Income Improves Subjective Well-Being: Evidence from an Old Age Pension Program

M. Alloush* S. Wu*

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Abstract

This paper estimates the causal impact of income on life satisfaction for a broad sample of individuals in a developing country. Using a large panel survey of South African residents, we find that receipt of the Old-Person's Grant increases several household-level measures of economic well-being and that the average 20% increase in household income per capita due to this pension increases life satisfaction by approximately 0.2 points—a large effect that extends to all members of the household. The discontinuity in the eligibility of the Old-Person's Grant provides reliable causal estimates of the effect of income on life satisfaction that are roughly twice as large as reduced-form OLS estimates.

Keywords: Income, Life Satisfaction, Happiness, Poverty, South Africa, Old Age Pension.

JEL Codes: D31, I31, I38

*Hamilton College, Department of Economics, 198 College Hill Road Clinton, NY 13323. Corresponding author email: malloush@hamilton.edu. Declarations of interest: None.

1 Introduction

A large and growing literature investigates the determinants of subjective well-being measures such as happiness and life satisfaction, and in particular, the role that income plays. Studies show, albeit with some significant debate, that income and wealth are positively related to measures of happiness and life satisfaction. This is consistent with most economic models that are based on the assumption that income increases utility, which strongly relates to survey based measures of subjective well-being (Benjamin et al., 2012). However, several sources of endogeneity make estimating the effect of income on measures of happiness and life satisfaction difficult, and thus, the evidence on the causal impact of changes in income or wealth on subjective well-being is sparse—especially among broadly representative samples in developing countries.

This paper addresses these issues by using the discontinuity in receipt of the Old Person's Grant (a large and unconditional cash transfer) to create a plausibly exogenous instrument for household income and evaluate the effect of increased income on individual life satisfaction using a large panel dataset from South Africa.[1] We contribute to the literature by answering two main questions: First, does household income play a significant role in determining an individual's subjective well-being, namely their reported measure of life satisfaction? And second, how does accounting for the endogeneity of household income change the magnitude of the estimated coefficient of income on well-being? The results show that an increase in monthly household income, due to the receipt of a monthly unconditional cash transfer from the federal old age pension program, leads to a large and significant increase in life satisfaction. Using the discontinuity of eligibility for the pension leads to estimates of the income-satisfaction relationship that are at least twice the size of reduced form estimates. Specifically, an increase of 20% in monthly household income per

[1] Duflo (2003) studies the effect of pension receipt in South Africa on intra-household allocation of resources using data from 1993. Our empirical strategy is similar, whereby we restrict our sample to households in members around the eligibility age of 60. However, with a significantly larger dataset, we are able to use smaller bandwidths around the cutoff, giving more credence to the causal estimates. In addition, eligibility criteria for the pension are no longer different for men and women as they were in 1993.

capita leads to a 0.2-point increase in life-satisfaction on a 10 point scale—an effect which is roughly the same as the differential between a married person and an unmarried one. Importantly, we find that this effect extends to all members of the household, not just the pension recipients.

This analysis adds to an inconclusive literature on the impact of income on subjective well-being. In a seminal paper, Easterlin (1974) compares income and happiness across countries and finds that individuals in richer countries, on average, did not appear to be happier than those living in poorer countries. This finding seemed to defy expectation and is dubbed the Easterlin paradox. However, in the same study and in several studies since, Easterlin shows that within countries, the poor exhibit consistently lower levels of happiness than the rich (Easterlin, 1974, 1995, 2001). Moreover, recent careful analyses that use data from many countries around the world show that subjective well-being and income are positively correlated both within and across countries (Graham, 2011; Di Tella and MacCulloch, 2008; Sacks, Stevenson and Wolfers, 2010; Wolfers, Sacks and Stevenson, 2012). Kahneman and Deaton (2010) find evidence that life evaluation in the United States increases with income up to very high levels, but emotional well-being plateaus after about $75,000 of yearly income. On the other hand, work by Stevenson and Wolfers (2013) suggests that there is no such satiation point for various measures of subjective well-being used in their analysis.

Fewer studies estimate the causal impact of income on subjective well-being. Exceptions include Frijters, Haisken-DeNew and Shields (2004), who use an increase in income due to German reunification to estimate the effect of income on life satisfaction, and Gardner and Oswald (2007) who find that individuals who win medium sized lottery prizes have significantly better levels of psychological well-being than those who win only small prizes or those who do not win at all. Powdthavee (2010) uses the existence of payslips as an instrument for household income and finds large effects on individual happiness, arguing that correlational methods likely understate the effect of income on subjective well-being. Moreover, Haushofer and Shapiro (2016) show that unconditional cash transfers

increase life satisfaction and psychological well-being among a sample of very poor rural individuals in Kenya. However, recent work has suggested that the long-term effects of lottery windfalls on mental health and happiness are significantly smaller than the effects on life satisfaction (Lindqvist, Östling and Cesarini, 2020).

The study most closely resembling ours is the recent work by Cuong (2020), who shows that the receipt of a social pension in Vietnam at the age of 80 increases in life satisfaction for a sample of elderly recipients. While our analysis similarly uses the discontinuity of pension receipt in a developing country, it is distinct in several ways. The South Africa Old-Person's Grant is a large unconditional cash transfer amounting to approximately 140% of the per capita poverty line and eligibility occurs at the much lower age of 60. We show that the pension improves several household-level measures of economic well-being. In addition to estimating the effect of increased income on the life satisfaction of the recipients, we show that this effect extends to all members of the household and is similar in magnitude. We also show that the effect on non-recipients is only evident when the grant recipient is female reiterating, albeit indirectly, conclusions of work that shows heterogeneity in the intra-household distribution of income changes based on the sex of the recipient (Duflo, 2003; Schady and Rosero, 2008; Phipps and Burton, 1998). This paper makes an important contribution to the literature by rigorously estimating the causal impact of income on life satisfaction for a broad sample of individuals in a developing country.

2 Data and Descriptive Statistics

2.1 Data

The data used in this analysis comes from the panel dataset of the National Income Dynamics Study (NIDS) of South Africa.[2] The first survey wave of this study was conducted in 2008 and households (and individuals) were interviewed again in 2010, 2012,

[2]This is a panel study conducted by the South Africa Labor and Development Research Unit at the University of Cape Town.

2014, and 2017. The 2008 sample of nearly 27,000 individuals was nationally representative.[3] Data were collected on many socio-economic variables that include demographic information, income, consumer expenditure, labor market participation, information on self-employment and farming activity, fertility, health, migration, education, and anthropometric measures.[4]

In the individual-level adult survey, individuals are asked to rate their overall satisfaction with their life on a scale of 1 to 10. The specific question in the survey asks: "Using a scale of 1 to 10 where 1 means "Very dissatisfied" and 10 means "Very satisfied", how do you feel about your life as a whole right now?" The data shows a very high response rate (approximately 90% per wave) and there is relatively little attrition between the different waves of the panel.

The NIDS dataset contains detailed information on household income and expenditure in addition to individual income. While we mainly choose to use household income per capita throughout the analysis, we also use food expenditure per capita and a wealth index as measures of economic well-being to test the robustness of some of the key results.[5]

2.2 Descriptive Statistics

South Africa is a middle-income country with the highest level of income and wealth inequality in the world (World Bank, 2018). The mean monthly household income per capita (standard deviation in parenthesis) in the study sample in 2017 is ZAR 3,301 (9,666).[6] This hides significant inequality as the median household income per capita is ZAR 1,450. Moreover, in 2017 nearly 50% of the sample is living in poverty and about 20% live in extreme poverty corresponding to recent analysis at the population level (Leibbrandt, Finn

[3] 15,630 completing the adult individual questionnaire in 6,598 households. Each wave's sample is refreshed in order to deal with attrition and keep each wave nationally representative.

[4] The data are publicly available: see http://www.nids.uct.ac.za/

[5] The wealth index is constructed through factor analysis of household-level dwelling characteristics and durable goods.

[6] This corresponds to 247 US Dollars or $514 PPP adjusted. The distribution of income is extremely skewed (a very large standard deviation). Income and expenditure numbers are adjusted for inflation and are in November 2017 prices.

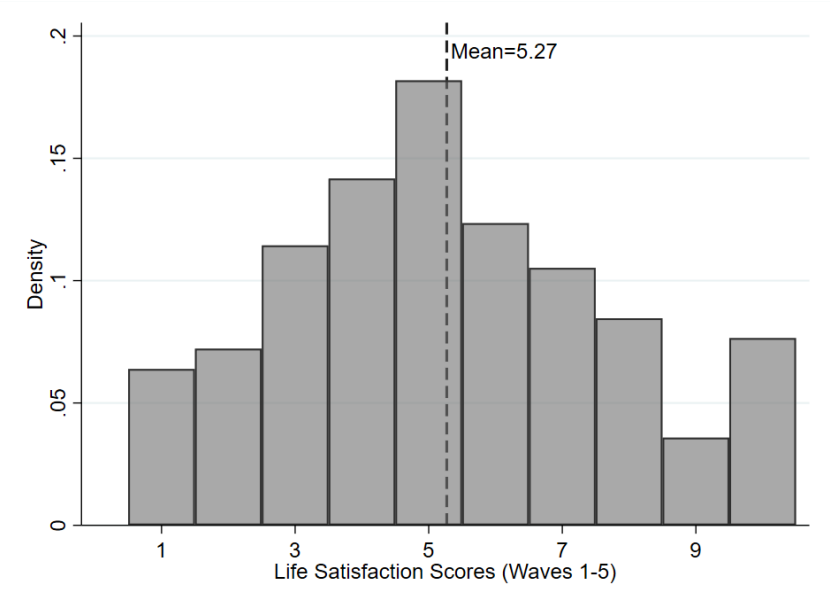


FIGURE 1: Histogram of life satisfaction scores across all five waves. Median and mode life satisfaction scores are 5. A disproportionate share of individuals report the highest level of satisfaction—a phenomenon that is consistent with life satisfaction scores in the United States and many different countries.

and Woolard, 2012). In the balanced panel sample of NIDS, 87% of individuals report income per capita levels that are considered poor in at least one of the five waves. However there is significant movement in and out of poverty as only 11% are poor in all five waves of the panel.[7]

In our data, the median reported level of life satisfaction on a scale of 1-10 is 5 whereas the mean is a bit higher at 5.27. The standard deviation is 2.45 and this measure of subjective well-being exhibits a relatively low correlation across waves of 0.12 and a within-person standard deviation of 2.06. A histogram of self-reported life satisfaction for the five waves of NIDS, as seen in Figure 1, is fairly bell-shaped, with the exception of a disproportionate share of individuals marking 10, the highest level of life satisfaction. This phenomenon is consistent with other data in the United States (such as the Behavioral

[7]We use a household income per capita of ZAR 1,138 (official 2017 upper-bound poverty line) to indicate poverty status and ZAR 531 (official food poverty line) to indicate extreme poverty (Lehohla, 2017).

Risk Factor Surveillance System) or in data across many different countries (such as the World Values Survey), where individuals are very likely to report the highest level of life satisfaction.[8]

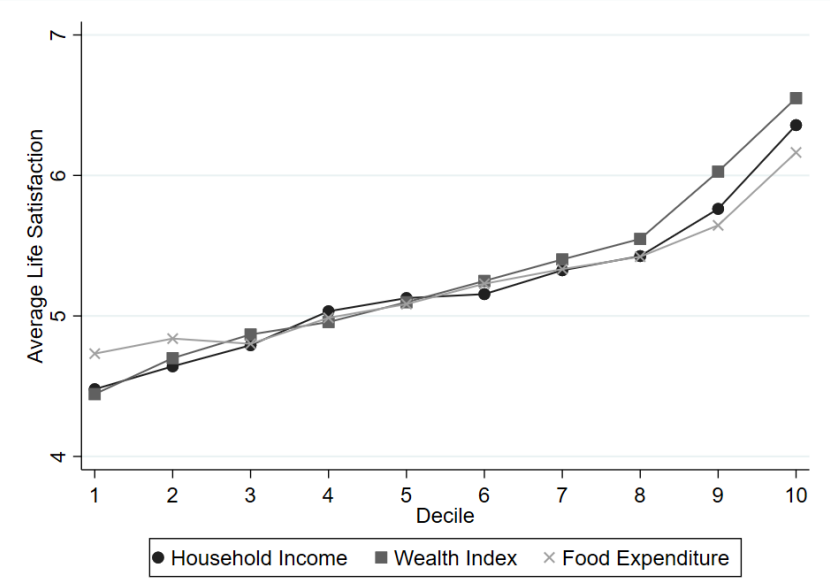
Consistent with other research discussed earlier, Figure 2(A) in our data that there are strong positive correlations between life satisfaction and several measures of economic well-being, notably household income, wealth, and food expenditures. The magnitude of these differences is not small: compared to those in the lowest decile, individuals living in households in the top 10% of income per capita report life satisfaction about two points higher on a 1-10 scale, which translates to roughly 0.8 standard deviations. This pattern is not merely masking difference due to the size of the household; average life satisfaction across household income deciles shows a similar positive pattern for different household sizes as shown in Figure 2(B).

While we have shown the expected correlations between economic and subjective well-being, we have yet to establish any clear directions of causality. The next section outlines our empirical strategy to estimate the causal effect of economic well-being on subjective well-being.

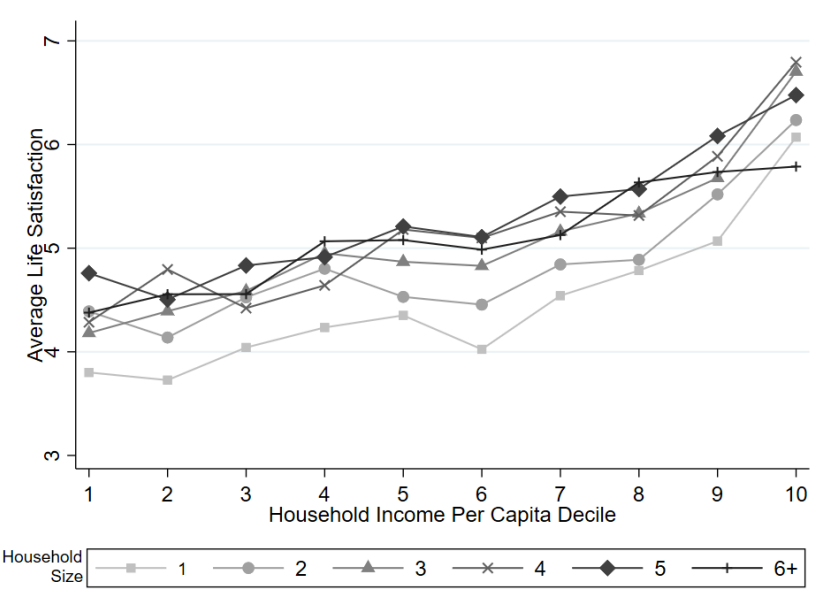
3 Estimation Approach

We use several approaches to look at the relationship between income and subjective well-being. First, we estimate the coefficient on the log of income using a a simple ordinary least squares regression, fixed effect regressions, and discuss potential sources of endogeneity. We then discuss how we exploit the discontinuity of the receipt of old age pension to causally estimate the effect of income on subjective well-being.

[8]Table A.1 in the Appendix shows mean life satisfaction scores across different demographic groups and waves. Males report lower levels of subjective well-being than do female respondents and Blacks also report significantly lower life satisfaction than individuals from other racial groups in South Africa. Being married, living in an urban area, and not being poor are positively related to well-being. There is no clear discernible pattern in the raw unadjusted relationship between age and life satisfaction. Overall life satisfaction increased by about 0.5 points between 2010 and 2017, but the trends vary by race and poverty levels.



(A) Average life satisfaction by different measures of economic well-being



(B) Differentiating household income per capita by household size

FIGURE 2: Average subjective well-being is increasing with measures that proxy economic well-being. For household income per capita, the bottom figure (B) shows that this pattern exists even when controlling for household size. Figure A.1 in the Appendix shows a similar, albeit more pronounced, pattern when determining income deciles within each household size.

3.1 OLS

First, with the entire sample, we estimate the following equation:

$$swb_{i,d,t} = \beta_0 + \beta_1 h_{i,d,t} + \Theta \boldsymbol{x}_{i,d,t} + \zeta_{t,d} + \delta_i + \epsilon_{i,d,t}$$

where $swb_{i,t}$ is the life satisfaction rating (1-10) for individual i living in district d in wave t, $h_{i,d,t}$ is the log of household income per capita (or another proxy for economic well-being), $\boldsymbol{x_{i,d,t}}$ is a vector of time varying individual and household characteristics including household size, number of children in the household, marital status, age (quartic), gender, race, and education. We also include neighborhood services. $\zeta_{t,d}$ is a district-wave fixed effect and δ_i is an individual fixed effect. Finally, $\epsilon_{i,d,t}$ is unobserved error.

Even after controlling for individual fixed effects, district fixed effects, and other time-varying neighborhood, household, and individual characteristics, the estimated coefficient cannot be interpreted in a causal manner as there are a number of other sources of endogeneity, namely omitted variables, measurement error, and reverse causality. There are likely omitted variables that are correlated with income and simultaneously affect subjective well-being. In addition, the potential error in the measurement of income and economic well-being which is common in observational data such as this one can lead to attenuation bias. Finally, it is difficult to untangle the reverse causality that exist between economic well-being and subjective measures of well-being. While a change in an individual's income may play a significant role in determining happiness or satisfaction with life, it may be that subjective well-being contributes in some way in determining an individual's earnings. In the next section, we discuss how we exploit a discontinuity in the receipt of old age pension to overcome these difficulties and estimate the causal effect of changes in household income on subjective well-being.

3.2 Discontinuity Due to Old-Age Pension

To address these difficulties and estimate the causal effect of income on subjective well-being, we use a plausibly exogenous instrumental variable for household income. South Africa has an old-age pension (known as the old-person's grant) that individuals become eligible for when they turn 60. It is an unconditional monthly cash transfer that is means tested based on individual and spousal income and the value of combined assets.[9] After means testing, 75% of individuals are eligible at age 60 and there is high take-up (above 90% of eligible members) of this cash grant.

In order to use eligibility for the pension of an individual in a household as an instrument for household income, we need to satisfy two assumptions: First, household income has to increase due to this eligibility. Second, having an eligible member in one's household should only affect life satisfaction through its impact on increased economic resources (proxied here by household income). For the overall sample, this assumption is not plausible: having a 60+ year old as a member of your household can change the household dynamics in a myriad of ways that could also affect life satisfaction. However, the assumption we make in this analysis is that having an *economically inactive* 59 year-old household member is similar to having a 61 year-old with the only difference being that the 61 year-old member is eligible for and likely receiving a pension.

Figure 3 shows, at the individual level, the discontinuity at age 60 of the amount of old-age pension received. As soon as individuals turn 60, they become eligible for the pension. The application process takes several months, which may explain the slightly lower average amount at age 60. In addition, due to the means test being attached to the spouse, it is also more likely at earlier eligible ages that the individual has an economically active spouse who earns enough to make the individual ineligible. However, the average amount stabilizes after a few years.

While it is clear that pension income at the individual level increases at age 60, it is also

[9] In 2017, annual income must be less than ZAR 73,800 for a single person or ZAR 147,600 for a couple, and household assets must be no more than ZAR 1,056,000 for a single person or ZAR 2,112,000 for a couple. In 2017, up to ZAR 1,600 a month is paid if aged 60 to 74

FIGURE 3: Individual-level average amount of old age pension received by age. There is a clear discontinuity of pension receipt around the age of eligibility of 60.

important for our identification strategy to show that this also increases overall household income. However, we cannot just compare the incomes of households with members above 60 to those without; households with individuals around the age of 60 differ in important ways from households without such individuals—especially when it comes to economic activity and earnings. Thus in order to investigate whether eligibility for the pension increases household income in a meaningful way, we restrict our sample to individuals in households with members who are economically inactive (not in the labor force) and are around the age of 60.

This sample restriction makes it more likely that we can satisfy our second assumption– that having a household member who is age 60 (or slightly above) only affects individuals through the increased household income. We will show results for various samples that are restricted to five different age ranges (two times the "bandwidth"), all centered around the age of 60. At its widest, we will use a "bandwidth" of six where we restrict the sample

TABLE 1: Balance Table: Age Range 57-62

	Pension-Receiving Household		Non-Receiving Household		p-value
	Mean	SE	Mean	SE	of Δ
Household Level					
Household Size	4.83	0.09	4.87	0.09	0.77
Average Age	38.81	0.37	36.09	0.39	0.00
Number of Children	1.44	0.05	1.43	0.05	0.82
Number of Elderly (66+)	0.24	0.01	0.20	0.01	0.01
Urban	0.44	0.01	0.43	0.01	0.44
Death in the past 2 years	0.10	0.01	0.10	0.01	0.60
Neighborhood					
Rubbish Pickup	0.40	0.01	0.38	0.01	0.43
Frequency of Murder (1-5)	2.92	0.04	2.86	0.04	0.29
Variables expected to change					
Average pension income	543.62	16.51	144.01	11.76	0.00
Savings	0.34	0.01	0.31	0.01	0.08
Share poor	0.30	0.01	0.37	0.01	0.00
Individual Level (Excluding members around threshold)					
Age	30.08	0.23	29.84	0.26	0.48
Race (Black)	0.87	0.01	0.87	0.01	0.71
Male	0.45	0.01	0.45	0.01	0.88
Married	0.11	0.00	0.12	0.01	0.34
In the Labor force	0.45	0.01	0.45	0.01	0.95

Notes: This table shows balance for a bandwidth of 3—the mean-square error optimal bandwidth. Other data-driven approaches suggest bandwidths between 2 and 4. Balance is similar for all five bandwidths considered below.

to individuals in households with a member between the age of 54 and 65 (inclusive).[10] The smallest bandwidth is two, where we only keep individuals who are in households with a member who between the age of 58 and 61. We show results for a range of different bandwidths (2-6); however, the mean-square error optimal bandwidth is 3.[11]

Table 1 shows a balance table for this restricted sample with the assumption that these households and individuals in them are fairly similar except for eligibility of a member

[10]This gives us "bandwidth" of 6 around the eligibility cutoff: ages 54, 55, 56, 57, 58, and 59 are in but not eligible for a pension, while 60, 61, 62, 63, 64, and 65 are. Similarly for smaller "bandwidths." where we successively remove 1 year from each end.

[11]Several different data-driven approaches to bandwidth selection suggest an optimal bandwidth between 2 and 4.

(or members) for receiving a pension.[12] The table shows strong balance across these two groups: we cannot statistically differentiate the two groups with respect to household size, number of children in the household, if the household is in an urban area, if they have experienced a death in the last year. We also cannot differentiate with respect to neighborhood characteristics. At the individual level, other members of the household (not including the recipient) have characteristics that are similar across the two groups in terms of the age, race, sex, marital status, and labor force participation. The only variables that are statistically different across pension receiving and non-pension receiving households (after our sample restriction) are things you would expect: average age within the household (includes the pension recipient), number of other elderly in the household, pension income, savings (likely moved by pension receipt), and poverty status (also likely moved by pension receipt).

After restricting the sample to households with economically inactive members around the age of 60 using several different bandwidths, first, we show in Table 2 if, at the household-level, having a member eligible for old-age pension predicts higher levels of several measures of economic well-being.[13]

Several measures of economic well-being show statistically significant increases at the household level when a member around age 60 is eligible for the Old-Person's Grant. In our analysis, we use the log of household income per capita as the main measure of income and the economic well-being of the household. The estimates indicate that households with a member eligible for old-age pension have over 20% higher income per capita compared to households with members just below the eligibility threshold. The table also shows that food expenditure increases by about 8% and wealth increases by about 0.12 standard deviations suggesting that the increase in income at the household level is resulting in measurable changes in expenditure and durable goods for the household.[14] Despite

[12]The table shows the means for the sample restricted to 57-62—the third largest age range: a bandwidth of 3 which is the mean-square error optimal bandwidth. Balance is similar for all five ranges considered.

[13]This can be viewed as a first-stage regression for using pension eligibility as an instrument for household income. However the sample size is smaller because it is at the household-level.

[14]Table A.2 in the Appendix displays results similar to Table 2 excluding households with members over the

TABLE 2: Improvement in Household-Level Economic Well-being Due to Pension

	Member Age Range centered at 60				
	54-65	**55-64**	**56-63**	**57-62**	**58-61**
			Household Income Per Capita		
Member Over 60	2.403***	2.225***	1.936***	1.824***	0.874
	(0.317)	(0.342)	(0.374)	(0.427)	(0.518)
			Log Household Income Per Capita		
Member Over 60	0.235***	0.224***	0.215***	0.206***	0.138***
	(0.0186)	(0.0202)	(0.0224)	(0.0257)	(0.0314)
			Log Food Expenditure		
Member Over 60	0.0931***	0.0824***	0.0839***	0.0769***	0.0485*
	(0.0143)	(0.0155)	(0.0173)	(0.0197)	(0.0237)
			Wealth index		
Member Over 60	0.139***	0.131***	0.126***	0.102**	0.117*
	(0.0295)	(0.0317)	(0.0348)	(0.0393)	(0.0479)
N	3,079	2,654	2,215	1,707	1,178

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. These results are estimated using OLS and restricted samples based on having a member around the age of 60. We control for household size and wave and district fixed effects.

the expectation of the pension, both consumption and durable goods increase on average among households after the pensioner becomes eligible. This is consistent with credit constraints among the poor in South Africa as shown by Berg (2013).

After restricting our sample to individuals in households with members around the age eligibility threshold of 60, we use the number of relatives who are at least 60 years or older (but within the respective bandwidth) as an instrument for household income and estimate the following equation:

$$swb_{i,d,t} = \alpha_0 + \alpha_1 h_{i,d,t} + w_t + \gamma_d + \Gamma \boldsymbol{x}_{i,d,t} + u_{i,d,t}$$

top end of the restricted age range—so for the age range of 12, we exclude households with members above the age of 65. The results are similar to those in Table 2.

where $swb_{i,d,t}$ is the life satisfaction score (scale of 1-10), $h_{i,d,t}$ is household income per capita, w_t is a wave fixed effect, γ_d is a district fixed effect,[15] $\boldsymbol{x_{i,d,t}}$ is a vector of time varying individual and household characteristics including household size, number of children in the household, marital status, age (quartic), gender, race, and education. We also control for district fixed effects and other neighborhood characteristics. In our results section, we also show the OLS estimates for these restricted samples.

4 Results

4.1 Overall OLS

Table 3 shows results of ordinary least squares regressions with individual reported life satisfaction on a 10 point scale as the dependent variable. These results are for the entire pooled sample. Consistent with prior research, we find that well-being has an approximate U-shape with respect to age (Blanchflower and Oswald, 2008; Wunder et al., 2013) and that life satisfaction is positively related to being female (Blanchflower and Oswald, 2004; Graham and Chattopadhyay, 2013), married (Diener et al., 2000; Mookherjee, 1997), and more highly educated (Ross and Van Willigen, 1997; Michalos, 2008). Column 1 shows the estimated coefficient on the log of household income per capita without any controls except for wave fixed effects since we are using panel data. This coefficient suggests a strong correlation between household income per capita and subjective well-being consistent with the pattern observed in Figure 2. A 20% increase in income is associated with a 0.112 overall increase in life satisfaction.

Results in column 2 add a number of individual and household characteristics that potentially influence subjective well-being and are associated with household income. The estimated coefficient on income decreases yet remains statistically significant. Adding neighborhood-level controls and district-wave fixed effects, as we do in column 3, does not change the estimated OLS coefficient in a statisticallys significant way.

[15] Unlike in equation (1), due to restriction in sample sizes, we cannot control for district-wave fixed effects as we do in the OLS regressions.

TABLE 3: OLS and Individual Fixed Effects Results

Dep Var: Life Satisfaction (1-10)	(1)	(2)	(3)	(4)
Log(HH Income Per Capita)	0.564***	0.450***	0.421***	0.254***
	(0.0183)	(0.0188)	(0.0182)	(0.0307)
African		-1.099***	-0.800***	
		(0.0701)	(0.0736)	
Male		-0.0845***	-0.0999***	
		(0.0151)	(0.0142)	
Household Size		0.0230**	0.0235***	0.00814
		(0.00931)	(0.00806)	(0.0111)
Number of Children		0.0365***	0.0317**	0.0359*
		(0.0139)	(0.0127)	(0.0194)
Married		0.266***	0.285***	0.0463
		(0.0279)	(0.0252)	(0.0466)
Age		-0.113***	-0.120***	-0.0609*
		(0.00777)	(0.00731)	(0.0328)
Age^2		0.0022***	0.0024***	0.0018***
		(0.00018)	(0.00017)	(0.00047)
Number of Elderly (66+)		-0.0168	-0.0210	-0.0514
		(0.0241)	(0.0218)	(0.0331)
Education: Primary		0.106**	0.0949**	0.152
		(0.0467)	(0.0388)	(0.113)
Education: Middle		0.169***	0.155***	0.163
		(0.0457)	(0.0355)	(0.116)
Education: Secondary		0.272***	0.286***	0.153
		(0.0519)	(0.0391)	(0.113)
Education: Diploma		0.381***	0.387***	0.157
		(0.0587)	(0.0458)	(0.116)
Education: Tertiary		0.444***	0.520***	0.237
		(0.0769)	(0.0693)	(0.179)
Perceived Ill Health		-0.182***	-0.181***	-0.141***
		(0.0142)	(0.0136)	(0.0162)
Urban			-0.168***	-0.154*
			(0.0548)	(0.0833)
Electricity			0.184***	0.213***
			(0.0483)	(0.0630)
Neighborhood: Rubbish Pickup			0.204***	0.213***
			(0.0471)	(0.0634)
Wave Fixed Effect	✓	✓		
District-Wave Fixed Effect			✓	✓
Individual Fixed Effect				✓
N	95,766	95,642	94,770	94,770
R^2	0.071	0.117	0.187	0.105

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Finally, in column 4, we run a fixed effect regression and find that the estimated coefficient on the log of household income per capita is reduced significantly to 0.255. This is consistent with other work that suggests that not taking into account certain personality traits can bias the income to subjective well-being estimates (Powdthavee, 2010; Ferrer-i Carbonell and Frijters, 2004). More importantly, this decrease in the estimated coefficient is consistent with increased attenuation bias due to fixed effects estimates where the signal-to-noise ratio decreases when income is differenced out (Freeman, 1984; Bound and Krueger, 1991; Bound et al., 1994).[16] While we control for potentially important individual fixed effects, we are likely worsening the bias due to measurement error.

4.2 RD and Instrument

Does the old-age pension affect the subjective well-being of the recipient? Figure 4 uses a regression discontinuity design and shows clearly that average life satisfaction jumps by about 0.25 points (0.11 SD) at age 60 when the individual becomes eligible for a pension. There seems to be a decline in later years; this may be due to the glow of initial increase in income fading away or due to other issues that vary with age—for example chronic illnesses of self and others in the household or lower per capita household income overall due to the aging of other members of the household. However, at least at the individual recipient-level, an increase in income due to an unconditional cash transfer does increase life satisfaction.

In Table 2 we showed that several measures of economic well-being at the household level improve due to the pension. Next we will show that this leads to average increases in life satisfaction for all members of the household. We exploit the discontinuity shown in Figure 4 and restrict the sample to households with at least one family member close to the age of 60 (as we did for the estimates in Table 2). Table 4 shows these results for different age ranges, with each successive row showing results for more narrow age ranges. The

[16] If household income per capita is fairly persistent, then a FE regression differences out a lot of the signal and we left with mostly noise.

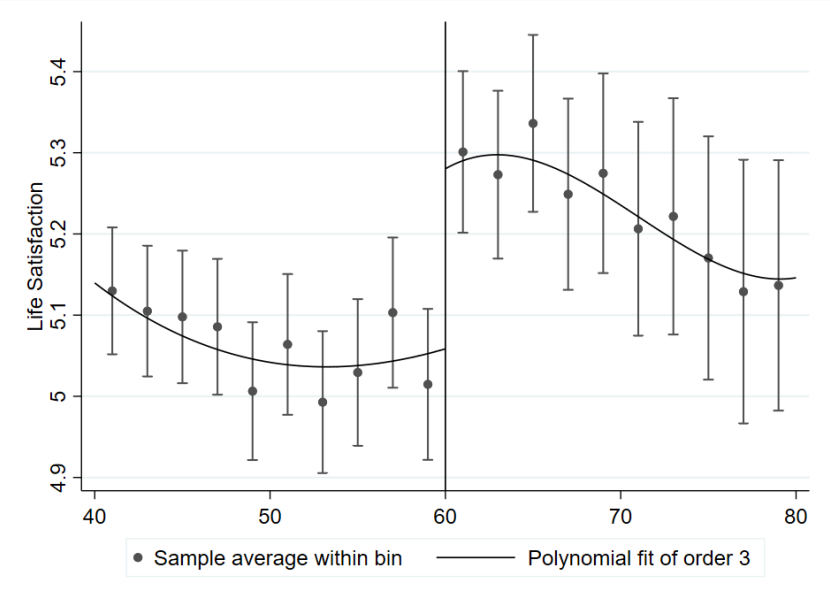


FIGURE 4: Individual-level life satisfaction around the old-age pension eligibility age of 60. Average life satisfaction shows about a 0.25-point increase at age 60.

first row shows results for individuals in households with members between ages 54 and 65 and the fifth row shows results those with a household member between ages 58 and 61. We show the estimate without any controls, with a handful of controls (same as those in column 3 of Table 3), and finally with individual fixed effects in columns 1, 2, and 3, respectively. The estimated coefficients for these restricted samples using OLS and fixed effects regressions are very similar to those for the full sample shown earlier in Table 3.

In columns 4 and 5, we show results for instrumental variable regressions with and without controls, respectively.[17] The estimated coefficients suggest that a 20% increase in household income per capita increase average life satisfaction by approximately 0.2 points.[18] The estimated impact of income of subjective well-being is robust to different log-normal transformations of the life satisfaction variable (Bond and Lang, 2019).[19] The

[17] As expected given the results in Table 2, these IV regressions have strong first stage results (shown in Appendix Table A.3).

[18] Fixed effects instrumental variable results exhibit a similar pattern with larger point estimates. These results are shown in Table A.4 in the Appendix.

[19] As Bond and Lang (2019) point out, if the variance among the two groups are not equal, findings could be reversed with different transformations (concave vs convex) of the numbers associated with different levels of life satisfaction. The variances among the two groups in our restricted samples are not statistically different, however, we estimated the regressions in Table 4 with different transformations and the pattern of results

TABLE 4: Restricted Samples OLS and IV Results

		OLS			IV	
		(1)	(2)	(3)	(4)	(5)
Age Range 54-65 N=18,641	*Log(HH Income Per Cap)*	0.749*** (0.052)	0.476*** (0.056)	0.314*** (0.098)	1.157*** (0.202)	0.867** (0.387)
Age Range 55-64 N=16,109	*Log(HH Income Per Cap)*	0.750*** (0.054)	0.490*** (0.059)	0.311*** (0.102)	1.020*** (0.214)	0.817** (0.403)
Age Range 56-63 N=13,396	*Log(HH Income Per Cap)*	0.778*** (0.060)	0.502*** (0.066)	0.348*** (0.116)	1.045*** (0.255)	0.901** (0.432)
Age Range 57-62 N=10,512	*Log(HH Income Per Cap)*	0.844*** (0.064)	0.532*** (0.074)	0.463*** (0.144)	1.275*** (0.309)	1.040* (0.547)
Age Range 58-61 N=7,178	*Log(HH Income Per Cap)*	0.888*** (0.077)	0.529*** (0.085)	0.369* (0.204)	2.017*** (0.463)	1.728* (1.012)
	Controls		✓	✓		✓
	Individual Fixed Effects			✓		

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls include all the variables listed in column (3) of Table 3 except wave-district fixed-effects. In these IV regressions, we instead control for wave and district fixed effects independently.

average increase in life satisfaction among the pension receivers was about 0.23 points, slightly higher than what would be predicted by the average increase in household income that is estimated to be around 20% in this sample. This suggests that the recipient at first may experience a bigger increase in subjective well-being than the average member of the household. While this makes sense intuitively—the recipient potentially has more ownership of this extra income—it begs the question: is the estimated average effect driven mainly by the recipients?

Our sample contains the individuals who are themselves around the pension threshold—the recipient and the potential recipient of the transfer—as well as other members of the household. To what degree is this estimated average effect driven by the individuals actually receiving the transfers? Does the subjective well-being of other adult household

remains the same with both convex and concave log-normal transformations. The results are similarly robust to the *dichotomous-around-the-mean* robustness test suggested by Bloem and Oswald (2020).

TABLE 5: Restricted Samples OLS and IV Results: Non-recipient

		OLS			IV	
		(1)	(2)	(3)	(4)	(5)
Age Range 54-65 N=7,113	*Log(HH Income Per Cap)*	0.727*** (0.070)	0.489*** (0.077)	0.417*** (0.110)	0.679** (0.315)	0.846** (0.330)
Age Range 55-64 N=6,139	*Log(HH Income Per Cap)*	0.737*** (0.076)	0.506*** (0.083)	0.413*** (0.119)	0.777** (0.355)	1.083*** (0.377)
Age Range 56-63 N=5,112	*Log(HH Income Per Cap)*	0.755*** (0.084)	0.495*** (0.091)	0.524*** (0.143)	0.737* (0.395)	0.861** (0.403)
Age Range 57-62 N=3,968	*Log(HH Income Per Cap)*	0.854*** (0.089)	0.530*** (0.099)	0.535*** (0.166)	1.246** (0.521)	0.901** (0.450)
Age Range 58-61 N=2,684	*Log(HH Income Per Cap)*	0.906*** (0.116)	0.503*** (0.120)	0.555** (0.271)	2.011** (0.858)	0.736 (0.584)
	Controls		✓	✓		✓
	Individual Fixed Effects			✓		

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Controls include all the variables listed in column (3) of Table 3 except wave-district fixed-effects. In these IV regressions, we instead control for wave and district fixed effects independently. These results are for members of the household that are not near the pension eligibility threshold.

members also increase due to the influx of added income to the economically inactive pension recipient? We further restrict our sample to focus on individuals who are not pension recipients, but still live with an adult household member in pension age ranges. The results in Table 5 show these estimates. The estimated coefficients are quite similar in magnitude to those in Table 4 suggesting that the added household income is also affecting the well-being of other household members on average and the size of the effects are comparable.

In Appendix Table A.5 we show that the effects on other members of the household depends on the sex of the recipient. Several studies have shown—including in South Africa—that the identity of the recipient of the added income affects the intra-household distribution of this income and on what it is used for Duflo (2003); Schady and Rosero (2008); Phipps and Burton (1998). The results in Table A.5 suggest that non-recipient household

members are more likely to benefit when the recipient of the pension is female, a finding that supports prior research.

The instrumental variable results suggest that the causal impact of a change in income on life satisfaction is nearly double that estimated using OLS. This suggests the correlational measures of the effect of income on subjective well-being may be underestimating the effect of income. This is similar to the conclusion of Powdthavee (2010), who explains that this finding may be indicative of the importance of accounting for measurement error in the income variable as well as the exclusion of some variables such as work hours and comparison income, which are known to be positively related to income but negatively related to life satisfaction.[20]

5 Conclusion

This paper explores the causal impact of income on subjective well-being using recent panel data from South Africa. When we restrict the sample to individuals who are part of households with a member near the eligibility age of 60 and use eligibility for the South Africa old age pension as an instrument for household income per capita, we find that increases in income lead to a large and significant improvement in subjective well-being. Specifically, we find that a 20 percent increase in household income increases life satisfaction by 0.2 points on a 10-point scale, which is roughly on the same scale as the differential between the life satisfaction of a married person and unmarried one. This effect is large and statistically significant, and is about twice the size of reduced form OLS estimates reinforcing the conclusion of recent studies that correlational estimates may be underestimating the effect of income on subjective well-being (Powdthavee, 2010).

One potential concern with our identification strategy is that the receipt of old age pensions could be associated with an increase in subjective well-being over and above

[20] In Appendix Table A.4, we show results for an instrumental variables regressions with fixed effects, more similar to the specifications used in Powdthavee (2010), and find even larger effects of household income per capita on well-being.

the effects from the added household income. Perhaps individuals receiving pensions might feel cared for by the state, which would contribute to their satisfaction with life. However, we also find that other members of the household have a comparable increase in life satisfaction resulting from the increase in household income, so our results should not be impacted by this unless this feeling of being cared for by the state extends equally or is transferred to all members of the household.

The paper contributes to the literature on the economics of subjective well-being by providing a plausible estimate of the causal effect of household income on the life satisfaction of individuals in a broadly representative sample in a developing country. We clearly show that a large unconditional cash transfer program in a country with high levels of poverty such as the South Africa old age pension program increases household income per capita by nearly 20% and significantly affects the well-being of both recipients and their family members. As more research is done in this area, we will continue to increase our understanding of the complex relationship between economic well-being and subjective well-being.

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Appendix

Tables

TABLE A.1: Life Satisfaction

	Mean 2010	Mean 2017
Overall	4.96	5.46
Sex		
Female	5.34	5.64
Male	4.11	5.04
Race		
Black	4.48	5.31
Other	6.88	6.17
Marital Status		
Married	5.58	5.78
Not Married	4.71	5.38
Poverty Status		
Poor	4.11	5.04
Not Poor	5.34	5.64
Location		
Urban	5.34	5.60
Traditional or Rural	4.41	5.25
Age		
20 and below	4.81	5.54
21-30	4.83	5.38
31-40	5.03	5.40
41-50	4.85	5.52
51-60	5.30	5.47
61-70	5.40	5.57
71-80	5.05	5.81
81 and above	4.74	4.94

TABLE A.2: Effect on Household-level Economic Well-being excluding households with members over the age of 65

	Member Age Range centered at 60				
	12	10	8	6	4
	Household Income Per Capita				
Member Over 60	1.834***	1.652***	1.425***	1.261**	0.663
	(0.364)	(0.392)	(0.427)	(0.484)	(0.595)
	Log Household Income Per Capita				
Member Over 60	0.205***	0.194***	0.191***	0.175***	0.121**
	(0.0218)	(0.0236)	(0.0261)	(0.0298)	(0.0366)
	Log Food Expenditure				
Member Over 60	0.0822***	0.0700***	0.0701***	0.0635**	0.0421
	(0.0164)	(0.0178)	(0.0197)	(0.0226)	(0.0272)
	Wealth index				
Member Over 60	0.112***	0.0963**	0.0965*	0.0657	0.0809
	(0.0333)	(0.0358)	(0.0392)	(0.0442)	(0.0540)
N	3,079	2,654	2,215	1,707	1,178

Notes: The results in the Table and similar to those in Table 2. However, here we excluding households with any member over 65 to show the effect of pension receipt on household-level measures of economic well-being without the confounding of other older members also receiving pensions. Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

TABLE A.3: First Stage regression results

		IV First Stage	First-Stage F-Stat (5)
Age Range 54-65 N=17,348	*Number of HH members 60-65*	0.140*** (0.014)	**93.37**
Age Range 55-64 N=15,016	*Number of HH members 60-64*	0.137*** (0.015)	**79.08**
Age Range 56-63 N=12,480	*Number of HH members 60-63*	0.143*** (0.017)	**69.6**
Age Range 57-62 N=9,747	*Number of HH members 60-62*	0.139*** (0.021)	**46.12**
Age Range 58-61 N=6,649	*Number of HH members 60-61*	0.116*** (0.026)	**19.35**

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. First stage of the IV regressions shows very strong predictive value of the instrumental variable for the log of household income. These first stage results correspond to the IV regression results in Table 4 column (5).

TABLE A.4: Fixed Effects IV Regressions Results

		IV
		(1)
Age Range 54-65 N=11,287	*Log(HH Income Per Cap)*	2.180*** (0.428)
Age Range 55-64 N=9,461	*Log(HH Income Per Cap)*	1.846*** (0.413)
Age Range 56-63 N=7,446	*Log(HH Income Per Cap)*	1.909*** (0.483)
Age Range 57-62 N=5,254	*Log(HH Income Per Cap)*	1.624*** (0.680)
Age Range 58-61 N=2,774	*Log(HH Income Per Cap)*	3.209*** (1.322)
	Controls	✓
	Individual Fixed Effects	✓

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Controls include household size, number of children in the household, marital status, and disability status. In these Fixed Effects IV regressions the sample size is reduced significantly.

TABLE A.5: Heterogeneity by Recipient Sex

		Female	Male
		(1)	(2)
Age Range 54-65	*Log(HH Income Per Cap)*	1.061***	-0.123
		(0.298)	(1.075)
Age Range 55-64	*Log(HH Income Per Cap)*	1.086***	0.162
		(0.414)	(0.939)
Age Range 56-63	*Log(HH Income Per Cap)*	0.966**	0.438
		(0.456)	(0.872)
Age Range 57-62	*Log(HH Income Per Cap)*	1.049*	1.352
		(0.555)	(0.995)
Age Range 58-61	*Log(HH Income Per Cap)*	2.552***	0.086
		(0.964)	(1.837)

Notes: Standard errors clustered at the original (i.e., wave 1) sampling cluster area are presented in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. These results are calculated using similar specifications to those in 5; the effect on other household members (non-recipients) differentiated by the sex of the recipient. The results suggest that there is more intra-household redistribution of the pension income if the pension recipient is female.

Figures

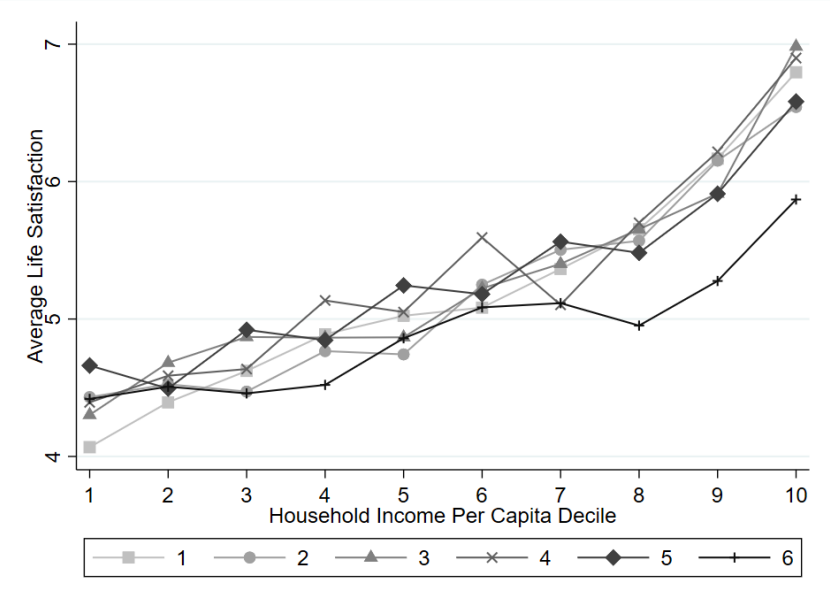

FIGURE A.1: Income per capita decile is calculated within each household size and wave. Difference in average life satisfaction here is even more pronounced.