

NEET status and mental health in South Africa: A bidirectional longitudinal analysis

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Abstract

Youth who are 'not in employment, education or training' (NEET) have become an important policy concern in many countries, since they signify unfulfilled economic potential. In trying to understand the causes and consequences of NEET status, empirical studies have found NEETs to exhibit various mental health disorders, but the nature of any causal relationship between NEET status and mental health remains under-explored. This study addresses the paucity of NEET research in South Africa, with the objective of investigating the NEET-mental health relationship in the context of a country where NEET status is highly prevalent and persistent. The analysis tracks a cohort of 16-24 year olds using the first four waves of the National Income Dynamics Study (NIDS). The descriptive analysis reveals endemic NEET prevalence, with such individuals exhibiting worse mental health, measured as a depression score, than their non-NEET counterparts. NEET rates are higher among females than males, and NEET females display worse mental health than NEET males. The causal relationship between NEET status and mental illness is investigated using regression analysis. A key contribution of this study is that it estimates the NEET-mental health relationship using a Maximum Likelihood dynamic panel approach, which accounts for both unobserved heterogeneity and state dependence in NEET and depression. NEET status is shown to worsen contemporaneous mental health for males, but not for females. Past depression has no effect on future NEET status. However, for both females and males NEET status is highly persistent, with young women being twice as likely as men to retain NEET status across waves. Mental health is less persistent than NEET status, but there is evidence of a weak state dependent relationship for depression for men.

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1. Introduction

Inadequate academic and employment opportunities for youth characterise the transition from adolescence into adulthood in many countries (Benjet *et al.*, 2012; Bynner and Parsons, 2002; Kraak, 2013). The 'not in education, employment or training' (NEET) youth population is commonly a focus of policy attention, due to their disengagement from major social institutions (O'Dea *et al.*, 2014) and economic potential that is unrealised (Bruno *et al.*, 2014). At the individual level, empirical studies have found NEET status to have a range of negative consequences. One such consequence is psychological: NEETs exhibit a variety of mental health disorders. However, all existing research into this effect has been conducted in high-income countries or in Latin America (Benjet *et al.*, 2012; Goldman-Mellor *et al.*, 2016; Gutierrez-Garcia *et al.*, 2017; O'Dea *et al.*, 2014; Power *et al.*, 2015). This paper investigates the relationship between NEET status and mental health among South African youths.

NEET status is highly prevalent and persistent in South Africa. Although South Africa is not unique in that its young population exhibits a lower labour absorption rate and greater unemployment rate relative to older individuals, the magnitude of the issue is far larger than in many other countries. Almost one third of 15-24 year olds in South Africa were NEET in 2018, in contrast to around ten per cent in the European Union (Eurostat, 2018; Stats SA, 2018). The magnitude of the NEET problem in South Africa threatens social stability, as these often-marginalised youths face a host of economic and social challenges (Holte *et al.*, 2018; Kraak, 2003).

The NEET classification aggregates categories that are typically kept separate in economic analyses, namely those who are unemployed and those (outside of education) who do not or cannot seek work. Such aggregation may have disadvantages if, for example, these categories are highly heterogeneous (Furlong, 2007). However, there are also several advantages to using the NEET classification. First, employment statistics may fail to account adequately for youth who have recently or temporarily left education, such that the unemployment rate will not reflect the extent of deprivation and exclusion youths face when they attempt to transition from education to the labour market (Ranzani and Rosati, 2013). Second, the NEET measure includes marginalised groups such as young mothers and persons with disabilities, who are typically excluded from economic analysis. NEET status thus provides a more comprehensive measure of youth vulnerability, which can be used as a complement to the traditional unemployment rate. Third, the time that NEETs spend disengaged from education or employment is likely to erode their existing human capital, and hamper any later attempts to transition into work, regardless of the reason for their NEET status (Arulampalam *et al.*, 2000; Bynner and Parsons, 2002). Therefore treating NEETs as a single group indicates to policy makers how many individuals could potentially be involved in productive activities, if the constraints that they face could be overcome. For example, in South Africa, the majority of young NEET individuals have incomplete secondary education (Department of Higher Education and Training, 2018). Therefore, an analysis of NEETs is able to provide insight into the consequences of non-completion of secondary education and the failure to access higher education.

NEET status is associated with a variety of mental health disorders in a range of international contexts (Benjet *et al.*, 2012; O'Dea *et al.*, 2014). Mental illness in adolescence increases the likelihood of occupying NEET status in early adulthood (Baggio *et al.*, 2015; Goldman-Mellor

et al., 2016; Power *et al.*, 2015; Rodwell *et al.*, 2018; Witt *et al.*, 2018). NEETs also contemporaneously exhibit diminished mental health (Goldman-Mellor *et al.*, 2016; Power *et al.*, 2015). Several studies find significant state dependence within NEET status (Bruno *et al.*, 2014; Razani and Rosati, 2013) and that mental health also exhibits persistence, although to a lesser degree (Hauck and Rice, 2004; Roy and Schurer, 2013). However, most studies that investigate the relationship between NEET status and mental health fail to account for state dependence in both NEET status and mental health.

This paper is a significant contribution to the literature in two ways. First, there are no large-scale, longitudinal studies that investigate NEET status and mental health in developing countries outside of Latin America. Although research in South Africa has identified some of the causal factors for mental health problems, this is the first study to assess the relationship between NEET status and mental health, and does so in a context where NEET status is highly prevalent and persistent among young people.

Second, and more broadly, this study addresses shortcomings in the previous attempts to determine the direction of causality between NEET status and mental health. The literature suggests that bidirectional causal pathways are possible (Benjet *et al.*, 2012; Power *et al.*, 2015; Goldman-Mellor *et al.*, 2016). However, the existing empirical research fails to account simultaneously for the unobserved heterogeneity, and the persistence over time, in NEET status and mental health. The availability of large-scale data collected over four waves enables the use of techniques that account for underlying susceptibility to depression, while simultaneously controlling for the tendency of an individual's economic and mental states to persist over time. Therefore, the second contribution of this study is to identify and apply appropriate econometric techniques to deal with these two issues, which might otherwise contaminate the estimation of causal effects.

2. Data and measures

The data analysed in this paper come from the first four waves of the National Income Dynamics Study (NIDS), collected in 2008, 2010/2011, 2012 and 2014/2015 by the Southern Africa Labour and Development Research Unit (SALDRU). NIDS is the first national longitudinal study in South Africa that tracks individuals.

The NIDS data are the only source of mental health information in South Africa at a large scale. The longitudinal nature of these data enables the most appropriate form of the NEET-mental health relationship to be modelled, by allowing for lagged effects and controlling for time-invariant unobserved factors. The first wave of NIDS consisted of a large nationally representative sample of 28,226 individuals from 7,296 households. There was a particularly high attrition rate between waves 1 and 2, of 21.95 per cent due to refusals, deaths and difficulties with tracking individuals. A second phase of data collection was conducted at wave 3 to mitigate against the large number of lost individuals, which resulted in lower subsequent attrition rates of 15.82 per cent between waves 2 and 3 and 13.75 per cent between waves 3 and 4 (Chinhema *et al.*, 2016).

The sample for this study consists of individuals that are aged 16 to 24 in any wave. The analysis then follows this cohort of individuals throughout their remaining appearances in the panel. This type of youth cohort analysis is commonly used in the NEET-mental health literature (Baggio *et al.*, 2015; Feng *et al.*, 2017; Goldman-Mellor *et al.*, 2016; Gutierrez-Garcia

et al., 2017; Power *et al.*, 2015; Rodwell *et al.*, 2018). The cohort analysis sample mean that respondents older than 24 may be included in the analysis, provided that they were within the 16 to 24 age range the first time that they were interviewed. The sample is further restricted to individuals who provide data in a minimum of three successive waves.¹

The pooled NIDS dataset for waves 1 to 4, including individuals of all ages, consisted of 56,450 individuals with 154,157 observations. Of these, 3,027 individuals with 10,557 observations are within the chosen age range and meet all the restrictions placed on the sample. They make up the sample for the study's analysis. A further 8,476 individuals with 13,036 observations meet the age requirements of the sample, but do not provide data in at least three successive waves. They are termed 'out of sample' respondents and will be used in the attrition analysis.²

The key variables for the study are NEET status and a measure of mental health. NEET status is coded as a binary variable equal to one if the individual is not in employment, education or training and zero otherwise. It is constructed based on respondents' answers to questions about their *current* education and employment status.

The measure of mental health is a depression score which ranges from 0 to 30. The score is derived from the emotional health section in the NIDS adult questionnaire, which is made up of ten questions assessing respondents' mental health in the past seven days. These questions come from the Center for Epidemiologic Studies Short Depression Scale (CESD-10) which uses self-reported information. Björgvinsson *et al.* (2013) find the CESD-10 to display strong psychometric properties and to be largely consistent with clinical diagnoses of depression and other psychiatric disorders. A higher score indicates more depressive symptoms and can be interpreted as a continuum of depression (Björgvinsson *et al.*, 2013; Burger *et al.*, 2017). However, this measure of mental health differs from those used in many other studies of the NEET-mental health relationship, which typically analyse lifetime measures of mental health, generally proxied by the respondent having received a diagnosis from a health care practitioner.

3. Descriptive statistics

3.1. Summary statistics for the pooled sample

The kernel density plots in Figure 1 explore potential differences in the distributions of depression scores between NEETs and non-NEETs (panel A) and then between female NEETs and male NEETs (panel B). In all cases, the densities are somewhat uneven due to the integer nature of the depression score. All of the distributions are skewed to the right, but the

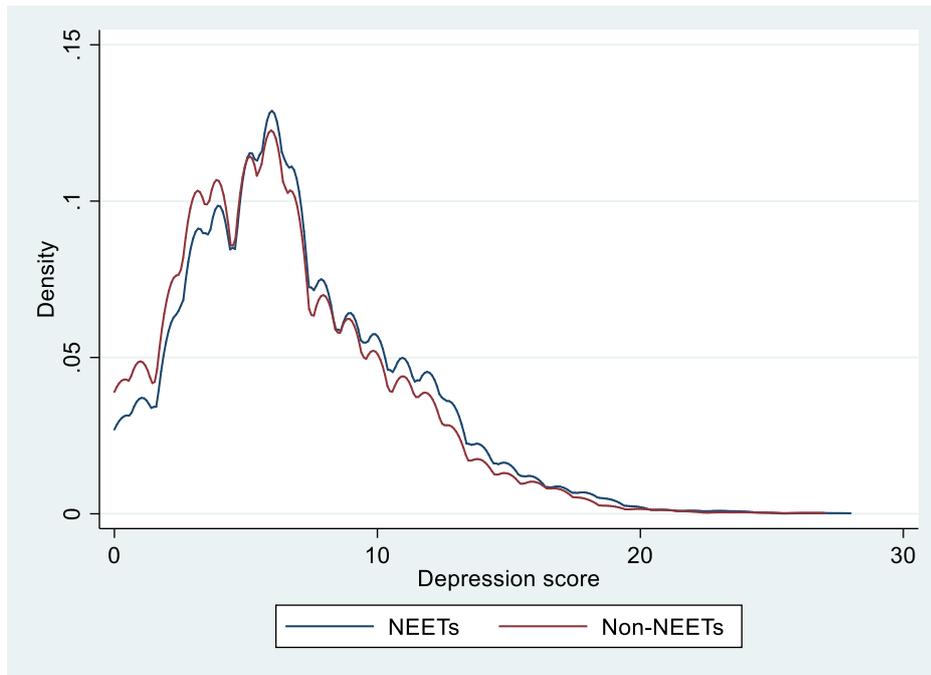
¹ Three observations per individual are needed in order to assess the change in status from one wave to another, while simultaneously controlling for a lagged value, that is, the degree of persistence of a status over time. The models used for the analysis do not support the analysis of cross-sections (individuals) that have gaps between waves (Barlotucci and Nigro, 2010; Kripfganz, 2016). Therefore, an individual who is interviewed in, for example, waves 1, 3 and 4 is dropped from the estimation.

² In defining the sample, all Indian race individuals were excluded as they did not meet all of the sample requirements. Although ten White individuals, with 31 observations, met the requirements, these respondents displayed a very limited degree of switching regarding NEET status and therefore could not be included in panel regression models. Therefore, these White respondents were removed from the analysis sample (into the 'out of sample' group). The analysis sample therefore consists of individuals of the African and Coloured race groups only.

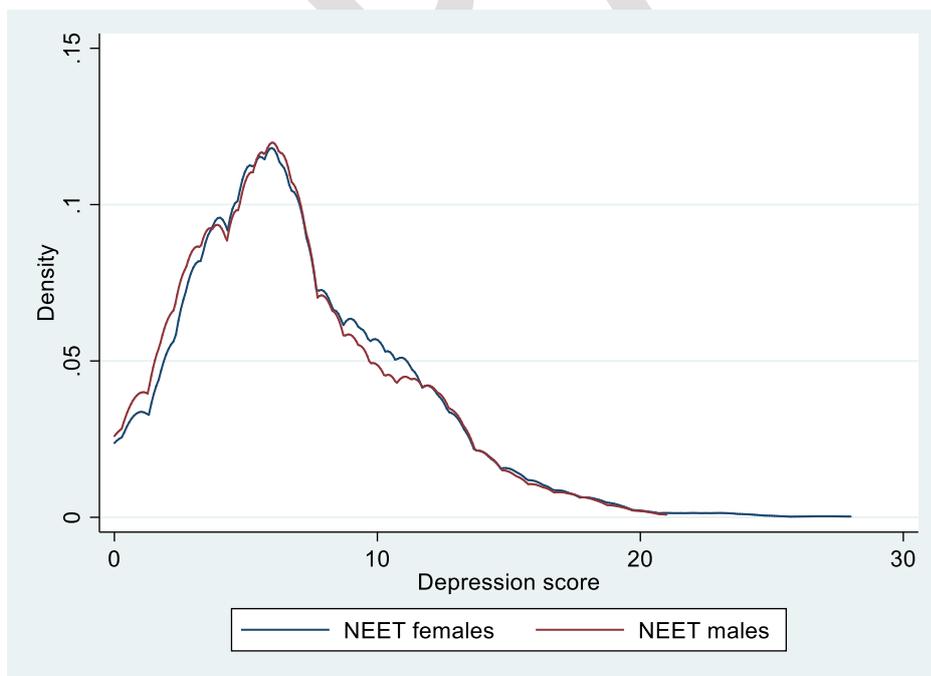
distribution for NEETs lies further to the right than that of non-NEETs in panel A, and the distribution of NEET females lies slightly further to the right than that of NEET males in panel B. This suggests that NEET individuals typically report higher depression scores than non-NEET individuals and that among NEETs, women report higher depression scores than men.

Figure 1. Distribution of depression scores

Panel A. Depression scores by NEET status (pooled sample)



Panel B. Depression scores of NEETs by gender (pooled sample)



Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves.

Table 1 displays the means (for continuous variables) and proportions (for dummy variables) of all covariates that will be used in the analysis, by NEET status and gender. All estimates have been subjected to a two-sample t-test that indicates which characteristics are statistically different between NEETs and non-NEETs for both women and men, as represented by significance stars. At a descriptive level, these results indicate a significant association between NEET status and mental health: among both women and men, NEETs report significantly higher mean depression scores in comparison to non-NEETs. The difference in average depression score by NEET status is larger for females than for males.

| | Females | | Males | |
|-----------------------------------|-----------------------|-------------------|-----------------------|-------------------|
| | NEET | Non-NEET | NEET | Non-NEET |
| Depression score | 7.035 *** (0.077) | 6.429 (0.075) | 6.746 *** (0.103) | 6.301 (0.072) |
| <i>Individual characteristics</i> | | | | |
| Employed | | 0.422 (0.009) | | 0.472 (0.009) |
| Enrolled | | 0.608 (0.009) | | 0.559 (0.009) |
| Age | 22.852 *** (0.057) | 21.242 (0.070) | 22.298 *** (0.074) | 21.168 (0.065) |
| African | 0.913 *** (0.005) | 0.890 (0.006) | 0.917 (0.007) | 0.920 (0.005) |
| Coloured | 0.087 *** (0.005) | 0.110 (0.006) | 0.083 (0.007) | 0.080 (0.005) |
| Married/Living with partner | 0.120 *** (0.006) | 0.067 (0.005) | 0.030 * (0.004) | 0.040 (0.004) |
| No schooling/Primary education | 0.089 *** (0.005) | 0.056 (0.004) | 0.146 *** (0.009) | 0.099 (0.005) |
| Incomplete secondary education | 0.532 *** (0.009) | 0.610 (0.009) | 0.510 *** (0.013) | 0.618 (0.009) |
| Completed secondary education | 0.283 *** (0.008) | 0.220 (0.008) | 0.276 *** (0.011) | 0.189 (0.007) |
| Tertiary education | 0.095 ** (0.005) | 0.114 (0.006) | 0.069 *** (0.006) | 0.094 (0.005) |
| Computer literate | 0.312 *** (0.009) | 0.423 (0.009) | 0.381 *** (0.012) | 0.445 (0.009) |
| Proficient in English | 0.592 *** (0.009) | 0.668 (0.009) | 0.548 *** (0.013) | 0.601 (0.009) |
| Poor health | 0.011 *** (0.002) | 0.005 (0.001) | 0.004 (0.002) | 0.005 (0.001) |
| Fair health | 0.033 *** (0.003) | 0.019 (0.002) | 0.022 (0.004) | 0.016 (0.002) |
| Good health | 0.212 (0.008) | 0.217 (0.008) | 0.206 (0.010) | 0.193 (0.007) |
| Very good health | 0.335 (0.009) | 0.334 (0.009) | 0.296 ** (0.012) | 0.326 (0.008) |
| Excellent health | 0.410 (0.009) | 0.426 (0.009) | 0.471 (0.013) | 0.460 (0.009) |

Table 1. Sample characteristics, by NEET status and gender

| | Females | | Males | |
|--|----------------------|------------------|----------------------|------------------|
| | NEET | Non-NEET | NEET | Non-NEET |
| <i>Household characteristics</i> | | | | |
| Living conditions index quartile 1 | 0.225 *** (0.008) | 0.289 (0.008) | 0.260 (0.011) | 0.279 (0.008) |
| Living conditions index quartile 2 | 0.380 *** (0.009) | 0.336 (0.009) | 0.374 *** (0.012) | 0.334 (0.008) |
| Living conditions index quartile 3 | 0.300 (0.008) | 0.283 (0.008) | 0.278 (0.012) | 0.294 (0.008) |
| Living conditions index quartile 4 | 0.095 (0.005) | 0.092 (0.005) | 0.087 (0.007) | 0.093 (0.005) |
| Household income per capita quintile 1 | 0.261 *** (0.008) | 0.197 (0.007) | 0.251 *** (0.011) | 0.219 (0.007) |
| Household income per capita quintile 2 | 0.307 *** (0.008) | 0.241 (0.008) | 0.278 *** (0.012) | 0.224 (0.007) |
| Household income per capita quintile 3 | 0.228 (0.008) | 0.231 (0.008) | 0.230 (0.011) | 0.217 (0.007) |
| Household income per capita quintile 4 | 0.135 *** (0.006) | 0.197 (0.007) | 0.147 *** (0.009) | 0.200 (0.007) |
| Household income per capita quintile 5 | 0.069 *** (0.005) | 0.133 (0.006) | 0.094 *** (0.007) | 0.141 (0.006) |
| Household lives in urban area | 0.426 *** (0.009) | 0.480 (0.009) | 0.444 ** (0.013) | 0.476 (0.009) |
| Number of other people employed in the household | 0.743 *** (0.018) | 0.877 (0.019) | 0.771 ** (0.024) | 0.831 (0.018) |
| Number of pensioners in the household | 0.369 (0.011) | 0.346 (0.011) | 0.407 *** (0.016) | 0.327 (0.010) |
| Number of young children in the household | 1.480 *** (0.024) | 1.082 (0.022) | 0.880 *** (0.029) | 0.745 (0.020) |
| Any biological children live in household | 0.641 *** (0.009) | 0.363 (0.009) | | |
| Receives child support grant | 0.484 *** (0.009) | 0.279 (0.008) | 0.003 *** (0.001) | 0.013 (0.002) |
| <i>Negative events</i> | | | | |
| Death of a core household member | 0.143 (0.006) | 0.132 (0.006) | 0.150 ** (0.009) | 0.124 (0.006) |
| Theft/fire/destruction of household property | 0.027 (0.003) | 0.028 (0.003) | 0.024 (0.004) | 0.028 (0.003) |
| Widespread death and/or disease of livestock | 0.010 (0.002) | 0.013 (0.002) | 0.016 (0.003) | 0.012 (0.002) |
| N | 2,947 | 2,971 | 1,517 | 3,122 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. Continuous variables represent means and categorical variables represent proportions. Standard errors are in parentheses. Significance tests were conducted within genders, with non-NEET as the reference group. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

For both genders, non-NEETs are more likely to be in education than employed. However, a larger portion of non-NEET females, at 60.8 per cent, are enrolled in an educational or vocational program than non-NEET males, at 55.9 per cent. In general, Table 1 shows there to be significant differences between NEETs and non-NEETs by gender, in terms of their human capital, access to resources, and household structure.

The ‘three successive wave’ requirement excludes a number of individuals so as to maintain a consistent sample throughout the analysis. Although this restriction on the sample is unavoidable for the later multivariate analysis, it is important to consider whether doing so results in a non-random selection of the sample. Following Feng *et al.* (2017), who use a similarly-defined cohort to analyse NEET status and mental health, a logit regression is used to assess this issue, akin to the typical test for attrition in panel data (Fitzgerald *et al.*, 1998). Here, the dependent variable equals one if respondents who are in the relevant age range are part of the analysis sample and zero otherwise. The key finding is that depression vulnerability and NEET status are insignificant: after controlling for the other observable covariates, depression and NEET status are not associated with whether respondents fall into or out of the sample. Therefore, there is unlikely to be a significant sample selection bias with respect to these two outcome variables in the regression results to follow, which also control for a full set of covariates.

| Table 2. Logit test for non-random sample selection | |
|--|----------------------|
| Dependent variable = 1 if in analysis sample, 0 otherwise | Pooled Logit |
| Depression score | -0.003 (0.004) |
| NEET dummy | -0.042 (0.035) |
| Constant | -6.861*** (0.483) |
| Other controls | Yes |
| N (groups) | 11 513 |
| N (sample) | 23 624 |
| Pseudo R² | 0.086 |
| Prob>χ^2 | 0.000 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed. Robust standard errors are in parentheses. ***Significant at 1%, **Significant at 5%, *Significant at 10%. A full set of control variables is included, as shown in Table 1. Reference categories: Non-NEET lagged, Male, African, Widowed/Divorced/Never married, No schooling/Primary education, Not computer literate, Not proficient in English, Poor health, Living conditions index quartile 1, Household income per capita quintile 1, Traditional/Farms, No child support grant, Wave1/Wave4.

3.2. Trends and transitions

This section explores how the prevalence of NEET status and characterisation of mental health varies throughout the survey period, and the dynamics of their relationship. Table 3 presents the NEET rate (upper panel) and associated mean depression scores (lower panel) across the four waves, separately for women and men. Females are considerably more likely

to occupy NEET status than males in every wave. The NEET rate among women (40.8 per cent) in wave 1 is almost double that of men (21.5 per cent). The increase in the rate of NEETs between waves 1 and 2 is larger for men than women, closing the gender gap slightly, but thereafter the NEET rate remained fairly static across the analysis sample. These results follow expectations as it is common within the NEET literature to find that females are more likely to be NEET than males (Benjet *et al.*, 2012; O’Dea *et al.*, 2014). The proliferation of youths who were disengaged from education and employment between wave 1 and wave 2 is perhaps unsurprising since, at a macro-economic level, the financial crisis was worst in South Africa over this period. Although not directly comparable, the NEET estimates in Table 3 are consistent with the findings of Essers (2017) that unemployment increased and remained high until wave 3 as a result of the recession in South Africa. The increase in NEET prevalence over time, and the failure of government policy to effectively combat the issue, is also reported by other sources (Kraak, 2013).

Table 3. NEET status and mean depression scores across waves and by gender

| | Females | | Males | |
|-------------------------|---------------------|------------------|---------------------|------------------|
| | NEET | Non-NEET | NEET | Non-NEET |
| NEET percentage | | | | |
| Wave 1 | 0.408*** (0.015) | 0.592 (0.015) | 0.215*** (0.015) | 0.785 (0.015) |
| Wave 2 | 0.495 (0.012) | 0.505 (0.012) | 0.354*** (0.013) | 0.646 (0.013) |
| Wave 3 | 0.537*** (0.012) | 0.463 (0.012) | 0.351*** (0.013) | 0.649 (0.013) |
| Wave 4 | 0.522* (0.013) | 0.478 (0.013) | 0.342*** (0.014) | 0.658 (0.014) |
| Depression score | | | | |
| Wave 1 | 8.469*** (0.216) | 6.932 (0.165) | 7.608** (0.323) | 6.873 (0.164) |
| Wave 2 | 6.749** (0.139) | 6.337 (0.134) | 6.809*** (0.177) | 6.140 (0.132) |
| Wave 3 | 7.043*** (0.138) | 6.217 (0.147) | 6.720*** (0.186) | 6.084 (0.136) |
| Wave 4 | 6.527 (0.142) | 6.324 (0.154) | 6.347 (0.120) | 6.280 (0.147) |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. Standard errors are in parentheses. Significance tests were conducted for females and males, by NEET status with non-NEET as the reference group. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

The lower panel of Table 3 displays the mean depression scores of women and men in the analysis sample by NEET status. With the exception of wave 2, NEET females exhibit a higher average depression score than NEET males across waves. Both NEET females and NEET males display higher mean depression scores in comparison to their non-NEET counterparts across all waves, significantly so for all periods other than wave 4. The overall trend indicates that the depression vulnerability gap between NEETs and non-NEETs diminishes as the survey progresses, with the largest differences recorded for wave 1 and there being no significant difference by wave 4.

As a first step in exploring the dynamics of NEET status, Table 4 presents transition matrices of NEET status for the full pooled sample (upper panel) and also separately for females (middle panel) and males (lower panel). Both categories of NEET status are quite persistent: 61.25 per cent of NEETs in the full sample in one wave continue in that status in the next wave, while the same is true of 63.07 per cent of non-NEETs. However, for females, NEETs are more than ten percentage points more likely to remain NEET (67.90 per cent) in subsequent waves as opposed to non-NEETs (57.25 per cent), whereas for males there is a 20 percentage point greater persistence in non-NEET status men (68.72 per cent) than in NEET status (48.12 per cent). Therefore, while non-NEET women are more susceptible to falling into NEET status than men, men are more likely than women to escape NEET status.

Table 4. Transition matrices of NEET status for full sample and by gender (pooled sample)

| | | Wave $t+1$ | | | |
|--------------------|----------|------------|----------|-----------------------|----------------------|
| | | NEET | Non-NEET | Total (percentage) | Total (frequency) |
| Full sample | | | | | |
| Wave t | NEET | 61.25% | 38.75% | 100 | 3,092 |
| | Non-NEET | 36.93% | 63.07% | 100 | 4,438 |
| Females | | | | | |
| Wave t | NEET | 67.90% | 32.10% | 100 | 2,053 |
| | Non-NEET | 42.75% | 57.25% | 100 | 2,180 |
| Males | | | | | |
| Wave t | NEET | 48.12% | 51.88% | 100 | 1,039 |
| | Non-NEET | 31.28% | 68.72% | 100 | 2,257 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves.

The depression score is a continuous integer variable, and thus transition matrices are not appropriate to illustrate changes over time. Instead, Table 5 explores the persistence over time by presenting the correlation coefficient between current and past depression vulnerability for the full sample as well as by gender. The depression score in the previous wave does not correlate very strongly with the current depression score, although the correlation is positive for all three groups. The small magnitudes of the correlations may partly reflect the short-term nature of the depression measure. The correlation coefficient for men (0.0752) in the sample is more than two times greater than for women (0.0338). Despite the small magnitudes, the correlation is also significantly different from zero for all three groups, albeit only at a 2.79 per cent significance level for women.

Table 5. Correlation coefficients of current and previous depression scores

| | Current depression score | | |
|---------------------------|--------------------------|---------|--------|
| | Full sample | Females | Males |
| Previous depression score | 0.0525 | 0.0338 | 0.0752 |
| <i>p-value</i> | 0.0000 | 0.0279 | 0.0000 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves.

Finally, Table 6 presents mean changes in mental health associated with a NEET status transition from one wave to the next. There are four possible NEET status transitions: non-NEET to non-NEET; NEET to non-NEET; non-NEET to NEET; and NEET to NEET, and the columns in Table 3.11 follow this ordering. The upper panel displays results for the full sample, while the middle and lower panels presents results for females and males, respectively. The mean changes in the depression score are negative for all possible NEET status transitions. This is consistent with respondents in the sample displayed a decreasing mean CESD-10 score as the survey progressed

Table 6. Changes in mental health by NEET transition types

| | Not → Not | NEET → Not | Not → NEET | NEET → NEET |
|----------------------|--------------------|----------------------|--------------------|---------------------|
| Full sample | | | | |
| Change in depression | -0.0611 (0.105) | -0.612*** (0.163) | -0.024 (0.135) | -0.257** (0.132) |
| N | 2,799 | 1,198 | 1,639 | 1,894 |
| Females | | | | |
| Change in depression | -0.102 (0.160) | -0.642*** (0.225) | -0.0279 (0.182) | -0.300** (0.156) |
| N | 1,248 | 659 | 933 | 1,394 |
| Males | | | | |
| Change in depression | -0.0284 (0.138) | -0.575*** (0.237) | -0.0184 (0.200) | -0.136 (0.245) |
| N | 1,551 | 539 | 706 | 500 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

The greatest and most significant decrease in the mean depression score is for respondents transitioning from NEET to non-NEET: a decrease of 0.612 points for the full sample, 0.642 for women and 0.575 for men. Analogously, the smallest decrease in mean depression scores are for the transitions from non-NEET to NEET: a decrease of 0.0238 for the full sample, 0.027 for women and 0.0184 for men, none of which are significantly different from zero. This indicates that mean depression scores do not change when individuals become NEET, while the depression score decreases significantly for those who become non-NEET.

The decrease in mean depression scores for those who maintain NEET status are substantially larger than the transition from non-NEET to NEET, which is insignificantly different from zero. This suggests that continuing in NEET status over the long-term may mitigate the initial mental

health shock of becoming NEET, in the sense that individuals may come to terms with their position. There is, however, an alternate explanation which seems to be supported when considering the differences between women and men. Long-term NEET status may be a (constrained) choice in the context of providing care for others in the household, rather than being due purely to a lack of educational or employment opportunities. Therefore, ongoing NEET status may be less detrimental to individuals' mental health as opposed to someone who is unable to retain their preferred non-NEET status. The decrease in the mean depression score for women for remaining NEET (0.300 and significant) is more than double than the decrease in the mean depression score for men for remaining NEET (0.136 and insignificant), which may provide some support for this conjecture since women are often thought to 'choose' to be NEET. Finally, individuals who retain their non-NEET status experience no significant change in their depression score.

4. Models and results

In a bivariate context, transitions out of NEET status are associated with a significant improvement in mental health. However, such findings cannot simultaneously account for other relevant dynamics, by holding other factors constant. Moreover, it is important to deal with the persistence (state dependence) of depressive symptoms and NEET status (Bruno *et al.*, 2014; Bynner and Parsons, 2002; Hauck and Rice, 2004; Ranzani and Rosati, 2013; Roy and Schurer, 2013; Zuroff *et al.*, 1999), which the descriptive analysis is not able to do simultaneously when describing the NEET-mental health relationship. This section therefore addresses these issues in a multivariate context, in an attempt to assess the causal effect and direction of the relationship between NEET status and depression.

This paper adopts an estimation strategy that closely follows the international literature in terms of the potential causal mechanisms between NEET status and mental health, but that improves on the previously used econometric techniques. In order to assess the extent of bidirectional causality, two models are used:

$$Depression_{it} = f(NEET_{it}, Depression_{it-1}, \mathbf{X}_{it}) \quad (1)$$

$$NEET_{it} = f(Depression_{it-1}, NEET_{it-1}, \mathbf{X}_{it}) \quad (2)$$

where $Depression_{it}$ is the depression score of respondent i at time t , $NEET_{it}$ is respondent i 's NEET status at time t , and \mathbf{X}_{it} is a vector of observable characteristics.

Given that, *a priori*, depression affects NEET status only with a lag, there are no concerns that there may be simultaneity in equation (1) that could bias the effect of NEET status on depression by causing endogeneity. However, two other econometric concerns exist. First, if unobserved individual heterogeneity is correlated with any of the right-hand-side variables, then their coefficients may be biased in a pooled regression. This would occur if genetic and psychological factors that pre-dispose an individual to depression are unmeasured. Provided that such factors are time-invariant, they can be accounted for through a fixed effects transformation. However, the second econometric issue is that introducing a lagged dependent variable into the models in order to control for state dependence violates the fixed effects model's strict exogeneity assumption, and may introduce a short-T bias (Nickell, 1981).

This paper addresses these concerns by using dynamic panel data models that enable the NEET-mental health relationship to be estimated in a theoretically and methodologically

consistent manner. Kripfganz (2016) provides a Quasi-Maximum Likelihood (QML) estimator for a linear dynamic panel data model which builds on the work of Hsiao *et al.* (2002). The QML estimator is used in this analysis when estimating the depression outcome models. The estimation is performed in Stata using the user-written command 'xtdpdqml' (Kripfganz, 2016). For the binary NEET status outcome, Bartolucci and Nigro's (2010) Conditional Maximum Likelihood (CML) approach to Cox's (1972) Quadratic Exponential model is used, which is able to account for both state dependence and unobserved heterogeneity for a binary variable. The estimation is performed in Stata using the user-written command 'cquad' (Bartolucci and Nigro, 2010; Bartolucci and Pignini, 2017).

Table 7 displays fixed effects results for the depression score estimated by QML, where for each sample, column I controls only for current NEET status and past depression, while column II controls for all covariates. On average, for the full sample, individuals who are NEET exhibit a 0.286 and 0.294 points higher depression score than non-NEETs in columns I and II, respectively. Controlling for observable characteristics that are known to influence depression does little to mitigate the effect of NEET status on the depression score, suggesting that NEET status has a robust independent effect on mental health. Rather, controlling for other covariates slightly increases the effect of NEET status on the depression score, which was also the case for the standard FE models in Section 4.3.2. Past depression scores have no effect on current depression scores: while the coefficients are positive, they are not significant.

Table 7. Quasi-maximum likelihood fixed effects estimation of depression by gender

| Dependent variable = depression score | Full sample | | Females | | Males | |
|--|--------------------|--------------------|-------------------|-------------------|--------------------|--------------------|
| | I | II | I | II | I | II |
| | | | | | | |
| NEET | 0.286** (0.130) | 0.294** (0.132) | 0.218 (0.173) | 0.221 (0.177) | 0.383* (0.197) | 0.329* (0.199) |
| Depression lagged | 0.030 (0.022) | 0.027 (0.022) | -0.008 (0.027) | -0.011 (0.028) | 0.091** (0.038) | 0.092** (0.039) |
| Additional controls | No | Yes | No | Yes | No | Yes |
| N (groups) | 3,027 | 3,027 | 1,684 | 1,684 | 1,342 | 1,342 |
| N (sample) | 7,530 | 7,530 | 4,233 | 4,233 | 3,295 | 3,295 |
| Log-likelihood | -22943 | -22830 | -12958 | -12861 | -9971 | -9899 |
| Prob>χ^2 | 0.006 | 0.053 | 0.032 | 0.089 | 0.015 | 0.081 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. Robust standard errors are in parentheses. The specifications and reference categories follow those in previous tables. The only exception is that the female regressions include an additional dummy variable for whether she has any biological children living in the household. Refer to Appendix Table A1 for full results. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

However, the results in Table 7 show a stark gender contrast. Both current NEET status and lagged depression scores are insignificant in both model specifications for females. For females, NEET status has no significant contemporaneous relationship with the depression score, while for males, being NEET is associated with a 0.329 greater depression score compared to being non-NEET, *ceteris paribus*. Men may derive more self-worth than women

from their ability to engage with the labour market, either through current employment or through their capacity to invest in education. This would be consistent with traditional gender roles, even in this young age group. Alternatively, men’s mental health may suffer more greatly than women’s from the social isolation that occurs through not working or attending education. There is no significant state dependence in depression scores among women. In contrast, males exhibit significant state dependence. Although this effect is small in magnitude, it is highly significant and robust to the inclusion of control variables. It largely matches the descriptive findings, in which depression scores were shown to be more than twice as persistent among men as among women.

Table 8 presents CML estimates of NEET status, controlling for the previous depression score while also accounting for state dependence. The coefficients are presented in the form of odds ratios. There appears to be no transmission mechanism from past depression vulnerability to current NEET status in the full sample: the estimated odds ratio for depression is insignificantly different from one. However, there is significant state dependence in NEET status. In specification II for the full sample, past NEET status is associated with an average 80.7 per cent increase in the odds of being NEET in the current period with reference to an individual who was non-NEET in the previous wave, *ceteris paribus*.

| Dependent variable = 1 if NEET, 0 otherwise | Full sample | | Females | | Males | |
|--|----------------------|---------------------|---------------------|---------------------|---------------------|--------------------|
| | I | II | I | II | I | II |
| | NEET lagged | 0.996 (0.00839) | 0.990 (0.00901) | 0.994 (0.0108) | 0.987 (0.0113) | 0.999 (0.0133) |
| Depression lagged | 2.097*** (0.0841) | 1.807*** (0.106) | 2.370*** (0.106) | 2.090*** (0.142) | 1.718*** (0.137) | 1.418** (0.165) |
| Additional controls | No | Yes | No | Yes | No | Yes |
| N (groups) | 1,514 | 1,514 | 852 | 852 | 661 | 661 |
| N (sample) | 3,943 | 3,943 | 2,229 | 2,229 | 1,712 | 1,712 |
| Log-likelihood | -1377.437 | -1215.072 | -767.42 | -659.00 | -607.48 | -539.13 |
| Prob>χ^2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. Robust standard errors are in parentheses. The specifications and reference categories follow those in earlier tables. The only exception is that the female regressions include an additional dummy variable for whether she has any biological children living in the household. Refer to Appendix Table A2 for full results. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

Unlike the dynamic panel estimation for the depression outcome, here the findings by gender are similar in significance, although they differ in magnitudes. The past depression score has no statistically significant relationship with current NEET status. This contrasts with the findings of many previous studies, and may be due to the contextual difference between this study and those previously discussed. There is significant state dependence in NEET status for both genders, although there is an interesting difference in the magnitude of the relationship. The percentage increase in the odds of continuing to be NEET, for those who were NEET in

the previous wave, is more than twice as high for females as for males, compared to their non-NEET counterparts.

5. Discussion

Table 9 summarises the findings across different models with respect to the key research questions of this paper. The upper panel displays the results concerning whether current NEET status causes respondents to exhibit a higher contemporaneous depression score and the lower panel considers whether a higher previous depression score causes respondents to be more likely to occupy NEET status in the current period. The table summarises the results presented in Tables 7 and 8, but also compares these to the findings of naïve estimates using pooled and static fixed effects estimation.³

| Table 9. Comparison across models: NEET and depression | | | |
|---|--|---|---|
| | Model controls for: | | |
| | State dependence only (pooled estimation) | Unobserved heterogeneity only (static fixed effects) | Both (dynamic fixed effects) |
| Current NEET → current depression | | | |
| Full sample | Positively | Positively | Positively |
| Females | Positively | Positively | No relationship |
| Males | No relationship | Positively | Positively |
| Lagged depression → current NEET | | | |
| Full sample | No relationship | No relationship | No relationship |
| Females | No relationship | No relationship | No relationship |
| Males | No relationship | No relationship | No relationship |

When estimating the effect of NEET status on contemporaneous depression vulnerability, both state dependence and unobserved heterogeneity matter. Failing to account for both issues simultaneously would result in an erroneous conclusion that being NEET significantly raises the depression score for women in comparison to non-NEET women. When using the correct QML estimator, NEET has no effect on women's vulnerability to depression. For men, failing to account for individual heterogeneity (in the pooled model) also leads to an incorrect conclusion. The FE and QML results, both of which account for unobserved heterogeneity, show that NEET men exhibit significantly higher depression scores relative to their non-NEET counterparts, after removing unmeasured time-invariant factors that influence both NEET status and mental health. These results justify the use of the QML estimator which is the most methodologically apt model to investigate the causal effect of NEET status on depression, as it addresses the econometric issues that would otherwise contaminate the results. Current NEET status causes men to exhibit a contemporaneously higher depression score in comparison to non-NEETs, but there is no causal difference in the depression score between NEET and non-NEET women.

³ These results can be obtained from the authors upon request.

There are several potential explanations for why NEET status might influence depression vulnerability differently for men and women. Men may derive more self-worth than women from their ability to engage with the labour market, either through current employment or through their capacity to invest in education (Bynner and Parsons, 2002; Witt *et al.*, 2018). Masculine identity might be attached to success in the labour market, and failure may result in stigmatisation (Paul and Moser, 2009). This would be consistent with the performance of traditional gender roles, even in this young age group. Since women often undertake the primary caregiver role in the household, either for the young or the elderly, their NEET status may be chosen, either freely or within the constraints imposed by household resources (Ranzani and Rosati, 2013; Rodwell *et al.*, 2018). Even if young women wish to engage further in education or the labour market, societal expectations may be more forgiving towards disengaged women than men, which may explain the different effect of NEET status on mental health between genders (McKee-Ryan *et al.*, 2005). Finally, men's mental health may suffer more greatly than women's from the social isolation that may occur through not working or attending education.

There is however another plausible reason as to why women do not experience the deleterious effects of NEET status on mental health, which relates to the overarching objective of this research - to investigate the relationship between NEET status and mental health among South African youths, in the context of a society where NEET status is highly prevalent and persistent. NEET status is pervasive in South Africa, and even more so among young women than men. If women compare themselves to their peers, they are likely to be in the same NEET situation. NEET status may thus be the norm for many women and therefore may not have a negative effect on their mental health, consistent with the idea that long term NEETs becoming accustomed to their situation.

The lower part of Table 9 considers the effect of past depression on current NEET status. In the literature, previous mental health disorders have been found to predict NEET status in a variety of studies (Goldman-Mellor *et al.*, 2016; Power *et al.*, 2015; Rodwell *et al.*, 2018; Witt *et al.*, 2018). However, here, there is no significant effect of past depression scores on the likelihood of being NEET in the current period in any of the models. This finding is not affected by controlling for state dependence, or both state dependence and unobserved heterogeneity. Therefore, this study concludes that there is no causal pathway from past depression scores to current NEET status for young women or men in South Africa.

This finding may reflect another key contextual difference between this study and previous ones, which may drive the non-significant effect of past mental illness on NEET status. This study shows how acute the NEET problem is in South Africa and that it is far more prevalent and persistent than in any other nation studied (Baggio *et al.*, 2015; Benjet *et al.*, 2012; Bruno *et al.*, 2014; Goldman-Mellor *et al.*, 2016; Ranzani and Rosati, 2013; Stats SA, 2018). This implies that the determinants of NEET status are likely to differ in South Africa than elsewhere. It is very likely that where NEET status is endemically prevalent and persistent, there are major structural issues contributing to NEET status that overpower individual factors such as mental health. Indeed, Holte *et al.* (2018) explicitly outlines how the discourse on NEET differs in South Africa relative to other higher income European nations. International researchers have attempted to problematise the NEET literature by exposing how NEETs are heterogeneous individuals and may require varying remedies. In contrast, South African researchers have been explicit in outlining that the NEET problem is structural,

relating to the poor labour market and education system (Holte *et al.*, 2018; Kraak, 2013). Therefore, there are major contextual differences between this research and others which may be an important reason for the differing results.

In addition to differing findings being explained by the context of the study, often regarding the geographical location as outlined in the previous paragraph, a further potential reason relates to the nature of the measure of mental health used in this study. The CESD-10 score is a measure of short-term depressive symptoms, with questions relating to the past seven days. This measure of mental health is therefore quite different from the measures used in many other studies (Baggio *et al.*, 2015; Goldman-Mellor *et al.*, 2016; Power *et al.*, 2015; Rodwell *et al.*, 2018; Witt *et al.*, 2018). These studies use a composite measure of mental health accounting for suicidal tendencies, substance use and often clinical measures of mental illness based on a diagnosis from a health care professional (Power *et al.*, 2015; Witt *et al.*, 2018), which constitute more serious mental health conditions relative to the self-administered CESD-10. Therefore, if depression vulnerability as measured in NIDS is a temporary state, it is unsurprising that it has no long-term effect on economic outcomes.

This interpretation of the CESD-10 score as a short-term measure of mental health is supported by the results regarding the state dependence of depression, which are summarised below in Table 4.10. The upper panel presents the findings for depression while the lower panel presents NEET status. The past depression score has no effect on current depression for women, and is only weakly associated with current depression for men. A one point increase in lagged depression raises the current score by just 0.09 points for men, *ceteris paribus*. State dependence is therefore not present for this measure of depression among women and weak among men, thus supporting the argument that the CESD-10 score is a short-term measure of mental health.

| Table 10. Comparison across models: State dependence | | |
|---|----------------------|-------------------------------------|
| | Pooled models | Dynamic fixed effects models |
| Depression outcome | | |
| Full sample | Weak | None |
| Females | None | None |
| Males | Weak | Weak |
| NEET outcome | | |
| Full sample | Strong | Moderate |
| Females | Strong | Strong |
| Males | Moderate | Moderate |

In contrast, NEET status has a large and robust degree of state dependence, which is substantially greater among women than men. Being NEET in the previous wave is associated with more than 40 per cent higher odds of being NEET in the current wave for men, and more than doubling of the odds for women, in comparison to someone who was non-NEET in the previous wave. This finding suggests that there is a NEET ‘trap’ for young African and Coloured individuals, which women find particularly difficult to escape, and speaks strongly to state of the South African education and employment sectors (Holte *et al.*, 2018; Kraak, 2013). This

finding is consistent with Ranzani and Rosati (2013), who find more vulnerable groups to exhibit greater state dependence.

6. Conclusion

This study shows that being NEET causes young males in South Africa to exhibit higher contemporaneous depression scores in comparison to non-NEET males, but there was no significant association for females. There are several potential explanations for why NEET status might influence depression vulnerability differently for men and women. These largely relate to men's identity and self-worth being strongly attached to their success in educational institutions and to a greater degree in employment (Bynner and Parsons, 2002; Paul and Moser, 2009; Witt *et al.*, 2018). In addition, there are two potential reasons for the non-significant effect of women's NEET status on mental health in South Africa. First, women often undertake the primary caregiver role in the household, either for children or the elderly, and thus their NEET status may be a choice, often made within the constraints imposed by household resources (Ranzani and Rosati, 2013; Rodwell *et al.*, 2018). Second, if young people assess their situation in life relative to their peers, and NEET status is endemically prevalent among women, the expected negative impact of NEET status on-mental health relationship may not materialise due to NEET status being normalised.

Regarding the reverse causal path, the past depression score was shown to have no significant effect on the likelihood of occupying NEET status for either women or men. This may reflect the short term, one-dimensional nature of the CESD-10 score as a proxy for mental health, whereas other studies that find past mental health to promote future NEET status use composite indices consisting of varying measures of mental health. Furthermore, a number of studies use clinical diagnoses of mental illness that may constitute a stronger measure of mental health than the self-administered CESD-10. The other potential reason as to why past the depression score does not cause future NEET status speaks to the context of this study. South Africa displays one of the worlds' largest and most persistent NEET prevalence rates, which reflect major structural socio-economic issues. These issues are thus likely to play a larger role in determining the risk of a young person occupying NEET status than individual measures such as the CESD-10.

Although being NEET does not cause depression vulnerability for women, NEET status is very persistent for women and they may thus enter a long term 'NEET trap'. The potential for this trap also exists, although to a lesser degree, for men. Since these young individuals are not enhancing their human capital (and instead, their human capital may depreciate while they are inactive), occupational scarring is likely to be a critical obstacle to leading a fulfilling life. As a result of their vulnerable position and lack of human capital, over the long term such individuals may be unable to assist their children and other household members in the arduous transition from school to work. This is a potential area for further study, as the inter-generational persistence of NEET status may be a key contribution to the inter-generational persistence of poverty literature.

The findings in this study stress the critical role for government in reducing the scale of NEET prevalence, or mitigating its impacts. Young NEETs find it increasingly arduous to exit NEET status, and aside from their lack of measured contribution to the South African economy, these youths (especially males) are also susceptible to depression. Youths who report high

levels of depressive symptoms are less likely to be productive members of society. The overall findings suggest that the negative effects of NEET status are not limited to economic outcomes, and it is therefore necessary to provide additional support to NEET males regarding coping mechanisms so that the associated deleterious effects on mental health are not felt long into the future. It may be important to provide psychological help to early school leavers, or provide access to activities that can keep these individuals socially engaged. Females, however, may require other forms of assistance. The presence of a young woman's biological child in the household, although having no effect on her depression score, is a large and robust contributor to being NEET. Therefore, in addition to child support grants, access to childcare service may be the key to reducing NEET persistence among young women, by facilitating their transition back into education or the labour market. This study has provided strong evidence that gender roles promote NEET status for women, but these findings may speak to women's *constrained* choices. Therefore, despite NEET status increasing vulnerability to depression only among males, the most vulnerable economic group in the long term may in fact be women, and reducing their NEET prevalence is as critical as for men.

7. References

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8. Appendices

| Dependent variable = depression score | Full sample | | Females | | Males | |
|--|--------------------|----------------------|-------------------|----------------------|--------------------|--------------------|
| | I | II | I | II | III | IV |
| NEET | 0.286** (0.130) | 0.294** (0.132) | 0.218 (0.173) | 0.221 (0.177) | 0.383* (0.197) | 0.329* (0.199) |
| Depression lagged | 0.030 (0.022) | 0.027 (0.022) | -0.008 (0.027) | -0.011 (0.028) | 0.091** (0.038) | 0.092** (0.039) |
| <i>Individual characteristics</i> | | | | | | |
| Age | | -0.017 (0.290) | | -0.224 (0.383) | | 0.181 (0.459) |
| Age squared | | -0.008 (0.005) | | -0.007 (0.007) | | -0.007 (0.009) |
| Married/Living with partner | | -0.315 (0.286) | | -0.371 (0.346) | | -0.459 (0.541) |
| Incomplete secondary education | | -0.710 (0.717) | | -0.269 (1.087) | | -0.985 (0.962) |
| Complete secondary education | | -0.691 (0.759) | | -0.042 (1.140) | | -1.112 (1.025) |
| Tertiary education | | -0.832 (0.782) | | -0.264 (1.160) | | -1.138 (1.074) |
| Fair health | | -2.541** (1.171) | | -3.944** (1.570) | | 0.178 (1.184) |
| Good health | | -2.884*** (1.082) | | -4.400*** (1.452) | | -0.109 (1.032) |
| Very good health | | -3.123*** (1.082) | | -4.349*** (1.452) | | -0.725 (1.024) |
| Excellent health | | -3.380*** (1.081) | | -4.760*** (1.447) | | -0.739 (1.029) |
| <i>Household characteristics</i> | | | | | | |
| Living conditions index quartile 2 | | 0.083 (0.170) | | 0.184 (0.220) | | -0.046 (0.263) |
| Living conditions index quartile 3 | | 0.151 (0.216) | | 0.559* (0.286) | | -0.347 (0.334) |
| Living conditions index quartile 4 | | 0.670* (0.343) | | 0.920** (0.445) | | 0.400 (0.540) |
| Household income per capita quintile 2 | | 0.331* (0.174) | | 0.365 (0.223) | | 0.312 (0.279) |
| Household income per capita quintile 3 | | 0.111 (0.193) | | 0.052 (0.261) | | 0.155 (0.292) |
| Household income per capita quintile 4 | | 0.285 (0.210) | | 0.495* (0.293) | | 0.060 (0.303) |
| Household income per capita quintile 5 | | 0.138 (0.254) | | 0.538 (0.355) | | -0.309 (0.367) |
| Household lives in urban area | | 0.639** (0.249) | | 0.678** (0.324) | | 0.688* (0.394) |
| Number of other people employed in household | | -0.193** (0.078) | | -0.229** (0.102) | | -0.174 (0.124) |
| Number of pensioners | | -0.098 | | 0.013 | | -0.251 |

Table A1. Quasi-maximum likelihood fixed effects estimation of depression by gender

| Dependent variable = depression score | Full sample | | Females | | Males | |
|--|---------------------|----------------------|---------------------|----------------------|---------------------|--------------------|
| | I | II | I | II | III | IV |
| in household | | (0.165) | | (0.217) | | (0.257) |
| Number of young children in household | | -0.011 (0.073) | | -0.117 (0.100) | | 0.117 (0.119) |
| Any biological children live in household | | | | 0.303 (0.276) | | |
| Receives child support grant | | -0.134 (0.207) | | -0.124 (0.228) | | -2.259* (1.336) |
| <i>Negative events</i> | | | | | | |
| Death of a core household member | | 0.099 (0.186) | | 0.058 (0.238) | | 0.231 (0.298) |
| Theft/fire/destruction of household property | | 0.481 (0.346) | | 1.020** (0.459) | | -0.097 (0.538) |
| Widespread death and/or disease of livestock | | 0.137 (0.443) | | 0.062 (0.596) | | 0.118 (0.692) |
| <i>Trend dummies</i> | | | | | | |
| Wave 2 | | -1.507** (0.685) | | -2.085** (0.845) | | -0.538 (1.167) |
| Wave 3 | | -0.794** (0.398) | | -1.033** (0.499) | | -0.329 (0.665) |
| Constant | 6.159*** (0.167) | 14.905*** (4.854) | 6.536*** (0.222) | 20.354*** (6.248) | 5.628*** (0.259) | 6.930 (7.744) |
| N (groups) | 3,027 | 3,027 | 1,684 | 1,684 | 1,342 | 1,342 |
| N (sample) | 7,530 | 7,530 | 4,233 | 4,233 | 3,295 | 3,295 |
| Log-likelihood | -22943 | -22830 | -12958 | -12861 | -9971 | -9899 |
| Prob>χ^2 | 0.006 | 0.053 | 0.032 | 0.089 | 0.015 | 0.081 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. Robust standard errors are in parentheses. Reference categories: Non-NEET, Widowed/Divorced/Never married, No schooling/Primary education, Poor health, Living conditions index quartile 1, Household income per capita quintile 1, Traditional/Farms, No biological children living in household, No child support grant, No death of a core household member in the past 24 months, No theft/fire/destruction of household property in the past 24 months, No widespread death and/or disease of livestock in the past 24 months, Wave 1/Wave 4. ***Significant at 1%, **Significant at 5%, *Significant at 10%.

Table A2. Conditional maximum likelihood estimation of NEET status, by gender

| Dependent variable = 1 if NEET, 0 otherwise | Full sample | | Females | | Males | |
|--|----------------------|-----------------------|---------------------|-----------------------|---------------------|-----------------------|
| | I | II | I | II | I | II |
| Depression lagged | 0.996 (0.00839) | 0.990 (0.00901) | 0.994 (0.0108) | 0.987 (0.0113) | 0.999 (0.0133) | 0.992 (0.0150) |
| NEET lagged | 2.097*** (0.0841) | 1.807*** (0.106) | 2.370*** (0.106) | 2.090*** (0.142) | 1.718*** (0.137) | 1.418** (0.165) |
| <i>Individual characteristics</i> | | | | | | |
| Age | | 3.264*** (0.198) | | 2.690*** (0.264) | | 3.885*** (0.311) |
| Age squared | | 0.974*** (0.00393) | | 0.977*** (0.00533) | | 0.972*** (0.00605) |
| Married/Living with partner | | 1.223 (0.221) | | 1.528 (0.275) | | 0.781 (0.363) |
| Incomplete secondary education | | 1.268 (0.375) | | 2.663* (0.527) | | 0.816 (0.512) |
| Completed secondary education | | 4.993*** (0.411) | | 11.09*** (0.581) | | 3.168** (0.569) |
| Tertiary education | | 3.526*** (0.432) | | 9.063*** (0.612) | | 1.751 (0.596) |
| Computer literate | | 0.677*** (0.104) | | 0.630*** (0.147) | | 0.763* (0.148) |
| Proficient in English | | 1.100 (0.0875) | | 1.117 (0.117) | | 1.074 (0.132) |
| Fair health | | 0.503 (0.594) | | 0.626 (0.704) | | 0.216 (1.340) |
| Good health | | 0.459 (0.542) | | 0.434 (0.605) | | 0.269 (1.285) |
| Very good health | | 0.490 (0.542) | | 0.475 (0.603) | | 0.289 (1.283) |
| Excellent health | | 0.543 (0.539) | | 0.513 (0.597) | | 0.338 (1.289) |
| <i>Household characteristics</i> | | | | | | |
| Living conditions index quartile 2 | | 1.112 (0.113) | | 1.156 (0.148) | | 0.999 (0.182) |
| Living conditions index quartile 3 | | 0.794* (0.136) | | 0.809 (0.180) | | 0.730 (0.216) |
| Living conditions index quartile 4 | | 1.178 (0.219) | | 1.018 (0.283) | | 1.194 (0.343) |
| Household income per capita quintile 2 | | 0.957 (0.108) | | 0.805 (0.146) | | 1.141 (0.167) |
| Household income per capita quintile 3 | | 0.686*** (0.116) | | 0.507*** (0.165) | | 0.977 (0.172) |
| Household income per capita quintile 4 | | 0.538*** (0.129) | | 0.406*** (0.182) | | 0.695* (0.186) |
| Household income per capita quintile 5 | | 0.567*** (0.157) | | 0.466*** (0.233) | | 0.671* (0.216) |
| Household lives in urban area | | 0.425*** (0.159) | | 0.412*** (0.220) | | 0.456*** (0.234) |

Table A2. Conditional maximum likelihood estimation of NEET status, by gender

| Dependent variable = 1 if NEET, 0 otherwise | Full sample | | Females | | Males | |
|--|-------------|----------------------|---------|--------------------|---------|---------------------|
| | I | II | I | II | I | II |
| Number of other people employed in the household | | 0.886** (0.0495) | | 0.947 (0.0672) | | 0.834** (0.0764) |
| Number of pensioners in the household | | 1.267** (0.102) | | 1.266* (0.142) | | 1.328* (0.149) |
| Number of young children in household | | 1.132*** (0.0451) | | 1.093 (0.0620) | | 1.091 (0.0740) |
| Any biological children live in household | | | | 1.562** (0.176) | | |
| Receives child support grant | | 1.054 (0.125) | | 0.886 (0.145) | | 0.657 (0.988) |
| <i>Trend dummies</i> | | | | | | |
| Wave 2 | | 0.815 (0.427) | | 0.604 (0.553) | | 1.257 (0.680) |
| Wave 3 | | 0.795 (0.255) | | 0.705 (0.333) | | 0.992 (0.404) |
| N (groups) | 1,514 | 1,514 | 852 | 852 | 661 | 661 |
| N (sample) | 3,943 | 3,943 | 2,229 | 2,229 | 1,712 | 1,712 |
| Log-likelihood | -1377.437 | -1215.072 | -767.42 | -659.00 | -607.48 | -539.13 |
| Prob>χ^2 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Source: Own calculations, NIDS 2008, 2010/2011, 2012, 2014/2015

Note: Estimates are based on respondents aged 16-24 when first interviewed and who were present in at least two following successive waves. Odds Ratios are presented. Robust standard errors are in parentheses. Reference categories: Non-NEET lagged, Widowed/Divorced/Never married, No schooling/Primary education, Not computer literate, Not proficient in English, Poor health, Living conditions index quartile 1, Household income per capita quintile 1, Traditional/Farms, No biological children in household, No child support grant, Wave1/Wave4. ***Significant at 1%, **Significant at 5%, *Significant at 10%.