0.04 **	-0.01 **	-0.22 **
Log of HH Education Spending	0.00	0.03 ***	0.00	0.13 ***
Mother has a Matric	-0.06 **	0.04 *	-0.06 *	0.72 ***
Years of Schooling	0.00	0.04 ***		
Coloured	-0.05	-0.16 ***	-0.05	-0.29 *
Mother Resident in HH	0.10 ***	-0.01	0.10 ***	-0.10
Log of Household Income	0.01	-0.01	0.01	0.13 **
Household Size	0.00	0.00	0.00	-0.05 ***
Rural	0.01	0.02	0.01	-0.15
Age Eligibility	0.46 ***		0.47 ***	
Dependent Variable Mean				
Number of Observations	1,885	1,885	1,890	1,890
F stat	109.0	25.5	113.7	59.2
Adjusted R-squared	0.47	0.24	0.46	0.34

This table reports the results of the first and second stages of instrumental variables estimations predicting the impact of CSG receipt on enrolment and years of schooling. Age eligibility as an instrument for actual receipt. The sample used is that of African and Coloured teens aged fifteen to nineteen in Wave 3 of the National Income Dynamics Survey who are means test eligible for the child support grant. A full set of province dummies is included in each specification. Robust standard errors are calculated, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

only one channel.

Table 6 contains the results of the estimates from Models (1) to (3), where Model (3) is a replication of Model (1), which makes use of potential duration of receipt as the CSG variable, instead of actual receipt. In Column (1), actual CSG receipt is associated with enrolment[57] that is higher by eight percentage points, an effect which is significant at the one percent level. This is approximately a ten percent effect when compared to the mean enrolment in this sample of eighty-one percent, and accords with the result of a twelve percentage point increase in enrolment due to grant receipt seen in the IV results in Column (2). Both of these are large effects in a sample with such high levels of baseline enrolment.

In Columns (3) and (6), the potential duration coefficient is reported to show the impact of an extra ten years of exposure. Students who have ten more years of exposure than other students have a much higher probability of being enrolled (fourteen percentage points), an effect which is significant at the one percent level. A comparison of ten years allows a realistic measurement of the approximate average impact of cumulative years of grant exposure that could be expected to be observed in this sample, given that potential duration varies from three to fourteen years for fifteen to nineteen-year-olds in Wave 3. For another comparison, consider seventeen and eighteen-year-old teens in 2012, who have thirteen and six years of potential exposure respectively, a difference of seven years. After controlling for other differences, these estimates predict enrolment that is eleven percentage points higher for seventeen-year-olds (0.15/10 multiplied by the seven year difference) compared to eighteen-year-olds.

In comparison to the positive grant effects on enrolment, none of the CSG receipt variables emerge as significant[58] in the years of schooling estimates, as can be seen in Columns (4) to (6) in Table 6. This is possibly to be expected for the models in Columns (4) and (5), which measure the impact of current receipt rather than cumulative, on years of schooling. However, potential duration of receipt as a cumulative measure seems more likely to be associated with education attained, a stock variable, and yet it is not.

A determinant which might be expected to be significant in these estimates is house-

[57]In Table 6 it can be seen that students who are either older, Coloured or living in the Western Cape are significantly less likely to be enrolled, and those with higher levels of education are significantly more likely to be enrolled.

[58]Older teenagers have significantly higher education (as expected), as do female teens. In addition Coloured teens have almost one-third of a year less education than African teens.

Table 6

Determinants of Enrolment and Schooling in Wave 3						
Dependent Variable	Enrolment			Years of Schooling		
	(1)	(2)	(3)	(4)	(5)	(6)
Actual Receipt	0.08 ***			0.08		
Age Eligibility (IV)		0.12 **			0.03	
Potential Duration X 10			0.15 ***			-0.02
Age in Years	-0.11 ***	-0.10 ***	-0.08 ***	0.68 ***	0.67 ***	0.66 ***
Female	-0.04 **	-0.04 **	-0.04 **	0.66 ***	0.66 ***	0.66 ***
CES D-10 X 10	-0.04 **	-0.04 **	-0.05 ***	-0.21 **	-0.22 **	-0.22 **
Log of HH Education Spending	0.03 ***	0.03 ***	0.03 ***	0.13 ***	0.13 ***	0.13 ***
Mother has a Matric	0.03 *	0.04 *	0.03	0.72 ***	0.72 ***	0.72 ***
Years of Schooling	0.04 ***	0.04 ***	0.04 ***			
Coloured	-0.16 ***	-0.16 ***	-0.16 ***	-0.29 *	-0.29 *	-0.29 *
Mother Resident in HH	0.00	-0.01	0.01	-0.10	-0.10	-0.09
Log of Household Income	-0.01	-0.01	-0.01	0.13 **	0.13 **	0.14 **
Household Size	0.00	0.00	0.00	-0.05 ***	-0.05 ***	-0.05 ***
Rural	0.02	0.02	0.02	-0.15	-0.15	-0.15
Dependent Variable Mean	0.81	0.81	0.81	8.76	8.76	8.76
Number of Observations	1,885	1,885	1,885	1,890	1,890	1,890
F stat	26.2	25.5	26.0	61.8	59.2	59.2
Adjusted R-squared	0.25	0.24	0.24	0.34	0.34	0.34

Three specifications are used to estimate the impact of CSG receipt on enrolment and years of schooling in Wave 3 of NIDS. In Columns (1) and (4), actual receipt is used as the CSG variable of interest. In Columns (2) and (5), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Columns (3) and (6), the impact of potential duration of CSG receipt is shown. The sample used is that of African and Coloured teens aged fifteen to nineteen in Wave 3 of the National Income Dynamics Survey who are means test eligible for the child support grant. A full set of province dummies is included in each specification. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

hold income, depending on the degree of income pooling in the household (Case & Deaton 1998). However household income is only a significant predictor[59] of years of schooling, but not of enrolment. This latter result is unexpected. Even if school fees are no longer relevant given the introduction of no fee schools in South Africa, there are other direct costs (transport, uniforms etc), as well as indirect costs (such as food or health spending) associated with school attendance. These are paid from the household budget, implying household income could be expected to be a significant determinant of enrolment, and yet it is not.

In comparison to household income, household[60] spending on education *is* seen to be positively associated with enrolment levels[61] as well as years of schooling (the latter to a similar degree as household income). Empirically mothers have been seen to direct extra income to child specific expenses such as the costs of schooling (Bourguignon et al. 1993). If mothers have a greater degree of control over how their own grant money is spent compared to overall household income, this result is as expected, especially if the degree of income pooling in the household is small (Delany 2008). If this is the case, this helps to explain why grant income or educational spending (both of which may be more targeted to teenagers) may have an impact on enrolment while household income does not. This result is investigated further in Chapter 5.

3.5.2 Sub-Sample Analysis

The literature suggests that differences may exist in the grant effect in certain sub-groups. Model (1), the results of which are seen in Columns (1) and (4) in Table 6, is re-estimated[62] for different sub-samples, and the results are shown in Table 7. The results from the identical sample analysis using the instrumental variables estimates are quantitatively similar, although larger. These IV estimates can be seen in Appendix Item A.1, Table 33. As the smallest coefficients seen in all of the enrolment estimates in Table 6, the ordinary least squares estimates (OLS) are used as the most conservative

[59] A one percent increase in household income is associated with just over one-sixth of a year more of schooling (this effect is significant at the five percent level).

[60] Household educational spending is included as opposed to individual educational spending as individual education spending is missing for a proportion of the sample.

[61] A one percent increase in education spending in the household is associated with a three percent increase in the probability of enrolment, and 0.13 of a year more of schooling, and both effects are significant at the one percent level.

[62] The top line in this table corresponds to the OLS coefficients in the first and fourth columns of Table 6.

estimates of grant impact on enrolment. The means test eligible sample[63] is the same as that used in Table 6, and the four numbers reported are the increase in enrolment related to CSG receipt, the significance level, the mean of the dependent variable in the sample (mean enrolment or years of schooling), and the number of observations in that sample.

Table 7

Grant Impact on Enrolment and Years of Schooling in Wave 3
(Selected Sub-Samples)

Samples	Enrolment		Years of Schooling	
Means Test Eligible	0.08	***	0.08	
Mean, Sample Size	0.81	1,885	8.76	1,890
All	0.07	***	0.10	
(Means Test Eligible and In-Eligible)	0.82	2,391	8.86	2,396
Coloured	0.25	***	0.34	**
	0.61	220	8.80	220
African	0.06	***	0.04	**
	0.83	1,665	8.75	1,670
Female	0.09	***	0.17	**
	0.79	980	9.08	983
16 and 17 Year Olds	0.11	***	-0.04	**
	0.88	789	8.49	791
Pensioner Household	0.15	***	0.20	**
	0.83	540	8.71	542
Rural	0.05	**	0.02	**
	0.83	1,231	8.64	1,235
Urban	0.15	***	0.21	**
	0.77	529	8.94	530

The main ordinary least squares estimates of grant receipt impact on enrolment and years of schooling are replicated in specific sub samples of the base sample (African and Coloured teens aged fifteen to nineteen in Wave 3 of the National Income Dynamics Survey who are means test eligible for the child support grant). The four elements reported are percentage point changes and significance, mean level of enrolment or education, and number of observations. For e.g., The entire sample has 2,321 observations, the effect of receipt on enrolment is eight percentage points, the mean level of enrolment in this sample is 82%, and this coefficient is significant at the one percent level. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

The positive effect of CSG receipt on enrolment is significant in all samples. Particularly high values are seen for Coloured teens[64], teens in urban areas, and those in

[63] African and Coloured teenagers between the ages of fifteen and nineteen who are means test eligible for the grant.

[64] This group has particularly low rates of enrolment at sixty-one percent, compared to values above eighty percent in most other samples.

households receiving both the government old age pension and the child support grant[65]. Of interest is that a positive and significant impact of CSG is now seen on years of schooling in certain sub-samples), although these coefficients are small[66].

These significant differences in enrolment by CSG beneficiary status are investigated further in the next section, using non-parametric estimations which again exploit the variation in potential duration of receipt to identify the grant effect.

3.5.3 Non-Parametric Estimation

Following Duflo (2000), non-parametric regressions are estimated as follows:

$$Y_i = g(Age_i) + \epsilon_i \tag{2}$$

Y_i is enrolment, for individual i, and Age_i is the age of the child. ϵ_i is an error term, where $\epsilon_i \sim i.i.d[0, \sigma_\epsilon^2]$, and $g()$ is the un-specified regression function[67]. These methods allow the most unrestricted estimation of any model relating enrolment and receipt. Equation (2) is graphed for a number of different samples, each of which have differing levels of potential duration of receipt, showing ninety-five percent confidence intervals.

In Figure 11, the probability of enrolment by proportion of life exposed is graphed, for those with less than or more than half of their lives exposed. Figure 12 graphs enrolment for individuals who have had potential duration of receipt which is less than or greater than three years. In both figures it can be seen that those with more exposure have a much higher probability of being enrolled, and these differences are significant at the five percent level. Figure 13 graphs enrolment by nature of receipt, whether interrupted or uninterrupted. Whether receipt was interrupted or not matters, as those with uninterrupted receipt (teens born after 1995), have a significantly higher probability of enrolment than those whose receipt was interrupted. The next section performs a number of robustness and validity checks of both the parametric and non-parametric results.

[65] Twenty-five, fifteen and fifteen percentage points respectively.

[66] The significant effects of the CSG on years of schooling range from 0.04 (African teens) to 0.2 years (the pensioner or CSG household sample). Female and Coloured teens see an increase in years of schooling associated with CSG receipt of 0.17 and 0.34 years respectively.

[67] Different methods are used, including a kernel weighted local polynomial regression, using the epanechnikov kernel, and a locally weighted smoothing estimator known as lowess (Cameron & Trivedi 2009). The local polynomial regression results are reported.

Figure 11

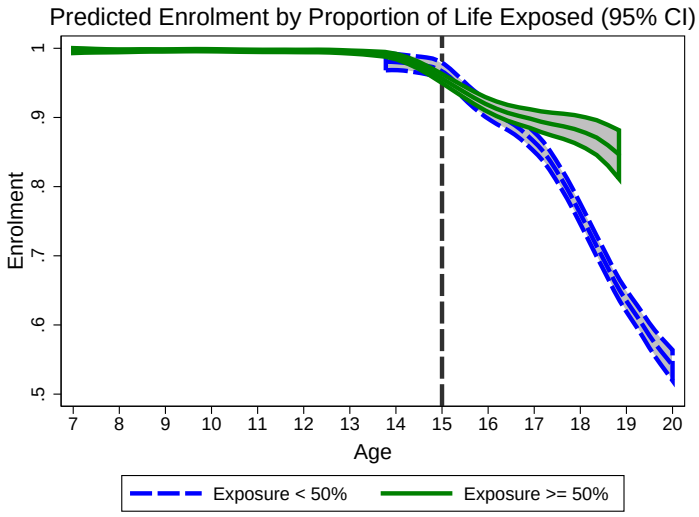


Figure 11 shows predicted enrolment (from a local polynomial regression), graphed by proportion of life exposed to the CSG (less or more than half of the teen's life), with ninety-five percent confidence intervals. The oldest a teen can be who has been exposed for more than fifty percent of their life is nineteen in Wave 3. The dashed curve ends abruptly because any child younger than thirteen has been exposed to the CSG for more than fifty percent of their life. Data: National Income Dynamics Survey.

Figure 12

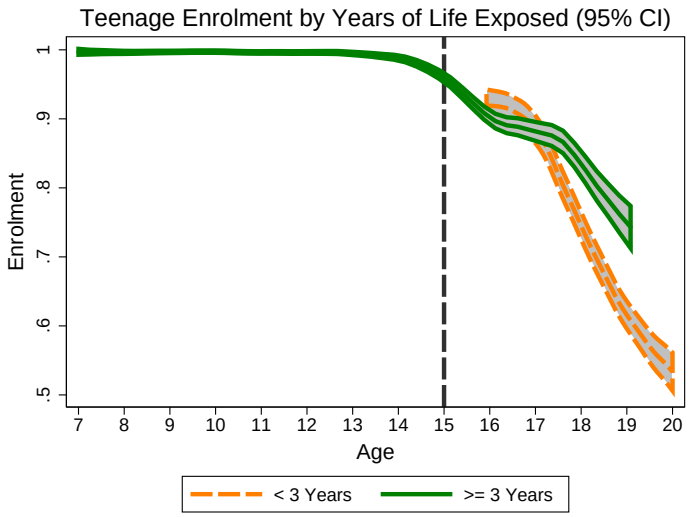


Figure 12 shows predicted enrolment as a function of age for those who have had exposure to the CSG for more, or less than three years, with ninety-five percent confidence intervals. Data: National Income Dynamics Survey.

Figure 13

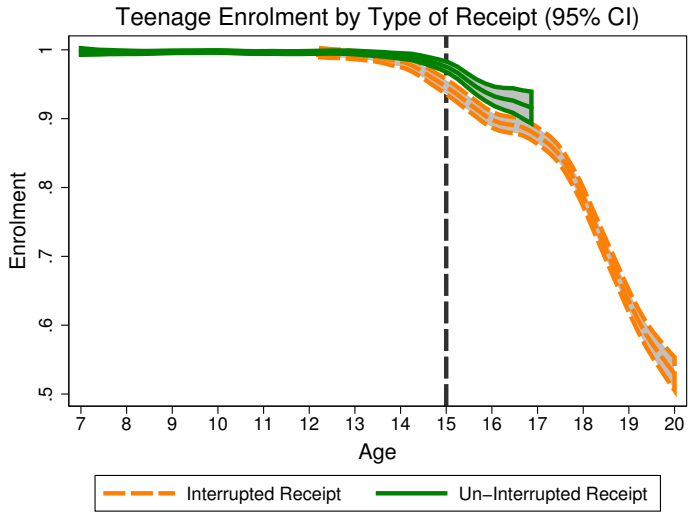


Figure 13 shows predicted enrolment as a function of age for those who have had either interrupted (born before 1995) or un-interrupted receipt, with ninety-five percent confidence intervals. Data: National Income Dynamics Survey.

3.6 Validity and Robustness of Results

3.6.1 Receipt and the Younger Child

In this section, the CSG effects are investigated further, and tested for validity using a number of different methods. These include the use of different samples, data sets, and specifications. To begin, the grant impacts are estimated using a sample of younger children below the age of fifteen - see Table 8. The question is whether or not similar CSG effects will be seen on enrolment, and on education. Ordinary least squares estimates are presented in Columns (1), (3) and (5), estimating the impact of actual receipt, and instrumental variables estimates are presented in Columns (2), (4) and (6), with actual duration of receipt instrumented for using potential duration of CSG receipt. These estimates cannot be performed for teens older than fifteen as duration of CSG receipt data is not collected in the adult questionnaire.

Age is not included in the instrumental variable estimates, as in the younger sample (children aged thirteen or lower), potential duration increases linearly with age[68], thus

[68]This can be seen in Figure 6, Chapter 2.

Table 8

Determinants of Enrolment and Schooling: Children Aged Seven to Fifteen						
Dependent Variable	Enrolment		Years of Schooling			
Age Range	7 – 14 Years Old		7 – 14 Years Old		10 – 14 Years Old	
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Actual Receipt	0.01 *		0.19 ***		0.30 ***	
Duration of Receipt		0.00		1.43 ***		2.92 ***
Dependent Variable Mean	1.00	1.00	3.59	3.49	5.38	5.36
CSG Variable Mean	0.88	8.63	0.87	8.23	0.86	9.54
First Stage Instrument Coefficient		0.46 ***		0.64 ***		0.38 ***
Number of Observations	3,177	2,128	3,745	2,511	1,816	1,163
F stat	0.80	0.31	849	31.5	95.3	0.76
Adjusted R-squared	0.00		0.80		0.43	

Two specifications are used to estimate the impact of CSG receipt and the duration of receipt on enrolment and years of schooling in Wave 3 of NIDS. In Columns (1), (3) and (5), actual receipt is used as the CSG variable of interest. In Columns (2), (4) and (6), instrumental variables estimates are presented, using potential duration as an instrument for actual duration of receipt. The sample is comprised of African and Coloured learners between the ages of seven and fourteen who are means test eligible for the child support grant. The years of schooling estimates are replicated for a slightly older sample of children aged ten to fourteen years old. A full set of province dummies is included in each specification, as well as other relevant controls: gender, log of educational spending, mother has a matric, years of schooling (in the enrolment estimates), race, mother is resident, log of household spending, household size and rural . The first stage instrument coefficient presents the coefficient on potential duration in the first stage CSG duration regression. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

the inclusion of age renders the estimate of duration effect meaningless[69]. Very small grant effects on enrolment are expected, due to the near one hundred percent rate of enrolment in this sample, and this is confirmed in the table. Receipt is associated with a one percent higher rate of enrolment, a coefficient which is only significant at the ten percent level. Of interest is that a positive and significant effect of receipt is seen on years of education: these younger beneficiaries obtain an additional 0.19 years of schooling, and this effect is significant at the one percent level.

The instrumental variables estimates show that duration of receipt is associated with a large and significant increase in average schooling. However, the results should be interpreted with caution, due to the nature of this selected sample. Not only is actual duration of receipt data not collected for older teens, it is also only collected for individuals who currently report receipt, thus these estimates of the impact of longer duration of receipt only apply to current beneficiaries. An extra year of receipt for current grant beneficiaries is associated with average years of schooling nearly 1.5 years higher in the sample aged seven to fourteen years old, and just under three years higher for children aged between ten and fourteen.

3.6.2 External Validity: General Household Survey Estimates

The effect of child support grant receipt on enrolment and years of schooling is also investigated using the 2012 General Household Survey (see Table 9), in a similar sample of means test eligible[70] African and Coloured teens aged fifteen to nineteen. The General Household Survey is a nationally representative survey collected by Statistics South Africa, containing 91,859 individuals in 25,365 households in 2012, designed to evaluate the welfare of South Africans (StatsSA 2012).

[69]Regression results including age and potential duration have no logical interpretation - it is impossible to estimate changes in the dependent variable arising from a change in potential duration, while holding age constant.

[70]The data available in the GHS necessitate the calculation of the means test eligible variable using a slightly less specific measure of means test eligibility than the NIDS. This is due to a lack of data on caregiver identity. The means test eligible are defined as those who live in households with both parents and a household income less than 5,600 rand, or with only one parent and household income less than 2,800 rand. This is an approximate measure. There may be age-eligible teens incorrectly classified as not means test eligible according to this measure: their parents may have dual income less than the joint means test threshold value of 5,600 rand, but overall household income may be more than 5,600 and thus these teens will be excluded from this sample. What is certain however is that no teen is included in this means test eligible sample who is not means test eligible. Table 34 in Appendix Item A.2 replicates this table using the full sample unrestricted by the means test, and apart from the expected increase in sample size, very similar effects are found (both in size and significance).

Table 9

Determinants of Enrolment and Schooling: General Household Survey 2012
Means Test Eligible Teens Aged Fifteen to Nineteen

	Enrolment			Years of Schooling		
	(1)	(2)	(3)	(4)	(5)	(6)
Actual Receipt	0.10 ***			0.26 *		
Age Eligibility (IV)		0.10 ***			0.04	
Potential Duration X 10			0.16 ***			0.49 ***
Age in Years	-0.08 ***	-0.08 ***	-0.06 ***	0.66 ***	0.59 ***	0.72 ***
Female	-0.05 ***	-0.05 ***	-0.05 ***	0.53 ***	0.54 ***	0.56 ***
Years of Schooling	0.03 ***	0.03 ***	0.03 ***			
Coloured	-0.15 ***	-0.15 ***	-0.14 ***	-0.01	-0.02	0.23
Mother Resident in HH	0.00	0.00	0.01	0.09	0.09	0.04
Log of Household Income	0.01	0.01	0.01	0.12 **	0.12 **	0.12 ***
Household Size	0.00	0.00	0.00	-0.05 ***	-0.06 ***	-0.05 ***
Rural	0.03	0.03	0.04 **	-0.27 ***	-0.27 ***	-0.26 ***
Dependent Variable Mean	0.82	0.82	0.83	8.80	8.80	8.72
CSG Variable Mean^{+}	0.49	0.50	10.0	0.49	0.49	10.0
Number of Observations	3,142	3,142	3,986	3,147	3,147	3,994
F stat	44.3	44.1	45.7	71.5	71.4	83.0
Adjusted R-squared	0.20	0.20	0.18	0.24	0.24	0.24

Three specifications are used to estimate the impact of CSG receipt on enrolment and years of schooling in the 2012 General Household Survey. In Columns (1) and (4), actual receipt is used as the CSG variable of interest. In Columns (2) and (5), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Columns (3) and (6), the impact of potential duration of CSG receipt is shown.$^{+}$The means of the three CSG variables of interested are reported: in Column (1), forty-nine percent of the sample are receiving the CSG, in Column (2) fifty percent of the sample are age eligible for the grant, and in Column (3) the average potential duration of receipt is ten years. The sample is comprised of African and Coloured teens between the ages of fifteen and nineteen, who are means test eligible for the grant. A full set of province dummies is included in each specification. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

The enrolment results are very similar[71] in both size and significance to the first estimates shown in Table 6. CSG receipt is seen to raise enrolment by approximately ten percentage points (in both the OLS and IV estimates), and an extra ten years of exposure to the grant is associated with enrolment that is higher by sixteen percentage points[72]. In these estimates, CSG impact is also positive and significant in some of the years of schooling estimates. The IV estimates are insignificant, although an additional ten years of potential grant receipt is associated with an extra half a year of education attained, significant at the one percent level, and grant receipt itself is associated with nearly a quarter of a year more schooling attained, although this effect is only significant at the ten percent level.

The effects on enrolment appear clear, but what conclusion to draw about years of schooling in this GHS sample is a little less clear. A conservative approach seems best. In the enrolment estimates in the NIDS, the OLS and IV CSG coefficients are always the same, or the IV is bigger (see Table 6), implying the OLS effect is a lower bound, and that possibly the IV has reduced some negative omitted variable bias. The potential duration estimates are larger than the OLS and IV too. However here in the GHS years of schooling estimates, the OLS is barely significant and the IV is not significant at all, leaving one to wonder if the potential duration estimate is to be relied on. Given the consistent null years of schooling result seen in the sub-sample analysis earlier in this chapter, it seems wise not to interpret too much from this one significant effect in the GHS.

3.6.3 Estimation Issues

Multicollinearity concerns motivated the exclusion of certain variables in the appropriate models (such as number of children, adults and pensioners in the household, household grant income, potential duration, education deficit). Their removal improves precision, but does not impact on the coefficients of interest. In other regressions, not reported here,

[71] Both the estimates using the NIDS and the GHS in turn have similar values for average enrolment (eighty-one percent vs eighty-two percent), years of schooling (8.80 vs 8.76), unadjusted and adjusted R-squared values (twenty-five and thirty-four in the NIDS, and twenty and twenty-four in the GHS), and similar size coefficients on most of the independent variables included in the regressions. This is despite certain differences in the variables controlled for, due to a lack of data in the GHS for certain variables.

[72] The corresponding figures are eight, twelve and fifteen percentage points in the NIDS data used in Table 6.

the inclusion or exclusion of other controls does very little to change the sign, magnitude or significance of these positive CSG coefficients in all three enrolment models.

The enrolment estimates are replicated excluding education level, in order to use an exactly identical set of controls in the estimates of both enrolment and schooling, as opposed to those reported in Table 6 which contain years of education as a control in the enrolment estimates in Columns (1) to (3). The main results do not differ in any meaningful way (see Table 35 in Appendix Item A.3).

The results of a number of consistency checks using different samples and specifications are presented in Table 10. The first line replicates the main OLS results from Table 6, reporting the coefficient on actual CSG receipt. The second set of results substitutes a measure of receipt which includes both current grant beneficiaries, and teenagers who are receiving, or have received the grant in the past two years[73], i.e. in Wave 3 or Wave 2. Current or recent past CSG receipt does not affect years of schooling, yet raises enrolment by ten percentage points. Even in the means test ineligible sample, although CSG receipt in this group is predictably low, fourteen percent do report receipt[74], and similar size effects are seen, implying that ineligible individuals also receive similar benefits from the grant to those who are actually eligible for the grant.

Whether the household contains a CSG recipient does not impact significantly on individual enrolment[75], nor does the number of CSG recipients in the household. When household fixed effects are included in the specification from the first line, the CSG variable becomes insignificant. It appears that individual CSG receipt matters most, and that possible spillover effects from CSG recipients to non-recipients (seen in earlier literature) are not present to any great degree[76].

Table 10 also reports marginal effects (at the means) from logit and probit estimates of enrolment. These effects are close to identical in size and significance to the ordinary least squares model. Table 10 also contains the main estimates performed using a sample of fourteen and fifteen-year-olds. As expected, given the very high enrolment in the fourteen-

[73]Approximately thirty-two percent of individuals in the base sample are current CSG recipients, and forty-three percent are current or past recipients.

[74]Those reporting receipt in this sample may reflect potential inclusion errors, or these recipients may have been means test eligible on first obtaining receipt in previous years, and may have seen their circumstances improve to take them over the threshold value in Wave 3.

[75]Although living in a CSG household is associated with lower educational education.

[76]This does lend weight to the identification strategy used in this thesis, as spillover is a potential concern in any experimental or quasi-experimental study.

Table 10

The Effect of CSG Receipt on Education and Enrolment in Wave 3 Robustness Checks				
Dependent Variable	Enrolment		Years of Schooling	
Means Test Eligible CSG Effect	0.08	***	0.08	
Mean, Sample Size	0.81	1,885	8.76	1,890
Past or Current Receipt	0.10	***	0.08	
	0.81	1,885	8.76	1,890
CSG Household	0.01		-0.24	**
	0.81	1,885	8.76	1,890
Number of CSG Recipients	0.01		-0.06	**
In the Household	0.81	1,885	8.76	1,890
Means Test Ineligible	0.07	**	0.08	
	0.88	473	9.33	473
Logit Marginal Effects	0.09	***		
	0.81	1,885		
Probit Marginal Effects	0.10	***		
	0.81	1,885		
14 Year Olds	0.04		0.28	
	0.99	455	6.70	463
15 Year Olds	0.08	***	0.30	*
	0.96	389	7.43	419
Household Fixed Effects	0.10		0.10	
	0.81	1,885	8.76	1,890

The main ordinary least squares estimates are replicated in a number of different samples and specifications, and the coefficient on CSG receipt is reported. The base sample is 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 NIDS. The four elements reported are percentage point changes and significance, mean level of enrolment or education, and number of observations. For example, the means test eligible sample has 1,885 observations, the effect of receipt on enrolment is eight percentage points, the mean level of enrolment in this sample is eighty one percent, and this coefficient is significant at the one percent level. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

year-old sample, the coefficient on receipt is not significant (although it is positive). As enrolment begins to drop for fifteen-year-olds, the CSG effect becomes significant and at eight percentage points is very similar in size to the main estimates in Table 6.

Regarding the CSG effects on education in Table 10, these are not consistently significant, nor similar in size or sign. Those living in CSG households have attained a quarter of a year less education than those living in non-CSG households, one of only three significant effects of the CSG on years of schooling. The CSG effect on years of education is consistent in the means test eligible and ineligible samples, and using past receipt, but is not significant. Similar results are seen in the estimation of the CSG effect on other educational outcomes in Table 11.

3.6.4 Alternative Educational Outcomes

Table 11

The Impact of CSG Receipt on Educational Outcome Measures in Selected Sub-Samples

Samples	Education Deficit		On Target or Ahead		Repeater		Skipper		Days Missed	
Means Test Eligible	0.04		-0.03		0.04		-0.03	**	-0.16	
Sample Size, Mean	1,886	1.48	1,890	0.30	1,890	0.42	1,890	0.06	4,269	0.74
All	0.01		-0.03		0.02		-0.01		-0.12	
(Means Test Eligible and In-Eligible)	2,390	1.37	2,396	0.33	2,396	0.40	2,396	0.06	5,509	0.70
Coloured	0.06		-0.04		0.07		0.00		-0.40	
	220	1.48	220	0.26	220	0.41	220	0.03	502	0.95
African	0.04		-0.03		0.04		-0.04	**	-0.08	
	1,666	1.48	1,670	0.30	1,670	0.42	1,670	0.06	3,767	0.71
Female	-0.01		-0.03		0.01		-0.03		-0.25	
	982	1.21	983	0.35	983	0.35	983	0.07	2,150	0.67
Male	0.06		-0.02		0.05		-0.03	*	-0.08	
	904	1.77	907	0.24	907	0.50	907	0.04	2,119	0.80
Pensioner & CSG Household	-0.21		0.00		-0.02		-0.03		-0.66	**
	541	1.47	542	0.28	542	0.42	542	0.05	1,266	0.74
Rural	0.08		-0.03		0.04		-0.04	*	-0.09	
	1,233	1.54	1,235	0.29	1,235	0.44	1,235	0.06	2,756	0.67
Urban	-0.15		-0.04		0.02		-0.02		-0.28	
	529	1.36	530	0.32	530	0.38	530	0.05	1,253	0.77

The main ordinary least squares estimates are replicated in specific sub samples of the base sample (African and Coloured teens between the ages of fifteen and nineteen who are means test eligible for the grant in NIDS Wave 3), with various educational outcomes as the dependent variable. These are: educational deficit, calculated as the difference between the expected grade of the individual, and their actual grade; on target or ahead which is a binary variable with one indicating that the individual has either no educational deficit, or has a negative deficit (i.e. exceeding expectations in grade attainment); repeater or skipper are binary variables indicating an educational deficit which is either positive or negative respectively. Days missed is a variable measuring the number of days absent in the past month, data which is only collected for children below the age of fifteen. The four elements reported are percentage point changes and significance, mean level of the dependent variable in question, and number of observations. For example, the entire sample has 2,320 observations, the effect of receipt on the education gap is negative one percentage points, the mean education gap in this sample is 1.37 years, and this coefficient is not significant. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

The estimates are also performed using a number of other educational outcomes as dependent variables, but little significant impact is found. These estimates are seen in Table 11.

The variables are educational deficit, calculated as the difference between the expected grade of the individual, and their actual grade; on target or ahead which is a binary variable with one indicating that the individual has either no educational deficit, or has a negative deficit (i.e. exceeding expectations in grade attainment); and grade repeater or skipper, which are binary variables indicating an educational deficit which is either positive or negative respectively. Days missed is a variable measuring the number of days absent from school in the past month, data which is only collected for children below the age of fifteen. The four elements reported are percentage point changes and significance, mean level of the dependent variable in question, and number of observations. In the top row of the table, it can be seen that the means test eligible sample has 1,886 observations, the effect of receipt on the education deficit is 0.04 years, the average education deficit in this sample is 1.48 years, and this coefficient is not significant.

There is very little significant impact of CSG receipt on these mostly cumulative educational outcomes. CSG receipt is seen in certain samples to have a significantly negative impact on the probability that a child has skipped a grade, although the variation in this variable is very low, indicating this is likely to be an unreliable estimate. In pensioner and CSG households, CSG receipt is associated with a reduction in the number of days of school missed for the younger sample (below the age of fifteen) of two-thirds of a day, however this effect is not observed in any other samples.

The mean values of these outcomes in Table 11 reflect the discouraging state of educational attainment in South Africa. In the means test sample, the average educational deficit in the fifteen to nineteen-year-old sample is nearly 1.5 years. Only thirty percent of students are on target or ahead of grade expectations given their age, and a full forty-two percent are grade repeaters. Only six percent are grade skippers, and teens on average miss three-quarters of a day of school a month.

These tests have further confirmed the results observed previously in this chapter, that CSG receipt is associated with significantly higher levels of enrolment, but little to no effect on years of schooling. Why this is the case is puzzling, as it implies school enrolment is not translating into actual achievement. It may possibly be that cumulative impacts

of grant receipt are a more correct measure to identify the impact of cash transfers, or that other confounding effects exist which affect the significance of the impacts found.

3.7 Confounding Effects

3.7.1 The Cumulative Effects of Grant Receipt

Many of the cash transfer programs in developing countries have been running since the 1990s, such as the *Bolsa Familia* in Brazil, *PROGRESA* in Mexico, the Family Allowance Program in Honduras, the Female Secondary School Assistance Project in Bangladesh, and more (Barham et al. 2013). Many children have received these transfers since birth, such as South African children born in 1998, while others received benefits for at least their early years. It is now possible to evaluate the long term impacts of cash transfer receipt in South Africa, and whether these transfers have resulted in significant investments in child health and schooling, as desired.

There is a need for research which evaluates the longer term impacts of these programs, on human capital levels in particular (Behrman et al. 2011, Amarante et al. 2011), a gap this thesis seeks to fill. Only with time can a true assessment be made as to whether the gains in enrolment have lead to true gains in human capital achievement (Baez & Camacho 2011). If no other inputs to the education production function change, an increase in enrolment may only have negative effects if it results in overcrowding or simply an influx of lower ability students who would have been less likely to complete their schooling before the transfer was introduced (Baez & Camacho 2011). In addition, enrolment may not necessarily imply higher achievement - actual attendance is far more key to achievement (Woolard & Buthelezi 2012). Transfers may be more valuable for educational attainment when provided at the ages when drop-out begins (Barham et al. 2013). Some studies exist which measure test scores (a more cumulative measure), but these are less common than those measuring attendance or enrolment (Baird, Ferreira, Özler & Woolcock 2014, Baez & Camacho 2011), and few of them find large effects (Wolf et al. 2013).

In a program evaluation ten years after an initial three years of program receipt in Nicaragua, Barham et al. (2013) observe a large, significant and persistent positive impact of cash transfer receipt on both years of schooling attained[77], and achievement

[77]Recipients attain half a year of education more than non-recipients.

scores. Other studies of programs such as the Mexican Oportunidades cash transfer system, report an increase in grades of a fifth of a year (Behrman et al. 2005, Barham et al. 2013, Baez & Camacho 2011). A ten year evaluation of the Oportunidades uses a measure of cumulative grant receipt to estimate program impact, and finds higher cognitive scores, lower levels of behavioural issues, and higher height for age Z scores due to cumulative grant receipt in eight to ten-year-olds (Fernald et al. 2009). Using exogenous variation in program receipt duration in Colombia, Baez & Camacho (2011) find persistent positive effects of receipt on school completion, in particular for girls and beneficiaries in rural areas, but no effects on test scores.

In this chapter, the estimates of the effect of potential duration of receipt show a large significant impact on the probability of being enrolled, yet no effect for years of schooling. The non-parametric estimates further support this finding of the positive effect of cumulative years of receipt on enrolment, with significant differences in enrolment observed depending on the proportion of life the child is exposed to the grant.

The instrumental variables results for the younger samples in Table 8 do show a large positive effect of duration of CSG receipt on years of schooling, although the nature of the data and sample, and the very large coefficient, recommend that caution be used when estimating these results. The results imply that for a sample of CSG beneficiaries, who are currently reporting duration of CSG receipt data, an extra year of receipt is associated with more than two years of years of schooling attained. This is a very large effect, and is not generalisable to the older teen sample necessarily. In the estimates from the General Household Survey (see Table 9), a positive impact of potential years of receipt on years of schooling can be observed: an extra ten years of receipt is associated with half a year more schooling attained. However, this effect does not accord with the IV or OLS results, implying another omitted factor may be driving those results.

That potential duration does not appear to consistently affect years of schooling for the older teen sample is an unexpected result, given the likely association between cumulative measures of receipt and cumulative outcomes such as years of schooling obtained. Despite the fact that variation in this sample in terms of potential duration does exist, it may be the case that evaluation in a slightly older sample than teens aged fifteen to nineteen is required, when all individuals in the sample are likely to have finished their schooling, and comparison in potential duration of receipt is less likely to be associated with age.

The use of the 2015 Wave 4 data may be more suited to this analysis and is an avenue for future researchers to pursue.

3.7.2 The Dynamics of Enrolment

The random variation in the likelihood of receipt due to the age eligibility changes between 2010 and 2012 would suggest the use of a difference-in-differences approach as an additional identification strategy. However, the unexplained large change in enrolment from Wave 1 to Wave 3 acts as a significant confounding factor. A large dip in enrolment is seen between Wave 1 and 2, followed by a recovery to the original levels in Wave 3 (see Figure 8), with no systemic reason suspected for the change by other researchers (Branson et al. 2013). Difference-in-difference estimates might erroneously suggest that the increase in enrolment could be attributed to grant receipt, when actually some other exogenous change might be causing these effects. Another potential explanation may be related to the data collection in the two waves, which could possibly differ in some important way which affects the measurement of enrolment, and thus renders comparison between the two waves invalid. This is a pity as a difference-in-difference estimation does not require the comparison of the same participants[78] across the waves.

3.7.3 Mother Quality and Reasons for Non-Receipt: Exploratory Analysis

If the quality of a mother's parenting is a significant factor in the child's educational outcomes, and their probability of grant receipt, this may serve as a confounding factor if not controlled for in some way in the estimation. In some preliminary analysis, the relationship between some measures of maternal attentiveness and child enrolment and grant receipt is explored. One measure for maternal "quality" is whether or not the child has a Road to Health clinic card (which records the child's growth, vaccinations and clinic visits). Data on clinic cards is only collected for children below the age of fifteen but it is possible to examine the rates of possession for the oldest teens (twelve, thirteen and fourteen-year-olds) and assume these rates of possession continue in a similar

[78]One could attempt to use the panel and fixed effects to identify the grant effect on enrolment between Waves 2 and 3, although this is not advisable. Besides the unexplained variation in enrolment between the waves, the potential sample size for fixed effects is very small. Of the sample of fifteen to nineteen-year-olds in Waves 2 and 3, the fifteen and sixteen-year-olds in 2010 appear again as seventeen and eighteen-year-olds in 2012 and thus are the only potential observations in a fixed effects analysis. Approximately fifty individuals report changes in both enrolment status and CSG beneficiary status over Wave 2 and 3, which does not yield enough variation for a successful fixed effects estimation.

pattern in the slightly older teens used in this analysis. In Wave 3 of the NIDS, rates of possession are high: eighty-nine percent of fourteen-year-olds hold a clinic card, ninety-one percent of thirteen-year-olds, and ninety-two percent of twelve-year-olds. These rates of possession do not differ significantly for those who are or are not income eligible for the CSG. Beneficiaries and non-beneficiaries in this sample of older children are found to have the same rate of possession of road to health cards[79]. Another measure is reported duration of receipt. Duration is not a predictor of current receipt, and its inclusion does not change the sign or size of the CSG coefficient, implying again that early CSG receipt (a sign of eagerness) does not impact on enrolment for older teens (although according to the literature it may well in the earlier years).

Reasons for non-receipt such as administrative issues, or lack of information about the process tend to be more of an issue for mothers of very young children obtaining receipt for the first time, and not for those of older children. Previous data collection (Department of Social Development 2012) shows that some incorrect beliefs are present regarding who can apply, and that lack of documentation has lowered access rates. However focus groups conducted by the Department of Social Development in 2012 seem to imply that wide spread educational campaigns to alert potential older recipients have been successful. Participants also report a large improvement in the ease of application compared to earlier years.

The stated reasons for non-receipt may also shed some light on the minimal grant effect on years of schooling observed. However, remarkably few individuals interviewed in the NIDS report their grant application being refused - only fifty-four individuals in Wave 3, forty-two in Wave 2, and sixty-nine in Wave 1. For age-eligible African and Coloured children, only eleven percent over the waves have never had anyone apply for a child support grant for them. For those who have not applied, the main reasons are split fairly evenly between lack of correct documentation and indifference (with too high costs of application, and lack of knowledge making up the remainder of significant reasons). This distribution of reasons remains fairly constant over the age distribution. This raises the question of whether it is safe to assume that recipients are no different from non-recipients. A binary variable for both these states jointly (indifference and documentation problems), and separately, are included in the enrolment regressions to

[79]Approximately eighty-eight percent of African and Coloured twelve to fourteen-year-olds possess a Road to Health card, and this figure does not differ significantly by beneficiary status.

determine if these are significant factors in predicting enrolment[80]. These variables are not found to be significant in enrolment regressions for the younger ages, nor for older teens (when using data from previous waves).

This chapter has found a significant and large impact of current grant receipt on the enrolment of older teenagers, and minimal to no impact on years of education. Besides the educational outcomes discussed in this chapter, the literature indicates that adolescent welfare is also affected substantially by cash transfers in other respects (Baird et al. 2013, Baird, Chirwa, De Hoop & Özler 2014). One of these effects is through the impact of a cash transfer on the mental health of teenagers, an outcome which Chapter 4 now examines. The effects found on teen enrolment are likely to be related to the mental health of mothers (Ozer et al. 2011, Ensminger et al. 2003) in some way, and Chapter 4 analyses the relationship between maternal and teen mental health, and the role cash transfers play to mitigate the strong intergenerational transmission of mental illness from mother to child.

[80]These estimates are not reported here.

4 The Parent Trap

> Mother, who has an absolute belief that it is not the cards that one is dealt in life, it is how one plays them, is, by far, the highest card I was dealt[81].

4.1 The Intergenerational Transmission of Depression: CSG as Mitigator

The literature has indicated that grant receipt may positively impact on the educational outcomes of teenagers, and a positive effect of CSG receipt on enrolment has been found in Chapter 3. Another key outcome for teenagers is mental health, an under-researched area. Program evaluation has tended to focus on tangible outcomes such as schooling, poverty, health, or labour force participation, with very little attention being paid to non-tangible elements such as mental health and well-being (Samuels & Stavropoulou 2016) or cognitive ability (Paxson & Schady 2010). Depression among teens in South Africa is a significant concern. As demonstrated in Chapter 2 (see Table 2), seventeen percent of teens in Wave 3 of the NIDS can be classified as depressed, and other studies show that South Africans suffer from depression at rates higher than other countries (Lester & Akande 1997, Ardington & Case 2010). Financial stress, which the grant may relieve, and maternal mental illness are two important determinants of mental health in adolescents.

In Wave 3, one third of teens with parents suffering from depression are seen to suffer from depression themselves, and this relationship continues to hold when children reach adulthood. In other countries, the maternal-child mental health link is similarly large (Currie & Stabile 2007, Victora et al. 2008, Ensminger et al. 2003, Currie & Almond 2011, Frank & Meara 2009, Weissman 2016). It is this effect which is investigated in this chapter, specifically the size of the inter-generational transmission of mental health between mothers and their teen children in South Africa. Although a well known concept, and used widely in many disciplines, the size of the intergenerational health transmission effect is under-researched in Africa and in South Africa (Burns & Keswell 2012, Akbulut & Kugler 2007, Strauss & Thomas 2007). In addition, the role that a cash transfer may play to reduce this negative effect has not been studied in South Africa, and a very sparse literature on this effect exists outside of South Africa. The results in this chapter show that parental mental health is by far the largest determinant of teen mental health in

[81] Kay Redfield Jamison, An Unquiet Mind: A Memoir of Moods and Madness.

South Africa, and the effect size itself is substantial. This chapter finds that the CSG acts as an substantial mitigator of the intergenerational transmission effect.

4.1.1 The Burden Of Mental Illness

One third of South Africans will suffer from a mental disorder in their lifetime (Lund 2012, Myer et al. 2009, Herman et al. 2009), and this burden of disease has been rising since 1990 (Jack et al. 2014). Rates of mental illness are higher in South Africa than many other countries (Lester & Akande 1997, Ardington & Case 2010, Herman et al. 2009), and women in particular are heavily affected by mental illness[82] (Moultrie & Kleintjes 2006). However, mental health care has been fragmented and inequitably distributed geographically (Moultrie & Kleintjes 2006, Lund, Kleintjes, Kakuma & Flisher 2010), and has not been integrated well into primary health care services. Care practitioners are often overstretched[83] and facilities are underfunded (Skeen et al. 2014, Jack et al. 2014, Lund, Kleintjes, Kakuma & Flisher 2010), despite the new policies which followed the Mental Health Act of 2002, such as the Mental Health Policy Framework, and the Strategic Plan for 2013 to 2020 (Moultrie & Kleintjes 2006). Even after the 2011 public commitments by the Ministry of Health, health budgets are not reflective of the ministry's stated intentions (Jack et al. 2014). Economic inequality has been linked to higher levels of mental illness, and with a Gini coefficient of 0.66, South Africa is one of the most unequal countries in the world (Blas & Kurup 2010).

Internationally, mental health, and the links between mental illness and physical illness, and poverty, have been largely ignored in public health research (Lund 2012, Prince et al. 2007), in particular in low and middle income countries (Chhagan et al. 2014). The mental health of adolescents in particular has been neglected as an area of study in developing countries, including South Africa (Plüddemann et al. 2014), despite the increasing incidence of suicide among adolescents (Li et al. 2008). Mental health does not form one of the Millennium Development Goals, despite the large contribution of mental illness to the global burden of disease[84], and the complicated link which exists between mental illness and many of the millenium development goals, such as female empower-

[82]In South Africa, depression in women has been found to be the second highest cause of loss of years of life to disability after HIV (Moultrie & Kleintjes 2006).

[83]South Africa has staff ratios of 1.2 psychiatrists, and 7.5 psychiatric nurses to 100 000 people (Jack et al. 2014), a tenth of the ratios seen in high income countries.

[84]Mental illness constituted fourteen percent of the global burden of disease in 2007 (Prince et al. 2007).

ment, child mortality reductions, HIV/AIDS, and others (Chhagan et al. 2014, Prince et al. 2007, Tsai & Tomlinson 2012, Lund 2012). Mental illness is forecasted to be the second highest cause of health disability by 2020 (Blas & Kurup 2010).

Chhagan et al. (2014) note the lack of research in lower and middle income countries on the link between maternal mental health and child development. Cash transfers have been studied extensively, but very few studies of cash transfer program effects have been performed in the psychology literature (Wolf et al. 2013). Indeed, very little research has been conducted on women's mental health in South Africa (Moultrie & Kleintjes 2006), and no other nationally representative surveys exist after the 2002 South African Stress and Health Study (Tomlinson et al. 2009), which measured the prevalence of psychiatric disorders in the population. Few studies exist of the specific economic costs associated with mental and other neurological disorders in South Africa (Jack et al. 2014, Lund et al. 2013), and which types of health care packages would be most effective from a cost and welfare perspective. Research is lacking on the specific impacts of socio-economic changes on the prevalence of mental disorders (Blas & Kurup 2010, Plagerson et al. 2011). Marais et al. (2014) note that mental health is often not considered as one of the issues of concern by government when considering the outcomes of social problems such as HIV/AIDS, and in turn is often not recognised as an area of concern by community based organisations. Another limitation in the literature is that many studies also make use of solely cross-sectional data, making it difficult to establish the direction of causality between outcomes of interest such as socio-economic status and mental health (Lund et al. 2013, Miech et al. 1999).

The costs of mental illness are multi-fold and include the costs of treatment, the costs of caregiving for sufferers of mental illness, whether financial or otherwise, reduced earnings and productivity (Hugo et al. 2003), and the costs arising from the co-morbidity[85] of other diseases (Blas & Kurup 2010). In addition, illnesses such as depression have biological effects on the body's functions, such as stress, inflammatory processes and immunity (Prince et al. 2007), and reduced brain function and brain matter (Sapolsky 2000). Chha-

[85]The disorders which may simultaneously be present include cardiovascular disease, strokes, obesity, smoking, diabetes complications, hypertension (Prince et al. 2007), substance abuse (Blas & Kurup 2010), and others. Research has shown depression very often pre-dates these conditions (Prince et al. 2007). Some research even suggests that individuals with mental disorders have a higher risk of contracting HIV, and adherence to HIV and other important medications is lower for those with mental illness (Prince et al. 2007).

gan et al. (2014) state the need for increased mental illness treatment, particularly for caregivers, given their markedly poor mental health, and the harmful effects of untreated mental illness in caregivers on key child outcomes, such as education (this is explored further in Chapter 5). In particular, treatment which takes into account the many links between mental health and other conditions/environmental factors is needed (Chhagan et al. 2014). On cost considerations alone, early mental health treatment is critical, as it can reduce overall health care costs by as much as a third (Prince et al. 2007), and has been associated with improved economic outcomes in developing countries (Lund 2012).

Yet even when care is available, it may not be sought. Men, and individuals in lower income brackets are less likely to seek treatment (Blas & Kurup 2010). A lack of knowledge about mental illness, and a lack of belief in the efficacy of treatments also prevents individuals from seeking care (Blas & Kurup 2010). Stigma and incorrect information about the diagnosis and treatment of mental health are widespread in South Africa (Skeen et al. 2014, Swanepoel 2011). Treatment of mental illness may also be complicated by the intersection of traditional methods and western medical practice (Jack et al. 2014, Hugo et al. 2003). Many individuals who suffer from mental disorders may not receive treatment (Kessler et al. 2007), or may drop out of treatment despite not reaching full recovery (Bruwer et al. 2011). The time from first onset to treatment may be very long (Kessler et al. 2007), which is unfortunate as treatment costs are higher the longer mental illness is left untreated (Lund 2012), as is the level of treatment resistance (Kessler et al. 2007, Garber & Cole 2010). More extreme illnesses such as psychosis are more likely to be diagnosed[86] and treated quickly, although these conditions are relatively infrequent in the population compared to depression and anxiety disorders (Kessler et al. 2007).

Suicide is the leading cause of death[87] in youth aged fifteen to twenty-four in China (Li et al. 2008), and other countries have similarly disturbing patterns, and an increasing trend, in youth suicide. Approximately half of all mood disorders begin at the age of fifteen, and by the mid-twenties roughly seventy-five percent of mood disorders are apparent (Kessler et al. 2007). Mental health problems are among the leading burden of disease for adolescents (Baird et al. 2013) and young adults[88] (Blas & Kurup 2010, Miech et al. 1999),

[86]This is due to their more noticeable manifestation in behaviour outside of the norm (Kessler et al. 2007).

[87]Youth suicides make up seventeen percent of the total number of suicides in China (Li et al. 2008).

[88]Common mental disorders are very high among adolescents and young adults in industrial countries: the percentage of young adults who meet the criteria for a psychiatric disorder ranges between 25 and

and are particularly problematic, as poor mental health in adolescence can lead to long term consequences, due to the formative nature of this period (Viner et al. 2012). South Africa has similarly high levels of mental illness in adolescents: estimates of teen depression range between thirteen[89] and fifteen percent (Myer et al. 2009, Plüddemann et al. 2014). Adolescents also struggle to gain access to treatment. Less than two percent of South African facilities providing mental health services are dedicated to teens and children (Lund, Kleintjes, Kakuma & Flisher 2010).

It is in adolescence that important relationships are formed, decisions about further education are made, and first jobs are sought (Baird et al. 2013, Kilburn et al. 2015), and poor mental health during this time[90] negatively impacts these important decisions. Teens suffering from depression are also more likely to engage in risky behaviours (Baird et al. 2013, Resnick et al. 2012, Plüddemann et al. 2014), and have poorer school attendance and educational achievement, and worse physical health. These negative outcomes have been observed among depressed youth in Malawi, America, the United Kingdom, Canada and New Zealand (Baird et al. 2013, Anderson et al. 2001, Beecham 2014, Anderson et al. 2012, Currie & Stabile 2007). Hammen et al. (2011) find that Australian adolescents who suffered from early onset depression had a higher risk of early child bearing. Girls often have significantly higher rates of depression than boys[91] (Ensminger et al. 2003, Plüddemann et al. 2014).

Teens infected with HIV are also far more likely to suffer from mental illness (Bhana et al. 2014). Adolescent girls have been found to have HIV rates which are three times that of boys (Datta et al. 2015), which again implies a higher burden of mental illness among girls. High HIV prevalence has resulted in many orphaned children, and very little research has been conducted on the mental health of this vulnerable group (Marais et al. 2014).

Higher rates of untreated depression in girls suggest higher rates of depression are likely to be observed in women (Cyranowski et al. 2000, Hammen et al. 2011). This is in part due to the persistant nature of the disease (Currie & Stabile 2007, Keller et al. 1986),

40 percent (Miech et al. 1999).

[89]In 2002, thirteen percent of study participants of the Stress and Health Survey presented with a mental disorder before eighteen years of age (Myer et al. 2009).

[90]Behaviours begun in adolescence contribute to a large proportion of adult health levels (WHO 2009).

[91]It may be the case that boys respond differently to maternal depression (Ensminger et al. 2003), as seen in higher rates of risky behaviour, suicide (Li et al. 2008), and substance abuse among boys, rather than depression.

and its propensity to increase with age (Ardington & Case 2010). Indeed rates of depression among women are higher, nearly twice that of the rate of depression among men, as documented in many countries, and in South Africa (Ardington & Case 2009, Chhagan et al. 2014, Lund et al. 2013, Hamad et al. 2008). Rates of depression peak among women during the childbearing years in particular (Ozer et al. 2011). This literature also finds that there is a higher prevalence among women of most other psychiatric disorders, compared to men.

Maternal mental illness has numerous negative effects on physical child outcomes. These include worsened infant outcomes including poor nutrition, diarrhoeal disease, low vaccination rates, and limited breastfeeding[92] (Lund 2012, Prince et al. 2007), all of which have a large impact on child development. Given the existing high levels of stunting[93], in particular among African and Coloured children in poor or rural households, maintaining maternal health is imperative (Ardington & Case 2009).

4.1.2 The Cycle Continues

Maternal mental illness affects more than the physical health of children. The children of women who suffer from untreated mental disorders are also more likely to suffer from mental health issues themselves, and the probability of suffering from depression is higher the younger the child is when the mother's depression manifests (Kessler et al. 2007, Hammen et al. 2011, Garber & Cole 2010, Ensminger et al. 2003), and thus a secondary cost to the mental health of children is incurred, in addition to their physical health. Mental health transmission is related to genetic and environmental factors (Ensminger et al. 2003), and thus which factor plays a larger role in transmission is often examined in the literature, as well as the size of the intergenerational transmission effect. Individuals may have a strong genetic predisposition to depression inherited from their parents, but in the absence of environmental stressors, this may not manifest as worsened mental health. Conversely, teens may suffer from depression even without a genetic predisposition, if they are subject to the same negative environmental factors[94] which have impacted negatively

[92]These effects of maternal mental illness have been found in Pakistan, India, Vietnam, Barbados and other countries (Prince et al. 2007).

[93]Ardington & Case (2009) find that twenty-four percent of children under five in 2008 can be classified as stunted, and Tsai & Tomlinson (2012) find a minimum of fourteen percent of cases of child stunting are associated with perinatal depression in Khayelitsha, an informal urban settlement in Cape Town.

[94]These negative factors could be financial stress, a troubled domestic environment due to abuse or the dissolution of marriages (Hammen et al. 2012, Ensminger et al. 2003), or many others.

on their mother's mental health (Ensminger et al. 2003).

The size of the intergenerational transmission effect differs across countries, but is never small. Rates of depression among the daughters of depressed mothers have been seen to be three times higher in Australia (Hammen et al. 2011), and for sons, four times higher (Hammen et al. 2012) than the rates among children whose mothers are not depressed. A child of any gender has rates of depression 1.3 times higher in America (Akbulut & Kugler 2007), five times higher in Denmark Strauss & Thomas (2007), and twice as high in a sample of Australian teens (Hammen et al. 2004). In five major studies of the genetic transmission of depression, Sullivan et al. (2000) find that the risk of suffering from depression if a first degree relative suffered from depression was nearly three times the normal rate of depression.

4.1.3 Cash Transfers and Adolescent Depression

The literature on the impact of cash transfers on teen mental health is limited, and usually based on studies of small-scale programs (Kilburn et al. 2015). Some studies have shown improvements in the mental health of beneficiaries on receipt of cash transfers; in Latin American countries (Samuels & Stavropoulou 2016, Lund 2012), in Niger (Fenn et al. 2014), in South Africa (Case 2004, Hamad et al. 2008), in Kenya and in Malawi (Baird et al. 2013) and others. Other studies have shown that cash transfers, particularly to women who head households, hold promise for the mental health of orphans and vulnerable children (Marais et al. 2014, Lund et al. 2011). In more general terms, lower socio-economic status has been frequently tied to worse mental health (Patel & Kleinman 2003, Lund, Breen, Flisher, Kakuma, Corrigall, Joska, Swartz & Patel 2010, Ensminger et al. 2003, Ozer et al. 2011), suggesting a positive role for exogenous income shocks such as grant receipt.

Where the impacts of cash transfers on mental health have been studied, positive impacts on recipient mental health and well-being have been observed (Lund 2012). Improvements are seen in many measures of emotional health, include child aggression, stress, cognitive development, emotional problems and stress as measured through cortisol production (Samuels & Stavropoulou 2016). Pensions have been found to reduce depression in South Africa, an unconditional cash transfers in Kenya improved happiness and life satisfaction, and cash transfers improved the mental health of adolescent girls

in Malawi (Case 2004, Samuels & Stavropoulou 2016, Baird et al. 2013), to name but a few examples. Less measurable aspects of human well-being, such as dignity, pride, control and self-confidence have all responded positively to cash transfers (Samuels & Stavropoulou 2016).

What is less well researched, if at all, is the impact that cash transfers have on the transmission of depression between parent and child. Fernald & Gunnar (2009) find lowered stress levels in teens who obtained a cash transfer in Mexico, with a particularly strong effect for those living with a depressed mother, but apart from this paper it is difficult to find research which specifically mentions the role that cash transfers can play to mitigate the strong genetic/environmental link between parent and child mental health. This is investigated in detail in this chapter.

4.2 Theoretical Framework

4.2.1 Cognitive and Biological Models of Depression

Depression models incorporate either biological or psychological factors, or both (Roy & Campbell 2013). A good model allows the testing of hypotheses about the causes of depression, and indicates some means of treatment (Rehm 1977). Modelling depression presents challenges, as the condition manifests itself in a wide array of symptoms (both cognitive and physical), which are not all present in every patient (Rehm 1977). Biological models have focused on neurological and hormonal factors such as the HPA axis[95] (Gotlib et al. 2015), cytokine/macrophage theories[96], monoamine theories[97], structural abnormalities[98], damage to brain tissue (Roy & Campbell 2013), and genetic vulnera-

[95]The hypothalamic–pituitary–adrenal axis (HPA or HTPA axis) is a complex set of direct influences and feedback interactions among hormones produced by three endocrine glands: two located in the brain (the hypothalamus and the pituitary gland) and one above the kidneys - the adrenal gland (Pariante & Lightman 2008).

[96]Macrophages are white blood cells which play an important role in reducing inflammation, through the release of cytokines. These are small protein particles which are strongly related to the healthy functioning of the immune system, and have been linked to depression in multiple studies (Roy & Campbell 2013, Dowlati et al. 2010).

[97]Monoamines such as serotonin, noradrenaline, norepinephrine and dopamine are neurotransmitters (chemical messengers in the brain) which may either be present in lowered amounts in the presence of depression, or an oversensitivity in the receptors which release these chemicals may be present, resulting in lowered monoamine levels (Roy & Campbell 2013).

[98]Two areas of the brain which have been seen to be different (through cell damage, atrophy, lesions or other differences) in individuals suffering from depression are the hippocampus, and the pre-frontal cortex (Sapolsky 2000, Roy & Campbell 2013). Nutritional deficiencies in vitamins or iron can also impact on neuronal integrity (Roy & Campbell 2013).

bility[99] (Beck 2008). Models combining both types of factors may have much stronger explanatory power (Roy & Campbell 2013, Beck 2008, Thompson 2014, Gibb et al. 2009), as such models combine the strengths of both of these areas of research, and help to establish the ways in which biological and cognitive factors may interact[100].

A large literature exists in the medical field, making use of the biological models mentioned previously, where often either animal experiments are used, or information about specific health conditions[101] is collected using health surveys, or specific physical aspects of individuals are measured, such as the level of stress hormones present. These approaches are very dis-similar to the methods used in the household survey context. The medical literature has used Kaplan-Meier survival analysis to model the likelihood of depression occurring, where event free survival is the absence of relapse into depression (Tomlinson et al. 2009). Survival analysis could be used with panel data. However, the episodic nature of depression implies the data may not include all instances of relapse, if a relapse occurs before or after survey interviews are conducted, and not at the time of surveying.

Cognitive models of depression are also numerous. They include heuristic models of depression manifesting in different ways related to an individual's actions, and feelings of guilt or failure or learned helplessness[102] (Rehm 1977, Abramson et al. 1978), pessimism and poor self-esteem arising from incorrect beliefs (Beck 2008), worries about an individual's physical health (Rehm 1977), and combinations of external changes and the individual's lack of resilience in the face of those changes (Lewinsohn et al (1974;1969) in Rehm (1977)), and very many others. Depression in children has been modeled with a launch and grow[103] framework, where maternal depression launches processes related to stress, an emotionally unhealthy family environment and low self worth, all of which

[99]Despite the absence of any negative life stressors, individuals may still suffer from mental illness, due to genetic factors (Garber & Cole 2010). Certain genes may be more, or less likely to be present in individuals suffering from depression. For example, the short version of a seratonin transporter gene may be present in a depressed person, rather than the long version (Beck 2008). There are many more examples of genetic differences among individuals suffering from depression (Gibb et al. 2009).

[100]Meyer et al (2004) in Beck (2008) find a relationship between dysfunctional attitudes and serotonin levels, and other studies have shown that genetic vulnerability (the existence of certain genes which predispose an individual to depression) can be strongly related to the presence of cognitive malfunctions, and an exaggerated response to normal life stressors (Caspi et al, 2006 in Beck (2008)).

[101]Such as asthma or hay-fever (Thompson 2014).

[102]Learned helplessness describes a state where an individual continues to feel powerless and lacking in control in a stressful situation, even after the situation resolves (Abramson et al. 1978).

[103]The grow portion of the model reflects the fact that adolescents' initial levels of depression significantly predicted the growth in their symptoms over time.

predict adolescent depression (Garber & Cole 2010).

Causality may be bi-directional between depression and the factors which predict depression (Roy & Campbell 2013, Hammen et al. 2011). A vicious cycle[104] often exists between poverty and mental illness (Patel & Kleinman 2003, Blas & Kurup 2010, Lund 2012). Either a worsening of mental health causes a reduction in earnings, or people with lower socio-economic status have a higher probability of suffering from mental illness. The former is known of as social causation or drift, where individuals "drift" into lower income levels, and the latter as social selection (Lund et al. 2013, Miech et al. 1999).

Some of the individual determinants of depression may also be related to cumulative factors, beginning as early as childhood. It is widely acknowledged that childhood has a strong impact on adult characteristics, such as sensitivity to stress, and resilience. Even stress of the mother during a pregnancy has been shown to impact on the levels of stress in the child in later life (Roy & Campbell 2013).

4.2.2 Modelling the Intergenerational Transmission of Depression

Besides the theory behind the determinants of depression, it is also important to consider the mechanisms through which intergenerational transmission occurs. Akbulut & Kugler (2007) note the limited number of studies of the intergenerational transmission of depression, as do Strauss & Thomas (2007), and the lack of research into the transmission of health in general. In South Africa, a limited number of studies have been conducted of the intergenerational transmission of any kind of status, whether health or economic, owing partly to data constraints (Burns & Keswell 2012).

The theory of intergenerational transmission is not limited to that of health. Studies have been performed of the intergenerational transmission of education, earnings, inequality, the intelligence quotient (IQ), income or wealth and parenting (Burns & Keswell 2012, Bowles & Gintis 2002, Erikson & Goldthorpe 2002, Bowles & Nelson 1974, Van Ijzendoorn 1992), among others. Different models are employed, from those assuming a regression to the mean model of intergenerational transmission of inequality or height (Bowles & Gintis 2002, Galton 1886), a model of intergenerational transmission of IQ which decomposes IQ up into genetic and environmental components (Bowles & Nelson 1974), but which requires very specific quality data and strict assumptions, health

[104]For example, lowered income may result in depression, which may impact on an individual's ability to work, which in turn again lowers income.

production functions (Thompson 2014), and others. Very many studies do not try to disentangle the genetic versus environmental factors in transmission (Van Ijzendoorn 1992).

A model of regression to the mean of mental health could be represented as follows:

$$MH_c - \overline{MH} = \beta_{MH}(MH_p - \overline{MH}) + \epsilon_{MH} \tag{3}$$

MH_c is the mental health of the child, MH_p is the corresponding mental health of the parent, $\overline{MH}$ is the mean of the mental health variable, assumed to be constant across both generations, and ϵ_{MH} is an error term with no correlation to MH_p. β_{MH} measures the intergenerational elasticity, i.e. the percentage change in the child's mental health status associated with a one percent change in the parent's status (Bowles & Gintis 2002), if mental health status is a variable measured in natural log format. The assumption in this model is that the children of parents with severe mental illness will present with mental illness which is not as severe, and thus closer to the mean value $\overline{MH}$, and children of parents presenting with very little or no mental illness will present with higher levels of mental illness, again closer to the value of $\overline{MH}$ (Galton 1886).

Given the nature and nurture elements of depression transmission, another theoretical model could include measures for both previous and current parental depression (or a duration of depression measure). Assuming a simple two period model,

$$MH_t^c = \beta_0 + \beta_1 MH_t^p + \beta_2 MH_{(t-1)}^p + \beta_3 X^c \tag{4}$$

MH_t^c represents the mental health of the child in time t, which relates to the current mental health of the parent, MH_t^p, and parental mental health in the previous period $MH_{(t-1)}^p$, and the X^c, which are individual characteristics of the child, of which some are fixed, and some are variable, and measured at time t. β_1 and β_2 are the main coefficients of interest. The coefficient β_1 may be more closely related to environmental type factors, as the mental health of both parents and children is affected by common environmental factors in the same period t. The coefficient on parental health in the previous period, β_2, may be more likely to reflect the influence of genetic factors. This is because if parental depression is present in previous time periods, it may be more likely to be a chronic condition related to genetic factors, and not just those situational factors which cause an episode of parental depression in the current period. However, it is impossible to ascribe either coefficient definitively to genetic or environmental factors, as situational factors in

time period $t-1$ may well persist to time t, and a significant β_2 may emerge from the model if a genetic predisposition to depression in the parent is triggered which manifests in the current period.

A more realistic model may be one motivated by the work of Thompson (2014), which acknowledges the inextricable link between genetic and environmental factors. The author uses a constant elasticity of substitution health production function to model the intergenerational transmission of health, which can be adapted for depression modelling as follows:

$$MH = A\left[\alpha g^{\gamma} + (1-\alpha)e^{\gamma}\right]^{1/\gamma} \tag{5}$$

MH is the mental health of the child, e and g are the environmental and genetic factors of transmission respectively, where e includes factors such as socio-economic status, health treatment, health behaviours, and other known determinants of depression, and g represents a measure of genes which make the person susceptible to depression. It is assumed that $\gamma \leq 1$ and $0 \leq \alpha \leq 1$. Children and parents share elements of both e and g (Thompson 2014), as they live in the same home environment, and children receive fifty percent of their genetic material from each parent. The size of α determines which factor is more important. The larger α is found to be, the more important genetic factors will be for the transmission of depression, and the smaller, the more important environmental factors will be. γ measures the degree of interaction between genes and the environment. If $\gamma = 1$ then the effects of genes and environment can be separated out as additive factors of MH, otherwise both e and g combined yield the health outcome MH. A value of γ which is less than one is the more realistic scenario (Thompson 2014), given the complicated interplay of genetic and environmental factors observed in the transmission of depression in practise. An example of a gene/environment interaction would be financial stress in an individual who already has a genetic predisposition to depression, resulting in a depressive episode. With available twin data, it is possible to separate[105] the genetic and environmental factors (Bowles & Gintis 2002). However, very often this data is not available[106], and it is not clear exactly how generalisable these results are (Erikson &

[105]In a sample of twins, Bowles & Gintis (2002) describe a simple additive model of earnings, where earnings is the sum of genetic, environmental, and idiosyncratic factors.

[106]Wave 3 of the NIDS contains approximately 297 twin pairs, and there is no way of knowing whether these twin pairs are fraternal or identical.

Goldthorpe 2002).

Household surveys which collect data on emotional health are often used to model depression and its determinants. These surveys tend to collect information more related to socio-economic and sociological factors rather than biological[107] (Blas & Kurup 2010). The data available for this thesis (a household survey), does not lend itself to any biological modelling of depression, except the consideration of the genetic link between parent and child, modeled using the depression data collected for both parents and children. Other papers making use of the NIDS, or other similar household survey data, to examine the correlates of depression, use weighted (and un-weighted) ordinary least squares multi-variate regression analysis (Tomita et al. 2015, Tomita & Burns 2013, Ardington & Case 2010, Miech et al. 1999), logit estimates reporting odds ratios (Li et al. 2008, Myer et al. 2008, Lund et al. 2013, McLaughlin et al. 2011, Miech et al. 1999, Klassen 2014, Hammen et al. 2004) or simply report correlations between depression and its potential causes (Chhagan et al. 2014, Myer et al. 2008, Thompson 2014), without attempting to disentangle genetic and environmental effects.

The theory described here suggests the use of the following model of intergenerational mental health transmission, given the nature of the data available from a household survey such as the NIDS. This model is similar to that used in practise by Thompson (2014) and Akbulut & Kugler (2007).

$$MH_i = f(X_i, HH_h, C_c, P_p, PD_p) \tag{6}$$

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 (Hamad et al. 2008, Ardington & Case 2010) and many more[108]. 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 size, access to services or transport, levels of safety or social cohesion (Tomita & Burns 2013), among others. The HH_h refer to household

[107]Many studies lack information on the genetic makeup of children and mothers, and thus are unable to model the interaction between genes and the environment, and the strength of the genetic connection in determining depression (Ensminger et al. 2003).

[108]Herman et al. (2009) find that women, those with lower levels of education or income, and unmarried individuals are more likely to suffer from poor mental health.

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 characteristics of the individual's parents, which are more important the younger the individual is (Kessler et al. 2007). This heterogeneity in the importance of parental characteristics by age will not be explored here due to the limited age range of the teen sample under analysis. Parental characteristics include the health of the parent, their age, labour market status and education, and any other variables which could impact on the child's mental health. PD_p separates out the mental health variables associated with the parent - this 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.

The model described in Equation 6 is primarily concerned with what one might call "nurture" factors, as opposed to "nature". Due to the nature of the data available, no biological[109] or neurological determinants of depression are taken into account. The NIDS contains many of the factors described here, but not all. As many relevant characteristics as are available in the data are included in the estimates which follow.

4.3 Data and Descriptive Statistics

4.3.1 Measuring Mental Health

The NIDS data is a particularly valuable resource for the study of depression in the South African population, as the only recent nationally representative survey which collects data on both depression and socio-economic factors (Ardington & Case 2009). Surveys containing mental health data often contain very little information about the socio-economic status of sufferers of mental illness, and conversely, those containing information about socio-economic status rarely capture information about mental health (Ardington & Case 2010).

The NIDS has been running for eight years, from 2008 to 2015, yet very little research has been performed using the data to investigate the relationships between maternal mental health and child outcomes. A few papers exist examining the impact of depressed mothers on younger children and infants (Tomita et al. 2015). However, very few have

[109] Apart from mother's mental health.

focused on teen and adult outcomes.

The episodic nature of depression makes it difficult to adequately describe the temporal nature of intergenerational transmission when using household survey data. An individual may suffer from chronic depression; however, if they are in between episodes at the time of the interview, they would be recorded as not depressed in that wave, which is an untrue reflection of their true state of mental health. This is a constraint, but it is to be hoped that on average in a large enough sample meaningful conclusions about the determinants of depression can still be drawn.

Depression is manifested in physical and mental symptoms. The Diagnostic and Statistical Manual-V (DSM-V) contains the most up-to-date definitions and descriptions of all mental disorders, and is one of the most common references for diagnosis (American Psychiatric Association 2015). However, empirical work is often performed by researchers who are not familiar with the DSM-V, 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 (Blas & Kurup 2010). The Center for Epidemiological Studies Short Depression Scale (CES-D 10) is a short self-reported scale which is designed to diagnose and classify the severity of depression (Radloff 1977). The NIDS collects data on emotional health, in particular the ten key variables used to calculate the CES-D 10 score, a screening instrument[110] to detect the presence of depression.

The NIDS also contains other questions which could indicate the presence of other psychiatric illnesses such as anxiety, bipolar, schizo-affective disorder, and others, but the average number of respondents of these questions is very low[111]. Other health measurement variables are self reported measures of overall health, and assisted daily living scores which can be computed from the data in Waves 2 and 3. The data includes general satisfaction with life measures, whether survey participants are happier, the same, or less happy than ten years ago, and whether participants feel their households are doing better or worse than others in terms of household income. Optimism variables of a prediction of the household's income levels in two or five years from the interview date are also in-

[110]Screening instruments are used to detect a potential disease in the general population (Radloff 1977), and should be distinguished from diagnostic tools, which are used to establish the presence of a disease in a symptomatic patient. Screening instruments such as the CES-D 10 are intended to be easy enough for a layperson to administer (Radloff 1977).

[111]In Wave 3, 78 adults answered in the affirmative that they had a psychological or psychiatric disorder, out of more than 25,000 possible respondents.

cluded. Some of these variables are analysed in part, but the main focus in the remainder of this analysis is the measurement of depression, as calculated using the CES-D 10 score.

4.3.2 CES-D 10 Score Calculation

Ten questions are asked of study participants. The questions rate on a scale of one to four the frequency in the past week that the person has experienced the symptom, ranging from (1) none of the time (less than one day), (2) some or a little of the time (one to two days), (3) occasionally or a moderate amount of the time (three to four days), to (4) all of the time (five to seven days). Self reported symptoms include:

1. I was bothered by things that usually don't bother me
2. I had trouble keeping my mind on what I was doing
3. I felt depressed
4. I felt that everything I did was an effort
5. I felt hopeful about the future
6. I felt fearful
7. My sleep was restless
8. I was happy
9. I felt lonely
10. I could not "get going"

The two positively phrased question, numbers (5) and (8), are inverted, and a score is calculated which sums the answers for each of the ten questions, after re-scaling the answers to range from zero to three, instead of one to four. A score is obtained which ranges between zero and thirty, where zero reflects no depressive symptoms, and thirty represents the maximum possible number of symptoms, signifying very high levels of depression. Following the standard procedure, a score of ten or more indicates the presence of mild to significant depression[112]. Figure 14 shows the distribution of CES-D 10 over age for each of the waves.

[112]This follows the standard process through which the CES-D 10 score is calculated (Radloff 1977, Tomita et al. 2015)

Figure 14

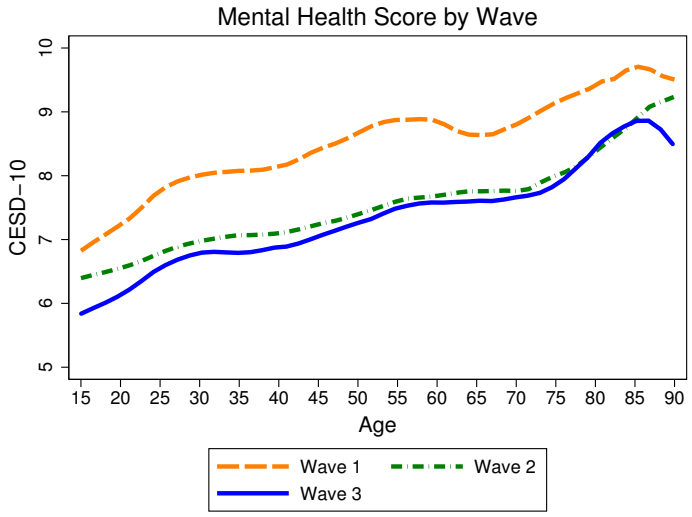


Figure 14 shows CES-D 10 (a measure of mental health status, ranging from 0 and 30), graphed by age and wave. The higher the score, the more likely an individual is to be depressed. Data: National Income Dynamics Survey.

CES-D 10 levels display the same upward pattern with age for all 3 waves of the NIDS, indicating increasing levels of depression as people age. CES-D 10 scores in Waves 2 and 3 are also significantly lower than those in Wave 1. Similar patterns are seen in Figure 15 which plots actual depression[113] levels by wave.

Figure 15

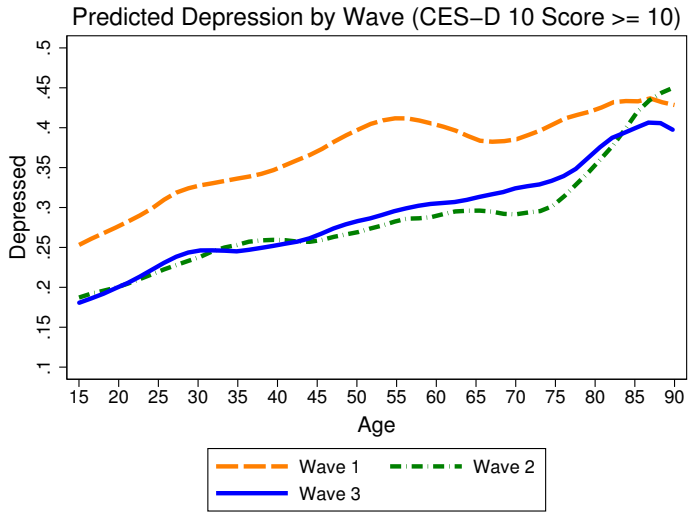


Figure 15 shows depression (defined as CES-D 10 greater than or equal to ten), graphed by age and wave. Data: National Income Dynamics Survey.

[113]Measured as the presence of a CES-D 10 score ten or above (Radloff 1977).

Data concerns sometimes indicate the use of the CES-D 8 score, which excludes the two positively phrased items in numbers (5) and (8), as survey participants may misunderstand these questions and answer in the reverse[114]. The CES-D 8 score ranges from 0 to 24.

Figure 16 shows the distribution of both CES-D 8 and CES-D 10 by age. Both variables follow the same pattern over the age distribution, and again, mental health is seen to worsen with age. The two variables have a significant correlation of eighty percent.

Figure 16

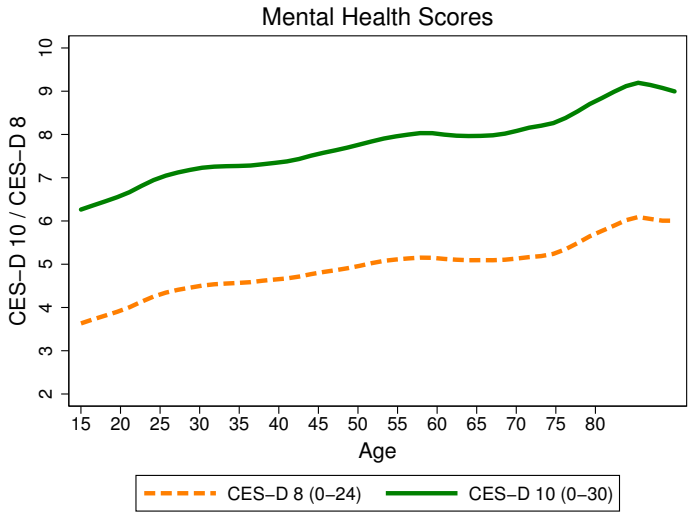


Figure 16 shows a graphic representation of the CES-D 10 (measured between 0 and 30) and the CES-D 8 (measured between 0 and 24) scores using data from all 3 waves. Data: National Income Dynamics Survey.

4.3.3 CES-D 10 Score Validation

Before proceeding, it is important to consider whether using the CES-D 10 score is valid in South Africa. A problem within this field of study is a lack of commonality in the measures used to measure emotional health (Samuels & Stavropoulou 2016). Levels of life satisfaction, depression (measured through a number of instruments or diagnostic screening tools), anxiety, stress, resilience, and self perceived health are but some of the many options available to researchers to measure psychological ill-health. Mental health screening instruments have to be verified for consistency and validity in developing

[114]These positively framed questions are included in order to prevent a pattern of answering questions by rote (Radloff 1977).

countries, as the majority of these are created in developed countries, where individuals face a widely different set of challenges to those living in lower income countries (Samuels & Stavropoulou 2016), and may have very dis-similar cultures (Strauss & Thomas 2007).

The CES-D 10 is a scale originally conceptualised in North America, and thus may not be as effective when used in other cultures. In addition, the scale may be understood differently in different cultures in the same country. However, in South Africa, the CES-D 10 is widely used and has been verified for use as an initial screening tool (Johnes & Johnes 2004, Hamad et al. 2008, Pretorius 1991, Myer et al. 2008).

The CES-D 10 has been found to be be consistent both internally, and in repeated testing, in other countries and in South Africa (Hamad et al. 2008, Kilburn et al. 2015). It is also consistent when compared to the CES-D 8, and the CES-D 20 (a longer version of the same questionnaire). The CES-D 20 has also been found to be valid in international studies and in South Africa (Myer et al. 2008). In addition, sensitivity testing using other threshold values to determine depression, as opposed to the standard cut-off of ten, yields similar results (Kilburn et al. 2015). 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 (Radloff 1977, Das et al. 2007).

A potential problem with the use of a psychometric scale such as the CES-D 10 is that the translation of the questions to other languages may lose something of the essence of the original question (Radloff 1977). The idioms used to describe depression in different languages and cultures are important (Blas & Kurup 2010, Tomlinson et al. 2009), and differences across different societies may make comparisons difficult. Metaphors or symbols[115] may be more appropriate in certain cultures to describe depression, and these do not form a part of the basic scale (Ellis 2003). Another potential issue for validity is that certain African languages are very good at naming tangible objects, but have great difficulty in naming intangible concepts, and will often use lengthy, and non-specific descriptions to do so (Ellis 2003), which are more difficult to compare directly to western scales or measures of depression. Other cultural conflicts include the fact that mental distress may be treated with traditional methods first before standard Western medical practice, and mental illness may be associated with troubles with one's ancestors, witch-craft, or the need to cast out demons (Ellis 2003, Hugo et al. 2003).

[115]For example, in Zulu descriptions such as," I cannot feel my body", or "my heart is tired", or "the blood is finished", may be used to describe depressive symptoms (Ellis 2003).

If stigma is higher in certain groups, and lower in others, one may find the questions for the CES-D 10 scale are answered with greater ease in low stigma communities, meaning the prevalence of depression measured in those community is likely to be closer to the true measure than in communities where mental illness is less well understood and possibly stigmatised. High levels of stigma persist in South African communities (Hugo et al. 2003). In these communities it is less likely that depression will be detected or treated. 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, other questions in the NIDS which specifically ask about mental illnesses have very low rates of response, and even lower numbers who actually answer in the positive to these questions. In Wave 1 of the NIDS, approximately seven percent out of more than eighteen thousand adults answer in the positive to having another illness, and only eighty-three individuals answer yes to having a psychiatric or psychological disorder. This pattern is seen in other surveys as well. For example, the 2012 General Household Survey contains a question about the respondent's mental health (StatsSA 2002). Less than ten percent of the sample answer the question, and of those who do, only 127 report suffering from depression or a mental illness (out of a sample of more than ninety thousand people).

In the NIDS itself, the rates of response for the CES-D 10 are high. Of the 4,051 fifteen to nineteen-year-olds in Wave 3, 3,217 of them answered the emotional health module from which the CES-D 10 score is calculated, and only 834 did not. Restricting the sample further to the 2,982 African and Coloured fifteen to nineteen-year-olds in Wave 3, an eighty-six percent response rate is seen. And of the 5,870 twenty to fifty-five-year-old African and Coloured mothers in Wave 3 of the NIDS, only three did not answer the questions which make up the scale. A strong selection effect does not appear to be present. A small difference is seen in the rate of response by gender for teens, indicating controlling for gender is recommended in any estimates including the CES-D 10 variable. No significant differences are seen by other variables such as rural or urban location, household income, maternal depression, age or means test eligibility status.

Those who did answer the questions are significantly more likely to be CSG beneficiaries and to live in households with more CSG beneficiaries. Africans are significantly

more likely to answer the questions, and Whites are less likely to, as are those with higher household incomes. Those who answer the questions are less likely to be enrolled, which makes sense as these teens are more likely to be at home when the interviewer is present[116]. Mothers are less likely to be present in the household for those who do answer the questions.

Despite these higher levels of stigma present in African communities in particular (Sorsdahl & Stein 2010), most studies show much higher levels of depression reported for Africans than Whites (Ardington & Case 2009). This implies the CES-D 10 scale may have succeeded at detecting mental illness without making this explicit to survey participants.

In the NIDS data itself, a positive correlation is seen between the CES-D 10 and other measures of negative events, such as a death in the family, or negative perceptions, such as being in a state of poor health. This can be seen in Table 12. The optimism variables display negative correlations with CES-D 10 in Waves 2 and 3, although not in Wave 1. Negative correlations exist between the CES-D 10 and measures of happiness and satisfaction. A measure of Chronbach's alpha[117] for the CES-D 10 between Waves 1 to 3 is between seventy-seven and sixty-seven percent (seventy is often taken as a the cut-off for a reliable scale).

The corresponding figures for the CES-D 8 are between seventy-eight and eighty-four percent. The correlations calculated between the individual questions that make up the scale are negative[118], except with the two positive questions about hope and happiness. Some of these correlations are not high, which is to be expected given heterogeneity in the sample (Radloff 1977), which is expected in a nationally representative sample such as the NIDS.

This thesis elects to continue to use the CES-D 10 score as the main measure of depression in its analysis. This both facilitates easy comparison with other literature, and incorporates all available data. The next section describes certain patterns in mental health seen in the data.

[116]CES-D 10 data will only be available for teens aged fifteen and above, due to the methods of data collection in the NIDS.

[117]A measure of internal consistency for a psychometric scale (Santos 1999).

[118]For example, in Wave 1, the correlations between all eight variables (excluding hope and happiness) range between 0.3 and 0.6. The corresponding figures for Waves 2 and 3 are between 0.2 and 0.45 in Wave 2, and between 0.18 and 0.51 in Wave 3.

Table 12

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
CES-D 10 Component Variables			
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.

4.3.4 Patterns in Mental Health

Mental health differs along a number of different characteristics in South Africa. Using data from all three waves of the NIDS, Figures 17 to 19 show CES-D10 scores graphed for a number of different categories. Figure 17 shows that those in rural areas are significantly more likely to suffer from depression than those in urban areas. In Figure 18, the positive effect of education on mental health is plainly seen: those who have obtained a matriculation certificate (matric) have CES-D 10 scores significantly lower than those who have not matriculated. Figure 19 shows CES-D 10 score by race. Whites have significantly better mental health than Coloureds, who in turn have better mental health than Africans. These significant differences imply that any analysis of mental health must at a minimum include controls for race, age, education and urban or rural status.

Figure 17

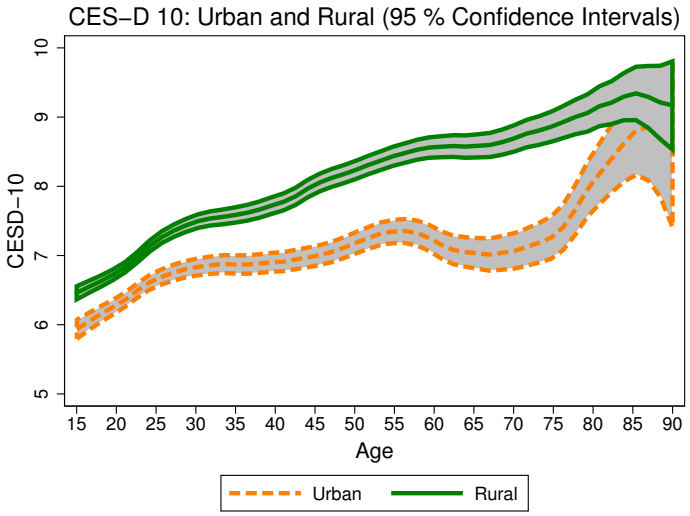


Figure 17 shows the CES-D 10 score in urban and rural areas, in all 3 waves of the NIDS, with ninety-five percent confidence intervals. Those who live in rural areas are significantly more depressed than those in urban areas. Data: National Income Dynamics Survey.

Figure 18

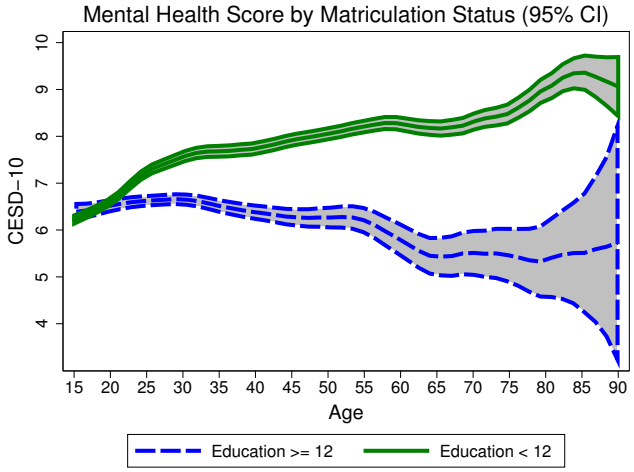


Figure 18 shows CES-D 10 graphed by age and matriculation status, in all 3 waves of the NIDS, with ninety-five percent confidence intervals. Those who have a matric are significantly less depressed than those who do not, and the difference increases over time. Data: National Income Dynamics Survey.

Figure 19

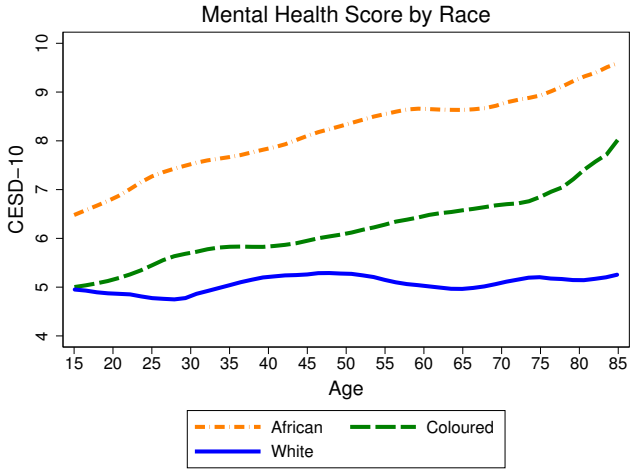


Figure 19 shows CES-D 10 by race, in all 3 waves of the NIDS. Whites have better mental health than Coloureds, who in turn have better mental health than Africans. Data: National Income Dynamics Survey.

4.3.5 Summary Statistics

In this section, mothers and children are examined for differences by CSG receipt and mental health status. A portion of this analysis has been performed in the previous chapters, and it is summarised here. A caveat is necessary. The presence of a mother's other children may slightly complicate this analysis, as a mother may report having a

depressed child, and being a CSG recipient, but she may not be receiving the grant for that child.

4.3.6 Teenage Beneficiaries

In Chapter 2, in a sample of children aged from birth to eighteen, slightly higher rates of maternal depression are seen among CSG beneficiaries than non-beneficiaries[119]. However, when the sample is restricted to African and Coloured fifteen to nineteen-year-olds, no significant differences in maternal or paternal depression are observed by beneficiary status[120].

Table 13 presents descriptive statistics for means test eligible African and Coloured teens between fifteen and nineteen years of age in Wave 3, differentiated by CSG beneficiary status, which focus only on certain mental health and welfare outcomes of these teens[121]. Nineteen percent of the entire sample can be classified as depressed. Overall very few significant differences are seen. In agreement with the preceding summary, the mothers of CSG beneficiaries are no more likely to be depressed, and neither are the fathers. Beneficiaries themselves do have significantly lower rates of depression than non-beneficiaries (sixteen versus twenty-one percent[122]), and correspondingly, beneficiaries live in households with fewer depressed teenagers. Beneficiaries are significantly less likely to smoke or drink (five percent versus nine percent), although reported rates of smoking and drinking are not high.

After investigating the nature of mental health by beneficiary status in Table 13, Table 14 now presents descriptive statistics which are tested for significant differences between teens who suffer from depression, and those who do not, in the same sample. The table shows highly significant differences in a number of key variables. Depressed teens are significantly less likely to be enrolled in school[123], and are less likely to be CSG beneficiaries[124]. All of the mental health outcomes, both individual and of the family, are significantly different (at the one percent level). Depressed teens are much more likely to have mothers, fathers or siblings who are depressed, and possibly have been for a number

[119]Twenty-seven percent versus twenty-one percent. Significant at the five percent level. See Table 2 in Chapter 2.

[120]See Table 3 in Chapter 2.

[121]Other key characteristics in the teen sample by beneficiary status can be seen in Table 2 in Chapter 2.

[122]Significant at the five percent level.

[123]Seventy-five percent of depressed teens are enrolled, versus eighty-three percent of non-depressed teens, significant at the five percent level.

[124]Thirty-six percent versus twenty-nine percent, significant at the five percent level.

of years. They are correspondingly more likely to live in households with a larger number of depressed individuals. These differences are large; for example, seventy-five percent of depressed teens have depressed mothers, compared to only twenty percent of teens who are not depressed (see Table 14).

Table 13

Individual Descriptive Statistics of Teenagers Aged 15 to 19 by CSG Beneficiary Status				
	All	CSG Beneficiary		Non Beneficiary
Individual Characteristics				
CES D-10*	5.96	5.67	**	6.11
Depressed (CES-D 10 >= 10)	0.19	0.16	**	0.21
Became Depressed in Wave 3	0.18	0.19		0.18
Level of Life Satisfaction (1-10, 10 is very satisfied)	4.62	4.64		4.61
In Poor Health (Self-Perceived)	0.03	0.02		0.03
Happier than Ten Years Ago	0.52	0.54		0.51
Optimistic (2 Years)	0.67	0.67		0.67
Optimistic (5 Years)	0.85	0.86		0.85
Smokes or Drinks	0.08	0.05	**	0.09
Mother is Depressed (CES-D 10 > 10)	0.30	0.29		0.31
Maternal CES D-10	7.62	7.82		7.50
Mother Became Depressed in Wave 3	0.24	0.29	*	0.21
Number of Waves the Mother is Depressed	1.06	1.06		1.06
Father is Depressed (CES-D 10 > 10)	0.28	0.23		0.31
Paternal CES D-10	7.06	6.56		7.37
Father Became Depressed in Wave 3	0.25	0.19		0.29
Number of Waves the Father is Depressed	0.83	0.84		0.82
Either Parent is Depressed	0.35	0.35		0.35
A Sibling is Depressed	0.12	0.11		0.12
Household Characteristics				
Number of Depressed Individuals in the Household	0.83	0.79		0.85
Number of Depressed Teens in the Household	0.24	0.20	**	0.26
Household has a Depressed Individual	0.38	0.39		0.38
Household has a Depressed Individual (Excluding Self)	0.38	0.39		0.38
Number of Observations	3,119	982		2,137

This table reports individual descriptive statistics 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.

Table 14

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.

These results imply that while CSG receipt is not enough to impact on the mental health of mothers, it may have a significant positive effect on the mental health of teenagers. This relationship, and other patterns in adolescent mental health, are investigated graphically in the next section.

4.3.7 Patterns in Adolescent Mental Health

In this section the differences in teen mental health by a number of different factors are investigated, including race, gender, grant receipt, and varying levels of exposure to the grant. Figure 20 shows that the mental health of Africans is significantly worse than that of Coloureds and Whites.

Figure 20

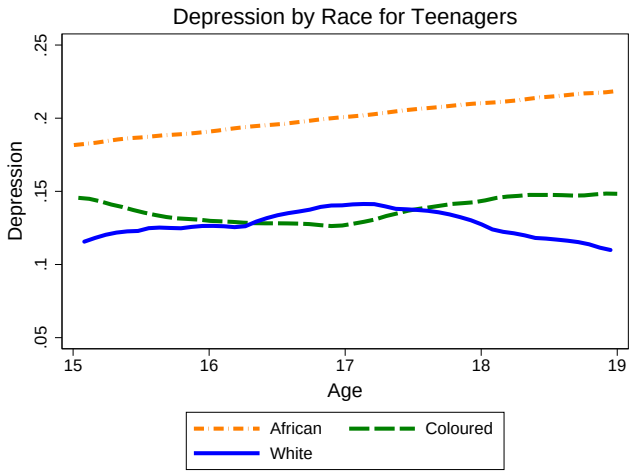


Figure 20 shows depression, graphed by age and population group, for teenagers. Africans are more depressed than other race groups. Data: National Income Dynamics Survey.

Figure 21

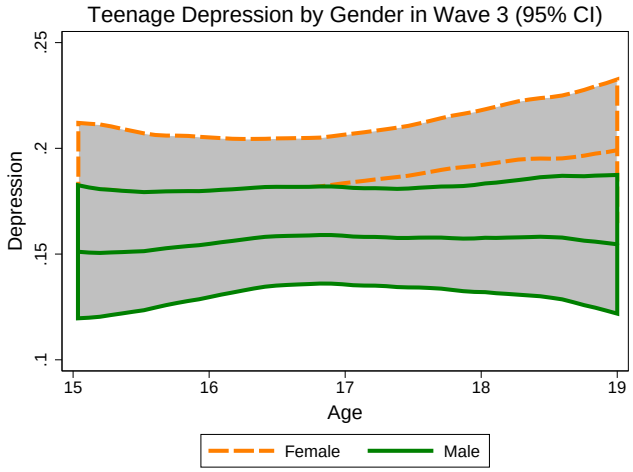


Figure 21 shows depression, graphed by gender, for teenagers, with ninety-five percent confidence intervals. Rates of depression do not differ significantly by gender. Data: National Income Dynamics Survey.

Figure 21 shows that teenage girls appear to have higher levels of depression than boys, but these differences are not significant. Figures 22 and 23 show the differences in mental health by teen gender, as they relate to parent mental health.

Figure 22

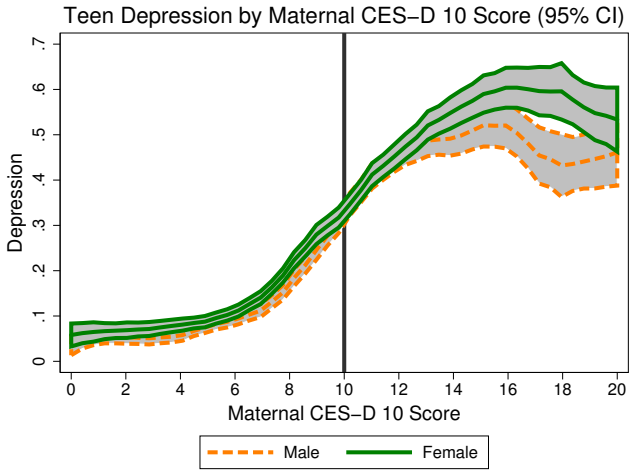


Figure 22 shows rates of teen depression, graphed as a function of maternal CES-D 10 score, by gender. The vertical line at 10 shows the cut-off after which mothers are classified as depressed. A strongly positive relationship is seen between teen and maternal depression levels. The maternal CES-D 10 score is capped at twenty, due to the very small sample size of mothers reporting CES-D 10 scores than twenty. Data: National Income Dynamics Survey.

Figure 23

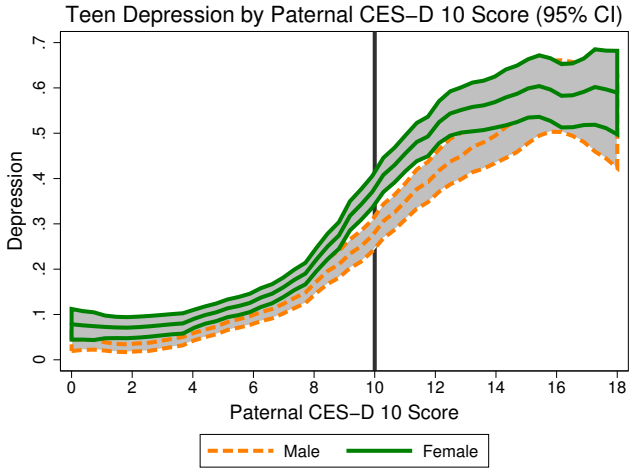


Figure 23 shows rates of teen depression graphed as a function of paternal CES-D 10 score, by gender, with ninety-five percent confidence intervals. The vertical line at 10 shows the cut-off after which fathers are classified as depressed. A strongly positive relationship is seen between teen and paternal depression levels. The paternal CES-D 10 score is capped at eighteen, due to the very small sample size of fathers reporting CES-D 10 scores than eighteen. Data: National Income Dynamics Survey

In both figures, a strongly positive relationship is seen between parent and teen mental heath. When maternal CES-D 10 score is lower, the rates of depression of boys and girls do not differ, but as the mental health of mothers worsens (as seen in higher CES-D 10 scores), teen girls start to have significantly higher rates of depression than boys. Similar patterns are seen in the relationship between teen depression and paternal CES-D 10 score in Figure 23.

The relationship between depression and different measures of CSG receipt, and CSG exposure, are graphed in Figures 24 through 28. Figure 24 plots average depression by CSG beneficiary status for teenagers in Wave 3 with ninety-five percent confidence levels. There is no significant difference in depression by CSG beneficiary status.

Figure 24

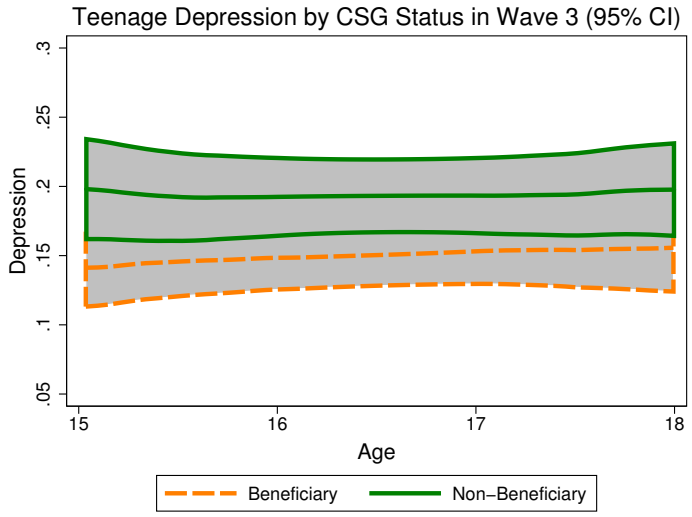


Figure 24 plots average depression levels by beneficiary status in Wave 3, with ninety-five percent confidence intervals. Beneficiaries do not have significantly different levels of depression than non-beneficiaries. Data: National Income Dynamics Survey.

Figure 25 graphs average depression for teenagers in Waves 1 and 3 with ninety-five percent confidence intervals.

Figure 25

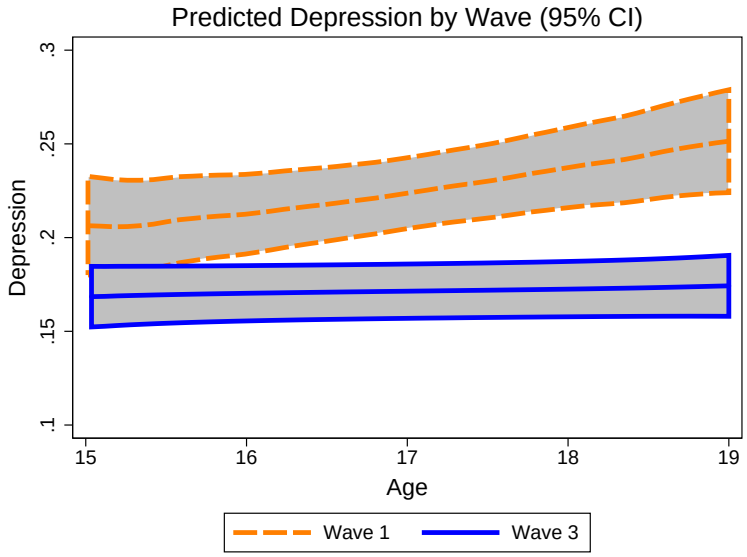
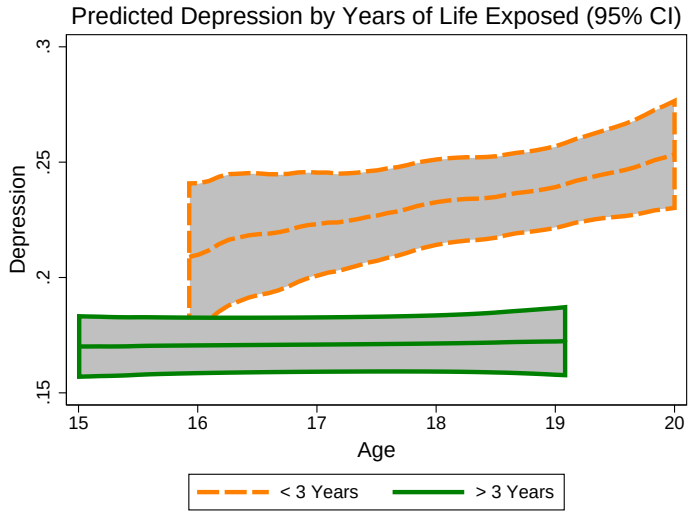


Figure 25 shows rates of teen depression graphed as a function of age, in Waves 1 and 3 with ninety-five percent confidence intervals. Due to the pattern of grant roll-out, teens in Wave 3 have a higher proportion of life exposed to the child support grant. Higher exposure to the grant is associated with significantly lower rates of depression. Data: National Income Dynamics Survey.

Due to the pattern in grant roll-out, teens in Wave 3 have much higher rates of CSG receipt, and higher potential life exposure to the grant. Seventeen and eighteen-year-olds in Wave 1 have had no exposure to the grant, whereas seventeen and eighteen-year-olds in Wave 3 have had thirteen and six years of potential receipt respectively, and may be current CSG beneficiaries. Teens in Wave 3 have significantly lower levels of depression than those in Wave 1, although this may also reflect a general declining trend in depression levels with time. These patterns are seen again in Figure 26.

Figure 26



In Figure 26, average depression levels are plotted by proportion of life exposed to the grant, for those with more than or less than 3 years of potential exposure, with ninety-five percent confidence intervals. Higher exposure to the grant is associated with significantly lower rates of depression. Data: National Income Dynamics Survey.

Depression levels are plotted for those who have been exposed to the grant for more than three years of their life, compared to those exposed for less than three years, with ninety-five percent confidence intervals. Higher potential grant exposure is associated with significantly lower levels of depression.

Figure 27 shows depression levels for those who have been exposed to the grant for less, or more than, fifty percent of their lives, with ninety-five percent confidence intervals. Those with more exposure have a lower probability of being depressed, and these differences are significant.

Figure 27

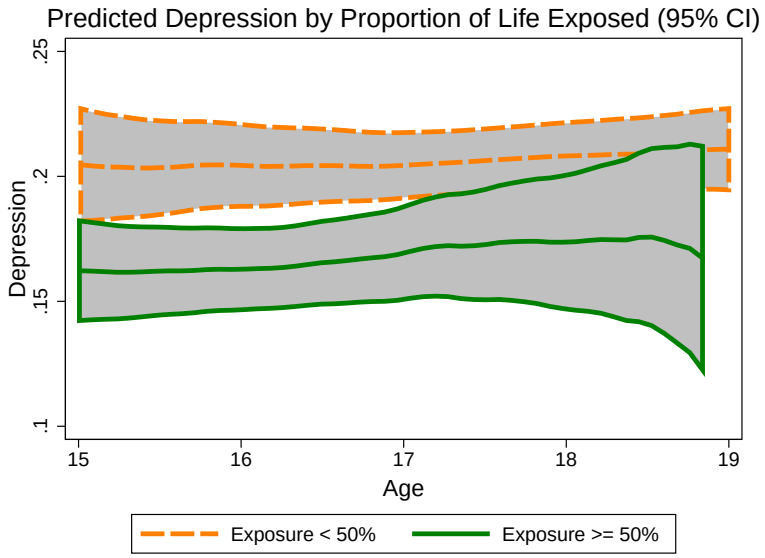


Figure 27 shows rates of teen depression, graphed as a function of age, by proportion of life exposed to the child support grant, whether more or less than half of the teen's life, with ninety-five percent confidence intervals. Higher exposure to the grant is associated with significantly lower rates of depression. Data: National Income Dynamics Survey.

Figure 28 plots depression levels by type of receipt.

Figure 28

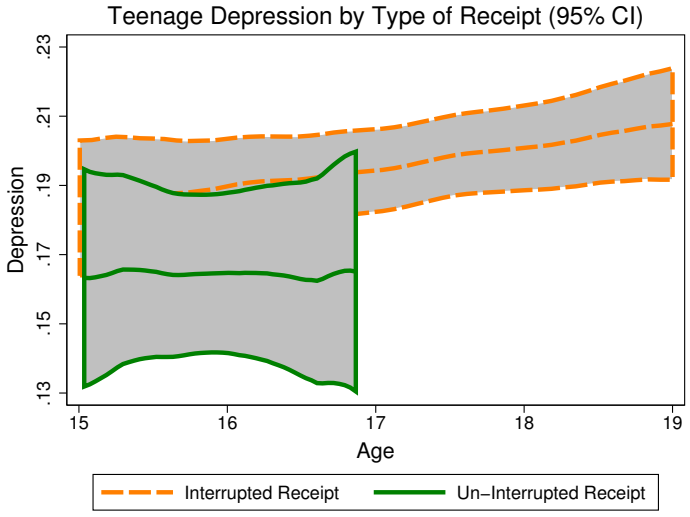


Figure 28 plots levels of depression by age, for those who have had either continuous receipt, or interrupted receipt (the latter are those born before 1995), with ninety-five percent confidence intervals. No significant differences in rates of depression can be seen. Data: National Income Dynamics Survey.

Whether receipt is potentially interrupted or not does not appear to make a difference

to depression levels, as those with un-interrupted receipt (those born after 1995), have similar rates of depression to those whose receipt was interrupted.

Figure 21 indicates that significant differences in mental health by gender do not appear to be present. However, some gender differences in teen depression can be seen when examining teen depression as a function of parental depression[125]. Duration of exposure appears to be related positively to teen mental health, although current grant receipt does not. The size of the differences in teen depression by differences in levels of exposure are not large however: between five to seven percent in most samples. This is an interesting finding however as it shows that cumulative grant receipt may be more important than current receipt in determining teen depression. However, the size of the relationship between parental mental health and teen depression is large: at the maximum level of parental CES-D 10 scores, teen depression is as high as seventy percent.

Patterns in teenage mental health are explored in Table 15, where average depression and CES-D 10 values are reported in a number of sub-samples, by gender. Girls appear to have worse mental health than boys. However, very few actual significant differences are seen, which accords with the pattern seen previously of insignificant differences in mental health by gender. In only two specific samples, CSG beneficiaries and those with resident mothers, do teenage girls have levels of depression which are significantly higher than those of boys. Depression peaks at age seventeen for girls, and age nineteen for boys. Similar patterns are mostly seen for CES-D 10 scores as for depression levels.

Table 15 shows that the rate of depression for teens with parents who have worse mental health is much higher than the average. For example, the average rate of depression in the entire sample is eighteen percent, whereas those with mothers or fathers who have above average CES-D 10 scores have depression rates of thirty and thirty-three percent respectively[126]. Forty-seven percent of teens who have depressed fathers are depressed themselves. Correspondingly thirty-eight percent of teens who have a depressed mother are themselves depressed. The highest rates of depression in teens are seen in the samples where parents have worse mental health.

The next section presents multi-variate estimates of the key determinants of depression, including parental mental health and CSG receipt.

[125]Both maternal and paternal depression are related to higher levels of depression in female teens (see Figures 22 and 23), with paternal depression impacting on female teens at lower levels than maternal depression does.

[126]See the first three elements of the first column of Table 15

Table 15

Mean Depression and CES-D 10 Scores in Wave 3 by Sample and Gender								
	Depressed				CESD-10			
	All	Female		Male	All	Female		Male
All	0.18	0.20		0.16	5.8	6.0		5.6
Above Average Maternal CES-D 10	0.30	0.33		0.26	7.2	7.4		7.0
Above Average Paternal CES-D 10	0.33	0.33		0.32	7.4	7.6		7.2
Mother is Depressed	0.38	0.42		0.33	8.0	8.3		7.7
Father is Depressed	0.47	0.54	*	0.38	8.9	9.2		8.5
Mother has Matric	0.16	0.18		0.13	5.5	5.7		5.2
Mother is Resident in the Household	0.17	0.21	**	0.14	5.6	5.9	*	5.3
Father is Resident in the Household	0.17	0.19		0.15	5.5	5.6		5.3
Means Test Eligible	0.19	0.20		0.17	6.0	6.1		5.8
Child Support Grant Beneficiary	0.16	0.21	**	0.11	5.7	6.2	**	5.2
Happier than Ten Years Ago	0.14	0.15		0.12	5.2	5.4		5.1
Above Average Level of Satisfaction	0.10	0.11		0.09	5.0	5.2		4.8
Depressed	1.00	1.00		1.00	12.5	12.6		12.5
Poor Health (Self-Perceived)	0.20	0.25		0.16	6.2	7.2		5.4
Poorest Household (Self-Perceived)	0.21	0.24		0.19	6.2	6.5		5.8
Rural	0.18	0.18		0.18	5.9	5.8		6.0
Age Categories								
15	0.15	0.17		0.12	5.4	5.9	**	4.8
16	0.17	0.18		0.16	5.8	5.7		5.8
17	0.20	0.24		0.17	5.9	6.2		5.6
18	0.17	0.21	*	0.12	5.8	5.8		5.7
19	0.21	0.19		0.23	6.2	6.1		6.2
African	0.18	0.21	*	0.16	6.0	6.2	*	5.8
Coloured	0.14	0.11		0.17	4.5	4.2		4.8
Indian/Asian					5.3	4.0		5.9
White	0.17	0.16		0.19	4.2	4.5		3.9
Number of Observations.	4,051	2,032		2,019	4,051	2,032		2,019

This table reports mean depression prevalence and CES-D 10 scores, presented in different samples, by gender. The sample consists of teenagers aged fifteen to nineteen in Wave 3. *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.

4.4 Estimation

4.4.1 The Intergenerational Transmission of Depression

The preceding descriptive statistics and graphical analysis indicate that parental mental health and the duration of CSG receipt are important determinants of teen depression. The former effect is expected to be much larger than all other potential determinants of depression given the results above. This hypothesis is investigated in Table 16, which presents preliminary ordinary least squares estimates of the determinants of teen depression, and the size of the intergenerational transmission coefficient.

Columns (1) and (4) of Table 16 show the effect of parental depression on own depression, excluding any control variables. The effect size is large, at approximately thirty-three percentage points, and highly significant. Adding in extra controls in Columns (2), (3), (5) and (6) changes the coefficient size and significance very little. The sample size in the paternal depression estimates in Columns (4) through (6) is much smaller than in the maternal depression estimates in Columns (1) to (3). Parental depression data can only be collected of resident household members, and the much smaller percentage of fathers who are resident results in this much smaller sample. At the bottom of the table the mean values for parental residence are reported. While eighty-nine percent of mothers are present in the sample which is used to investigate paternal depression transmission, only forty-five percent of fathers are present in the sample used to investigate maternal depression transmission.

In the specifications in Columns (3) and (6), a dummy variable for whether the other parent is resident is included. It can be seen that data for whether the father is resident is of poor quality, and thus more likely to be missing, as can be seen by the further drop in sample size from Column (2) to (3) when an indicator for whether a father is resident is included. There are no quality concerns with the mother resident variable, as seen in the lack of change in sample size from Column (5) to (6). Having the other parent resident has no significant impact on teen depression.

In contrast to the sample of teens with resident mothers, none of the teen characteristics in the fathers resident sample have any impact on teen depression, apart from whether the father is depressed. The sample of teens whose fathers are resident 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.

Table 16

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.

It may be the case that the effect of parental depression reflects the effect of some other parental characteristics. To account for this, variables such as parent's education and whether they are economically active or not are included. The inclusion of these variables does not impact on the size of the coefficients of parental depression, nor are they significant in the resident father sample in Columns (4) to (6)[127]. Having a mother who is economically active lowers the probability of depression by five percentage points, a relatively large effect.

Table 16 shows that female teens are slightly more likely to suffer from depression than male teens. However, this effect is only significant at the ten percent level, which is as expected given the previous graphical analysis in Figure 21. Coloured teens have better mental health than African teens. Living in a household with a pensioner is associated with lower levels of depression in the maternal depression sample[128]. These pensioner household effects are fairly large, at seven percentage points, compared to the mean depression level of seventeen percent in the sample under investigation (see Table 16, fifth last row). As suspected, the size of the intergenerational transmission of depression is very large, and highly significant. In the next section the relative size of this effect is investigated in different sub-samples.

4.4.2 Sub-Sample Analysis

The literature suggests that certain groups will be more vulnerable to the presence of parental depression, and thus the relative size of the intergenerational transmission coefficient is of interest. The estimates in Columns (3) and (6) of Table 16 are replicated[129] for a number of sub-samples, as seen in Table 17, and the coefficient on parental depression is reported, for sons and daughters. The majority of coefficients are significant at the one percent level[130]. The size of intergenerational transmission is significantly larger for daughters than sons in the vast majority of samples. The effect size for boys is not small, although it does have greater variability. The table indicates a large, significant and consistent intergenerational transmission effect, which is above thirty percentage points

[127]These results echo those in Powdthavee & Vignoles (2008) who find only maternal education significantly impacts own depression, while many other parental characteristics are insignificant.

[128]No pensioner effect by gender exists. Other estimates not reported here show that living in a household with a female pensioner is not a significant determinant of teen depression, but rather living with any pensioner, no matter their gender.

[129]The fourth row of Table 17 is the relevant intergenerational transmission coefficient from Table 16.

[130]The impact of paternal depression for sons in pension/CSG households can be seen to be negative, but this effect is not significant.

Table 17

Intergenerational Transmission Effect Sizes: Gendered Sub-Samples								
	Impact of a Depressed Mother				Impact of a Depressed Father			
Samples	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.

in many of the samples. For girls, the effect size is below thirty percent in only five out of twenty-eight samples, and below twenty-five percent in only one sample.

4.4.3 Intergenerational Transmission Effects and the CSG

The preceding discussion has suggested that CSG receipt may impact on teen depression. In Table 18, the same estimates are performed, including a term for CSG receipt, and an interaction term between CSG receipt and parental depression. Receipt by itself does not significantly impact on teen depression in the maternal depression sample, but does lower the probability of being depressed in the paternal depression sample by twelve percentage points.

Table 18

Intergenerational Transmission of Mental Health: Determinants of Child Depression										
	Maternal Depression Transmission					Paternal Depression Transmission				
Other Parent	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.

A very strong interaction effect is found between CSG receipt and parental depression. It appears that the CSG is acting as a mitigating force to reduce the large negative effect parental mental illness has on the mental health of teens. CSG receipt lowers the probability of being depressed by nineteen percentage points for those whose mothers are depressed - see Column (2), and this effect is even larger in households where fathers are resident - see Column (3), at twenty-seven percentage points. These coefficients are significant at the one percent level. Similarly large size[131] and significance effects are seen in the paternal depression sample, although this mitigating effect of paternal intergenerational transmission is slightly lower in households where mothers are also present -see Column (8).

In Columns (4) and (9) 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 - thirty-seven and forty-four percent in the mother and father depression samples respectively. In these estimates the sample size is very low (ninety-four and eighty-nine individuals respectively), and the significance and pattern of the main coefficients of interest are very different. The intergenerational 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. The interaction term is insignificant, but the coefficient on CSG receipt is very large, and negative, implying that in these samples where at a minimum one parent is depressed, CSG receipt is very important for teen health. This agrees with the significance of the interaction terms observed in Columns (3) and (8). One last sample is investigated in Columns (5) and (10), that of the teens who report having a sibling who is depressed. As the mean level of depression reported at the bottom of the table shows, teen depression is very high if a sibling is depressed - approximately fifty percent. In addition, the maternal intergenerational transmission effect is very large and significant, at forty one percent, implying that a teen who has a depressed mother and depressed sibling will with almost certainty be depressed. CSG receipt in these sibling depressed samples is insignificant. However, the paternal intergenerational transmission effect is insignificant in the sample of teens who have a depressed sibling, as is the CSG interaction term. This latter sample is very small, at only seventy-nine

[131]The specifications in Table 18 are replicated, using logistic regressions reporting marginal effects (see Table 36 in Appendix Item A.4). The results are similar to those seen in the main estimates in Table 18 in significance, and for the most part in size.

individuals.

The estimates in the fourth column of Table 18 are replicated to include both the instrumental variables and potential duration specifications from Chapter 3. The results can be seen in Table 19. In Column (2) and (4), CSG receipt is instrumented for using age eligibility, and Columns (3) and (6), the CSG variable of interest is years of potential duration of receipt. Columns (1) and (4) are the same as the estimates in Columns (2) and (7) of Table 18.

In all specifications, the intergenerational transmission of depression is similarly large and significant. The mitigating factor of the CSG is similar in size and significance for mother's depression, in the ordinary least squares and potential duration estimations. In addition, years of exposure to the grant both reduce teen depression directly (see Column (3)), and reduce the impact of maternal depression, with both of these effects nearly cancelling out the negative maternal intergenerational transmission effect. Following the technique used in Chapter 3, the coefficient on potential duration is reported multiplied by ten, for ease of interpretation. An extra ten years of exposure to the grant reduces the probability of depression by fourteen percent, and by a further eighteen percent if the teen's mother is depressed, which is large in comparison to the maternal transmission coefficient of forty-one percent.

For both maternal and paternal depression, the IV estimates do not reveal significant coefficients for the interaction term, although the size and direction are similar to the ordinary least squares estimates for maternal depression.

Table 19

Intergenerational Transmission of Mental Health: Alternative Specifications						
	Mother			Father		
	OLS	IV	Exposure	OLS	IV	Exposure
	(1)	(2)	(3)	(4)	(5)	(6)
Parent is Depressed	0.42 ***	0.36 ***	0.41 ***	0.39 ***	0.31 ***	0.45 ***
CSG Variable	0.01	-0.15	-0.14 **	-0.04	-0.25 *	-0.15 *
CSG Variable*Parent is Depressed	-0.19 ***	-0.09	-0.18 ***	-0.26 ***	-0.11	-0.02 *
Other Parent Resident	0.00	0.00	0.00	0.01	0.03	0.00
Parent's Education	0.01 ***	0.01 **	0.01 ***	0.00	0.00	0.00
Parent is Economically Active	-0.05 *	-0.04 *	-0.05 *	0.01	0.00	-0.01
Age in Years	0.01	-0.03	-0.04 *	-0.01	-0.05	-0.05
Female	0.04 **	0.04 *	0.04 *	0.03	0.03	0.02
Years of Attained Education	-0.01	0.00	-0.01	0.00	0.01	0.00
Coloured	-0.08 *	-0.11 **	-0.09 *	-0.06	-0.06	-0.05
Log of Household Income	0.02	0.01	0.02	-0.01	-0.01	-0.01
Pensioner Household	-0.06 **	-0.05 *	-0.06 **	-0.01	-0.02	-0.03
Household Size	0.01	0.01	0.01	0.00	0.00	0.00
Rural	0.00	0.00	0.01	0.04	0.05	0.03
Dependent Variable Mean	0.16	0.16	0.16	0.16	0.16	0.16
Number of Observations	936	936	936	423	423	423
F stat	7.0	7.3	7.4	3.0	2.9	3.0
Adjusted R-squared	0.22	0.20	0.22	0.19	0.15	0.16

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. In Columns (1) and (4), actual receipt is used as the CSG variable of interest. In Columns (2) and (5), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Columns (3) and (6), the impact of potential duration of CSG receipt is shown, with the coefficient reported multiplied by ten years. 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. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

4.4.4 Inter-Familial Transmission Effects

The estimates in this chapter indicate that mental health in family members is very closely related. In Table 20, the relationship between grant receipt and depression is expanded to include measures of depression for other household members. These estimates include the impact of a mother, father, either parent, a sibling, or any member of the household being depressed on teen depression, and how these effects interact with CSG receipt. Different samples are also examined: the full, means test eligible, female, African and those in female headed households. The first two sets of elements in the means test eligible sample column correspond to the Column (2) and (7) estimates in Table 18.

The overall size of the transmission effects is again large, and highly significant, for all the familial connections, and in all the sub-samples. The smallest size transmission coefficient is thirty-two percent, and the largest is fifty-one percent. Rates of intergenerational transmission are particularly high for female teens, and for those living in female headed households.

Having a depressed sibling negatively impacts on one's own mental health, and to a large degree (sibling depression transmission effects range between thirty-six and fifty-one percent). In addition, CSG receipt is not seen to mitigate this negative sibling effect. This accords with the results in Table 18 where a teenager with both a depressed parent and depressed sibling was with almost certainty likely to be depressed.

The CSG has a positive impact in all samples on the familial transmission of depression except when the relative is a sibling. For the most part, CSG receipt lowers the transmission of depression by approximately a third, which is a large impact relative to the transmission size, and in comparison to all other determinants of teen depression. The CSG has the largest impact in households where the father is depressed: in these households CSG receipt reduces intergenerational transmission by a factor of two or more. All effects except one are significant at either the five or one percent level.

Table 20

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

4.5 The Effect of Time

The NIDS allows the measurement of both the persistence of individual depression, and the impact of parental depression on children over time. This analysis in this chapter examines the impact of both current CSG receipt and parental depression on teen depression, ignoring any time dimension in the intergenerational depression relationship. The mental health of both parents and children is a function of not only current factors, but also the cumulative effect of previous events. Depression is generally observed to increase with age (Ardington & Case 2010), and this is seen in Figure 29. Half of all mood disorders are apparent by the age of fifteen (Kessler et al. 2007), although the rate of increase from this point is not clear in the teenage sample.

Figure 29

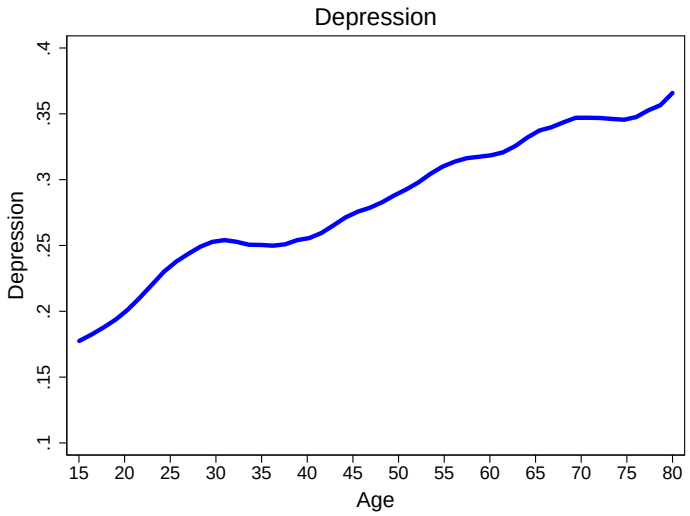


Figure 29 plots levels of depression by age, for African and Coloured individuals in Wave 3. Data: National Income Dynamics Survey.

In the sub-sample analysis of the intergenerational transmission effect in Table 17, the effect appears to be highly variable with teen age - there is no clear increasing or decreasing pattern in the impact that parents have on their children. A question is which matters more for the mental health of teenagers - the current mental health of their parents, or their parents' mental health in previous years?

In Figure 30, average depression in Wave 3 is plotted as a function of maternal CES-D 10 in each separate wave, for a full sample of individuals from age fifteen to sixty. The line for Wave 3 shows the relationship between the person's depression status, and the mental health of their mother in the same wave, Wave 3. This line is increasing.

Figure 30

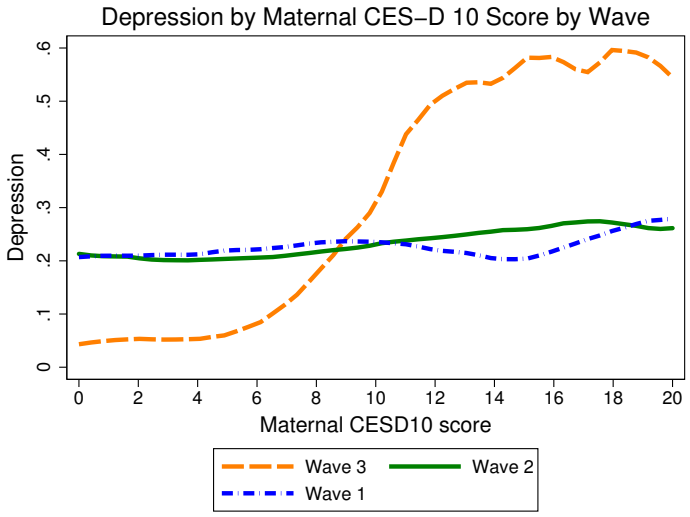


Figure 30 plots levels of depression by maternal CES-D 10, for a full sample of individuals from age 15 to 60 in each wave. Own depression in the current wave (Wave 3) is positively related to maternal CES-D 10 values in Wave 3, yet appears unrelated to maternal CES-D 10 in Waves 2 and 1. Data: National Income Dynamics Survey.

Figure 30 shows that individuals are more likely to be depressed in Wave 3 the worse their mother's mental health is in Wave 3. The line for Wave 2 again shows the person's depression in Wave 3, although now graphed as a function of the mother's CES-D 10 score in Wave 2. This line is flat, showing that the person's mental health in Wave 3 is unrelated to their mother's mental health in Wave 2. Similarly, the line for Wave 1 shows average depression in Wave 3, graphed as a function of maternal CES-D 10 score in Wave 1, and again no relationship is found; mental health in Wave 3 is unrelated to maternal mental health in Wave 1.

Figure 31

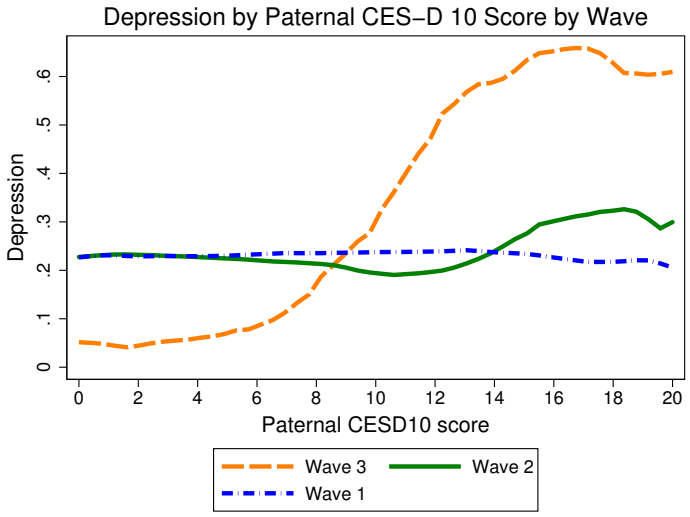


Figure 31 plots levels of depression by paternal CES-D 10, for a full sample of individuals from age 15 to 60 in each wave. Own depression in the current wave (Wave 3) is positively related to paternal CES-D 10 values in Wave 3, yet appears unrelated to paternal CES-D 10 in Waves 2 and 1. Data: National Income Dynamics Survey.

Similar findings can be seen for paternal CES-D 10 values in Figure 31. These findings imply it is the mental health of the mother in the current period which matters for a child's depression, whether that child is an adult or a teen, rather than in previous periods.

Table 21 contains the average levels of depression in the African and Coloured population for teenagers aged fifteen to nineteen, and their mothers or fathers, in a number of transmission matrices. Each cross tabulation is performed in reference to the mental health of the person in question in Wave 1. For example, it can be seen that in a sample of 1,927 teenagers in Wave 2, of those who report being depressed in Wave 1, twenty percent of them also report being depressed in Wave 2, and the rates of depression in Wave 2 for teens do not differ significantly by whether or not they were depressed in Wave 1, as shown by the p-value of 0.48. Of the 762 teens in Wave 2, nineteen percent of those whose fathers were depressed in Wave 1 are themselves depressed in Wave 2, and this difference is significant: the p-value is 0.05.

Teen depression does not appear to be persistent over time. Table 21 shows that teenagers in Wave 2 and Wave 3 have similar depression levels[132] no matter their mental health in Wave 1.

[132]Teens in Waves 2 and 3 have depression rates of approximately twenty percent, no matter their mental health in Wave 1.

Table 21

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	No	1.00	0.00	0.81	0.19	0.78	0.22
in Wave 1	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	No	0.86	0.14	0.83	0.17	0.80	0.20
in Wave 1	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	No	0.87	0.13	0.87	0.13	0.80	0.20
in Wave 1	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	No	1.00	0.00	0.75	0.25	0.74	0.26
in Wave 1	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					
Child is depressed	No	0.59	0.41	0.71	0.29	0.71	0.29
in Wave 1	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					
Child is depressed	No	0.69	0.31	0.80	0.20	0.74	0.26
in Wave 1	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.

Mothers and fathers are seen to impact largely on the mental health of teenagers in the current wave. In Wave 1, thirty-three percent of teens who have depressed mothers are themselves depressed, compared to only fourteen percent of teens whose mothers are not depressed, and this difference is significant at the one percent level. Similar patterns are seen for teens who have depressed fathers[133] in Wave 1. These effects of significantly

[133]Of those who whose fathers were depressed in Wave 1, thirty-four percent are themselves depressed,

higher depression among teens who have depressed parents in Wave 1 persist to Wave 2, but by Wave 3 the rates of depression in teens are the same no matter the mental health status of the parent in Wave 1.

The bottom three panels of Table 21 show the mean depression levels among mothers and fathers, dependant on the mental health of their children in Wave 1, and the persistence of mothers' own depression from Wave 1. If mothers are depressed in Wave 1, they continue to be significantly more depressed in Waves 2 and 3, although mothers suffer from high rates of depression, no matter their initial state of mental health in Wave 1. Rates of depression in mothers are consistently high in all the waves, at a minimum of twenty-five percent in each wave. The last two panels in the table examine the impact of having a depressed child in Wave 1 on either parent's mental health in Waves 1, 2 and 3. These figures can begin to answer in a small way the question of which way the causality runs between child and maternal mental health. Mothers and fathers who have depressed children in Wave 1 have very high contemporaneous rates of depression (more than sixty percent for both parents), but by Waves 2 and 3 these differences fade, until in Wave 3 they are no longer significant. At least a fifth of all mothers and fathers are depressed in each wave, no matter the mental health status of their children in Wave 1. These differences provide no solid evidence that the causality of the intergenerational transmission effect runs from children to parents, and not the other way around.

Another method to test the hypothesis that it is current parental depression which matters the most for teen depression is to use the parental depression values from previous waves in place of the current measures. Other estimates, which are not reported here, of Table 18 are performed using the maternal and paternal depression values not from Wave 3, but rather Wave 2. An insignificant coefficient both on paternal depression in Wave 2, and on the interaction term between CSG receipt in Wave 3 and paternal depression in Wave 2 is found. CSG receipt in Wave 3 is still found to have a negative and significant coefficient in these new estimates - receipt lowers the probability of depression. Another test employing a CSG variable which rather measures whether the individual gained receipt between Waves 2 and 3, rather than measuring current CSG receipt, yields an insignificant coefficient on this variable and the interaction term.

Establishing the direction of causality is difficult for the income-health relationship,

compared to thirteen percent of those whose fathers were well in Wave 1, and this difference is significant (the p value is 0).

and in the parent-child mental health transmission (Godlonton & Keswell 2005). For the latter, it may seem more likely that the direction of the causality runs from parent to child. In support of this assumption, Garber & Cole (2010) find that adolescent symptoms of depression do not predict mothers' mental health symptoms. Children inherit their parent's genetic predisposition to mental illness, and it is often assumed that the impact of a depressed parent on a child is likely to be far larger than the impact of a depressed child on the parent. Apart from the impact of a child who suffers from mental illness on a parent, the recent birth of children may well impact on parental health if post-natal depression occurs after the birth.

Table 21 allows the preliminary testing of which direction the causal link may take, whether from child health to parental health, or vice versa. In this uni-variate analysis, the mental health of teenagers does not appear to impact on paternal depression in the future, and for mothers, the impact of a depressed child on maternal depression persists until Wave 2 but by Wave 3 is not present. For teenagers, similar results are present - it appears the current link is the most important between the mental health of parents and teens, and not a link to previous waves. Solving the simultaneity problem is complex, and requires more than the simple uni-variate analysis used here, but is beyond the scope of this chapter.

The next section discusses certain potentially confounding issues of the estimates presented here.

4.6 Confounding Factors and Robustness Checks

The results presented in this chapter examine the relationship between parental and child depression. Estimates are also performed[134] using both the parental and child CES-D 10 scores as the independent and dependent variables of interest (rather than depression), and quantitatively similar results are found. Satisfaction with life, as well as the component[135] parts of the CES-D 10 score are also used as dependent variables and relatively similar results are found.

[134]Not reported here.

[135]These are the ten component questions which are used in the calculation of the score, which ask about individual issues such as sleep, eating, feelings of hope and happiness, and others.

4.6.1 Maternal Depression and Child Age

A potentially confounding factor exists if maternal depression decreases with teen age (possibly due to the increasing independence of older teens and thus lower care burdens for mothers). If so, given a negative correlation between CSG receipt and education (older teens have higher education and are less likely to be recipients), the positive coefficient on the CSG-maternal depression interaction term may arise as a result of the multiplication of these two negative effects, and not due to any positive benefit derived from CSG receipt of teens with depressed mothers. The data however does not support this theory. The inclusion of an interaction term[136] between maternal depression and teen age is insignificant in the estimates in Table 18. In addition when this interaction term is removed, this results in smaller standard errors on the CSG-maternal depression term (as expected due to lowered multicollinearity), and a higher value of the coefficient (as expected due to the positive correlation between the two interactions terms).

In addition, the relationship between the age of teens and maternal depression levels appears to be constant. Graphing the predicted values of maternal depression by child age, using local polynomial estimation, shows a flat relationship between teen age and maternal depression (see Figure 32), especially in Wave 3 (the main sample of interest), implying this potential confounding factor may not be of concern.

Figure 32

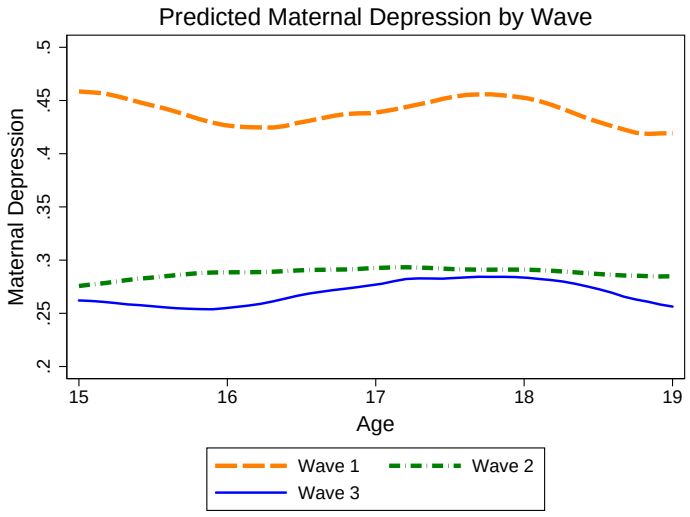


Figure 32 shows average maternal depression by teen age per wave.
Data: National Income Dynamics Survey.

[136]Estimates not reported here for brevity.

4.6.2 Sample Selection

Differential attrition rates between people who suffer from depression and those who do not will cause bias. The estimations used control for the variables used to create the sample weights, which should ameliorate some sample selection. Research in the Netherlands has shown that attrition among individuals suffering from psychiatric conditions is only marginally significantly different from individuals who do not suffer from these conditions (de Graaf et al. 2000). 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.

While the probability of dying between waves is significantly higher for people with depression, the rates of attrition (excluding death) between all waves are not significantly different between individuals who are depressed and those who are not, both for all adults, and for teens in particular, and for male teens. The death rate of people who suffer from depression between Wave 1 and 2 is 6.5 percent, compared to 4.3 percent of people who are well (thirty-four percent of adults are depressed in Wave 1). The death rate of people suffering from depression between Wave 2 and 3 is 4.5 percent, compared to 3.1 percent of people without depression (thirty-four percent of adults are depressed in Wave 2). Parental depression also has no impact on one's own possibility of attrition.

Other sample selection concerns include the fact that the sample used in this thesis consists only of resident household members, and those who are not present may differ in characteristics (Burns & Keswell 2012). Unfortunately there is no solution to this in the NIDS, and any conclusions drawn from these results must take this into account. However, as noted previously, those who have left the household may well have done so in search of work (Case & Deaton 1998), and are less likely to suffer from depression than those remaining in the household. This may imply that were those members to be present in the household, average depression levels in the household 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.

Whether the CSG and parental depression interaction term would still be negative and significant in such a sample may be debatable. This interaction is the second largest determinant of teen depression, and is much larger than all other potential determinants,

implying it may be less likely to be affected. The re-inclusion of these healthier individuals would have a positive effect on both teen and parental mental health, given what is known about the strong relationship between own depression and the depression of other household members. Thus the interaction term may emerge as less significant, if the CSG is not needed as much to help teens cope with depressed parents when depression levels in the household are lower.

An additional source of positive bias is possible given that the specifications do not control for the mental health of these non-resident household members. Non-resident members' mental health will be associated negatively with mother's depression, given what has been seen previously in this chapter about the positive correlation between the mental health of household members, and negatively with teen depression, implying the existence of a positive bias in the coefficient on maternal depression in estimates of teen depression. This implies the intergenerational transmission effect may be too large in these estimates. However, given that not every household has absent household members, this positive bias will be present only in some households. Without knowing the size or significance of the relationship of absent members' mental health to resident members, it is difficult to know quite how large the bias may be.

Missing data for either maternal or paternal depression also impacts on the size of the sample available for estimation. If either parent is not resident, their depression data will be missing. A strategy to mitigate this issue is employed, by assigning a zero for depression to all those with missing data, and then controlling for those with missing data in the estimation with a binary variable. This binary variable is significant in the paternal depression estimates, and is associated with higher depression. However, the size of the CSG and parental depression and interaction terms does not change, and nor does the significance[137]. In addition, sample sizes are not impacted on dramatically by this correction, implying the quality of the parental depression data is not very different from the quality of other parental variables such as parental education or labour market status.

[137]See Appendix Item A.5, Table 37.

4.6.3 Household Income

The insignificance and instability of household income in the depression estimates in Table 18 is unexpected. Household income[138] is only slightly significant, and in certain specifications higher household income is even associated with higher levels of depression rather than lower (the expected result). However, this effect size is very small, and not stable - the exclusion of parent's labour market status from the estimates results in household income becoming insignificant. Using other measures of a household's socio-economic status such as remittance income, grant income or household expenditure (in log and level formats), no significant coefficients are found. That grants are significant, and household income is not may reflect the direct control teens may have over their own grants, compared to household funds. Changes in household income may have less of an impact if these changes do not result in any increase in the teen's own resources.

The relationship between household income and average depression is graphed, by household income quartile, including ninety-five percent confidence intervals (see Figure 33).

Figure 33

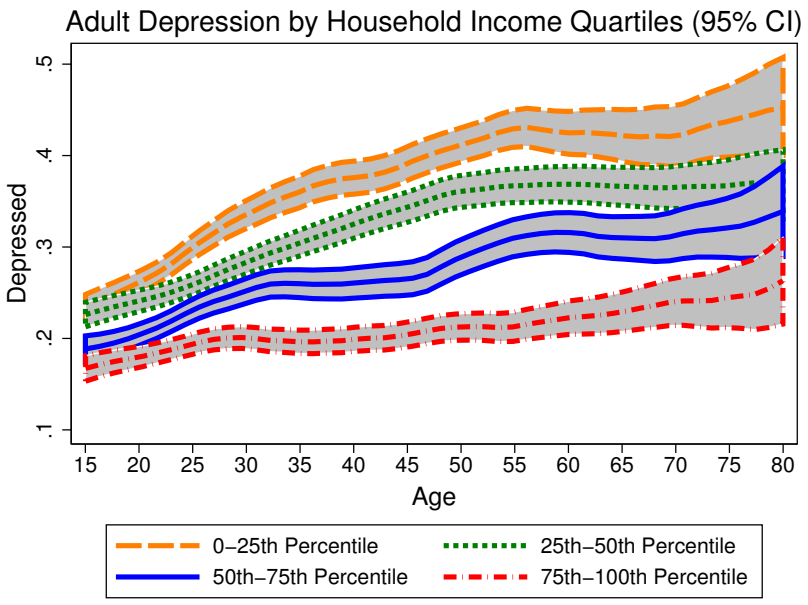


Figure 33 shows average depression by household income quartile, including ninety-five percent confidence intervals around each line, for a sample of individuals aged fifteen to eighty. Average depression rises with age, and rates of depression are lower the higher the income quartile. Data: National Income Dynamics Survey.

[138]Results do not differ when the inverse hyperbolic sine transformation of household income is used.

Average depression increases over age, as observed before, and higher household income is associated with a lower probability of being depressed. These are significant differences in the middle of the age distribution, but greater variation exists for teens and for the elderly. Insufficient sample size is unlikely to be driving these results - the sample sizes for teens and those aged above seventy-five are 10,241 and 876 individuals respectively. Figure 34 shows depression graphed by household income quartile, specifically for the sample of teenagers.

Figure 34

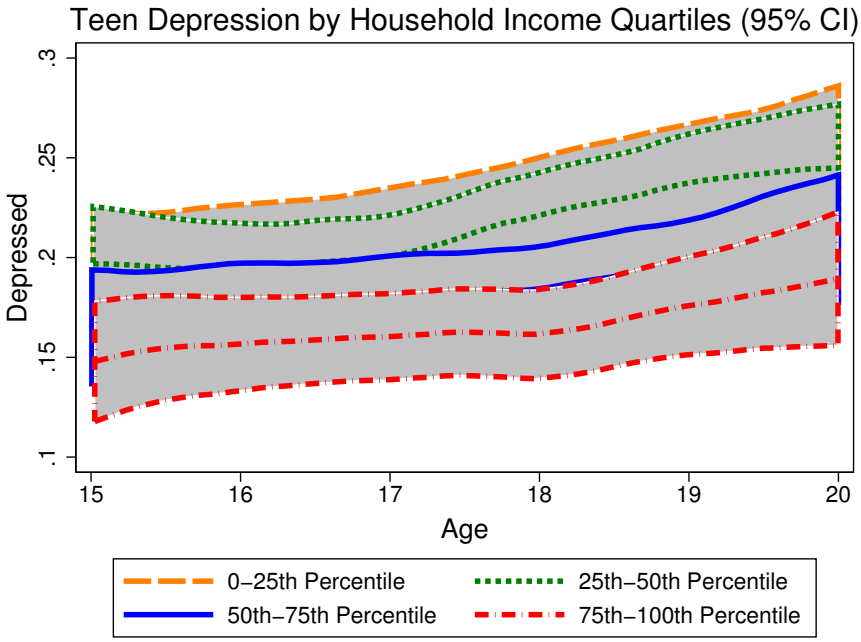


Figure 34 repeats the graph shown in Figure 33 for teens between fifteen and twenty. Data: National Income Dynamics Survey.

Both Figure 33 and 34 show the large overlap in teen depression levels by household income quartile. No clear pattern of a strict one directional relationship between depression and household income can be found in the teen sample.

The identification of the CSG impact stems from variation in receipt, which originates from individuals who either lose or gain access to the grant over time. This implies that it may be the *change* in individual income which is important, as opposed to the absolute levels of household income. Changes in income have been associated with changes in mental health (Sareen et al. 2011, Das et al. 2007, Baird et al. 2013). A literature exists which shows that relative consumption matters (Luttmer 2005), and obtaining a grant may increase utility for adolescents as their position improves in relation to that of their

peers (Baird et al. 2013). This may explain why grant receipt matters for teen depression, and yet the absolute level of household income does not necessarily matter for depression.

This chapter has investigated the size of the intergenerational transmission of depression effect, and the positive role that the CSG can play to mitigate the negative effect a parent with mental illness can have on a teenager's mental health. The grant has the potential to not only impact on the outcomes of the intended beneficiary, but may also have an impact on the welfare of the recipient caregivers, even if this has not been the intention of the program designers (Samuels & Stavropoulou 2016). A literature exists showing the positive impacts cash transfers can have on the mothers of beneficiaries, especially in countries where the size of the transfer forms a meaningful share of household income. Similarly to the mental health of teenagers in South Africa, maternal mental health is also of concern, and the grant has the potential to impact positively on the mental health of mothers. If this link exists, it could be a key auxiliary channel through which grants can improve child outcomes, both directly and through the improved mental health of mothers, which has been seen in the literature to play an important role in improved child outcomes such as nutritional status and educational achievement (Ensminger et al. 2003). Another potential channel through which grants may improve beneficiary welfare through the maternal channel is if grants cause an increase in maternal bargaining power, which implies more resources will be directed to child specific spending, such as the costs of schooling (Strauss et al. 2000). Chapter 5 investigates these potential impacts of the grant on mothers, and the effect of maternal depression on teen educational outcomes.

5 At the Mother's Knee

> Education commences at the mother's knee, and every word spoken within hearsay of little children tends toward the formation of character[139].

5.1 From Beneficiary to Recipient

Understanding the causal chain through which the CSG impacts on adolescent outcomes is important. Children do not receive the grant in a vacuum, rather their primary caregivers receive the money on their behalf and decide how to allocate it. In South Africa, the vast majority of CSG recipients are the mothers of the beneficiaries[140], and in many cash transfer programs around the world, women are the intended recipients of cash transfers (Ozer et al. 2011). Child outcomes are often the main focus of cash transfer programs, and the subsequent program evaluation (Ozer et al. 2011), leaving the potentially important mother-to-child transmission element out of the analysis. How caregiver welfare changes after grants are received, and what decisions are made by mothers about how grants are spent, are key determinants to whether or not positive impacts are felt in child welfare.

Mothers act as gatekeepers, and without positive intentions on their part, the intended targeting of the grant to improve child outcomes may fail. The results in this chapter indicate that grant targeting works: maternal outcomes are very minimally affected by grant receipt. Where maternal outcomes may possibly be affected, for example in increased bargaining power, this is only evidenced through changes which benefit children, such as decisions regarding the child's education.

Chapter 3 has shown that both current and cumulative CSG receipt have positive impacts on teen enrolment, although no impact on years of schooling achieved is found. There are many explanations for the positive effect of grants on enrolment. Grants may improve nutrition (Adato & Bassett 2009), lower the opportunity cost of schooling (Amarante et al. 2011), lower levels of financial stress in the household which make human capital investment more likely (Mincer 1958, Wolf et al. 2013), and reduce child labour and improved physical health through higher health care expenditure (Wolf et al. 2013).

Explaining the lack of grant impact on years of schooling attained is more challenging.

[139] Hosea Ballou (Groszmann 1900).

[140] In Wave 2 of the NIDS, Woolard & Buthelezi (2012) find that 98.3 percent of recipients are women.

It may be the case that the cumulative effects of grant receipt have not been properly identified, or there may be other reasons which explain this non-result, one of which may again be through the mother-child channel of influence. It is possible the grant is large enough to improve the probability that a child goes to school, but is not large enough to improve the lot of mothers sufficiently that they are able to ensure that enrolment of the child in school translates into actual achievement.

In Chapter 4, a second positive impact of the CSG on adolescent welfare is found. The grant acts to mitigate the strongly negative effect mothers who have mental illnesses have on their children's mental health. This may occur through a direct effect, that the CSG makes teens more resilient to the often observed poor parenting of mothers with mental illness, or through an indirect effect, that the CSG reduces depression in mothers, thus making them less likely to impact their children negatively on a range of outcomes.

A literature investigating the mostly positive effects of cash transfers on the mental health of *beneficiaries* certainly exists (Samuels & Stavropoulou 2016, Lund 2012, Fenn et al. 2014, Case 2004, Hamad et al. 2008, Baird et al. 2013), but far less research has been performed into the potential grant effects on the mental health of *recipients* (Chhagan et al. 2014, Ozer et al. 2011, Fernald et al. 2009). Any positive impacts on mothers' psychological health[141] are usually a possible but unintended side benefit of cash transfer programs, rather than the main target (Samuels & Stavropoulou 2016). Understanding the relationship between cash transfers and maternal mental health is important given the often very high levels of mental illness in female caregivers (Chhagan et al. 2014).

Could improvements in maternal mental health improve the educational and health outcomes of children? This is likely given the crucial role mothers play in the development of their children (Ensminger et al. 2003). If so, this provides one mechanism to explain the enrolment results found in Chapter 3. If mental illness in mothers does impact in a substantially negative way on child outcomes, and grants can ameliorate these effects, grants could have a large positive effect for not only children, but both children *and* mothers.

Receipt of the child support grant in South Africa has been seen to positively impact maternal involvement with children, as seen in increased time helping children complete homework, accompanying them on the walk to and from school, and engaging in shared

[141]To my knowledge, no large scale cash transfer program exists which specifically targets maternal mental health.

activities such as reading, playing, or watching TV (Patel et al. 2015). These are activities which promote school achievement, and could be indicative of improved mental health among recipients.

This chapter investigates whether CSG receipt does in fact improve maternal mental health, and to what degree the mental health of South African mothers is connected to the educational outcomes of their children. The grant is found to have insignificant impacts on maternal mental health, which is unfortunate given the significant negative effect poor mental health is found to have on teen educational achievement. Having a mother who is depressed for more than one wave is associated with a fifth of a year less schooling for teens. One other avenue to explain positive grant effects on teen enrolment is through changes in maternal bargaining power after the grant is received. Due to the differential spending patterns of women compared to men, increased female bargaining power can result in increased spending on children's needs, including school costs (Plagerson et al. 2011, Hochfeld 2013). This is explored in brief at the end of this chapter.

5.1.1 The Caregiver's Burden

In South Africa, not only gender differences, but also racial differences exist in the prevalence of mental illness. African women have the highest rates of depression compared to other races (Ardington & Case 2009). These higher rates of mental illness are related to the costs of gender specific factors which these women bear, such as the mental and physical costs of child care and child bearing, the prevalence of HIV and other illnesses such as obesity[142], and the impact of domestic or societal violence, or general powerlessness due to gender disadvantage (Moultrie & Kleintjes 2006). South Africa's unique past has implied that women, and in particular African women, suffered to a higher degree due to many of these factors (Chhagan et al. 2014, Jack et al. 2014). The highest rates of poverty, unemployment, HIV and violence (in particular sexual violence) are seen among African and Coloured women, and women living in poor rural areas (Moultrie & Kleintjes 2006).

Care giving has been found to be a strong predictor of high stress and poor mental health (Moultrie & Kleintjes 2006, Chhagan et al. 2014), and most caregivers tend to be women. One third of caregivers in a Kwazulu Natal study were found to suffer from

[142]Sixty percent of all women in Wave 1 of the NIDS in 2008 are either overweight or obese (Ardington & Case 2009).

psychiatric conditions (Chhagan et al. 2014), and a similar figure of twenty-eight percent was found for carers of HIV positive household members in Malawi and South Africa (Skeen et al. 2014). Caregivers are also unlikely to seek help for psychiatric illnesses[143]. Postnatal depression is also higher in South African women than the international average[144], as is antenatal depression (Chhagan et al. 2014). Women pay a high price for this higher prevalence of illness: Lund et al. (2013) calculate that the average estimated lost earnings among women with severe depression and anxiety are more than four times those of men's.

5.1.2 Maternal Mental Health and Child Outcomes

Maternal characteristics such as years of schooling attained are important for key child outcomes, such as infant health and mortality (Cleland & Van Ginneken 1988), education (Burns & Keswell 2012, Ensminger et al. 2003), and health (Case & Paxson 2002). Poor maternal mental health in particular is found to be associated strongly with child outcomes. The children of mothers suffering from mental illness have lower levels of human capital achievement[145] (Currie & Stabile 2007, Victora et al. 2008, Ensminger et al. 2003, Currie & Almond 2011, Frank & Meara 2009), and it is likely that this low achievement cannot solely be attributed to lower intelligence (Ensminger et al. 2003). These children also have worse developmental, cognitive and behavioural outcomes (Chhagan et al. 2014, Ozer et al. 2011, Currie & Almond 2011), have poor mental health themselves (Hammen et al. 2011), are more likely to die in their first year (Skeen et al. 2014, Prince et al. 2007), and are born at lower birth weights, even if depression occurs prior[146] to pregnancy (Tomita et al. 2015). Prince et al. (2007) estimate that twenty percent of stunting in infants could be avoided if maternal depression is appropriately treated.

Not only does it appear that mental illness in mothers may have an acute contemporaneous effect on children, but these effects may be long-lasting, resulting in persistent

[143]Of those classified as depressed in Wave 3 of the NIDS (2012), only thirty-one percent had sought treatment in the previous month (for any health condition).

[144]On average, more than twenty percent of post-partum women suffered from depression, in studies conducted in an informal urban settlement in Cape Town (Tsai & Tomlinson 2012).

[145]Often through the pathway of insufficient nutrition among children of mothers with poor mental health.

[146]Using the first two waves of the NIDS data, Tomita et al. (2015) find that mothers suffering from depression *prior* to pregnancy have infants with significantly lower birth weight. The authors cite the relationship between depression and poverty as a cause. Poverty is often associated with unhealthy behaviours such as smoking and drinking, and poor nutrition during pregnancy, all of which have been linked to low birth weight (Tomita et al. 2015).

negative outcomes manifesting much later in the child's life. Depression is a chronic condition, characterised by recurrence of episodes (Garber & Cole 2010). Solomon et al. (1997) estimate the average length of a depressive episode at five months, and this figure is likely to be higher for mothers with no access to treatment. If mother's depression is more severe, episodes are predicted to last longer, and occur more frequently (Spijker et al. 2002, Keller et al. 1986). In addition, the earlier in a child's life maternal depression manifests, the larger the impact on the child is likely to be (Kessler et al. 2007). The negative effects of maternal depression on birth weight, breastfeeding and adherence to vaccination schedules (Prince et al. 2007, Galler et al. 2000) all have the potential for long term negative impacts on child outcomes. Indeed, the effects of maternal depression in the first six months after a child's birth have been seen to impact on the cognitive outcomes of children in their early teens (Galler et al. 2004).

How exactly does maternal depression manifest for children? Poor parenting, and a lack of involvement in children's lives is a common feature of mothers suffering with depression (Whitbeck et al. 1992, Ensminger et al. 2003). Mothers in psychological distress may be less able to form quality attachment with their children, or provide sufficient supervision and nurturing (Ensminger et al. 2003, Hammen et al. 2011). Depressed mothers are often more pessimistic, more critical, and more inconsistent in their parenting depending on their current state of health (Ensminger et al. 2003). Financial stress, which is associated with depression (Patel & Kleinman 2003), is also associated with lower levels of parental involvement (Paxson & Schady 2010, Green et al. 2007). Parental involvement has been found to be very important for the educational outcomes of students, whether in primary, middle or high school (Green et al. 2007). A key factor for this involvement is the attitude parents hold about the possibility that involvement will produce a positive outcome, and the pessimistic thinking present in those suffering from depression is likely to be associated with an expectation that parental involvement will not produce any tangible benefit (Green et al. 2007).

5.2 Cash Transfers and Maternal Mental Health

Cash transfers have been found to positively impact on the mental health of caregivers (Fernald et al. 2009). As an exogenous income shock, the child support grant may improve mental health through the reduction of financial stress (Ensminger et al. 2003), and in

general reductions in poverty are associated with lower levels of mental illness (Patel & Kleinman 2003, Blas & Kurup 2010, Lund 2012). In addition, simultaneity exists between income and mental health: the theories of social selection (which explains the causal chain from poverty to mental illness), and social drift (the worsening of socio-economic status resulting from mental illness) explain why without treatment to interrupt these causal chains, a vicious cycle may exist between an individual's mental health and income (Lund et al. 2013, Miech et al. 1999). Again, given the nature of the household survey that is the NIDS, modelling the subsequent changes in mental health after grant receipt can only be done with cognitive models, given the lack of data collection on any physiological signs of depression such as changes in stress hormones present in the body (Samuels & Stavropoulou 2016).

In general, grant receipt is expected to be viewed positively, and could lift mood through an increase in optimism and self esteem due to an improved ability to meet the needs of a child (Beck 2008), and through a reduction in maternal guilt due to the previous inability to care for the child adequately (Abramson et al. 1978), a reduction in worries about physical health, if the costs of health care can now be borne (Rehm 1977), and others. These changes are all predicated on the size of the grant being sufficiently large to have such positive impacts. The next section investigates differences in adult caregivers by recipient status.

Certain studies have shown lowered maternal depression levels among cash transfer recipients (Ozer et al. 2011). Reduced maternal depression has been found when mothers gain access to an income assistance program in America, aimed at improving child and mother nutrition[147] (Downey & Greder 2014). However, only insignificant effects on maternal mental health after receipt of a cash transfer in Ecuador are recorded, although this lack of significance may be due to the relative shortness of the program receipt, which was only nine months long (Paxson & Schady 2010). Longer evaluations, for example after more than three years of cash transfer receipt in Mexico, have reported significant positive effects of receipt on maternal mental health (Ozer et al. 2011).

Besides an insufficient duration of receipt, an additional reason cash transfers may not significantly impact on caregiver mental health is if the relative size of the transfer is too low (Ozer et al. 2011). The child support grant is not considered to be large by

[147]The Special Supplemental Nutrition Assistance Program for Women, Infants and Children (WIC).

any standards. However, it is not entirely insignificant given the low average household incomes in South Africa. As noted in Chapter 2, in 2010, a child support grant amounted to forty percent of median monthly per capita income (Woolard & Leibbrandt 2010).

Significant impacts on mental health have been seen in Mexico, where families received an income supplement which constituted twenty-five percent of the family's income, compared to cash transfers in Nicaragua and Ecuador, which comprised only ten to fifteen percent of family income, and which had no significant impact on maternal mental health (Ozer et al. 2011). Similarly in Canada, large child benefits[148] resulted in significant changes in maternal mental health (Milligan & Stabile 2011). Lund (2012) notes the need for research which reports not only the effects associated with a binary indicator for receipt of cash transfers, but also measures the specific value of the amount received, in order to obtain a precise estimate of the treatment effect. Conditionality may also matter. Insignificant effects on mental health were observed in an unconditional cash transfer program in Ecuador, but a marginally significant effect on mental health was found for a cash transfer program in Nicaragua with conditions attached (Ozer et al. 2011).

In South Africa, some positive[149] effects of CSG receipt on caregivers' mental health have been found, which are larger if more of the caregiver's children are receiving the grant (Plagerson et al. 2011). However, these are not from a nationally representative survey and may not generalise to the entire population.

If maternal mental health is affected by the CSG, this may occur through the provision of a "psychological safety net", a greater sense of control over one's destiny, the elimination of food insecurity from the household, and the ability to pay for funeral policies[150] (Plagerson et al. 2011).

5.2.1 The Nature of Caregivers

Table 22 examines a sample of means test eligible Coloured and African mothers aged between twenty-five and fifty-five over Waves 1, 2 and 3, and their differences by recipient status.

[148] An increase in a thousand US dollars of child benefits per year was associated with a decrease in maternal depression of just over one-tenth of a standard deviation (Milligan & Stabile 2011).

[149] Grant receipt among some of the caregiver's children yielded a reduction in the probability of suffering from a mental disorder by sixty percent, and this reduction increased to eighty-four percent if all of the recipient's children were receiving the child support grant (Plagerson et al. 2011).

[150] Funeral costs are often large compared to household income in South Africa. To be able to afford funeral insurance relieves the worry of facing a large uncertain expense if a household member passes away (Plagerson et al. 2011).

Table 22

Mean Characteristics by Child Support Grant Recipient Status: Mothers									
	Wave 1			Wave 2			Wave 3		
	Non Recipient	Recipient		Non Recipient	Recipient		Non Recipient	Recipient	
Age in Years	40.3	36.0	***	40.7	35.6	***	40.7	36.2	***
Years of Education	7.40	8.26	***	7.96	8.90	***	8.24	9.14	***
Married	0.32	0.28		0.28	0.24	*	0.28	0.21	***
CES D-10 Score	9.36	9.50		8.04	7.37	**	7.24	7.53	
Depressed	0.45	0.44		0.32	0.25	**	0.29	0.29	
Life Satisfaction (Score from 1-10)	5.03	4.75	*	4.35	4.37		4.32	4.45	
Has Depressed Child	0.42	0.33	**	0.27	0.24		0.25	0.29	
Number of Children	1.76	2.84	***	2.03	2.96	***	1.71	2.72	***
Age of Youngest Child	12.3	6.57	***	12.4	6.54	***	13.4	7.11	***
Employed	0.59	0.51	***	0.65	0.55	***	0.65	0.54	***
Labour Force Participant	0.66	0.75	***	0.53	0.56		0.61	0.68	***
Average Monthly Wage	857	700	***	1,092	959	**	1,380	1,224	**
Main Decision Maker over:									
Expenditure	0.59	0.50	***	0.64	0.58	*	0.65	0.61	
Large Purchases	0.53	0.46	**	0.56	0.51	*	0.59	0.54	*
Who is a HH member.	0.54	0.45	***	0.55	0.49	**	0.57	0.53	
Where the household lives.	0.54	0.45	***	0.57	0.49	**	0.59	0.53	***
Where do the children go to school.	0.60	0.54	**	0.57	0.62		0.50	0.64	***
Household Head	0.47	0.38	***	0.53	0.43	***	0.59	0.57	
Pension Household	0.09	0.13	***	0.15	0.18	**	0.12	0.15	**
Number of CSG Beneficiaries	0.55	1.81	***	0.86	2.10	***	0.81	2.11	***
Household Expenditure	2,436	2,106	*	2,819	2,458		2,968	2,428	**
Household Size	4.13	5.26	***	4.46	5.63	***	4.18	5.15	***
Rural	0.39	0.50	***	0.42	0.49	**	0.39	0.46	**
Number of Observations	1,525	1,874		1,572	2,143		1,423	2,553	

The sample for this table comprises African and Coloured mothers between the ages of twenty-five and fifty-five who are means test eligible for the child support grant. Means are calculated for all 3 waves, and by recipient status. Variables not included for reasons of brevity and lack of significant difference: number of depressed children, happier than ten years ago, household remittance income, and household income. Child support grant beneficiaries are overwhelmingly African and Coloured, justifying the use of this sample. The significance of the differences between recipients and non-recipients is reported: * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

This sample should include the mothers of the teens under discussion in Chapter 3, while excluding pensioners (who are significantly different in characteristics compared to non-pensioners). Using the means test eligible sample lowers the likelihood that any differences between recipients and non-recipients are driven by large differences in household income.

Some differences are as expected given the literature. Recipients are on average younger than non-recipients (four years younger on average), and have correspondingly younger children. Recipients have more children, despite their much younger average age, and are less likely to be employed. They live in larger and poorer households, which are more likely to be located in rural areas. All these differences are significant at the one percent level. Recipients are significantly (at the five percent level) more likely to live in pensioner households, although these differences are small[151].

Recipients have significantly higher average levels of education (nearly one year more), despite their younger average age. This may reflect a generational effect of higher educational achievement among younger cohorts, due to improvements in government education provision over time (Burns & Keswell 2012). Despite lower rates of employment, CSG recipients are significantly more likely to be labour force participants in Waves 1 and 3.

Regarding mental health, it can be seen that recipients do not suffer from depression at different rates to non-recipients, except in Wave 2 where recipients have significantly better mental health than non-recipients (at the five percent level). Recipients are less likely to have a depressed child in Wave 1, but not in the following waves. Life satisfaction is significantly lower for recipients in Wave 1, but equal to that of non-recipients in the following waves. These descriptive statistics do not suggest that positive grant effects on maternal mental health exist in the NIDS. The next section uses non-parametric and parametric estimates to further identify the impact of grant receipt, if any, on maternal mental health.

5.2.2 Estimates

Estimation of the effect of CSG receipt on maternal outcomes is complicated by a number of factors. Mothers may be receiving the grant for one child, however, they may have other children in the household who also impact on their mental state, income levels,

[151]Fifteen percent versus twelve percent in Wave 3.

and decision making processes. In addition, the age of the mother's youngest child is likely to be most binding constraint on their labour market participation decisions, and potentially on their mental health, given the higher demands on mothers' attention of younger children versus older children. A first attempt to control for this is to control for as many relevant characteristics of the mother as possible, and in particular including controls for how many children the mother has, and the age of her youngest child. In addition, estimation is kept to the means test eligible sample, in an attempt to reduce omitted variable bias related to socio-economic status. As in Table 22, the base sample chosen for analysis is African and Coloured mothers between the ages of twenty-five to fifty-five in Wave 3 of the NIDS, as most likely to include the mothers of the teens under discussion in Chapters 3 and 4. This is referred as Sample (1) in the following analysis. Multi-variate estimates are performed using Equation 7 below, to investigate the strength of the CSG-mental health link including a number of key characteristics.

$$MH_i = \beta_0 + \beta CSG_i + \alpha X_i + \gamma HH_h + \epsilon G_g + u_i \tag{7}$$

MH_i reflects mental health status using a binary indicator for the presence of depression for individual i, in household h. CSG_i represents actual CSG receipt, the X_i include individual characteristics including age, race, years of education, and others pertaining to mental health, HH_h is a vector of household characteristics including household size and income. G_g includes geographical controls, and u_i is an individual error term.

The preceding discussion indicates the coefficient on actual CSG receipt for mothers in ordinary least squares estimates of maternal depression may well emerge as negative, if the endogeneity of CSG receipt has not been eliminated. The impact of CSG receipt on maternal depression can be investigated in a number of sub-samples. The use of these sub-samples is motivated by the identification strategies discussed in Chapter 2, and the patterns of maternal receipt and depression previously seen in the descriptive statistics of this chapter. Sample (2) limits the base sample to those who are means test eligible, Sample (3) further restricts this sample to women with their youngest child aged between fifteen and nineteen, and Samples (4) and (5) further limit Sample (3) to mothers with either one child, or mothers who have three or more children. In Sample (4), the limitation to mothers of only children is intended to reduce the possible confounding when grant receipt is recorded for more than one child.

As a baseline, the impact of CSG receipt is estimated using ordinary least squares, with as many relevant controls as possible, however, the assumption is that this effect may still emerge as negative if the endogeneity in grant receipt has not been eliminated. A second strategy used is to estimate the impact of the potential duration of receipt seen in the mother's youngest child on maternal depression. Following the discussion in Chapter 2, potential duration of receipt is assumed to be random given the pattern of program roll-out. The results are presented in Table 23.

In none of these samples, whether referring to the OLS or instrumental variables estimates, is child support grant receipt, or duration of receipt, seen to significantly impact on maternal depression. The lack of significant grant effect on maternal mental health may due to the relatively small size of the grant (Ozer et al. 2011). In Appendix Item A.10, Tables 23 and 24 are replicated, using number of CSGs received as the CSG variable of choice. However, no significant effects are found.

A third strategy used for identification of grant receipt impact is that of an instrumental variables specification similar to that seen in the enrolment and years of schooling estimates for teens in Chapter 3. In this IV specification, the instrument chosen for CSG receipt among mothers is whether or not the mother's youngest child is age eligible for the grant[152]. As noted previously, depending on the sample, age eligibility can be assumed to be random, given the staggered increases in age cut-off values from the start of the CSG program.

[152]Given that there is also random variation in potential duration of receipt among the mother's children, this could be an instrumental variable for maternal receipt. It is true that the higher the potential duration of receipt is, the older the child will be, and the more likely the mother will be to receive the grant, up to a certain age value at which potential duration (and receipt) declines. However, both very young children, and much older children, have very low levels of potential duration of receipt, and the mother is more likely to receive the grant for younger children than much older children who are no longer age eligible, thus the direction of impact of potential duration on maternal CSG receipt would be unclear. This is confirmed in other IV estimates (not reported here), where the first stage coefficients range only between 0.02 and 0.06.

Table 23

Determinants of Depression: African and Coloured Means Test Eligible Mothers in Wave 3: Ordinary Least Squares Estimates										
	Base Sample		Means Test Eligible		Youngest Child Aged 15-19		One Child		Three or More Children	
	CSG Receipt	Exposure	CSG Receipt	Exposure	CSG Receipt	Exposure	CSG Receipt	Exposure	CSG Receipt	Exposure
Sample	(1)		(2)		(3)		(4)		(5)	
Maternal Characteristics										
CSG Recipient/Potential Duration of Receipt	0.03*	-0.00	0.03	-0.00	0.04	-0.01	0.09	0.01	0.08	-0.01
	(0.02)	(0.00)	(0.02)	(0.00)	(0.05)	(0.01)	(0.08)	(0.02)	(0.10)	(0.03)
Age in Years of the Mother	0.02	0.02	0.02	0.02	0.05	0.05	0.12	0.10	0.38	0.33
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)	(0.07)	(0.07)	(0.30)	(0.30)
Age Squared of the Mother	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00*	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
African	0.04	0.02	0.01	-0.02	0.07	0.07	0.07	0.07	-0.17	-0.17
	(0.03)	(0.03)	(0.04)	(0.04)	(0.09)	(0.09)	(0.14)	(0.14)	(0.27)	(0.29)
Years of Schooling	-0.00	-0.00	-0.00	-0.00	-0.01*	-0.01*	-0.01	-0.01	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married	-0.02	-0.02	-0.02	-0.02	-0.00	-0.00	0.08	0.08	0.02	0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.04)	(0.04)	(0.09)	(0.09)	(0.09)	(0.09)
Has a Depressed Child	0.43***	0.43***	0.42***	0.42***	0.48***	0.47***	0.54***	0.54***	0.38***	0.38***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.10)	(0.10)	(0.10)	(0.10)
In Poor Health	0.13***	0.13***	0.13***	0.12***	0.06	0.05	0.01	0.00	-0.06	-0.06
	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.11)	(0.11)	(0.12)	(0.12)
Age of Youngest Child	0.00	-0.00	0.00	-0.00	0.02	-0.00	0.03	0.03	0.03	-0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.02)	(0.04)	(0.03)	(0.07)	(0.04)	(0.08)
Number of Resident Biological Children	-0.00	-0.00	-0.00	-0.00	-0.02	-0.02			-0.00	-0.02
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)			(0.09)	(0.09)
Economically Active	-0.06***	-0.07***	-0.05**	-0.06***	-0.05	-0.05	-0.06	-0.05	-0.03	-0.02
	(0.02)	(0.02)	(0.02)	(0.02)	(0.05)	(0.05)	(0.09)	(0.09)	(0.09)	(0.09)
Household Size	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.03**	-0.03**	0.03*	0.03*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Pensioner Household	-0.01	-0.01	-0.01	-0.01	0.01	0.01	-0.01	-0.02	0.08	0.08
	(0.02)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.09)	(0.09)	(0.13)	(0.13)
Rural	-0.03	-0.05*	-0.02	-0.05*	-0.05	-0.04	-0.18**	-0.18**	-0.10	-0.05
	(0.02)	(0.03)	(0.03)	(0.03)	(0.05)	(0.05)	(0.09)	(0.08)	(0.12)	(0.13)
Log of Household Income	-0.03**	-0.04***	-0.03**	-0.04**	-0.02	-0.02	0.01	0.01	-0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
Observations	1,977	1,737	1,653	1,451	374	374	128	128	108	108
R-squared	0.24	0.24	0.23	0.23	0.28	0.28	0.39	0.38	0.31	0.31

This table reports estimates of maternal depression, for a base sample of Coloured and African mothers between the ages of twenty-five and fifty-five, from Wave 3 of the NIDS. Ordinary least squares estimates are reported, where the CSG variable is either actual receipt reported by mothers, or the potential duration (or exposure) of grant receipt of their youngest child. Sample (2) limits the base sample to the means test eligible. Sample (3) limits the previous sample to women with their youngest child between fifteen and nineteen, Sample (4) limits the sample further to women who have one child, and Sample (5) is limited to women with three or more children. Each regression includes province dummies. Robust standard errors are reported in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Table 24 presents the first and second stage estimates of this instrumental variables strategy, again in Samples (1) through (5). Despite the fact that age eligibility of the youngest child emerges as a fairly strong instrument in the first stage estimates[153], no significant effect is found of grant receipt on maternal depression.

From Tables 23 and 24, the strongest determinants of maternal depression are whether she has a depressed child, whether she considers herself to be in poor health (both are associated with higher maternal depression), and whether she is economically active (which is associated with reduced depression).

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 (Chhagan et al. 2014), and in many countries around the world, and in South Africa, the connection between maternal depression and child outcomes is highly significant (Currie & Stabile 2007, Victora et al. 2008, Ensminger et al. 2003, Currie & Almond 2011, Frank & Meara 2009, Chhagan et al. 2014, Ozer et al. 2011, Hammen et al. 2011). The next section investigates the patterns seen in children's characteristics and outcomes depending on the state of their mothers' mental health.

[153]The coefficient on age eligibility in the first stage ranges between 0.37 and 0.46, and it is significant in all samples at either the one percent or five percent level.

Table 24

Determinants of Depression: African and Coloured Means Test Eligible Mothers in Wave 3: Instrumental Variables Estimates										
Sample	Base Sample		Means Test Eligible		Youngest Child Aged 15-19		One Child		Three or More Children	
Stage	First	Second	First	Second	First	Second	First	Second	First	Second
	(1)		(2)		(3)		(4)		(5)	
Maternal Characteristics										
Youngest Child is Age Eligible	0.37***		0.41***		0.37***		0.39**		0.46**	
	(0.04)		(0.05)		(0.10)		(0.15)		(0.18)	
CSG Recipient		-0.06		-0.13		-0.11		0.24		-0.29
		(0.11)		(0.11)		(0.25)		(0.35)		(0.35)
Age in Years of the Mother	0.03	0.03	0.04	0.02	-0.01	0.05	-0.16*	0.14*	-0.12	0.29
	(0.02)	(0.02)	(0.03)	(0.02)	(0.05)	(0.04)	(0.08)	(0.08)	(0.33)	(0.30)
Age Squared of the Mother	-0.00	-0.00	-0.00	-0.00	0.00	-0.00	0.00**	-0.00*	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
African	-0.01	0.03	0.02	-0.00	0.08	0.08	-0.02	0.08	-0.08	-0.20
	(0.05)	(0.04)	(0.06)	(0.05)	(0.08)	(0.09)	(0.11)	(0.12)	(0.35)	(0.32)
Years of Schooling	-0.01***	-0.00	-0.00	0.00	0.00	-0.01*	0.00	-0.01	0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married	-0.07***	-0.01	-0.06**	-0.02	-0.04	-0.01	0.03	0.07	0.05	0.03
	(0.02)	(0.02)	(0.03)	(0.02)	(0.05)	(0.04)	(0.09)	(0.09)	(0.09)	(0.09)
Has a Depressed Child	0.03	0.42***	0.02	0.41***	-0.05	0.47***	-0.02	0.55***	0.05	0.40***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.06)	(0.10)	(0.09)	(0.11)	(0.10)
In Poor Health	0.02	0.12***	0.01	0.12***	-0.03	0.05	-0.07	0.02	0.02	-0.06
	(0.03)	(0.03)	(0.03)	(0.04)	(0.06)	(0.06)	(0.11)	(0.11)	(0.10)	(0.11)
Age of Youngest Child	-0.01***	-0.00	-0.01***	-0.00	-0.02	-0.00	-0.01	0.05	-0.01	-0.02
	(0.00)	(0.00)	(0.00)	(0.00)	(0.04)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
Number of Resident Biological Children	-0.01	-0.00	-0.00	-0.00	0.02	-0.02			-0.11	-0.05
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)			(0.08)	(0.10)
Economically Active	0.01	-0.07***	0.03	-0.06**	0.04	-0.05	0.07	-0.06	0.24***	0.04
	(0.03)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)	(0.10)	(0.08)	(0.08)	(0.11)
Household Size	0.02***	-0.00	0.01	-0.00	0.02*	-0.00	0.02	-0.03**	0.03*	0.04**
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)
Pensioner Household	-0.01	-0.01	-0.04	-0.01	-0.03	0.01	-0.05	-0.00	-0.06	0.06
	(0.03)	(0.03)	(0.04)	(0.03)	(0.06)	(0.05)	(0.12)	(0.09)	(0.12)	(0.12)
Rural	0.04	-0.03	0.03	-0.03	0.08	-0.03	0.02	-0.19**	0.25*	0.02
	(0.03)	(0.03)	(0.04)	(0.03)	(0.06)	(0.05)	(0.11)	(0.08)	(0.14)	(0.15)
Log of Household Income	-0.09***	-0.04**	0.01	-0.04**	-0.01	-0.02	-0.03	0.01	-0.04	-0.01
	(0.01)	(0.02)	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.05)	(0.06)	(0.06)
Number of Observations	1,599	1,599	1,341	1,341	374	374	128	128	108	108
Adjusted R-squared		0.22		0.19		0.26		0.37		0.21

This table reports instrumental variables estimates of the impact of CSG receipt among mothers on their depression status, for a base sample of Coloured and African mothers between the ages of twenty-five and fifty-five, from Wave 3 of the NIDS. The first and second stage estimates are reported, where maternal CSG receipt is instrumented for using the age eligibility of the youngest child. Sample (2) limits the base sample to the means test eligible. Sample (3) limits the previous sample to women with their youngest child between fifteen and nineteen, Sample (4) limits the sample further to women who have one child, and Sample (5) is limited to women with three or more children. Each regression includes province dummies. Robust standard errors are reported in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

5.3 The Importance of Mothers

5.3.1 Depressed Mothers and Their Children

As discussed previously, mothers who suffer from depression are likely to parent differently to mothers who are not depressed, and are also more likely to live in stressful circumstances. These hypotheses are tested in Table 25, where descriptive characteristics of mothers are examined, and significance tests are performed by mental health status.

Table 25 shows that mothers who are depressed are slightly older than non-depressed mothers, although this difference is only significant at the ten percent level. Mothers who suffer from depression have significantly more children than mothers who are well, and these children are on average slightly older than those of mothers who do not suffer from depression[154]. The means of a number of variables do not differ by maternal depression status[155]. Depression manifests in significantly lower levels of life satisfaction and worse self-perceived health. The probability of an adult mother's parent suffering from depression if they are depressed is very high, as well as the probability that a depressed mother has a depressed child, or a depressed sibling[156]. These results link to the strong intergenerational transmission effect found in Chapter 4, and shows the effect is present in adults as well as teens.

Mothers who have depression have lower levels of schooling, and a lower probability of having matriculated[157], earn lower wages and live in households with much lower household income, and correspondingly lower household spending on education[158].

[154]Mothers with depression have on average 2.9 children compared to 2.73 for non-depressed mothers, and youngest children with average age of 9.91 years of age compared to 9.3 years for mothers who do not suffer from depression. These differences are significant at the five percent level.

[155]These include urban or rural status, household size, household grant receipt, pregnancy, decision maker status, race, gender of household head, age category and number of children in the household.

[156]As much as three or four times the rate of parental depression seen in mothers who are healthy. Maternal depression among mothers who are themselves depressed is sixty-nine percent, versus nineteen percent for healthy mothers. Similarly paternal depression among mothers who are themselves depressed is seventy-two percent versus eighteen percent in the non-depressed sample: see Table 25. In addition, a mother who has depression has a four time higher risk of having a depressed child than a mother who is well. The probability of a depressed mother having a depressed sibling is three times that of mentally well mothers.

[157]Only twenty-eight percent of depressed mothers have a matric, versus thirty-five percent of not-depressed mothers.

[158]This difference is large: households spend double the amount on education in households where mothers are not depressed, although this difference is only significant at the ten percent level.

Table 25

Descriptive Statistics of Mothers in Wave 3 by Mental Health Status				
	All	Depressed	Sig.	Not Depressed
Age in Years	38.1	38.6	*	37.9
African	0.89	0.91		0.88
Coloured	0.11	0.09		0.12
CSG Recipient	0.53	0.57	**	0.52
Years of Completed Education	9.63	9.15	***	9.80
Matric	0.33	0.28	***	0.35
Married	0.35	0.31	**	0.37
Employed	0.68	0.67		0.68
Labour Force Participant	0.71	0.63	***	0.74
Monthly Wage	3,294	2,702	**	3,477
Female Headed Household	0.57	0.60		0.56
Mother's Years of Completed Education	3.57	3.64		3.55
School Location Decision Maker	0.58	0.57		0.59
Age of Youngest Child	9.47	9.91	**	9.30
Number of Children	2.77	2.90	**	2.73
Pregnant	0.03	0.04		0.03
Has Depressed Child	0.25	0.54	***	0.14
CES D-10 Score	7.17	12.9	***	5.05
Life Satisfaction (Score from 1-10)	4.73	3.86	***	5.05
In Poor Health	0.12	0.18	***	0.10
Sibling is Depressed	0.04	0.09	***	0.03
Mother is Depressed	0.32	0.69	***	0.19
Father is Depressed	0.33	0.72	***	0.18
Age 25-34	0.39	0.38		0.40
Age 35-44	0.35	0.33		0.35
Age 45-55	0.26	0.28		0.25
Pension Household	0.15	0.15		0.15
CSG Household	0.78	0.78		0.78
Number of Children in HH	1.11	1.12		1.11
Household Income	4,808	3,578	***	5,209
Household Remittance Income	138	85		155
Household Grant Income	1,082	1,068		1,087
Total Spending on Education (2011)	1,034	583	*	1,181
Household Size	3.08	3.09		3.08
Rural	0.33	0.34		0.32
Number of Observations	5,102	1,404		3,696

This table reports weighted means of individual characteristics, tested for significant differences by depression status. The sample consists of African and Coloured mothers between the ages of 25 and 55. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

Mothers with depression are also less likely to be married, although rates of marriage are not high in either group[159]. Depressed mothers are also less likely to be labour force participants, although rates of employment do not differ for the two groups. CSG receipt is slightly higher for depressed mothers (five percentage points) although more than half of all mothers receive the grant, whether depressed or not.

The differences seen in Table 25 provide evidence in support of the negative correlation between depression and maternal outcomes, and the high correlation between environmental factors such as financial stress, and maternal mental health. Maternal depression is expected to be reflected not only in differential characteristics in mothers, but also in teenagers. Table 26 investigates this possibility using the sample of teens aged fifteen to nineteen years old. The results support a theory of shared financial deprivation in the household. Teenage children of depressed mothers live in larger households with significantly lower levels of household incomes, and lower levels of educational spending, and the magnitude of these differences is large. These children are also more likely to be income eligible for the child support grant, and to be current child support grant beneficiaries, and their mothers have significantly lower education levels.

Maternal depression does not appear to impact on teenage enrolment. However, it does significantly and negatively impact on years of schooling achieved, and the mental health of teens themselves. Again, evidence of a strong intergenerational transmission of depression effect is observed[160]. From these results, it appears to be the case that maternal characteristics, and particularly maternal mental health, significantly impact on a number of child outcomes. Continuing with the analysis from Chapter 3, the next section investigates the impact of maternal and paternal depression on the two outcomes of interest, namely teenage enrolment and years of schooling. Both non-parametric and parametric estimates of these two outcomes are presented.

[159]Thirty-one percent of depressed mothers are married, compared to thirty-seven percent of mothers who are not depressed.

[160]Teens have much higher levels of depression if their mothers are depressed (forty-seven percent of these teens are depressed versus seven percent of teens whose mothers are healthy). Their fathers also have substantially higher levels of depression than teens whose mothers are well (sixty-three percent versus fifteen percent).

Table 26

Individual Descriptive Statistics for Teens Aged 15-19 by Maternal Depression Status				
Teenage Characteristics	All	Mother is Depressed		Mother is Not Depressed
Age	16.8	16.9		16.8
Female	0.50	0.54		0.49
Total Spending on Education (2011)	3,611	2,094	**	4,081
Income Eligible for the CSG	0.72	0.88	***	0.66
Mother's Education	8.52	7.13	***	8.97
Mother is Resident in the HH	1.00	1.00		1.00
CES D-10*	5.54	8.87	***	4.45
Depressed (CES-D 10 > 10)	0.17	0.47	***	0.07
Mother is Depressed	0.24	1.00	***	0.00
Father is Depressed	0.23	0.63	***	0.15
Enrolled	0.85	0.81		0.86
Years of Completed Education	8.97	8.73	**	9.05
African	0.79	0.90	***	0.75
Coloured	0.11	0.06	*	0.12
Indian/Asian	0.03	0.02		0.03
White	0.07	0.01	***	0.09
CSG Beneficiary	0.29	0.33	*	0.27
Duration of CSG Receipt	12.6	12.0		12.7
Household Size	5.54	6.30	***	5.63
Rural	0.44	0.48	*	0.39
Household Income	8,483	5,216	***	11,282
Household Grant Income	1,390	1,272		1,239
Number of Children in HH	2.48	2.98	***	2.51
Number of Pensioners in HH	0.38	0.29		0.27
Number of CSG Recipients in HH	1.52	2.01	***	1.50
# Observations	1,988	533		1,455

This table presents descriptive statistics for teenagers by maternal depression status, and tests of significance between the two groups. The sample consists of teenagers aged fifteen to nineteen in the National Income Dynamics Survey, Wave 3. Estimates presented are weighted using the sample weights from Wave 3. Significant differences are starred. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

5.3.2 Maternal Depression and Educational Outcomes: Part A

Figures 35 and 36 depict graphically the relationship between enrolment and years of schooling and parental depression, with ninety-five percent confidence intervals.

Figure 35

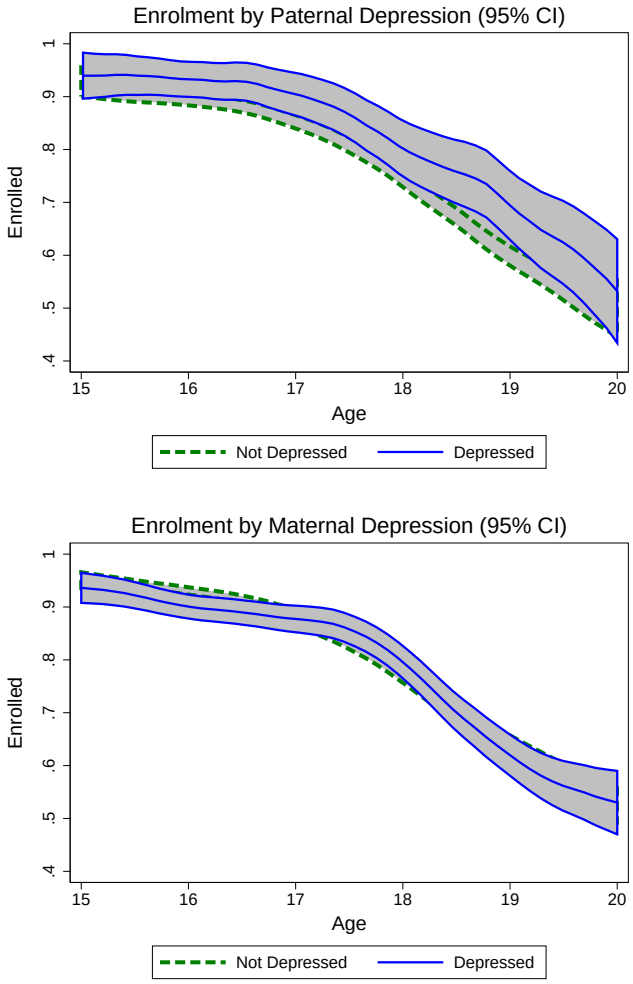


Figure 35 shows average enrolment for teens by parental depression status, with ninety-five percent confidence intervals. Data: National Income Dynamics Survey.

Figure 35 shows that parental depression does not appear to significantly impact on teen enrolment. However, in Figure 36 it can be seen that parental depression is associated with fewer years of schooling achieved, with a larger effect seen for teens who have depressed fathers. These differences are significant but not extremely large, at approximately half a year at their highest point.

Figure 36

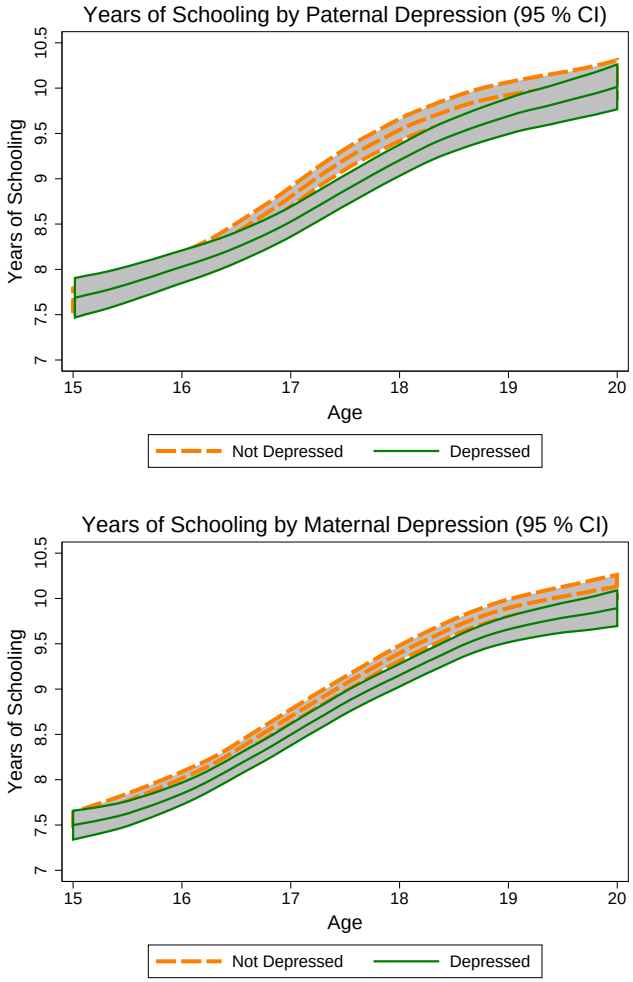


Figure 36 shows average years of schooling for teens by own and parental depression status, with ninety-five percent confidence intervals. Data: National Income Dynamics Survey.

5.3.3 Maternal Depression and Educational Outcomes: Part B

A multiple linear regression is performed in Table 27, with a model similar to that used in the estimates performed in Chapter 3.

$$Y_i = \beta_0 + \beta CSG_i + \lambda NumWavesMDep_p + \alpha X_i + \gamma HH_h + \epsilon G_g + u_i \quad (8)$$

Y_i reflects the outcome variable for individual i, in household h. The two outcome variables under analysis in Table 27 are teen enrolment and years of schooling. CSG_i represents actual CSG receipt, the X_i include individual characteristics, $NumWavesMDep_p$ reflects the number of waves that the mother has been depressed. HH_h is a vector of household characteristics. G_g includes geographical controls, and u_i is an individual error term.

Number of waves depressed is initially chosen as the maternal measure of mental health, as it reflects a cumulative measure, which is more likely to be related to teen education levels than current maternal depression status. This is due to the chronic nature of the disease, and the fact that the impact of a mother's depression on a child is larger the more severe the mother's condition - as measured here by duration of depression (Kessler et al. 2007).

The model in Equation (8) is also estimated in a number of different sub-samples. The base sample is Coloured and African fifteen to nineteen-year-olds in Wave 3 (labelled all), and the other samples are the means test eligible proportion of this base sample, and the students from the base sample who are either female, African or living in households where the head of the household is female. These groups are potentially more vulnerable from a socio-economic point of view to the negative impact of poor maternal mental health, as discussed previously in the literature.

In Table 27 the number of waves a mother has been depressed for does not impact on enrolment (this result accords with Figure 35). However, having a mother who is depressed for more than one wave is associated with fewer years of schooling attained (of just over a fifth of a year, which is in agreement with the differences seen in Figure 36). These differences are significant at the one percent level in all samples. To give context to the size of these coefficients, in the base sample education which is lower by 0.22 of a year equates to a three percent reduction in education level compared to the mean of education of 8.79 years in this sample.

Table 27

The Determinants of Teen Education Outcomes: Ordinary Least Squares Estimation

	Enrolment					Years of Education				
	All	Means Test Eligible	Female	African	Female HH Head	All	Means Test Eligible	Female	African	Female HH Head
CSG Beneficiary	0.09 ***	0.10 ***	0.08 **	0.09 ***	0.07 **	0.28 **	0.32 **	0.52 ***	0.28 *	0.26
# of Waves Mother is Depressed	0.01	0.02	0.03	0.02	0.02	-0.22 ***	-0.23 ***	-0.26 ***	-0.24 ***	-0.26 ***
Age	-0.11 ***	-0.11 ***	-0.12 ***	-0.10 ***	-0.11 ***	0.71 ***	0.71 ***	0.82 ***	0.69 ***	0.72 ***
Female	-0.03	-0.03	0.00	-0.03	-0.04	0.61 ***	0.66 ***		0.68 ***	0.66 ***
Log of HH Educational Spending	0.02 ***	0.02 ***	0.02 *	0.02 ***	0.02 *	0.09 ***	0.11 ***	0.07 **	0.10 ***	0.10 ***
Mother has a Matric	0.02	0.00	0.01	0.02	0.00	0.84 ***	1.06 ***	0.87 ***	0.80 ***	0.95 ***
Mother is Economically Active	-0.01	0.00	0.04	-0.02	-0.01	-0.09	-0.06	-0.15	-0.04	-0.16
Mother 's Age	0.00	0.00	0.00	0.00	0.00	0.02 **	0.02 **	0.01	0.02 *	0.01
Years of Education	0.04 ***	0.04 ***	0.05 ***	0.03 ***	0.04 ***					
Coloured	-0.07	-0.11	-0.06	0.00	-0.10	-0.03	-0.01	-0.18	0.00	0.07
Log of Household Income	0.00	-0.02	-0.01	0.00	0.00	0.13 *	0.06	0.08	0.12	0.13
Household Size	-0.01	-0.01	0.00	-0.01	-0.01 **	-0.04 **	-0.03	-0.04 **	-0.03 *	-0.06 ***
Rural	-0.01	0.03	-0.01	-0.01	0.00	-0.25	-0.22	0.10	-0.15	-0.24
Mean of Dependent Variable	0.83	0.81	0.81	0.85	0.81	8.79	8.68	9.09	8.77	8.80
Average # Waves Mother is Depressed	1.00	1.07	1.03	1.07	1.06	1.00	1.07	1.04	1.07	1.06
F Statistic	12.2	10.9	8.1	9.2	11.6	35.5	26.3	21.7	28.6	28.3
R Squared	0.22	0.24	0.22	0.20	0.20	0.31	0.28	0.33	0.29	0.30
Number of Observations	1,032	806	508	884	740	1,175	912	576	989	839

Estimates are presented of the determinants of teen enrolment and years of education, using ordinary least squares estimates. The instrumental variables estimates (where age eligibility instruments for actual receipt) are larger than the ordinary least squares, although the levels of significance are lower depending on the sample. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. All specifications include province dummies. The base sample consists of African and Coloured individuals aged fifteen to nineteen years old in Wave 3 of the National Income Dynamics Survey.

Current enrolment may be more likely to be related to current maternal depression (as opposed to the length of a mother's depression), if both are simultaneously impacted on by shared environmental factors.

Table 27 is replicated using current maternal depression as the maternal mental health measure (see Table 28). However, current maternal depression is also not related to enrolment, and although it displays some relationship to years of schooling, this relationship is neither stable nor consistently significant in all samples. A possible reason it may emerge significant in some samples is that it may indicate the presence of chronic depression, given the positive likelihood that current and past depression are related.

Of interest in Table 27 is that when maternal depression is controlled for in the schooling estimates, a positive and significant coefficient on CSG receipt is seen[161], whereas the previous estimates[162] in Chapter 3 did not display any significant relationship between grant receipt and years of schooling attained. In these estimates, CSG beneficiaries attain at least a quarter of a year more schooling than non-beneficiaries. The effect is largest in the female sample, where receipt results in an increase in years of schooling of half a year. In Chapter 4, Table 14, these slight differences were apparent in a simple comparison of means.

The emergence of a significant coefficient on CSG receipt status after the inclusion of maternal mental health could indicate the existence of negative omitted variable bias[163] on the CSG receipt coefficient in Chapter 3, which is eliminated when maternal depression is controlled for. However, these estimates are performed using only the OLS specification, which as discussed in previous chapters, may not be free of endogeneity.

[161]Except in female headed households, where although the coefficient is positive, it is not significant.
[162]See Tables 6.
[163]Assuming any correlations between CSG receipt and the other explanatory variables are not large enough to be meaningful, the sign of the bias is mainly composed of the product of two factors: the effect maternal depression has on schooling (which is known to be negative - see Table 27), and the covariance between maternal depression and child CSG receipt. The overall bias could only emerge as negative if the latter was positive, i.e. the presence of maternal depression is associated with higher levels of CSG receipt. This is entirely possible if lower socio-economic status is associated with both a higher probability of being a CSG recipient, and of being depressed, which it is (Department of Social Development 2012, Lund et al. 2013).

Table 28

The Determinants of Teen Educational Outcomes: Wave 3										
	Enrolment					Years of Education				
	All	Means Test Eligible	Female	African	Female HH Head	All	Means Test Eligible	Female	African	Female HH Head
CSG Beneficiary	0.07 ***	0.07 ***	0.06 **	0.06 ***	0.06 ***	0.31 ***	0.36 ***	0.41 ***	0.31 ***	0.38 ***
Mother is Depressed	-0.03	-0.02	-0.02	-0.02	-0.03	-0.18 **	-0.16	-0.13	-0.19 *	-0.23 **
Age	-0.12 ***	-0.12 ***	-0.12 ***	-0.10 ***	-0.11 ***	0.73 ***	0.72 ***	0.77 ***	0.72 ***	0.77 ***
Female	-0.04 **	-0.04 **	0.00	-0.04 **	-0.05 **	0.63 ***	0.65 ***		0.70 ***	0.69 ***
Log of HH Educational Spending	0.02 ***	0.02 ***	0.02 ***	0.02 ***	0.02 ***	0.09 ***	0.11 ***	0.09 ***	0.08 ***	0.09 ***
Mother has a Matric	0.04 *	0.04	0.05	0.04	0.03	0.80 ***	0.81 ***	0.67 ***	0.81 ***	0.88 ***
Mother is Economically Active	0.00	0.01	0.02	0.00	0.00	0.00	0.03	-0.06	0.02	-0.03
Mother 's Age	0.00 *	0.00	0.00	0.00	0.00 *	0.01 ***	0.02 ***	0.01	0.01 **	0.01 *
Years of Education	0.04 ***	0.05 ***	0.04 ***	0.04 ***	0.04 ***					
Coloured	-0.08 *	-0.11 *	-0.06	0.00	-0.10	0.06	0.05	-0.09	0.00	0.18
Log of Household Income	0.00	-0.01	0.00	0.00	0.00	0.17 ***	0.06	0.18 ***	0.16 ***	0.18 ***
Household Size	0.00	0.00	0.00	0.00	-0.01 **	-0.04 ***	-0.03 **	-0.05 ***	-0.04 ***	-0.06 ***
Rural	0.01	0.04	0.02	0.00	0.00	-0.10	-0.04	0.12	0.00	-0.05
Mean of Dependent Variable	0.82	0.81	0.81	0.85	0.82	8.76	8.60	9.06	8.73	8.75
Mean of Maternal Depression	0.27	0.28	0.28	0.29	0.29	0.27	0.29	0.28	0.29	0.29
F Statistic	19.9	19.1	13.0	14.4	17.4	60.4	34.6	28.4	49.1	48.8
R Squared	0.24	0.25	0.23	0.19	0.22	0.32	0.27	0.32	0.30	0.31
Number of Observations	1,701	1,320	875	1,447	1,233	1,924	1,489	975	1,617	1,395

Estimates are presented of the determinants of teen enrolment and years of education. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. All specifications include province dummies. The base sample consists of African and Coloured individuals aged fifteen to nineteen years old in Wave 3 of the National Income Dynamics Survey.

These estimates can be investigated for robustness using the same strategies employed in Chapter 3 (see Table 6), to ensure a true causal effect is being measured. The results can be seen in Table 29, with the newly included maternal depression variable that of current depression. The estimates are ordinary least squares measuring the impact of actual CSG receipt, instrumental variables estimates with age eligibility instrumenting for CSG receipt, and years of potential duration of receipt.

Table 29

Determinants of Enrolment and Schooling in Wave 3: Including Maternal Depression						
Dependent Variable	Enrolment			Years of Schooling		
	(1)	(2)	(3)	(4)	(5)	(6)
Actual Receipt	0.07 ***			0.35 ***		
Age Eligibility (IV)		0.14 **			-0.07	
Potential Duration X 10			0.18 ***			-0.06
Mother is Depressed	-0.02	-0.02	-0.02	-0.16	-0.17	-0.17
Age in Years	-0.12 ***	-0.11 ***	-0.09 ***	0.74 ***	0.65 ***	0.65 ***
Female	-0.04 **	-0.04 **	-0.04 **	0.65 ***	0.65 ***	0.65 ***
Log of HH Education Spending	0.02 ***	0.02 ***	0.02 ***	0.11 ***	0.11 ***	0.11 ***
Mother has a Matric	0.03	0.03	0.02	0.73 ***	0.74 ***	0.74 ***
Years of Schooling	0.05 ***	0.05 ***	0.05 ***			
Coloured	-0.12 **	-0.11 *	-0.12 **	0.01	-0.03	-0.02
Mother Resident in HH	0.00	0.00	0.00	0.00	0.00	0.00
Log of Household Income	-0.01	-0.01	-0.01	0.07	0.07	0.07
Household Size	0.00	0.00	0.00	-0.03 **	-0.03 **	-0.03 **
Rural	0.04	0.04	0.03	-0.03	-0.01	-0.01
Dependent Variable Mean	0.81	0.81	0.81	8.60	8.60	8.60
Number of Observations	1,322	1,322	1,322	1,492	1,492	1,492
F stat	20.8	20.1	21.2	36.2	35.6	35.9
Adjusted R Squared	0.25	0.25	0.26	0.26	0.26	0.26

Three specifications are used to estimate the impact of CSG receipt on enrolment and years of schooling in Wave 3 of NIDS, including maternal depression as a control. In Columns (1) and (4), actual receipt is used as the CSG variable of interest. In Columns (2) and (5), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Columns (3) and (6), the impact of potential duration of CSG receipt is shown. The sample is comprised of African and Coloured teens between the ages of fifteen and nineteen who are means test eligible for the child support grant. A full set of province dummies is included in each specification. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

Similar patterns are seen, in that CSG receipt has a positive impact on enrolment, in the three estimations used, implying focusing on only the OLS coefficient in the enrolment estimates is acceptable as a lower bound for the CSG effect. Current maternal depression again has no impact on teen enrolment, or teen years of schooling (as seen in the seventh column of Table 28 in the means test eligible sample). In the OLS estimates of years of

education, CSG emerges as a significant positive influence on years of education, however it appears that the true causal effect of grant receipt on years of schooling is not significant, as the OLS result is not confirmed in either the potential duration or IV estimates in Columns (5) and (6). The results are quantitatively similar when the number of waves that a mother is depressed for is the maternal depression measure of choice, as seen in Table 40 in Appendix Item A.8.

Despite the prediction from the literature that the CSG may help to ameliorate the negative effect of maternal depression on teen educational outcomes, this has not been seen in the data work in this chapter. One final check, however, is conducted to test this hypothesis. Tables 27 and 28 are re-estimated to include an interaction term between CSG receipt and the measure of maternal health, and the results can be seen in Tables 41 and 42 in Appendix Item A.9. Were CSG receipt to be improving maternal mental health, and were this improvement to be associated with higher teen educational achievement, these interaction terms would be expected to be significant. However, this is not the case. Very few of these interaction terms emerge as significant, and no specific consistently significant pattern is seen in any of these coefficients.

The next section discusses some potential matters arising from the analysis in this chapter. The first is whether it is the mother who should be the main focus of investigation, given the presence of a strong interfamilial correlation of depression which could confound the estimation results. The second is the question of how large an impact depression in teens themselves may have on their educational outcomes, if any. The third is that given the positive impacts on enrolment do not seem to stem from improvements in maternal mental health, it may be possible that they arise from another channel, that of changes in maternal bargaining power which arise when women become recipients (Ambler 2013).

5.4 Matters Arising

5.4.1 Who Matters Most?

These estimates also raise questions as to whether it is the influence of the mental state of mothers which is particularly important for educational outcomes, or whether either a father, sibling, or any household member has the same influence. In Table 30, estimates are presented to answer this question[164].

Number of waves each of the individuals has been depressed for is used as the cumulative mental health measurement of choice, for the reasons discussed previously. Years of schooling attained are negatively affected by the mental health status of mothers and fathers, and that of any member[165] of the household (including mothers or fathers). However, sibling depression does not impact on years of schooling attained. The results are as expected for teen enrolment given the estimates already discussed - no measures of familial depression are found to impact on teen enrolment (see Appendix Item A.7, Table 39). CSG receipt again emerges as significant in the years of schooling estimates, but from the IV and potential duration estimates discussed previously, which do not accord with this conclusion, this coefficient is not assumed to be reliable, nor appropriate for causal interpretation.

One may ask whether more focus should be placed on the effect of fathers' depression on teens as well, and not just on the effect of depression in mothers. While the impact of paternal depression is of a similar size to that of mothers, given the high probability that a mother is present in the household (eighty-nine percent of mothers are resident in households also containing a father - see Table 16 in Chapter 4), and given the high correlation between paternal and maternal depression of 0.42 in the sample of interest[166], it is possible that the impact of a depressed father is conflated with the impact of a depressed mother instead. More evidence to support this hypothesis is seen in Chapter 4 (see Table 18), where the intergenerational transmission effect is insignificant in samples where the other parent is depressed, implying the effect of two depressed parents is not additive.

[164]The sample used is again African and Coloured teens between the ages of fifteen and nineteen.

[165]Any member excluding oneself. This variable is calculated excluding the individual, i.e. the household depression indicator variable will be zero if the teen in question is the only household member suffering from depression, and one if another household member besides the teen suffers from depression.

[166]Means test eligible African and Coloured sample of teens between the ages of fifteen and nineteen

Table 30

The Determinants of Teen Years of Schooling in Wave 3					
Individual Suffering from Depression:	Mother	Father	Any Parent	Sibling	HH Member
CSG Beneficiary	0.28 **	0.17	0.29 **	0.24 **	0.34 ***
# Waves Depressed (Individual in Column Header)	-0.22 ***	-0.23 **	-0.13 *	-0.03	-0.20 ***
Mother has a Matric	0.84 ***	0.25	0.72 ***	0.85 ***	0.87 ***
Mother is Economically Active	-0.09	-0.13	-0.12	-0.04	-0.04
Maternal Age	0.02 **	0.02 **	0.02 *	0.02 ***	0.02 ***
Age	0.71 ***	0.68 ***	0.70 ***	0.70 ***	0.72 ***
Female	0.61 ***	0.57 ***	0.50 ***	0.56 ***	0.62 ***
Coloured	0.09 ***	0.08 **	0.09 ***	0.09 ***	0.09 ***
Log of HH Educational Spending	-0.03	0.21	-0.10	0.01	0.11
Log of Household Income	0.13 *	0.13	0.19 **	0.16 ***	0.13 **
Household Size	-0.04 **	-0.03	-0.05 **	-0.04 ***	-0.03 **
Rural	-0.25	-0.33	-0.16	-0.14	-0.22
Mean Years of Schooling	8.79	8.87	8.75	8.79	8.77
Mean Depression Variable	1.00	0.79	1.22	0.46	1.43
F Statistic	35.5	23.6	23.7	53.5	46.6
Adjusted R Squared	0.31	0.45	0.31	0.32	0.33
Number of Observations	1,175	349	780	1,649	1,445

This table presents estimates of the determinants of years of schooling. Each specification differs by the inclusion of a term indicating how many waves each person has been depressed for, respectively mother, father, any parent, sibling and any household member. Each specification differs by the inclusion of a term indicating how many waves each person has been depressed for. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. All specifications include province dummies. The base sample consists of African and Coloured individuals aged 15 to 19 years old in Wave 3 of the National Income Dynamics Survey. In specification (2), the paternal variables for matric, economically active and age are substituted into the estimation, and all other specifications include the maternal versions of these characteristics.

Sample selection may also be an issue in the sample of families with depressed fathers. Some fathers who are absent have left the household to seek jobs as migrant labourers. The rates of mental illness may be higher among fathers who remain versus fathers who have left to seek work, as depression impacts on the individual's ability to function and perform the tasks necessary to seek work (Kassam & Patten 2006). If this is the case, the impact of these fathers will be felt even more strongly, as the estimated effect of their depression is likely to include other socio-economic factors which also negatively effect teen educational achievement. Given that the vast majority of CSG recipients are women, and the low proportion of fathers who are resident[167], choosing to focus on mothers avoids these issues of sample selection, and also allows the evaluation of grant receipt and its important interaction with parental mental health.

Not only is a family with a father present a selected sample, the sample size also differs largely[168] in the estimates of the paternal depression effect, due to the much lower proportion of fathers present in households compared to mothers. Unfortunately no depression data is recorded for absent fathers. Another reason to focus on mothers, and not just that of any household member, is that the estimates for the impact of any household member can include both other family and mothers and fathers, making it impossible to disentangle the separate effects by parent. It is also impossible to separate out the genetic versus situational factors of depression, as these other household members may not be related to the child.

5.4.2 Adolescent Depression and Educational Outcomes

The mental health of mothers is seen to be important for teen educational success, but the negative impact on educational outcomes of poor mental health in teens themselves is also important to consider, especially when attempting to understand the pathways through which cash transfers can improve educational outcomes. Poor mental health among teens is associated with worsened educational outcomes in Malawi (Baird et al. 2013), America and the United Kingdom (Ensminger et al. 2003, Anderson et al. 2001, Beecham 2014, Vander Stoep et al. 2003), Canada and New Zealand (Anderson et al. 2012, Currie & Stabile 2007) and South Africa (Myer et al. 2009). The size of these effects is often large,

[167]Only forty-five percent of fathers are resident in African and Coloured households - see Table 16 in Chapter 4.

[168]This is seen in Chapter 4 (Table 16) where sample sizes fall below a hundred individuals when performing sub-sample analysis measuring the intergenerational transmission effect of paternal depression.

and larger still among more vulnerable groups, such as those with more severe forms of mental illness, and those with lower socio-economic status (Vander Stoep et al. 2003). The odds of failing to complete secondary school while suffering from depression in South Africa are nearly double compared to teens who do not suffer from mental illness (Myer et al. 2009). More than fifty percent of American teenagers who drop out of secondary school have been found to have a diagnosed psychiatric illness, a very high percentage (Vander Stoep et al. 2003).

Turning to the NIDS data, Figure 37 shows that teenagers suffering from depression have consistently and significantly lower rates of enrolment, beginning from age seventeen, and this difference increases with age[169].

Figure 37

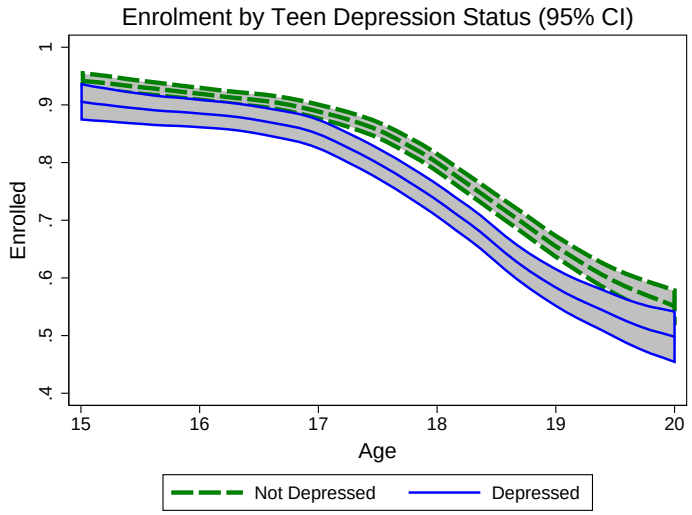


Figure 37 shows average enrolment for teens by own depression status, with ninety-five percent confidence intervals. Data: National Income Dynamics Survey.

[169] At the age of eighteen, those suffering from depression have enrolment rates just under ten percentage points lower than those who do not suffer from depression.

Figure 38

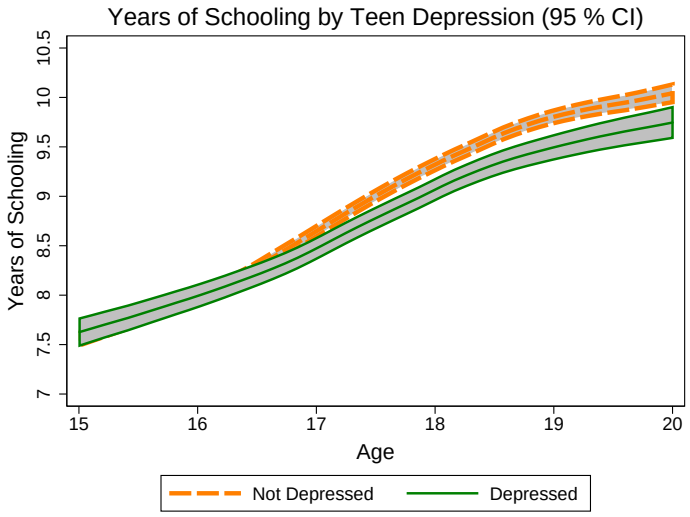


Figure 38 shows average years of schooling for teens by own depression status, with ninety-five percent confidence intervals. Data: National Income Dynamics Survey.

Figure 38 shows that poor mental health in teens is associated with significantly lower levels of teen educational achievement, which become apparent from approximately age sixteen. These differences are significant but not extremely large, at approximately half a year at their highest point.

The estimates of the impact of grant receipt on teen years of schooling and enrolment in Chapter 3[170] included a control for teen CES-D 10 score[171], which is associated with lower enrolment (of four percentage points), and fewer years of schooling (approximately a fifth of a year), significant at the five percent level. However, these effects are not large. In addition, the estimate of the teen mental health effect is not consistent, and varies depending on the measurement used[172]. This suggests the relationship between teen depression and both enrolment and years of schooling for teens may be weak, or non-linear, once individual characteristics have been controlled for. The differences seen in Figures 35 and 36 are possibly related to individual characteristics which reflect the

[170] See Table 6.

[171] The coefficient on CES-D 10 is reported multiplied by ten. Establishing the impact of a one unit change in the CES-D 10 score is not particularly meaningful, whereas an increase in the CES-D 10 score of ten points is enough to push someone over the threshold at which they are considered depressed. However, although this interpretation may be more meaningful, such large changes are possibly unlikely to occur in practice.

[172] A replication of Table 6 in Chapter 3 is performed, although not reported due to the high similarity of the results, with depression substituted for CES-D 10 score. Depression in teens is associated with a similarly lower probability of enrolment, and fewer years of schooling achieved, but these effects are not statistically significant.

teen's environment, which may be strongly correlated with teen depression, and thus when accounted for in multi-variate analysis, reduce the significance of the teen mental health measure. This is unlike maternal mental illness, which is a significant determinant of years of education even in multi-variate analysis.

While the preceding estimates have showed the strong relationship between chronic maternal mental illness and years of schooling, the preceding link between grant receipt and maternal mental health does not appear to be present. Another channel through which the child support grant may impact positively on the human capital achievement of children is through a change in household spending, to items which directly benefit children's welfare, including schooling costs. This may occur due to a shift in bargaining power when mothers receive the grant (Ambler 2013). The next two sections explore this possibility.

5.4.3 Cash Transfers and Maternal Bargaining Power: Theory

A wide literature exists on the differential consumption patterns of men and women (Bourguignon et al. 1993). Empirically, men tend to spend extra income on personal consumption, while women direct additional income to spending on children (Strauss et al. 2000, Thomas 1990, Duflo 2000). In many countries, women have been observed to spend the income from cash transfers on nutrition, schooling, and health care (Lagarde et al. 2007, Antman 2014, Doss 2013, Gitter & Barham 2008, Doss 1996, Thomas 1990), with subsequent improvements in the human capital achievement of children. The younger the child when grant receipt begins, the more powerful and long lasting the impact may be.

A wide literature exists on changes in intra-household allocation after cash transfer receipt in developing countries such as Mexico, Nicaragua, Brazil, sub-Saharan Africa and many others (Doss 2013, Antman 2014, Haddad et al. 1997). Whether income is pooled in the household or not has direct relevance to the impact of the grant. If income pooling does not occur, different expenditure patterns by household members may be seen after grant receipt[173]. In Kwa-Zulu Natal, fifty percent of mothers do not tell their partners they are receiving the grant (Hunter & Adato 2007*a*), and this secrecy is

[173]These differences in expenditure have been observed among elderly pensioners in South Africa (Bertrand, Mullainathan & Miller 2003), where more income is directed to prime age men than women if grandmothers are receiving a pension and not grandfathers (Doss 1996).

evidence against an income pooling hypothesis (Agarwal 1997). Much empirical work, both internationally and in South Africa, supports the rejection of the income pooling model to describe resource allocation (Quisumbing & de La Brière 2000, Quisumbing & Maluccio 2003, Alderman et al. 1995, Gummerson & Schneider 2013, Jensen 2004, Fortin & Lacroix 1997, Bourguignon et al. 1993, Duflo 2003, Ambler 2011, Maitra & Ray 2000).

When the unitary model is abandoned, the literature has used bargaining models[174] (Manser & Brown 1980), for example cooperative models based on Pareto efficient resource allocation (Browning & Chiappori 1998, Agarwal 1997) or non-cooperative models (or a mixture of both). These models recognise the collective nature of decision making in households (Strauss & Beegle 1996). Non-cooperative models, in contrast to cooperative[175], relax the assumptions of common preferences, income pooling, Pareto efficiency, and binding contracts (Agarwal 1997), and allow for asymmetries between the parties. As such, less than efficient equilibria may be reached (Bourguignon & Chiappori 1992).

In bargaining models, if the individual's utility from household membership falls below their reservation utility, they quit the household (Maitra & Ray 2000, Manser & Brown 1980), or move from a cooperative equilibrium to a non cooperative one (Lundberg & Pollak 1994). Once bargaining has arrived at the point where each individual is guaranteed their reservation utility, "excess" utility (above the threat point) must be allocated[176] (Strauss & Beegle 1996). A large enough cash transfer may make it more attractive to dissolve the household (Manser & Brown 1980). As such, intra-household allocation, and changes in resource levels may have strong impacts on household formation (Strauss et al. 2000). Collective models make the assumption that household structure is exogenous, and fixed (Strauss et al. 2000).

This theory would suggest a collective approach, which incorporates cooperative and some non-cooperative models (or a mix of both) may be more appropriate when analysing the impact of cash transfers, and that consumption is better analysed having been broken up into individual consumption, and a public good in the household available for consumption (Bourguignon & Chiappori 1992, Manser & Brown 1980). However it is important to remember that a rejection of income pooling does not with certainty imply

[174]Using game theoretical analysis (Sutton 1986).

[175]Which allow for individual preferences but retain other assumptions.

[176]Two Pareto optimal solutions to the cooperative bargaining approach include a dictatorial marriage and a symmetric one (Manser & Brown 1980). In the dictatorial marriage, the dictator offers the other partner just enough to impel them to accept.

that a collective model is the right alternative (Bourguignon & Chiappori 1992). Testable assumptions are required to support that hypothesis (Bourguignon & Chiappori 1992). Rosenzweig and Schultz (1992) in Strauss et al. (2000) find that households allocate resources to individuals where their return on investment is deemed to be highest, for example more food may be allocated to male children, if their potential earnings are higher. These sorts of decisions will tend to reinforce inequality in the household (Strauss et al. 2000), although household aversion to inequality may change as external factors (such as the seasons) change, and as overall household income rises[177]. This implies that possibly the higher household income is, the more likely it is that women are allowed to keep and decide how to use the grant.

Individuals will tend to have higher bargaining power the higher their initial assets, and ability to earn more assets[178], at the time of household formation (Quisumbing & Maluccio 2003). Other factors which can influence bargaining power include the legal rights of household members (and the ability to enforce those rights), information (Manser & Brown 1980), bargaining skills, self confidence, and the ability to tap into social networks[179] for support, whether financial or otherwise (Adato et al. 2000, Goudge et al. 2009, Hunter & Adato 2007*a*). Agarwal (1997) cites as additional factors in bargaining power ability to access communal resources, social norms, social perceptions about relative contributions and relative need, gender differences in terms of self interest, the existence of coalitions in the household, and others. Physical strength may also impact on bargaining power, if domestic violence is present, which may be likely in South Africa (Moultrie & Kleintjes 2006). Identifying which factors are most critical to the bargaining process is an important consideration (Agarwal 1997). The child support grant, as a non labour related source of income, does not impact on the relative prices of home produced and bought goods (Doss 1996), and may thus be used as a cleaner measure to test the impact of raised individual income on bargaining power.

[177]Kanbur & Haddad (1994) show that under certain conditions, as household income increases, inequality can lesson, hold constant, or increase, or it can follow the familiar Kuznets inverse U relationship.

[178]For example, measured by male/female literacy or education ratios (Gitter & Barham 2008). The NIDS data shows that over time, while the average years of education attained has risen for both men and women, the ratio of mens' education to women's education has gradually shifted from above one, to below one. In 2012, women on average obtained just over half a year more education than men, and African women aged between sixteen and thirty had a matric attainment rate five percent higher than men, implying the possible increase in female bargaining power over time. Source: Calculations using Wave 3 of the NIDS.

[179]Rotating savings and credit associations (ROSCAs) in South Africa may function as such social networks.

Women traditionally have come from positions of lower bargaining power, according to Becker (1981), due to their presumed "comparative advantage" in household duties. However in a marriage, it may be likely that the husband and wife have similar levels of bargaining power, due to assortative mating (Becker 1973). Men may have such high initial bargaining power that open negotiation is not even entered into before final resource allocation, as such allocation may be implicitly assumed (Lundberg & Pollak 1994). These assumptions can arise due to social norms[180], which in addition may dictate which resources are even contestable (Agarwal 1997). Situations like this may imply that multiple equilibria to the bargaining problem are available, and the one arrived at is determined by social conventions (Lundberg & Pollak 1994). Social norms themselves may be changed as a result of bargaining process (Agarwal 1997), especially in response to changing economic status.

5.4.4 Cash Transfers and Maternal Bargaining Power: Practice

A full analysis of intra-household allocation is beyond the scope of this thesis. Some exploratory analysis is performed of the general trends in bargaining power which may be related to grant receipt. Ascertaining if recent changes in bargaining power in South Africa are due to increases in grant receipt may be complex, due to an overall increasing trend of female empowerment over the past ten to fifteen years. This is seen in a rise in the number of female headed households in South Africa, with single mothers most often the household head (Slijper 2014), and declining marriage rates. These households are often smaller, and have a lower caretaking burden, which lowers the constraints on women's ability to seek employment (Slijper 2014).

Outcomes showing changes in bargaining power include decision making variables, division of labour and resources, and general attitudes regarding women's capabilities (Agarwal 1997). Cash transfers have been associated with higher levels of female empowerment in developing countries (Ensminger et al. 2003, Doss 2013), manifesting in women being more involved in household decision making, especially decisions regarding what the transfer is spent on. Similar effects are seen for for female pensioners and CSG

[180]Such as those limiting the ability to work outside the home, dictating which tasks are traditionally done by women, whether women can own or inherit land, which crops may be grown by women, what wages are paid to women, restricting access to resources in and out of the home, and restricting the possibility that women can even leave the household (Agarwal 1997).

recipients[181] in South Africa (Ambler 2013, Patel 2012).

The NIDS collects data on the identity of decision makers in the household regarding certain key decisions: who makes decisions about household expenditure, large purchases, who may be a household member, where the children go to school, and where the household lives. The NIDS also identifies the gender of the household head, which reflects women's ability to form their own households. It is important to note that bargaining power may only increase gradually over the years, and thus if it is associated with grant receipt, it may only emerge in an analysis of cumulative grant impacts, and not immediate.

The descriptive statistics discussed in this chapter support a theory of slightly increased female bargaining power in the household related to grant receipt, and in addition increased bargaining power over time for South African women in general. Initially in Wave 1 grant recipients are significantly less likely to be decision makers in the household, or to be household heads (see Table 22 in this chapter). By Wave 3, the rates of decision making and female household headship have equalised[182], and by Wave 3 recipients are even significantly *more* likely to be making school related decisions than non-recipients. Recipients are also significantly less likely to be married[183] by Wave 3.

Table 31 presents a breakdown of the means of decision making variables (whether solely or jointly with another family member), broken down by recipient and mental health status, including the results of significance tests across recipient status. A potential time dimension is explored by examining the means of decision making variables in combinations with both current receipt and receipt in previous waves. The sample used is that of African and Coloured mothers who report the presence of a spouse[184] in the household (whether legally married or spouses described as common law partners).

The elements in the table are interpreted as follows. For example, in the upper right panel, for the decision regarding where the children go to school, two pairs of numbers are reported: 0.49, 0.41 and 0.53 and 0.41, and for the second pair, the differences are reported

[181]Increases in child related spending were observed, on schooling costs, clothing, food, and also spending on general items such as health and transport costs.

[182]Except for the decision regarding where the household lives. CSG recipients are still significantly less likely to be making this decision by Wave 3.

[183]Marriage rates are falling , and rates of decision making are rising in both groups.

[184]Only women who report a partner present in the household are chosen for analysis, as the inclusion of female single parent households does not allow the examination of changes in bargaining power between adult household members.

as significant at the one percent level. These numbers imply that forty-nine percent of depressed mothers who were CSG recipients in Wave 1 report making the decision in Wave 3 regarding where children go to school, while only forty-one percent of depressed individuals who were non-recipients in Wave 1 report making this schooling decision in Wave 3. This difference is not significant. However, of those who are not depressed, fifty-three percent of Wave 1 CSG recipients are making the schooling decision in Wave 3, compared to only forty-one percent of Wave 1 CSG non-recipients.

Some general patterns are apparent. In all three waves women are far less likely to be decision makers regarding large household purchases no matter their depression or recipient status. On average less than one-third of women in Waves 1 and 3 make this decision, and only approximately forty-five percent of women in Wave 2 are decision-makers in this regard. In general, married or co-habiting women have very low bargaining power as measured by these decision making variables. They are far less likely to be the main decision maker, and only in day to day expenditure, and school making decisions, are rates of primary decision making by women likely to be above fifty percent.

Receipt does not show a significant positive affect on bargaining power for mothers who are depressed, except regarding the decision where children attend school. CSG receipt in the current and previous waves is associated with a significantly higher proportion[185] of mothers making the decision where children attend school (whether as sole or joint decision makers). The differences are fairly large, and range from nine to eighteen percentage points. These effects are seen for both mentally well and unwell mothers, but are highest for mothers who are not depressed, indicating that depression may make it harder for women to remain or become decision makers in the household.

These effects also appear to be persistent. Wave 1 receipt is still associated with higher school attendance decision making in Wave 3 for well mothers (see the upper right hand panel of the table). Wave 1 CSG receipt appears to be significantly significantly associated with only school selection in Waves 2 and 3, and none of the other decision making variables. Of the twenty-three significant differences seen in Table 31, ten are seen in school selection. The main impact of receipt for mothers whether well or unwell appears to be related to schooling.

[185]Forty-nine percent of Wave 3 recipient mothers who are depressed decide where children go to school in Wave 3 compared to only forty percent of depressed non-recipients. An even higher proportion of recipient mothers who are depressed make the joint decision regarding school attendance (fifty-five percent compared to forty-three). These numbers can be seen in the upper left panel of Table 31.

Table 31

Differences in Decision Maker Status by CSG Receipt and Depression Status: All Wave Combinations																		
	Depressed			Not Depressed			Depressed			Not Depressed			Depressed			Not Depressed		
Recipient?	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.	Yes	No	Sig.
	Wave 3 Decisions by Wave 3 CSG Receipt						Wave 3 Decisions by Wave 2 CSG Receipt						Wave 3 Decisions by Wave 1 CSG Receipt					
Day to Day Household Expenditure	0.52	0.57		0.57	0.54		0.53	0.56		0.57	0.55		0.52	0.58		0.56	0.56	
Joint	0.47	0.49		0.44	0.46		0.51	0.46		0.43	0.47		0.49	0.48		0.45	0.46	
Large Household Purchases	0.33	0.31		0.37	0.31	**	0.33	0.30		0.35	0.32		0.35	0.28		0.32	0.34	
Joint	0.61	0.68		0.60	0.67	***	0.61	0.67		0.63	0.66		0.64	0.68		0.68	0.64	
Who is a Household Member	0.27	0.31		0.32	0.28	*	0.24	0.33	*	0.34	0.29		0.25	0.31		0.29	0.32	
Joint	0.67	0.65		0.64	0.70	**	0.68	0.63		0.64	0.70	*	0.71	0.63		0.71	0.67	
Where the Household lives	0.28	0.28		0.32	0.27	*	0.23	0.32	*	0.34	0.28	**	0.28	0.28		0.30	0.31	
Joint	0.64	0.69		0.65	0.71	**	0.65	0.65		0.64	0.70	**	0.68	0.67		0.70	0.67	
Where the Children Go to School	0.49	0.40	*	0.57	0.39	***	0.44	0.45		0.55	0.40	***	0.49	0.41		0.53	0.41	***
Joint	0.55	0.43	**	0.41	0.45		0.56	0.43	**	0.44	0.44		0.53	0.47		0.45	0.44	
Number of Observations	190	274		520	936		139	239		397	754		127	225		360	724	
	Wave 2 Decisions by Wave 2 CSG Receipt						Wave 2 Decisions by Wave 1 CSG Receipt						Wave 1 Decisions by Wave 1 CSG Receipt					
Day to Day Household Expenditure	0.63	0.60		0.60	0.58		0.60	0.64		0.57	0.62		0.39	0.44		0.42	0.42	
Joint	0.39	0.40		0.42	0.44		0.38	0.40		0.46	0.41		0.65	0.63		0.59	0.61	
Large Household Purchases	0.45	0.46		0.45	0.44		0.42	0.48		0.45	0.46		0.29	0.36		0.28	0.28	
Joint	0.43	0.43		0.42	0.48	*	0.42	0.43		0.45	0.47		0.66	0.67		0.65	0.69	
Who is a Household Member	0.45	0.44		0.42	0.42		0.42	0.47		0.43	0.42		0.31	0.34		0.23	0.28	
Joint	0.43	0.46		0.47	0.51		0.43	0.46		0.50	0.51		0.66	0.69		0.70	0.69	
Where the Household lives	0.46	0.43		0.41	0.42		0.41	0.45		0.42	0.43		0.29	0.33		0.22	0.27	*
Joint	0.54	0.57		0.60	0.59		0.59	0.54		0.62	0.58		0.68	0.71		0.71	0.69	
Where the Children Go to School	0.66	0.55	**	0.59	0.48	***	0.65	0.55	*	0.59	0.49	***	0.41	0.40		0.38	0.36	
Joint	0.35	0.37		0.41	0.42		0.37	0.38		0.44	0.42		0.62	0.66		0.64	0.65	
Number of Observations	141	214		396	751		120	183		328	645		201	312		300	669	

This table reports significance tests for five decision making variables, by CSG receipt and depression status, across the six combinations of Waves 1, 2 and 3. The elements in the table are interpreted as follows. For example, in the upper right panel, for the decision regarding where the children go to school, two pairs of numbers are reported: 0.49, 0.41 and 0.53 and 0.41, and for the second pair, the differences are reported as significant at the one percent level. These numbers imply that forty-nine percent of depressed mothers who were CSG recipients in Wave 1 report making the decision in Wave 3 regarding where children go to school, while only forty-one percent of depressed individuals who were non-recipients in Wave 1 report making this schooling decision in Wave 3. This difference is not significant. However, of those who are not depressed, fifty-three percent of Wave 1 CSG recipients are making the schooling decision in Wave 3, compared to only forty-one percent of Wave 1 CSG non-recipients. Individuals make decisions regarding day to day household expenditure, large household purchases, who may be a household member, where the household lives, and where the children go to school. The sample consists of African and Coloured mothers living with a spouse. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

It may seem trivial that CSG receipt is mainly associated with differences in school selection; however, it is important to remember that mothers often send children either to better schools which are further away, or foster them out completely, in order to improve the quality of the school attended by the child (Djebbari & Mayrand 2011), and the grant may be used to fund these costs of travel and relocation.

Multi-variate estimates are performed, to investigate the strength of the CSG-bargaining power link once other characteristics have been controlled for, similar to those estimating the determinants of maternal mental health in Tables 23 and 24. The estimates of Equation 9 can be seen in Table 32. The sample is that of African and Coloured women who report the presence of a spouse. The same samples are chosen for analysis as in Table 23.

$$Dec_i = \beta_0 + \beta CSG_i + \alpha X_i + \gamma HH_h + \epsilon G_g + u_i \tag{9}$$

Dec_i reflects the decision making variable for individual i, in household h. In this analysis this variable is whether the individual is the decision maker regarding school choice for children. CSG_i represents actual CSG receipt, the X_i include individual characteristics, HH_h is a vector of household characteristics. G_g includes geographical controls, and u_i is an individual error term.

The results show a weak association between CSG receipt and school decision making, in the means test eligible sample. Recipients appear to have a higher probability of decision making of eight percentage points in the means test eligible. However this effect is only significant at the ten percent level. No other significant effects of receipt are seen, although Samples (4) and (5) are too small for reasonable analysis. An extra ten years[186] of potential receipt in the base sample raises decision making probability by ten percent, significant at the five percent level, a fairly large effect. However these results are not consistent, nor highly significant, and when the instrumental variables estimates are performed[187], no significant impact of CSG receipt on decision making is found[188], implying no true causal effect exists.

[186]The usual increment for analysis for potential duration in Chapter 3 of ten years is chosen for comparison purposes.

[187]The IV estimates replicate the maternal depression IV estimates in Table 24 in Section 5.2.2. The estimates show a much weaker instrument, with a first stage coefficient on youngest child age-eligible of 0.2.

[188]See Appendix Item A.11, Table 44.

Table 32

Determinants of School Decision Making: African and Coloured Means Test Eligible Mothers in Wave 3: Ordinary Least Squares Estimates										
	Base Sample		Means Test Eligible		Youngest Child Aged 15-19		One Child		Three or More Children	
	CSG Receipt	Exposure	CSG Receipt	Exposure	CSG Receipt	Exposure	CSG Receipt	Exposure	CSG Receipt	Exposure
Sample	(1)		(2)		(3)		(4)		(5)	
Maternal Characteristics										
CSG Recipient/Potential Duration of Receipt	0.07	0.01**	0.08*	0.01	0.11	-0.03	-0.27	-0.07	0.18	-0.00
	(0.04)	(0.00)	(0.05)	(0.01)	(0.10)	(0.03)	(0.40)	(0.07)	(0.19)	(0.06)
Age in Years of the Mother	0.02	0.01	0.05	0.04	0.14	0.15	-0.07	-0.10	0.56	0.49
	(0.04)	(0.05)	(0.05)	(0.06)	(0.10)	(0.10)	(0.19)	(0.20)	(0.80)	(0.85)
Age Squared of the Mother	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	0.00	0.00	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
African	-0.13*	-0.11	-0.12	-0.06	0.13	0.09	0.09	0.01	-0.23	-0.23
	(0.07)	(0.08)	(0.10)	(0.11)	(0.26)	(0.26)	(1.07)	(1.02)	(0.62)	(0.60)
Years of Schooling	0.01**	0.01**	0.02**	0.02**	0.04**	0.04***	0.03	0.03	0.02	0.04
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.04)	(0.04)	(0.03)	(0.03)
Has a Depressed Child	0.08*	0.08*	0.10**	0.10*	0.02	0.01	0.07	-0.12	0.20	0.23
	(0.04)	(0.05)	(0.05)	(0.05)	(0.10)	(0.10)	(0.39)	(0.37)	(0.21)	(0.20)
In Poor Health	0.02	-0.01	0.03	0.00	0.08	0.05	-0.10	-0.10	0.17	0.19
	(0.05)	(0.06)	(0.06)	(0.07)	(0.12)	(0.12)	(0.37)	(0.46)	(0.24)	(0.23)
Age of Youngest Child	-0.01**	-0.01**	-0.01**	-0.01**	0.02	-0.06	-0.02	-0.19	0.09	0.08
	(0.00)	(0.00)	(0.00)	(0.01)	(0.03)	(0.09)	(0.09)	(0.23)	(0.13)	(0.21)
Number of Resident Biological Children	-0.01	0.00	-0.02	-0.01	-0.02	-0.01			0.07	0.04
	(0.02)	(0.02)	(0.02)	(0.02)	(0.06)	(0.06)			(0.18)	(0.18)
Economically Active	0.04	0.05	0.03	0.04	-0.07	-0.10	0.17	0.07	-0.19	-0.18
	(0.04)	(0.04)	(0.05)	(0.05)	(0.10)	(0.10)	(0.47)	(0.55)	(0.28)	(0.27)
Household Size	0.01	0.01	0.01	0.01	-0.00	-0.01	-0.01	-0.04	0.03	0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.08)	(0.08)	(0.04)	(0.05)
Pensioner Household	-0.00	0.04	0.03	0.06	0.16	0.15	0.35	0.33	0.01	-0.00
	(0.05)	(0.06)	(0.06)	(0.07)	(0.13)	(0.13)	(0.39)	(0.38)	(0.22)	(0.22)
Rural	-0.02	-0.06	-0.06	-0.08	0.03	0.03	0.00	0.11	0.17	0.25
	(0.06)	(0.06)	(0.06)	(0.07)	(0.13)	(0.13)	(0.63)	(0.54)	(0.30)	(0.33)
Log of Household Income	-0.04*	-0.05**	-0.03	-0.02	-0.03	-0.03	0.05	0.14	-0.09	-0.08
	(0.02)	(0.02)	(0.03)	(0.03)	(0.07)	(0.07)	(0.22)	(0.25)	(0.13)	(0.12)
Number of Observations	716	643	541	486	116	116	32	32	43	43
Adjusted R-squared	0.09	0.08	0.10	0.08	0.21	0.21	0.50	0.52	0.42	0.40

This table reports estimates of maternal bargaining power, as evidenced by who makes the school location decision, for a base sample of Coloured and African mothers between the ages of twenty-five and fifty-five, from Wave 3 of the NIDS who report the presence of a spouse in the household. Ordinary least squares estimates are reported, where the CSG variable is either actual receipt reported by mothers, or the potential duration (or exposure) of grant receipt of their youngest child. Sample (2) limits the base sample to the means test eligible. Sample (3) limits the previous sample to women with their youngest child between fifteen and nineteen, Sample (4) limits the sample further to women who have one child, and Sample (5) is limited to women with three or more children. Each regression includes province dummies. Robust standard errors are reported in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

Further analysis of the dynamics of maternal bargaining power is beyond the scope of this thesis. Although the bivariate analysis indicates that CSG receipt may increase bargaining power, these preliminary results are not robust, and are not found in the multivariate analysis. CSG receipt does not appear to have a significant impact on maternal bargaining power, even when cumulative effects are taken into account in the potential duration estimates.

This chapter has investigated two channels through which the CSG may impact on the educational attainment of teens, namely through changes in maternal mental health and bargaining power. It appears that unlike other cash transfer programs which have seen positive changes in both of these maternal outcomes, the child support grant may be too small to do so. In addition, these results indicate that the CSG is being spent on the child, as shown in the positive impact of CSG receipt on adolescent enrolment and mental health, and the lack of any significant impact on maternal outcomes. While this is to the benefit of the child, it is unfortunate that no effect is seen on maternal mental health, as poor maternal mental health is found in this chapter to have a significantly negative effect on teenage educational achievement, as predicted by the literature (Ensminger et al. 2003).

Chapter 6 now turns to general discussion, and concludes.

6 In the Right Direction

> [The current grants for children and families are] derived from a model of family life which was based on the nuclear family, where men worked and women looked after children, when divorce and single parenting were unusual. One of the reasons why the system is so difficult to implement and so open to abuse is that the model does not fit with today's realities ... with the hope of establishing a basis which could be built on in future, the Committee shifted focus, and modelled its plan around a central theme: 'Follow the child.'[189]

Adolescence has been cited as the second most important developmental period for children, second only to early childhood. Throughout the developing world, early childhood development has been recognised as crucial for the success of children in later life, and many social security programs have been put into place to provide inputs into the development of children from birth. A wide research focus, both in South Africa and internationally, has been placed on the effects of cash transfer programs on the outcomes of child beneficiaries, with a much smaller emphasis on the potential impacts on adolescent beneficiaries and their mothers. In addition, much of the literature has focused on both short term, and tangible outcomes. This thesis evaluates the impact of the South African child support grant on the schooling and mental health outcomes of older adolescents, using exogenous variation in both current and cumulative receipt to identify these effects.

6.1 Findings

Beneficiaries are found to have school enrolment rates at least ten percent higher than non-beneficiaries, and these effects are even higher in certain sub-groups. Duration of receipt is also found to be an important predictor of enrolment. From survey data and anecdotal evidence, it appears that one possible channel through which the CSG affects enrolment is through the alleviation of the costs of school attendance.

However, this positive improvement in school-going has not translated into higher human capital achievement. Neither current nor cumulative receipt is found to be associated with any change in years of schooling achieved. For younger children, who are already child support grant beneficiaries, a year of receipt translates into more than a year's worth of schooling attained, but this effect cannot be generalised to older teens.

[189] Lund Committee on Child and Family Support (1996).

A second important outcome that grants may possibly impact on is the mental health of teens. This thesis investigates the determinants of teen depression. The intergenerational transmission of depression effect in South Africa is found to be the largest determinant of mental health by an order of magnitude, rarely averaging less than thirty percentage points, and larger still for those living with a depressed father, and for girls. This represents a tripling of the normal risk of suffering from depression. Receipt of the child support grant is found to almost halve this effect, depending on the sample under examination, showing that the grant is playing an important mitigating role, improving the resilience of children in households affected by mental illness. No other determinant of teen mental health approaches this size, except for the intergenerational transmission effect itself. Current receipt on its own does not impact on teen depression, although evidence suggests that cumulative receipt may lower rates of depression in teens.

Grant receipt is not found to have a significant impact on maternal depression, or maternal bargaining power. This is unfortunate, as maternal depression in mothers is estimated to lower years of schooling achieved (by approximately a fifth of a year). The targeting of the child support grant appears to be working as intended. Very little change seems to occur in mothers' welfare on becoming a recipient, with the only positive effects being observed in their children's welfare.

6.2 Contributions

Mental health is a neglected area of research, and in particular the mental health of adolescents has been neglected in the literature. This thesis adds to the limited literature with an investigation into the impact of an unconditional cash transfer on the mental health of teens.

Internationally, the study of the intergenerational transmission of mental health is extensive, including research into both its genetic and environmental components. However research both in Africa and South Africa in particular, is lacking on this topic. Both the intergenerational transmission of mental illness, and other outcomes which are passed down through the generations, such as education or economic equality, have not been a major focus of research.

The work presented here provides the most recent nationally representative estimates of the intergenerational transmission of depression effect in South Africa. The effect is

large, rarely averaging less than thirty percentage points, and is larger still for those living with a depressed father, and for girls. This represents a tripling of the normal risk of suffering from depression. This thesis contributes to a very limited literature with a measure of the key role that cash transfers can play to reduce the size of this transmission. Receipt of the child support grant is found to almost halve this effect, depending on the sample under examination, showing that the grant is playing an important mitigating role at preventing mental illness in parents manifesting in teens. No other determinant of teen mental health approaches this size, except for the intergenerational transmission effect itself. A few similar results have been found in other countries, although in general the literature on this effect is extremely limited.

This thesis makes a modest contribution to the scarce literature (within South Africa and externally) about the long term cumulative impacts of cash transfer programs, using a measure of the potential duration of receipt, in a sample of older teenagers who have the largest amount of variation in their exposure to the grant.

6.2.1 External Validity

The estimates presented in this work measure the impact of receipt on teen outcomes, for those who acquire receipt, given age and income eligibility. Can these results be generalised to all those who might acquire receipt? There are four compelling reasons why this might be the case. The means test eligible sample used have very high rates of receipt, the sample chosen of African and Coloured teens represents approximately ninety percent of the population, the analysis makes use of a nationally representative dataset, which is often not the case either in the evaluation of cash transfer programs, or in the medical literature, and the instrumental variable of age eligibility fulfils the criteria required for a valid instrument, resulting in the effects having the interpretation as an average treatment effect, for all those who seek receipt if they are eligible, as opposed to a local treatment effect.

In addition, the results presented in Chapter 5 suggest that the intergenerational transmission of depression is particularly high even for adults, indicating a sustained effect of parents on their children, even when they reach maturity, supporting the idea that this is a persistent effect which is apparent no matter the age of the child, and is not just a temporary feature of adolescence.

All of these reasons imply that the estimation of the effects of the CSG may be representative of the general population, and not the result of estimation in a selected sample.

6.3 Limitations and Avenues for Further Research

The strength of the NIDS data for research into mental health is that it is nationally representative, and longitudinal. However it, and any other panel or cross-sectional study, is restricted by the episodic nature of depression. An individual who presents as depressed in Wave 1 and not depressed in Wave 2 may either have recovered fully by Wave 2, or may simply be asymptomatic at the time, and may slip into depression immediately after the interview occurs, thus registering erroneously in the data as not depressed, or, in the reverse, with an opposite presentation, as not having recovered when actually they have. Interviews which are conducted at different times of year may also skew the results, as depression often has a seasonal component, with a higher proportion of individuals reporting as depressed in the winter months.

This thesis uses Wave 3 for the major part of the analysis, and thus avoids in large part the potential problems caused by comparing depression status across waves, however, in so doing it misses the opportunity to eliminate fixed characteristics from the estimates of the determinants of depression through the full use of the panel. In addition, it makes no account for seasonal patterns in depression. The use of Wave 3 in this thesis is appropriate due to the research focus placed on the interaction between grant receipt and depression, and the potential for exploitation of exogenous variation in grant receipt in Wave 3, however, further studies could exploit the panel nature of the data, an angle very few researchers have pursued.

This work provides an estimate of the size of the intergenerational transmission of depression. However, this effect has not been broken up into its two components, that of genetic and environmental factors. Models of intergenerational transmission often struggle with disentangling the two effects. A potential method to do so is to make use of twins data, who depending on whether they are identical or fraternal twins share more or less DNA, allowing the separation of the two effects. The NIDS does not have sufficient data on twins, neither from a sample size perspective nor from the perspective of a sufficient level of detail. The numbers of twins is not high - 297 pairs in Wave 3, and

one cannot identify whether these twins are identical or fraternal.

However, another unique feature of South Africa's family structure does provide a framework for analysis. Thompson (2014) discuss using using biological and adopted children to estimate environmental effects, by exploiting their shared environment but lack of shared genetic material. South Africa's high levels of fostering of children may provide enough variation in the data to use such a framework (Djebbari & Mayrand 2011), as well as the high number of three generation households. Using variation in genetic similarity between parents, children, grandparents, cousins, unrelated household members and orphans, it may be possible to identify the portions of intergenerational transmission which are due to nature or nurture, and this is a promising avenue for future exploration. This scarcity of research has been related to a lack of data in the past, however the NIDS now offers the chance to truly investigate this topic, including making use of three generation households, an avenue this thesis has not explored.

The results presented in Chapter 5 suggest that the intergenerational transmission of depression is particularly high even for adults. This thesis has explored the determinants of depression, both in mothers and teens, but has not analysed what the key factors are which determine the intergenerational transmission of depression, which is a worthwhile question, given the intergenerational effect is by far the largest determinant of depression in both teens and adults. To do so might help to explain the large interaction found between cash transfer receipt and maternal depression.

Simultaneity exists between poverty levels and the state of mental health - improving the one tends to improve the other. Lund (2012) state the need for more research into the mental health consequences of cash transfer programmes for recipients. It is not necessarily the case that cash transfers should specifically be used to improve mental health, but it is worth investigating whether improved mental health is one of the outcomes of cash transfer programs. Mental health was not intended as a target outcome for improvement withh the Opportunidades in Mexico but nonetheless did so (Ozer et al. 2011). As a blunt tool to improve mental health, cash transfers may be a cost effective mechanism, which can improve the well being of those who may live in areas without access to any psychiatric treatment.

The results seen in Chapter 3 are significant overall, but do not explain a great deal of the variation in either enrolment or education. It may be helpful to incorporate

the average quality of schools in the immediate vicinity, as this gives a measure as to teen choices when making the enrolment decision, and may help to explain more of the variation in enrolment and years of schooling. Average teen wages in the immediate vicinity may also be useful data to include, though this may have to come from an external data set (if available), as observed rates of teen employment are not high in the NIDS.

This thesis has evaluated a current time decision to enrol, using variation in CSG receipt among a particular age group. Vander Stoep et al. (2003) note that the proportion of children who drop out of school due to mental illness is large. Using the panel nature of the NIDS it is possible to both evaluate the size of that proportion of drop-out in South Africa which is due to mental illness, and to determine which factors are most important at the beginning of a teen's school career to guarantee academic success.

In Chapter 3, enrolment and years of schooling attained are the main educational outcomes of interest. Other papers have also focused on days of school missed (Baird et al. 2011), which is an even more current measure of educational status. In Table 11, the impact of grant receipt on days of school missed in the past month is estimated, and no significant effect is found except in pensioner households, where beneficiaries miss almost three-quarters of a day of school less than non-beneficiaries. However, this data is only collected for individuals below the age of fifteen, thus the grant receipt is possibly endogenous in the estimation. Days missed is also a self reported measure, as is enrolment, and it may be subject to reporting bias. Enrolment *may* have the same problem, but this is less likely to be an issue, as this variable refers to enrolment in school in that year of study, which is unlikely to be susceptible to recall error.

In theory, the variation in receipt generated by the doubling of the means threshold value in 2008 could also be exploited to estimate the effects of grant receipt. However, although officially the means test amount changed at the end of 2008, the graphical analysis in Chapter 2 shows that increased levels of receipt for all children only occurred between 2010 and 2012. This in all likelihood rules out this exogenous change in policy as an avenue for future research, especially due to the unrelated large drop in mental illness between Waves 1 and 2, both in mothers and fathers, which provides evidence that this fall was not grant related.

A negative link exists between mental health and income status, however very little

research has been conducted in low income countries about this relationship, despite the higher prevalence of mental illness in lower income countries. Using data from 2002, Lund et al. (2013) report an estimated income loss for adults suffering from depression or anxiety of 4,798 US dollars per year in South Africa, not including the costs of treatment or the lost earnings of caregivers. The forecasted total loss to South Africa due to these mental illnesses was 3.6 billion US dollars. This figure is a lower bound, not including the earnings lost to mild to moderate depression, and other illnesses such as bipolar disorder or schizophrenia. In contrast, the estimated spending for mental health services by the government was fifty-nine million US dollars. A strong economic argument exists for an increase in mental health services. Treatment may not lead to a full return to previous earnings levels, but the estimated costs of not treating these disorders are objectively very high. An updated set of figures for these current costs to the economy from untreated mental illness would be beneficial for policy makers.

This study is limited to the use of a measure of depression, and due to a lack of data does not take into account that mental illness has high comorbidity with other diseases (Kessler et al. 2007, Herman et al. 2009), for example depression and anxiety often present together, as well as many other physical ailments. The NIDS contains detailed health data which allow the investigation of co-morbidity, a well known phenomenon in mental illness research. This may prove to be a promising area for further study.

The NIDS is particularly valuable due to its longitudinal monitoring of population mental health, which allows the estimation of true causal effects through the elimination of fixed individual characteristics, something which is impossible in many studies which use cross-sectional data. This thesis has focused on the contemporaneous effect of maternal depression on child outcomes, with a limited measure of the duration of mother's depression included in the analysis. Age at onset of adolescent depression is important for the progression of the disease, as is the age at which teen's first experience the negative effects of maternal depression. Future research could use the NIDS to analyse the strength of these respective effects.

Despite that no effects on human capital attainment are found, it may be the case that other cumulative effects do exist, such as an effect of improved nutrition. This is a possibility given the wide research which has found positive effects of grant receipt on the nutritional status of young children. This is a potential avenue for future research,

the estimation of not just the educational achievement of CSG beneficiaries as this thesis has attempted, but also other measures of welfare.

In addition, other valid metrics of academic success do exist, besides years of schooling. The absolute quality of academic achievement as measured by test scores, or university entrance, are other options for study. Even if the grant has not resulted in more years of schooling attained, it is possible that the quality of the years attained may be higher, which is testable given the right data.

This thesis has not focused on the mechanisms behind the reduction in the intergenerational transmission of depression which is due to grant receipt. Baird et al. (2013) find many different ways that cash transfers impact on teen mental health, including improved self esteem, efficacy, pride in appearance, reductions in physical illness and others. Many of these variables are collected in the NIDS, and their study may reveal additional channels through which positive impacts of grant receipt may be seen.

Very little research has been performed on the specific size (i.e. the treatment "dosage") of the amount of a cash transfer, measured as a percentage of household income, beyond which meaningful impacts of cash transfers may be found, and this is an avenue for future study. In South Africa, a child born in 1991 would have been consistently above the age eligibility limit during their entire childhood, and therefore would not have accumulated any grant income. A child born in 1998 would have been covered since birth, and could have accumulated 27,576 rand by 2014, using a rough estimate. Using the newly available Wave 4 data of the NIDS, Figure 39 shows the large differences in the potential amount of grant income received due to the arbitrary changes of age limits and means test value. It is possible that using the NIDS Wave 4 will help in the estimation of the precise amounts required to make a significant improvement in child welfare.

6.4 Discussion

The positive impacts of the child support grant in the short term are clear, helping to keep teens in school, at a time when drop-out becomes common. Larger increases in enrolment are usually only seen in countries with lower baseline levels of school-going, thus the size of the results seen is noteworthy given the high initial enrolment levels among South African teens.

Figure 39

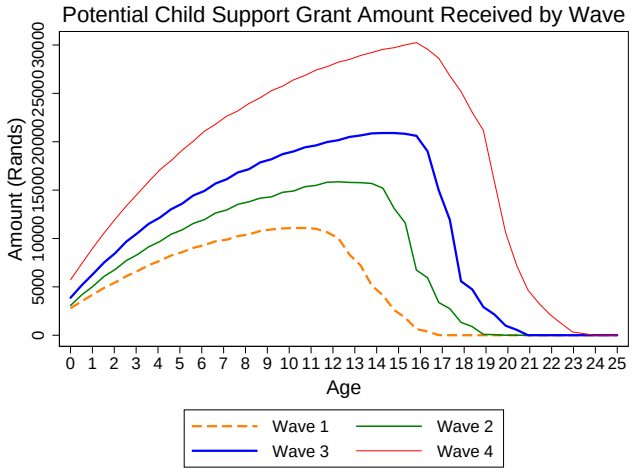


Figure 39 shows potential cumulative income received in all four waves.

However, the lack of conversion from enrolment benefits to human capital achievement is concerning. South Africa is not unique in this regard. These results accord with both the international and domestic literature which show transfers frequently affect enrolment, however, modest or no effects on cumulative outcomes such as test scores and years of schooling are usually found in lower and middle income countries.

It is crucial to understand why this is the case. This result could be related to the quality of schools. Being in school does not help a child achieve if the school itself is lacking in resources or skilled teachers, and respondents in the NIDS in 2012 do cite poor quality of school as one reason for non-enrolment. It may also be the case that the grant has not yet been evaluated over a long enough time span for human capital gains to manifest. In 2016, the first group of beneficiaries who received the grant from birth are coming of age. Possibly the evaluation of this group could yield significant impacts on schooling, but given the already large duration of potential receipt in the 2012 sample used in this thesis[190], and the consistently insignificant effects observed of receipt on years of schooling in a number of different samples and specifications, this is unlikely to be the case.

With any welfare program comes the concern that the transfer will not reach the intended beneficiaries. This does not appear to be an issue for the child support grant in South Africa. Mothers tend to spend the extra resources on their children, and from

[190]The maximum possible expected duration of receipt in 2012 was fourteen years.

this thesis very little change seems to occur in mothers' welfare on becoming a recipient, with the only positive effects being seen in their children's welfare. Mothers are crucial in the welfare of their children, and the lack of impact of the grant on maternal depression may imply that the grant is enough to get the child to school, but not enough to lift a mother's mental state sufficiently for her to provide the child with a properly supportive domestic environment for academic success.

Whether any improvements in outcomes are sustained after cash transfer programs end is important. Cash transfers have reduced the probability that adolescents suffer from psychological distress in the short term, but these effects have been seen to diminish after termination of cash transfer program (Baird, Chirwa, De Hoop & Özler 2014). This raises the question of what occurs when CSG receipt ends, and teenagers lose the important financial buffer between themselves and a parent who may suffer from untreated mental illness.

6.5 Policy Recommendations

The South African constitution guarantees the right to social assistance, and lays down a number of conditions under which the government is bound to implement any social security programs. One of the key conditions is that the program "may not exclude a significant segment of society". Through allowing policies which have not ensured access to the grant to all eligible recipients, it can be argued that the South African government has infringed on the constitutional rights of a group of marginalised individuals.

Although grant uptake is indeed remarkable in absolute numbers, exclusion - despite income eligibility - is still high. It has been estimated that 3.2 million eligible children did not receive the grant in 2010, despite being income and age eligible, and that more than a million beneficiaries missed out on getting the grant due to the artificially low means test threshold prior to 2008. It is to be hoped that any future expansion of the grant, and in general the administration of the grant, is efficient and takes into account what the literature has found regarding errors in program implementation. Given the high levels of poverty in South Africa, and the lack of other essential services such as quality schooling and health care, the government cannot afford to exclude individuals who are most in need of help, as the particularly vulnerable group of potential grant beneficiaries is.

The means test amount doubled in 2008, however the resultant increase in receipt took as long as four years to happen, as seen in the patterns of receipt in Chapter 2. This implies the information about how to access the grant, and who can access the grant, is not filtering through to eligible applicants. The application process is in need of streamlining to avoid high costs to those applying, such as transport for repeated trips to obtain and supply the necessary documentation. A successful information campaign would be beneficial to dispel misconceptions about grant receipt which are prevalent. These include incorrect beliefs about the actual value of the means test threshold and the documents required for application, a belief that the child must be enrolled at school or forgo receipt, and that certain groups cannot receive the grant, such as government employees, nor anyone in general who is working. Both stigma and ignorance are present regarding men receiving the grant: very often it is believed that men cannot (or should not) be grant recipients. All of these incorrect beliefs have occurred to the detriment of children who are in need of the support the grant provides. These erroneous assumptions have also reduced the ability of men to play a proper role in fathering their children, something which is unfortunate given South Africa's legacy of absent fathers after Apartheid.

It is women in particular who are disadvantaged by documentation requirements that they prove that their husbands are not earning money or supporting them, or that ex-partners are not doing this. If a man has migrated to look for work, or left the household entirely, it is difficult to obtain details of his financial status and whether or not he is providing support to the woman in question. However, the costs of onerous document requirements are not only borne by potential recipients. SASSA employees have to apply these requirements, and they have been applied inconsistently across different branches of SASSA. Removing many of the requirements would result in much lower administrative costs for the Department of Social Development, as well as the South African Police Services who are required to supply the affidavits necessary for applicants when the required documentation is not available.

Grants comprise seventy percent of income for households in the lowest income quintile, and are crucial to keeping these families out of poverty. A worrying phenomenon has emerged which further threatens the financial security of these households. Unscrupulous companies have succeeded in making unauthorised debit deductions on grant payments, which require a recipient to go through a complex procedure to cancel. This is an illegal

practice, and was first observed in 2011. Organisations such as Black Sash have been working diligently to stop these practices, but it is not their responsibility to do so. A thorough investigation of the distribution of the grant, and the processes by which debit orders can be attached to grants, is recommended.

That the grant has positive impacts on teen enrolment despite its relatively small size is encouraging, but given what the literature has shown about the potential improvements in maternal mental health if the size of the transfer is large enough, and the many negative consequences of untreated maternal mental illness for both children and mothers, it is crucial that the amount of the grant be analysed carefully before further policy decisions are made. If impacts are seen on human capital attainment, they may be driven by an unfortunate effect often seen in developing countries, where parents concentrate resources on only one child. This is clearly not optimal for the other children, and speaks further to the debate regarding whether the size of the grant is large enough if by itself it does not have any impact on outcomes. It may be that rather than expanding the grant to all children under the age of twenty-three, as has recently been proposed (Beukes et al. 2015), possibly the age limit ought to be kept constant, and the grant amount should increase substantially for existing and new age-eligible beneficiaries.

The grant amount has been adjusted every year to account for base inflation, however a case could be made for more than inflation related adjustments. The poor are disproportionately vulnerable to food price inflation, given the large share of the household budget that is spent on food This is the case not just in South Africa but in the rest of the world. Food price inflation is much higher than the rate of change in the general Consumer Price Index. In 2010, the world prices of staples such as maize, wheat, sugar and oil increased by more than fifty percent (Ivanic et al. 2012) due to adverse weather shocks, export restrictions, and fuel price adjustments and this was accompanied by a rise in poverty levels in many countries. If executed correctly, social security programs can serve as a safety net insuring the poor against volatility in food prices.

The roll-out of the CSG in South Africa was irregular, with unexpected changes in amount, and both income and age threshold values, in the years following program inception. These changes created exogenous variation in grant receipt which this thesis has used to identify the impact of transfers. However, as many other countries around the world have done, impact analysis would be that much easier, and the results that

much more valid, were roll-out to be exogenous. If the age limit is increased, it would be optimal if this were done if a few selected areas first, using a truly randomised controlled trial. Ethical reasons may preclude the full scale roll-out of cash transfer programs in randomised controlled trial format, but a small-scale randomised evaluation should prove invaluable. This said, it is known that although this will help researchers to evaluate the short term impacts with a much lower error bound, there may be other impacts which will only be seen in the long term.

Mental illness is one of the most neglected health issues in South Africa. Adolescents in particular have very few resources available to them in terms of treatment. Coupled with this is a particularly high burden of mental illness in mothers, who are subject to a relentless range of stressors, including financial stress, and violence, both in the home and out. Without intervention, the likelihood that the next generation of adults will grow up to suffer from mental illness is high.

Section 27 of South Africa's constitution guarantees the right of access to health care, and Section 9 affirms the equality under the law of those with disabilities. The reality in terms of access to treatment and discrimination differs widely from these stated aims. The lack of resources dedicated to all disabilities, and in particular those to teens suffering from chronic mental illness, results in teens with poorer mental health, and lowered educational outcomes. The child support grant is acting to mitigate these impacts slightly, yet the grant ought not to be utilised to finance the consumption of goods which it is the responsibility of the state to provide, such as education and health care.

An earlier age of depression onset is often associated with greater severity of symptoms, longer duration of suffering and a higher likelihood of treatment resistance. Any targeted interventions to improve maternal or child outcomes must take into account the likely age at first onset of depression for both mother and child, as maternal depression could have differential impacts depending on the child's stage of life. Consultation with researchers when designing interventions for children is recommended.

When designing policies, it is crucial that no conflicts arise from other competing policies. This has occurred in the past, with large consequences for those in the poorest of households. For example, in 2005 the means test threshold in rural areas was 800 rand, while the minimum wage for farm workers was 850 rand, thus precluding the vast majority of farm workers from accessing the grant. It is to be hoped that this thesis

provides compelling evidence for considered and deliberate evaluation of CSG eligibility both by age and means, in order to avoid more social losses to the outcomes of South Africa's children.

In fulfilling its constitutional mandate to protect the most vulnerable in society – the last, the least and the littlest - the child support grant has been a considerable success. However, these successes have not translated into human capital accumulation in terms of years of schooling attained - a reminder that improving educational outcomes is more than simply ensuring learners are in front of a black-board. Despite this, the grant's other successes prove that, in a context of high inequality and pervasive poverty, it indeed takes a grant to raise a child. Most notably, the child support grant helps to loosen the tight grip of parentally transmitted intergenerational mental ill-health. This 'parent trap' has proven remarkably resilient to other interventions and conditions making this a noteworthy finding. Despite encouraging literature and theoretical predictions, the grant does not help alleviate maternal depression and its impact on female intra-household bargaining power is modest at best. This is an unfortunate finding considering the mother's knee is an important stepping stone on the child's journey to adolescence and adulthood. Nonetheless, this journey seems to be moving in a direction consistent with the vision of the Lund Commissions; the grant is following the child.

A Appendix

A.1 IV Estimates: Enrolment and Years of Schooling (Selected Sub-Samples)

Table 33

Grant Impact on Enrolment and Years of Schooling in Wave 3 Instrumental Variables Estimates in Selected Sub-Samples				
Samples	Enrolment		Years of Schooling	
Means Test Eligible	0.12	**	0.03	
Mean, Sample Size	0.81	1,885	8.76	1,890
All	0.18	***	-0.03	
(Means Test Eligible and In-Eligible)	0.82	2,391	8.86	2,396
Coloured	-0.18	***	-0.09	
	0.61	220	8.80	220
African	0.15	**	0.04	
	0.83	1,665	8.75	1,670
Female	0.06	**	0.57	*
	0.79	980	9.08	983
16 and 17 Year Olds	0.00	**	0.00	*
	0.88	789	8.49	791
Pensioner Household	0.15	**	0.21	*
	0.83	540	8.71	542
Rural	0.11	*	-0.14	*
	0.83	1,231	8.64	1,235
Urban	0.08	*	0.55	*
	0.77	529	8.94	530

The instrumental variables estimates (with age eligibility as IV) of grant receipt impact on enrolment and years of schooling are replicated in specific sub samples of the base sample (African and Coloured teens aged fifteen to nineteen in Wave 3 of the National Income Dynamics Survey who are means test eligible for the child support grant). The four elements reported are percentage point changes and significance, mean level of enrolment or education, and number of observations. For example, the entire sample has 2,321 observations, the effect of receipt on enrolment is eight percentage points, the mean level of enrolment in this sample is 82%, and this coefficient is significant at the one percent level. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

A.2 Determinants of Enrolment and Years of Schooling: General Household Survey 2012

Table 34 replicates Table 9 in Chapter 2, using the full sample of African and Coloured teenagers aged fifteen to nineteen in the 2012 General Household Survey, without excluding the means test eligible. Similar size coefficients, with similar significance levels are found. CSG receipt is associated with higher levels of enrolment.

Table 34

Determinants of Enrolment and Schooling: General Household Survey 2012												
Dependent Variable	Enrolment						Years of Schooling					
	(1)		(2)		(3)		(4)		(5)		(6)	
Actual Receipt	0.11	***					0.45	***				
Age Eligibility (IV)			0.09	***					-0.07			
Potential Duration X 10					0.18	***					0.36	***
Age in Years	-0.08	***	-0.09	***	-0.06	***	0.73	***	0.57	***	0.70	***
Female	-0.05	***	-0.05	***	-0.04	***	0.48	***	0.48	***	0.49	***
Years of Schooling	0.03	***	0.03	***	0.03	***						
Coloured	-0.12	***	-0.12	***	-0.11	***	0.09		0.07		0.18	*
Mother Resident in HH	0.01		0.01		0.02	**	0.02		0.03		0.00	
Log of Household Income	0.02	***	0.02	***	0.02	***	0.23	***	0.23	***	0.21	***
Household Size	0.00	*	0.00	*	0.00	*	-0.07	***	-0.07	***	-0.06	***
Rural	0.01		0.01		0.02		-0.24	***	-0.24	***	-0.25	***
Dependent Variable Mean	0.82		0.82		0.84		8.96		8.96		8.87	
CSG Variable Mean^{+}	0.47		0.48		10.1		0.47		0.47		10.1	
Number of Observations	5,011		5,011		6,805		5,028		5,028		6,826	
F stat	71.9		71.2		71.7		128		128		156	
Adjusted R Squared	0.19		0.19		0.18		0.27		0.27		0.26	

Three specifications are used to estimate the impact of CSG receipt on enrolment and years of schooling in the 2012 General Household Survey. In Columns (1) and (4), actual receipt is used as the CSG variable of interest. In Columns (2) and (5), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Columns (3) and (6), the impact of potential duration of CSG receipt is shown.$^{+}$The means of the three CSG variables of interested are reported: in column (1), forty-seven percent of the sample are receiving the CSG, in Column (2) forty-eight percent of the sample are age eligible for the grant, and in Column (3) the average potential duration of receipt is 10.1 years. The sample is comprised of African and Coloured learners between the ages of fifteen and nineteen. A full set of province dummies is included in each specification. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

A.3 Determinants of Enrolment excluding Years of Schooling

The estimates in Table 6 of Chapter 2 are re-estimated for enrolment, however excluding years of schooling as a determinant. The size and significance of the CSG and other coefficients do not change in any meaningful way.

Table 35

Determinants of Enrolment and Schooling in Wave 3 (Excluding Years of Schooling)						
Dependent Variable	Enrolment					
	(1)		(2)		(3)	
Actual Receipt	0.08	***				
Age Eligibility (IV)			0.13	**		
Potential Duration X 10					0.15	***
Age in Years	-0.08	***	-0.07	***	-0.05	***
Female	-0.01		-0.01		-0.01	
CES D-10 X 10	-0.05	***	-0.05	***	-0.06	***
Log of HH Education Spending	0.03	***	0.03	***	0.03	***
Mother has a Matric	0.07	***	0.07	***	0.06	***
Coloured	-0.17	***	-0.17	***	-0.17	***
Mother Resident in HH	-0.01		-0.01		0.00	
Log of Household Income	-0.01		-0.01		-0.01	
Household Size	0.00		0.00		0.00	
Rural	0.01		0.01		0.01	
Dependent Variable Mean			0.81			
Number of Observations	1,888		1,888		1,888	
F stat	24.7		23.8		23.7	
Adjusted R Squared	0.22		0.22		0.22	

The main estimates from Chapter 3 are re-estimated excluding years of schooling as a determinant of enrolment. The coefficients reported do not differ in size or significance in any meaningful way. Three specifications are used. In Column (1), actual receipt is used as the CSG variable of interest. In Column (2), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Column (3), the impact of potential duration of CSG receipt is shown. The sample is comprised of African and Coloured teenagers between the ages of fifteen and nineteen who are means test eligible for the CSG. A full set of province dummies is included in each specification. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

A.4 Intergenerational Transmission of Depression: Logit Estimates

The specifications in Table 18, Chapter 5, are replicated, using logistic regressions. The coefficients reported are marginal effects, evaluated at the mean value of each independent variable. The results are similar to those seen in the main estimates in Table 18 in significance, and for the most part in size. Similar to the main estimates, there are no significant predictors of depression in the estimates which include father's depression, apart from CSG receipt and whether the father is depressed.

Table 36

Intergenerational Transmission of Mental Health: Determinants of Child Depression (Logit Marginal Effects)

	Child is Depressed							
	Mother				Father			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Parent is Depressed	0.34***	0.29***	0.29***	0.34***	0.33***	0.28***	0.26***	0.36***
CSG Receipt			-0.04*	-0.01			-0.11***	-0.04
CSG Receipt*Parent is Depressed				-0.05**				-0.08***
Parent's Education		0.00*	0.00*	0.00*		0.00	0.00	0.00
Parent is Economically Active		-0.04**	-0.04**	-0.04**		-0.01	-0.01	0.00
Age in Years		0.01	0.00	0.00		0.00	-0.02	-0.02
Female		0.03*	0.03*	0.04**		0.03	0.04	0.04
Years of Attained Education		0.00	0.00	0.00		0.00	0.00	0.00
Coloured		-0.08***	-0.09***	-0.09***		-0.05	-0.06	-0.06
Log of Household Income		0.02*	0.02*	0.02**		0.01	0.01	0.00
Pensioner Household		-0.05***	-0.05***	-0.05***		-0.02	-0.02	-0.01
Household Size		0.00	0.00	0.00		0.00	0.00	0.00
Rural		0.01	0.01	0.02		0.04	0.05	0.05
Dependent Variable Mean			0.17				0.17	
Number of Observations	1,325	1,320	1,320	1,320	459	428	428	428
F stat	146.7	198.9	197.8	205.3	46.6	67.7	63.5	66.3
Adjusted R Squared	0.17	0.22	0.22	0.22	0.17	0.22	0.24	0.25

Notes: Logit estimates are calculated to measure the impact of parental depression on child depression. Marginal effects are reported. 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 0 and 30, where a higher score indicates higher levels of depression. 4 Specifications are presented. In Specification (1), child depression is regressed on a binary variable for parental depression, either maternal or paternal. In Specification (2), a full set of relevant controls are included. In Specification (3), Child Support Grant Receipt is included, and in Specification (4), an interaction term between CSG receipt, and the parental depression term. African and Coloured learners between the ages of 15 and 19 who are income eligible for the Child Support Grant constitute the sample. Data from wave 3 of the National Income Dynamics Survey is used. A full set of province dummies is included in specifications (2) through (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.

A.5 Chapter 4 Missing Data Checks

Table 37

Intergenerational Transmission of Mental Health: Determinants of Child Depression										
	Maternal Depression Transmission					Paternal Depression Transmission				
Other Parent	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***	0.46***	0.24	0.41***	0.27***	0.38***	0.35***	0.11	0.02
CSG Receipt	-0.04	0.01	0.01	-0.28**	0.07	-0.11**	-0.04	-0.04	-0.37**	0.00
CSG Receipt*Parent is Depressed		-0.20***	-0.29***	-0.15	-0.40**		-0.24***	-0.20**	-0.03	-0.22
Other Parent Resident	0.00	0.00			0.11	0.02	0.02			0.36
Missing Depression Data	0.08	0.09	0.16	-0.06	-0.03	0.12**	0.13**	0.12*	0.04	-0.47**
Parent's Education	0.01**	0.01**	0.00	-0.01	0.01	0.00	0.00	0.00	0.02	0.00
Parent is Economically Active	-0.04	-0.03	-0.06*	-0.15	0.05	-0.01	0.00	-0.01	-0.15	0.05
Age in Years	0.00	0.00	0.01	-0.03	-0.02	-0.01	-0.01	0.00	-0.05	-0.02
Female	0.04**	0.05**	0.05	0.15	0.16**	0.03	0.04	0.04	0.11	0.23*
Years of Attained Education	-0.01	0.00	0.00	-0.01	0.03	0.00	0.00	0.00	0.00	0.01
Coloured	-0.12**	-0.11**	-0.09	0.13	0.02	-0.08	-0.08	-0.1	-0.37	1.21***
Log of Household Income	0.01	0.01	0.02	-0.10	-0.02	-0.01	-0.01	-0.03	-0.06	-0.05
Pensioner Household	-0.05*	-0.06*	-0.10**	-0.25*	0.06	-0.03	-0.02	-0.05	-0.23	-0.06
Household Size	0.00	0.01	0.00	0.01	-0.01	0.00	0.00	0.00	0.02	-0.01
Rural	-0.03	-0.02	-0.05	-0.02	0.12	0.02	0.02	0.02	-0.13	-0.2
Dependent Variable Mean	0.16	0.16	0.16	0.36	0.47	0.16	0.16	0.16	0.43	0.52
Other Parent Resident Mean	0.46	0.46	1.00	1.00	0.55	0.89	0.89	1.00	1.00	0.93
Number of Observations	981	981	446	104	157	475	475	421	103	91
F stat	7.0	7.0	3.8	-	-	2.8	2.8	2.9	-	-
Adjusted R Squared	0.21	0.23	0.26	0.39	0.37	0.18	0.20	0.20	0.29	0.47

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. Depression data for parents is replaced as zero if missing, and a dummy variable for whether their data was originally missing is included in the set of control variables. CSG Income eligible African and Coloured learners between the ages of fifteen and nineteen in NIDS Wave 3 constitute the sample. 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.

A.6 Duration of Mothers' Depression

Table 38 replicates the estimates in Table 27 in Chapter 5. The key difference is that the estimates presented in Table 38 include not whether the mother is depressed in the current time period, but rather a measure of how many waves the mother has been seen to be depressed in, which can be seen as an indicator for the severity or duration of the mother's depression. The average number of waves a mother is depressed is a little over one in each sample. Similar to current maternal depression, the number of waves a mother is depressed has no impact on the enrolment decision, but has a significant and negative impact on years of schooling attained, which is similar in size to the coefficient on current maternal depression in the original estimates in Table 27. Every extra wave that a mother is depressed in lowers educational achievement by a little over a quarter of a year. The interaction between number of waves the mother is depressed and current CSG receipt is mostly insignificant. The negative effect of maternal depression measured in this way is highest for girls.

Table 38

The Determinants of Teen Education Outcomes: Waves 3										
	Enrolment					Years of Education				
	All	Means Test Eligible	Female	African	Female HH Head	All	Means Test Eligible	Female	African	Female HH Head
CSG Beneficiary	0.12 ***	0.15 ***	0.04	0.13 ***	0.12 ***	0.01	-0.05	-0.02	0.02	-0.09
# of Waves Mother is Depressed	0.03	0.03	0.02	0.03	0.03	-0.23 ***	-0.28 ***	-0.32 ***	-0.25 ***	-0.27 ***
# of Waves Mother is Depressed*CSG	-0.03	-0.04	0.04	-0.04 *	-0.05 *	0.14	0.16	0.29 *	0.10	0.17
Teen is Depressed	-0.01	0.05	-0.01	0.02	0.01	-0.18	-0.15	-0.05	-0.10	-0.21
Age	-0.11 ***	-0.11 ***	-0.12 ***	-0.10 ***	-0.11 ***	0.67 ***	0.66 ***	0.72 ***	0.65 ***	0.68 ***
Female	-0.03	-0.03	0.00	-0.03	-0.04	0.63 ***	0.74 ***	0.00	0.69 ***	0.71 ***
Log of HH Educational Spending	0.02 ***	0.02 ***	0.02 *	0.02 ***	0.02 *	0.12 ***	0.13 ***	0.12 ***	0.11 ***	0.14 ***
Mother has a Matric	0.02	0.00	0.01	0.02	-0.01	0.71 ***	1.01 ***	0.68 ***	0.65 ***	0.77 ***
Mother is Economically Active	-0.01	0.01	0.04	-0.02	-0.01	-0.09	-0.05	-0.04	-0.01	-0.13
Mother 's Age	0.00	0.00	0.00	0.00	0.00	0.01 **	0.02 **	0.02 **	0.02 **	0.01
Years of Education	0.04 ***	0.05 ***	0.05 ***	0.03 ***	0.04 ***					
Coloured	-0.07	-0.11	-0.06	0.00	-0.10	-0.20	-0.33	-0.15	0.00	-0.14
Log of Household Income	0.00	-0.02	-0.01	0.00	0.00	0.14 *	0.13	0.05	0.15 *	0.15 *
Household Size	-0.01	-0.01	0.00	-0.01	-0.01 **	-0.04 **	-0.03	-0.03	-0.04 **	-0.06 ***
Rural	-0.01	0.03	-0.02	-0.01	0.00	-0.20	-0.19	0.13	-0.08	-0.13
Mean of Dependent Variable	0.83	0.81	0.81	0.85	0.81	8.83	8.74	9.15	8.82	8.86
Average # Waves Mother is Depressed	1.00	1.07	1.03	1.06	1.06	1.00	1.07	1.03	1.06	1.06
F Statistic	11.2	10.2	7.7	8.4	10.6	35.0	27.7	22.3	29.9	29.2
R Squared	0.22	0.24	0.22	0.20	0.20	0.36	0.34	0.36	0.35	0.38
Number of Observations	1,029	803	506	882	739	1,029	803	506	882	739

Estimates are presented of the determinants of teen enrolment and years of education. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. All specifications include province dummies. The base sample consists of African and Coloured individuals aged 15 to 19 years old in Wave 3 of the National Income Dynamics Survey.

A.7 Who Matters Most for Teen Enrolment?

Table 39

The Determinants of Teen Enrolment in Wave 3					
Individual Suffering from Depression:	Mother	Father	Any Parent	Sibling	HH Member
CSG Beneficiary	0.07 ***	0.06 **	0.06 ***	0.07 ***	0.07 ***
Individual in Column Header is Depressed	-0.03	0.01	-0.01	0.01	-0.01
Mother has a Matric	0.04 *	0.03	0.07 **	0.05 **	0.04 **
Mother is Economically Active	0.00	-0.04	0.00	0.01	0.00
Maternal Age	0.00 *	0.00	0.00 *	0.00 **	0.00 **
Age	-0.12 ***	-0.11 ***	-0.12 ***	-0.11 ***	-0.11 ***
Female	-0.04 **	0.02	-0.03	-0.05 ***	-0.05 ***
Years of Education	0.04 ***	0.04 ***	0.04 ***	0.04 ***	0.04 ***
Log of HH Educational Spending	0.02 ***	0.02 **	0.02 ***	0.02 ***	0.02 ***
Coloured	-0.08 *	-0.08	-0.04	-0.08 *	-0.08 *
Log of Household Income	0.00	0.03	-0.01	0.00	0.00
Household Size	0.00	0.00	0.00	0.00	0.00
Rural	0.01	0.01	0.02	0.01	0.01
Mean Enrolment	0.82	0.84	0.82	0.83	0.83
Mean Depression Variable	0.27	0.28	0.40	0.14	0.40
F Statistic	19.9	6.1	17.1	20.3	20.5
Adjusted R Squared	0.24	0.21	0.24	0.23	0.23
Number of Observations	1,701	685	1,324	1,788	1,788

This table presents estimates of the determinants of enrolment. Each specification differs by the inclusion of a term indicating which person in the household is depressed, respectively mother, father, any parent, sibling and any household member. Standard errors are clustered at the PSU level and corrected. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. for heteroskedasticity. All specifications include province dummies. The base sample consists of African and Coloured individuals aged fifteen to nineteen years old in Wave 3 of the National Income Dynamics Survey. In Specification (2), paternal variables for matric, economically active and age are substituted in place of the maternal variables, and all other specifications include the maternal versions of these characteristics.

A.8 Determinants of Educational Outcomes: Maternal Depression

Table 40

Determinants of Enrolment and Schooling in Wave 3: Including Maternal Depression						
Dependent Variable	Enrolment			Years of Schooling		
	(1)	(2)	(3)	(4)	(5)	(6)
Actual Receipt	0.10 ***			0.30 *		
Age Eligibility (IV)		0.09			-0.30	
Potential Duration X 10			0.19 ***			-0.01
#Waves Mother is Depressed	0.02	0.01	0.02	-0.23 ***	-0.24 ***	-0.24 ***
Age in Years	-0.11 ***	-0.11 ***	-0.08 ***	0.73 ***	0.60 ***	0.66 ***
Female	-0.03	-0.03	-0.03	0.65 ***	0.66 ***	0.65 ***
Log of HH Education Spending	0.02 ***	0.02 ***	0.02 **	0.11 ***	0.12 ***	0.11 ***
Mother has a Matric	0.00	0.00	-0.01	0.97 ***	0.98 ***	0.97 ***
Years of Schooling	0.04 ***	0.04 ***	0.04 ***			
Coloured	-0.11	-0.12	-0.13	-0.06	-0.18	-0.12
Mother Resident in HH	0.00	0.00	0.00	0.00	0.00	0.00
Log of Household Income	-0.02	-0.02	-0.02	0.06	0.06	0.06
Household Size	-0.01	-0.01	-0.01	-0.03	-0.03	-0.03
Rural	0.03	0.03	0.03	-0.22	-0.20	-0.21
Dependent Variable Mean	0.81	0.81	0.81	8.69	8.69	8.69
Number of Observations	807	807	807	914	914	914
F stat	12.0	11.6	12.1	28.9	28.3	29.3
Adjusted R Squared	0.24	0.24	0.24	0.28	0.26	0.27

Three specifications are used to estimate the impact of CSG receipt on enrolment and years of schooling in Wave 3 of NIDS, including number of waves a mother is depressed as a control. In Columns (1) and (4), actual receipt is used as the CSG variable of interest. In Columns (2) and (5), instrumental variables estimates are presenting, using age eligibility as an instrument for actual receipt. In Columns (3) and (6), the impact of potential duration of CSG receipt is shown. The sample is comprised of African and Coloured teens between the ages of fifteen and nineteen who are means test eligible for the child support grant. A full set of province dummies is included in each specification. Robust standard errors are reported, corrected for clustering. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01.

A.9 Interactions

Table 41

The Determinants of Teen Educational Outcomes in Wave 3										
	Enrolment					Years of Education				
	All	Means Test Eligible	Female	African	Female HH Head	All	Means Test Eligible	Female	African	Female HH Head
CSG Beneficiary	0.11 ***	0.14 ***	0.04	0.13 ***	0.12 ***	0.10	0.13	0.13	0.15	0.04
# of Waves Mother is Depressed	0.03	0.03	0.01	0.04 *	0.03	-0.28 ***	-0.30 ***	-0.38 ***	-0.28 ***	-0.32 ***
# of Waves Mother is Depressed*CSG	-0.03	-0.04	0.04	-0.04 *	-0.05 *	0.17	0.17	0.36 **	0.12	0.20
Age	-0.11 ***	-0.11 ***	-0.12 ***	-0.10 ***	-0.11 ***	0.71 ***	0.71 ***	0.82 ***	0.69 ***	0.71 ***
Female	-0.03	-0.03	0.00	-0.02	-0.04	0.61 ***	0.66 ***	0.00	0.67 ***	0.66 ***
Log of HH Educational Spending	0.02 ***	0.02 ***	0.02 *	0.02 ***	0.02 **	0.09 ***	0.11 ***	0.07 **	0.10 ***	0.10 ***
Mother has a Matric	0.02	0.00	0.01	0.02	-0.01	0.83 ***	1.08 ***	0.88 ***	0.80 ***	0.96 ***
Mother is Economically Active	-0.01	0.00	0.04	-0.02	-0.01	-0.08	-0.05	-0.13	-0.03	-0.16
Mother 's Age	0.00	0.00	0.00	0.00	0.00	0.02 **	0.02 **	0.01	0.02 *	0.01
Years of Education	0.04 ***	0.05 ***	0.05 ***	0.03 ***	0.04 ***					
Coloured	-0.07	-0.11	-0.06	0.00	-0.10	-0.03	-0.02	-0.16	0.00	0.06
Log of Household Income	0.00	-0.02	-0.01	0.00	0.00	0.13 *	0.05	0.07	0.12	0.12
Household Size	-0.01	-0.01	0.00	-0.01	-0.01 **	-0.03 **	-0.02	-0.04 **	-0.03 *	-0.06 ***
Rural	-0.01	0.03	-0.01	-0.01	0.00	-0.25	-0.22	0.10	-0.15	-0.24
Mean of Dependent Variable	0.83	0.81	0.81	0.8462	0.81	8.79	8.68	9.09	8.77	8.80
Average # Waves Mother is Depressed	1.00	1.07	1.03	1.07	1.06	1.00	1.07	1.04	1.07	1.06
F Statistic	11.7	10.4	7.8	8.7	11.0	34.4	25.9	21.2	27.7	27.6
R Squared	0.22	0.24	0.22	0.20	0.20	0.31	0.28	0.33	0.29	0.30
Number of Observations	1,032	806	508	884	740	1,175	912	576	989	839

Estimates are presented of the determinants of teen enrolment and years of education. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. All specifications include province dummies. The base sample consists of African and Coloured individuals aged fifteen to nineteen years old in Wave 3 of the National Income Dynamics Survey.

Table 42

The Determinants of Teen Educational Outcomes in Wave 3										
	Enrolment					Years of Education				
	All	Means Test Eligible	Female	African	Female HH Head	All	Means Test Eligible	Female	African	Female HH Head
CSG Beneficiary	0.06 ***	0.07 ***	0.05 *	0.05 **	0.06 **	0.24 **	0.28 **	0.28 *	0.22 *	0.29 **
Mother is Depressed	-0.04	-0.02	-0.04	-0.04	-0.04	-0.27 **	-0.27 *	-0.30 *	-0.30 **	-0.34 **
Depressed Mother*CSG	0.03	0.00	0.04	0.03	0.02	0.26	0.27	0.43 *	0.27	0.32
Age	-0.12 ***	-0.12 ***	-0.12 ***	-0.10 ***	-0.11 ***	0.73 ***	0.72 ***	0.77 ***	0.72 ***	0.77 ***
Female	-0.04 **	-0.04 **	0.00	-0.04 **	-0.05 **	0.62 ***	0.65 ***	0.00	0.69 ***	0.68 ***
Log of HH Educational Spending	0.02 ***	0.02 ***	0.02 ***	0.02 ***	0.02 ***	0.09 ***	0.11 ***	0.09 ***	0.08 ***	0.09 ***
Mother has a Matric	0.04 *	0.04	0.05	0.04	0.03	0.80 ***	0.82 ***	0.68 ***	0.81 ***	0.88 ***
Mother is Economically Active	0.00	0.01	0.02	0.00	0.00	0.00	0.03	-0.05	0.02	-0.03
Mother 's Age	0.00 *	0.00	0.00	0.00	0.00 *	0.01 ***	0.02 ***	0.01	0.01 **	0.01 *
Years of Education	0.04 ***	0.05 ***	0.04 ***	0.04 ***	0.04 ***					
Coloured	-0.08 *	-0.11 *	-0.06	0.00	-0.10	0.06	0.05	-0.08	0.00	0.17
Log of Household Income	0.00	-0.01	0.00	0.00	0.00	0.17 ***	0.06	0.17 **	0.16 ***	0.17 ***
Household Size	0.00	0.00	0.00	0.00	-0.01 **	-0.04 ***	-0.03 **	-0.05 ***	-0.04 ***	-0.06 ***
Rural	0.01	0.04	0.02	0.00	0.00	-0.10	-0.04	0.12	0.00	-0.05
Mean of Dependent Variable	0.82	0.81	0.81	0.85	0.82	8.76	8.60	9.06	8.73	8.75
Mean of Maternal Depression	0.27	0.28	0.28	0.29	0.29	0.27	0.29	0.28	0.29	0.29
F Statistic	19.0	18.2	12.4	13.7	16.5	57.3	33.0	28.0	46.6	46.7
R Squared	0.24	0.25	0.23	0.19	0.22	0.32	0.27	0.32	0.30	0.31
Number of Observations	1,701	1,320	875	1,447	1,233	1,924	1,489	975	1,617	1,395

Estimates are presented of the determinants of teen enrolment and years of education. Standard errors are clustered at the PSU level and corrected for heteroskedasticity. * implies p value < 0.10, ** implies p value < 0.05, and *** implies p value < 0.01. All specifications include province dummies. The base sample consists of African and Coloured individuals aged fifteen to nineteen years old in Wave 3 of the National Income Dynamics Survey.

A.10 Number of CSGs Received and Maternal Depression

No significant impacts of CSG receipt are found on maternal depression in any of these samples, when CSG receipt is measured as the number of grants that a mother is receiving.

Table 43

Determinants of Maternal Depression										
	Base Sample		Means Test Eligible		Youngest Child Aged 15-19		One Child		Three or More Children	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Sample	(1)		(2)		(3)		(4)		(5)	
Number of Grants Received	-0.00	-0.07	-0.01	-0.15	-0.05	-0.10	-0.08	0.35	-0.05	-0.22
	(0.01)	(0.14)	(0.01)	(0.14)	(0.05)	(0.23)	(0.09)	(0.66)	(0.10)	(0.29)
Age in Years	0.02	0.02	0.01	-0.00	0.05	0.05	0.10	0.13	0.35	0.34
	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)	(0.04)	(0.07)	(0.09)	(0.31)	(0.33)
Age Squared	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
African	0.03	0.03	-0.00	-0.00	0.08	0.09	0.06	0.07	-0.16	-0.09
	(0.03)	(0.04)	(0.04)	(0.05)	(0.09)	(0.10)	(0.14)	(0.14)	(0.30)	(0.35)
Years of Schooling	-0.00	-0.00	-0.00	-0.00	-0.01*	-0.01*	-0.01	-0.01	-0.01	-0.01
	(0.00)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Married	-0.02	-0.02	-0.02	-0.03	-0.01	-0.02	0.06	0.14	0.01	-0.02
	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)	(0.06)	(0.09)	(0.14)	(0.10)	(0.11)
Has a Depressed Child	0.42***	0.42***	0.41***	0.40***	0.47***	0.47***	0.53***	0.52***	0.38***	0.40***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.06)	(0.06)	(0.09)	(0.12)	(0.10)	(0.10)
In Poor Health	0.13***	0.12***	0.13***	0.12***	0.06	0.06	-0.00	0.04	-0.05	-0.05
	(0.03)	(0.03)	(0.04)	(0.04)	(0.06)	(0.06)	(0.11)	(0.15)	(0.12)	(0.12)
Age of Youngest Child	-0.00	-0.01	-0.00	-0.02	-0.00	-0.01	-0.00	0.08	0.01	-0.02
	(0.00)	(0.01)	(0.00)	(0.01)	(0.02)	(0.05)	(0.03)	(0.13)	(0.04)	(0.07)
Number of Resident Biological Children	-0.00	0.02	-0.00	0.06	-0.02	-0.01		0.00	-0.02	-0.02
	(0.01)	(0.05)	(0.01)	(0.05)	(0.03)	(0.03)		(0.00)	(0.09)	(0.10)
Economically Active	-0.07***	-0.07***	-0.07***	-0.06**	-0.05	-0.04	-0.04	-0.11	-0.01	0.02
	(0.02)	(0.02)	(0.02)	(0.03)	(0.05)	(0.05)	(0.09)	(0.14)	(0.09)	(0.11)
Household Size	-0.00	-0.00	-0.00	-0.00	-0.01	-0.01	-0.03**	-0.02	0.03*	0.03*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)
Pensioner Household	-0.01	0.01	-0.00	0.02	0.01	0.01	-0.01	-0.03	0.09	0.10
	(0.03)	(0.04)	(0.03)	(0.04)	(0.05)	(0.05)	(0.09)	(0.11)	(0.12)	(0.13)
Rural	-0.05*	-0.03	-0.05	-0.02	-0.04	-0.03	-0.16*	-0.22*	-0.06	-0.01
	(0.03)	(0.03)	(0.03)	(0.03)	(0.05)	(0.06)	(0.08)	(0.12)	(0.13)	(0.15)
Log of Household Income	-0.04***	-0.05	-0.04**	-0.05**	-0.02	-0.02	0.02	-0.00	-0.00	0.00
	(0.01)	(0.03)	(0.02)	(0.02)	(0.03)	(0.03)	(0.05)	(0.06)	(0.06)	(0.06)
Observations	1,672	1,599	1,397	1,341	374	374	128	128	108	108
R-squared	0.23	0.21	0.22	0.14	0.28	0.28	0.39	0.21	0.31	0.28

This table reports estimates of maternal depression, for a base sample of Coloured and African mothers between the ages of twenty-five and fifty-five, from Wave 3 of the NIDS. OLS and instrumental variables estimates are reported, where the number of grants received is instrumented for using the age eligibility of the youngest child. Sample (2) limits the base sample to the means test eligible. Sample (3) limits the previous sample to women with their youngest child between 15 and 19, Sample (4) limits the sample further to women who have one child, and Sample (5) is limited to women with three or more children. Each regression includes province dummies. Robust standard errors are reported in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

A.11 Bargaining Power: Instrumental Variables Estimates

Table 44

Determinants of School Decision Making: African and Coloured Means Test Eligible Mothers in Wave 3: Instrumental Variables										
	Base Sample		Means Test Eligible		Youngest Child Aged 15-19		One Child		Three or More Children	
Stage	First	Second	First	Second	First	Second	First	Second	First	Second
	(1)		(2)		(3)		(4)		(5)	
Maternal Characteristics										
Youngest Child is Age Eligible	0.19**		0.21*		0.27		-0.37		0.34	
	(0.08)		(0.11)		(0.21)		(0.44)		(0.37)	
CSG Recipient		0.06		-0.40		-0.61		2.06		-0.28
		(0.45)		(0.49)		(0.96)		(2.05)		(1.00)
Age in Years of the Mother	0.10**	0.01	0.12**	0.11	0.16*	0.25	-0.06	0.03	-0.25	0.40
	(0.04)	(0.07)	(0.06)	(0.09)	(0.09)	(0.18)	(0.10)	(0.18)	(0.74)	(0.76)
Age Squared of the Mother	-0.00**	-0.00	-0.00**	-0.00	-0.00*	-0.00	0.00	-0.00	0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)
African	0.05	-0.11	0.09	-0.02	-0.03	0.09	-0.08	0.23	-0.03	-0.24
	(0.08)	(0.10)	(0.11)	(0.12)	(0.23)	(0.26)	(0.22)	(0.69)	(0.43)	(0.42)
Years of Schooling	-0.01**	0.01	-0.00	0.02**	0.02	0.05**	-0.01	0.06	0.07**	0.06
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.02)	(0.05)	(0.03)	(0.08)
Has a Depressed Child	0.03	0.10*	0.03	0.13**	0.05	0.05	0.07	-0.24	0.15	0.28
	(0.04)	(0.05)	(0.05)	(0.06)	(0.10)	(0.13)	(0.25)	(0.50)	(0.23)	(0.22)
In Poor Health	0.06	-0.05	0.06	-0.00	-0.02	0.04	-0.49**	0.83	0.11	0.22
	(0.06)	(0.07)	(0.07)	(0.08)	(0.12)	(0.14)	(0.19)	(0.91)	(0.20)	(0.20)
Age of Youngest Child	-0.01	-0.00	-0.01**	-0.01	0.03	-0.01	-0.25*	0.31	0.10	0.09
	(0.01)	(0.01)	(0.01)	(0.01)	(0.06)	(0.06)	(0.13)	(0.31)	(0.16)	(0.09)
Number of Resident Biological Children	-0.03	0.01	-0.02	-0.01	-0.01	-0.02			-0.17	-0.01
	(0.02)	(0.03)	(0.02)	(0.03)	(0.06)	(0.07)			(0.19)	(0.21)
Economically Active	0.03	0.04	0.04	0.05	-0.09	-0.15	0.27	-0.49	0.05	-0.17
	(0.04)	(0.05)	(0.05)	(0.06)	(0.10)	(0.15)	(0.18)	(0.71)	(0.21)	(0.20)
Household Size	0.02**	0.01	0.01	0.01	0.03	0.01	0.04	-0.12	0.06	0.05
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.04)	(0.04)	(0.12)	(0.05)	(0.06)
Pensioner Household	0.07	0.05	0.06	0.09	-0.02	0.14	-0.10	0.61*	-0.06	-0.02
	(0.06)	(0.07)	(0.06)	(0.08)	(0.15)	(0.17)	(0.24)	(0.35)	(0.23)	(0.18)
Rural	-0.00	-0.07	0.00	-0.09	0.06	0.06	-0.92**	1.85	0.38	0.37
	(0.06)	(0.06)	(0.07)	(0.08)	(0.14)	(0.16)	(0.39)	(1.58)	(0.41)	(0.48)
Log of Household Income	-0.16***	-0.04	-0.02	-0.03	-0.05	-0.05	-0.16	0.52	0.02	-0.07
	(0.02)	(0.07)	(0.03)	(0.04)	(0.08)	(0.08)	(0.15)	(0.42)	(0.11)	(0.09)
Number of Observations	594	594	448	448	116	116	32	32	43	43
Adjusted R-squared		0.06		-0.11		-0.21		-0.57		0.30

This table reports instrumental variables estimates of the impact of CSG receipt on maternal bargaining power, as evidenced by who makes the school location decision, for a base sample of Coloured and African mothers between the ages of twenty-five and fifty-five, who report the presence of a spouse in the household, from Wave 3 of the NIDS. The first and second stage estimates are reported, where maternal CSG receipt is instrumented for using the age eligibility of the youngest child. Sample (2) limits the base sample to the means test eligible. Sample (3) limits the previous sample to women with their youngest child between fifteen and nineteen, Sample (4) limits the sample further to women who have one child, and Sample (5) is limited to women with three or more children. Each regression includes province dummies. Robust standard errors are reported in parentheses, *** p<0.01, ** p<0.05, * p<0.1.

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