

Poverty, Depression, and Anxiety: Causal Evidence and Mechanisms^{*}

Matthew Ridley[†] Gautam Rao Frank Schilbach Vikram Patel

April 2020

Abstract

Why are people living in poverty disproportionately affected by mental illness? We review the interdisciplinary evidence of the bi-directional causal relationship between poverty and common mental illnesses – depression and anxiety – and the underlying mechanisms. Research shows that mental illness reduces employment and therefore income and that psychological interventions generate economic gains. Similarly, negative economic shocks cause mental illness, and anti-poverty programs such as cash transfers improve mental health. A crucial next step toward the design of effective policies is to better understand the mechanisms underlying these causal effects.

^{*}This paper was prepared for the Tomorrow’s Earth series in *Science Magazine*. Papers in the series are peer-reviewed, but with binding length restrictions and intended to be selective and somewhat speculative. We thank Teresita Cruz Vital, Jishnu Das, Emily Gallagher, Johannes Haushofer, Anne Karing, Jing Li, Crick Lund, Malavika Mani, Kate Orkin, and Keshav Rao for helpful comments and suggestions. We thank the editor and six anonymous referees for detailed comments and helpful suggestions. We thank Chris Roth and Lukas Hensel for kindly providing us the data needed to construct Figure 3. The authors have no competing interests.

[†]Ridley: MIT (mridley@mit.edu); Rao: Harvard and NBER (grao@fas.harvard.edu); Schilbach: MIT and NBER (fschilb@mit.edu); Patel: Harvard (vikram_patel@hms.harvard.edu);

1 Introduction

Depression and anxiety are the most common mental illnesses: 3 to 4% of the world’s population suffers from each at any given time, and they are together responsible for 8% of years lived with disability globally (James et al., 2018). Contrary to widely-held preconceptions from the 20th century, these are not ‘diseases of affluence’ (Desjarlais, 1995; Murray et al., 1996). Within a given location, those living in poverty are at least as likely to suffer as the rich. By some measures, in fact, they are substantially more likely to suffer: rates of depression, anxiety, and suicide correlate negatively with income (Sareen et al., 2011; Lund et al., 2010; Iemmi et al., 2016; Banks et al., 2018) and employment (Lund et al., 2010; Frasilho et al., 2016). Those with the lowest incomes in a community suffer from depression, anxiety and other common mental illnesses 1.5 to 3 times as often as those with the highest incomes (Lund et al., 2010). For instance, in India, 3.4% of those in the lowest income quintile have suffered from depression in the past two weeks, compared to 1.9% of those in the highest quintile (Figure 1).

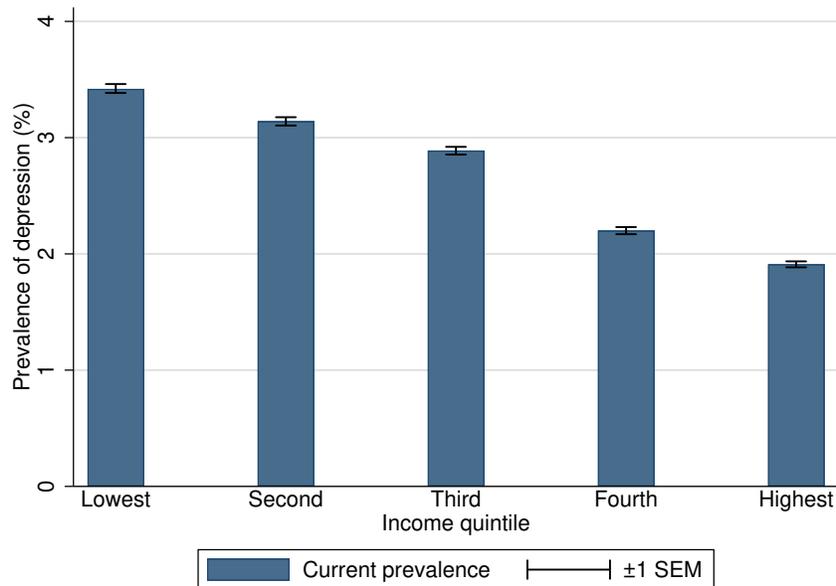


Figure 1: Prevalence of Depression by Income Quintile in India. This graph shows the average percentage of people in each income quintile in India who have had depression within the past two weeks (‘current’ prevalence). Error bars show ± 1 standard error of the mean (SEM). These numbers come from (Arvind et al., 2019), who analyzed the Indian National Mental Health Survey, 2015-16.

Low income also correlates with poor physical health (Cutler et al., 2008; Bleakley, 2010), but the relationship between mental illness and poverty is worth emphasizing. First, mental health has historically not been considered a priority by economists and policymakers, and until recently has not been evaluated as an anti-poverty tool. Second, mental health is under-resourced relative to physical health. On average, countries spend 1.7% of their health budgets on mental health, even though 14% of years lived with disability globally are due to all mental illnesses (James et al., 2018). Low and middle-income countries spend an even

smaller share of their already small health budgets on mental health (Figure 2). Such low investments in mental health have contributed to treatment gaps of over 80% globally for common mental illnesses—much larger than for major physical health conditions—despite the existence of cost-effective treatments (Chisholm et al., 2016; Patel et al., 2009; Wang et al., 2007; Kohn et al., 2004). Third, mental and physical health are tightly connected. When mental health problems co-exist with physical health problems, the impact on disability, health outcomes, and costs tends to be much worse (Scott et al., 2016; Vamos et al., 2009; Shen et al., 2008). Fourth, economic growth is unlikely to improve mental health in the same way it improves physical health. While many aspects of health correlate positively with GDP per capita at the country level, mental illness does not (Figure 6). Fifth, as we will discuss, unlike most physical health conditions, mental disorders may distort economic decision-making in ways that perpetuate poverty, by directly affecting cognitive function, preferences, and beliefs.

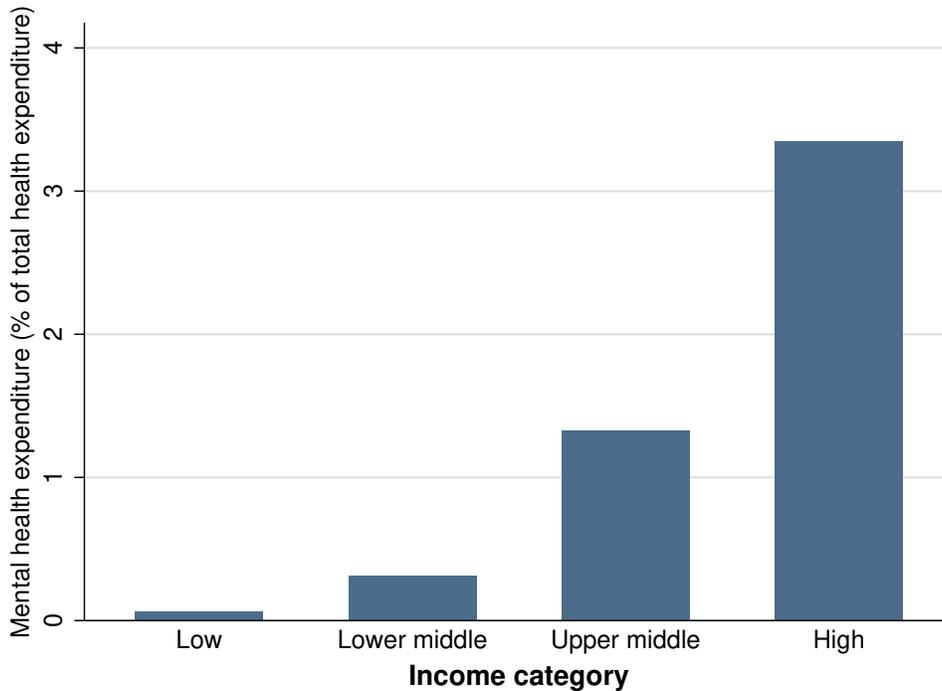


Figure 2: Mental Health Expenditure by Country Income Category. This graph plots the average percentage of overall health budgets spent on mental health across countries in each of the four income categories used by the World Bank. Percent spent on mental health comes from the authors’ own calculations, using data on overall mental health spending from the WHO Mental Health Atlas 2017, accessible at: https://www.who.int/mental_health/evidence/atlas/profiles-2017/en/, with data on total overall health spending from the WHO’s Global Health Expenditure Database, accessible at <https://apps.who.int/nha/database>.

What are the causal links between poverty and mental illness? Do economic policies improve psychological well-being? Can psychological interventions reduce poverty? Any attempt to understand this relationship must acknowledge the complexity and multi-dimensional nature of both mental health and poverty. Mental health in the broadest possible sense has

been defined as “a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community” (World Health Organization, 2005). This definition includes both happiness or life satisfaction, which also correlate positively with income (Haushofer and Fehr, 2014), and symptoms associated with anxiety and mood disorders such as depression. The two are clearly related: depression and anxiety are strong determinants of happiness (Layard et al., 2012), and ultimately mental health and even mental illnesses such as depression and anxiety exist along a continuum.

We focus on the causal evidence linking poverty with depressive and anxiety disorders, the most common mental illnesses, which we refer to here using the more general terms ‘mental health’ and ‘mental illness’. Box 1 provides definitions of these illnesses and a brief primer on their measurement. While other more serious mental illnesses such as schizophrenia are also correlated with poverty, and may have powerful effects on economic outcomes, we do not discuss them here for reasons of space (Lund et al., 2014).

Box 1: Definition and Measurement of Depression and Anxiety

Depression, by which we refer here to Major Depressive Disorder, is a constellation of symptoms including changes in psychomotor function, weight loss, oversleeping or undersleeping, decreased appetite, fatigue, difficulty concentrating, extreme feelings of guilt or worthlessness, and suicidal ideation. According to the American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (DSM-5), diagnosis of depression requires a set of these symptoms to be present over a two-week period.

Anxiety, by which we refer here to Generalized Anxiety Disorder, is characterized in the DSM-5 by long-lasting and excessive fear and worries over at least a six-month period, with three or more of the following symptoms: restlessness, fatigue, concentration problems, irritability, muscle tension and problems with sleep. Other definitions (e.g. the ICD-10) require the presence of at least one physical symptom such as heart palpitations, difficulty breathing, nausea or abdominal distress, dizziness and numbness.

Measuring depression and anxiety in large population samples is feasible using non-specialist surveyors or even self-administration. Reliable short-form diagnostic tools can predict professional diagnosis with rates of both false positives and false negatives between 10 and 20%, and have been validated in low-income countries (Patel et al., 2008; Kroenke and Spitzer, 2002; Spitzer et al., 2006). Widely used tools include the CES-D and PHQ-9 surveys for depression, the GAD-7 for anxiety, and the GHQ-12 and SRQ-20 for any common mental illness. These scales typically ask respondents how much they experienced symptoms of depression or anxiety (such as sadness, lack of concentration, or poor sleep) in the past few weeks. The PHQ-9 and GAD-7 ask one question for each of the symptoms which are used to define major depressive disorder and generalized anxiety disorder, respectively. In practice, depression and anxiety are correlated, as evidenced by the fact that they share some symptoms.

The CES-D is the most popular measure among studies that look at the effect of economic interventions or shocks on mental health. Several studies also use custom indices of psychological well-being, typically an average of a life satisfaction scale, a ‘stress index’, and some measure of worry or anxiety. In practice, such indices often measure several of the same symptoms as the PHQ-9 and GAD-7.

Some national surveys already include short-form screening tools, such as the U.K. Longitudinal Household Panel Survey (GHQ-12) and the South Africa National Income Dynamics Study (CES-D).

Like mental health, poverty is multidimensional. We examine causal links between mental illness and important economic dimensions of poverty, particularly income and unemployment. We also touch upon other dimensions of poverty, including a lack of capabilities resulting from low education and physical health, as well as relative poverty and associated low social status. Due to a relative scarcity of studies, we focus less on the relationship between mental health and the consumption of goods and services, a more direct economic

measure of poverty. The existing evidence on this correlation is contentious, but the relationship appears to be weaker than that with income (Tampubolon and Hanandita, 2014; Banks et al., 2018; Das et al., 2009). Since income is more volatile than consumption, a stronger cross-sectional correlation of mental illness with income than with consumption may imply that mental health is more affected by shocks to economic circumstances than to permanent levels, although more evidence is needed on this question.

We provide an interdisciplinary, concise, and therefore selective review of the evidence for the bi-directional causal relationship between poverty and mental health, and its underlying mechanisms. We discuss causal evidence from randomized-controlled trials (RCTs) of poverty alleviation programs and mental health treatments. These create variation in individuals' poverty and mental health status, respectively, that is uncorrelated by design with other observed or unobserved shared risk factors. We also discuss studies of 'natural experiments' in which naturally-occurring variation in economic circumstances or mental health is argued to be 'as good as random' and therefore uncorrelated with other risk factors, conditional on some set of observables. Examples range from financial windfalls such as lottery wins – where lottery winners may be thought of as a treatment group and lottery losers as a control group – to climate shocks that affect some farmers' incomes more than others'.

2 The Causal Impact of Poverty on Mental Ill-Health

Job loss and income declines – drivers of poverty – often precede episodes of mental illness (Olesen et al., 2013; Alloush, 2018). Evidence from natural experiments confirms that this relationship is causal, and not driven by omitted factors. For instance, reduced agricultural output and income due to extreme rainfall caused increased rates of depression and suicide in rural parts of Indonesia (Christian et al., 2019), see Box 2. Similarly, job losses due to plant closures in Austria were associated with higher subsequent antidepressant use and mental health-related hospitalization (Kuhn et al., 2009). US areas more exposed to trade liberalization with China saw reduced income and employment for some groups of workers and increased mortality through suicide among those same groups (Pierce and Schott, 2016). Whether job loss worsens mental health beyond the impacts of the associated loss of income is unclear, but both mechanisms are argued to play a role in the phenomenon of 'deaths of despair' (Case and Deaton, 2020).

Conversely, income or wealth increases can improve mental health. For example, Native American tribes that opened casinos have seen substantial rises in income and reductions in anxiety relative to those that did not (Wolfe et al., 2012). Some studies show that lottery winners enjoy better mental health compared to those who win less or play but don't win (Apouey and Clark, 2015). Fully controlling for the number and frequency of lottery tickets bought, however, leads to small or no impacts of lottery winnings on mental health (Cesarini et al., 2016; Lindqvist et al., 2018).

The most compelling causal evidence that poverty causes mental illness comes from randomized-controlled trials (RCTs) that evaluate anti-poverty programs. Several studies

Box 2: Cash Transfers, Rainfall Shocks, and Suicides

Christian et al. (2019) examine how income shocks affect suicide rates and depression in Indonesia. They use two natural experiments: the staggered roll-out across sub-districts of a conditional cash transfer program and annual and spatial variation in rainfall that affects farmers' incomes. They measure depression using a 10-question CES-D scale which is included in the Indonesian Family Life Survey. They also use the incidence of suicides, as measured by the reports of village leaders in census surveys.

Sub-districts which received the cash transfer program in the first wave of roll-out saw an 18% drop in suicides ($p < 0.01$) relative to those that received it later, even though both sets of districts had similar trends in suicide before the program's start. These effects persisted through all six years of the cash transfer program. Meanwhile, rural sub-districts that experienced positive rainfall shocks (which increase crop yields) between census years saw decreases in depression and suicides relative to those with negative rainfall shocks. The cash transfer had its largest effects on suicide in districts undergoing droughts, suggesting that policy can play a role in mitigating the mental health effects of economic shocks (Figure 3).

Since suicide is only measured at the sub-district level in this study, it is not possible to fully disentangle direct effects of the cash transfers on recipients from spillover effects on others in the village. This highlights the need for better routine data collection on mental health outcomes alongside economic variables.

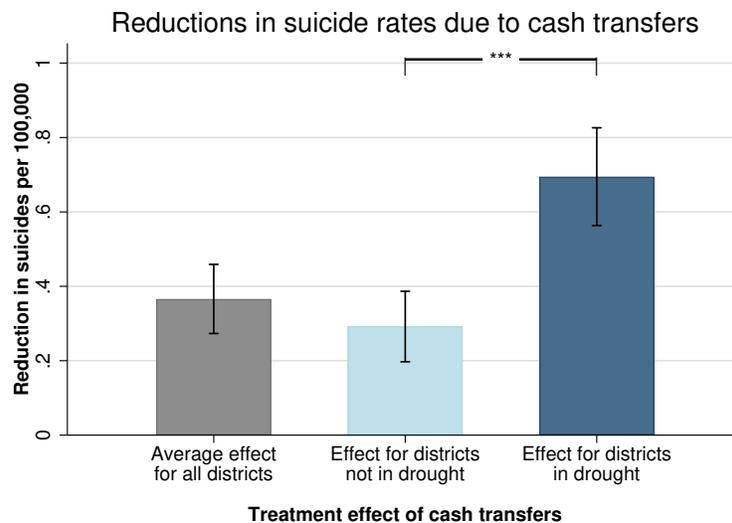


Figure 3: Cash transfers, suicide rates, and droughts. This figure plots the estimated effect of the cash transfer roll-out on district suicide rates, for all districts and separately by whether or not they were in a drought (bottom 20% of the rainfall distribution) when the cash transfers reached them. Error bars show ± 1 SEM. Stars denote a significant difference between effects. ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

evaluating cash transfer and broader anti-poverty programs have found significant positive impacts on mental health, including over long time horizons when the effects of any initial celebratory reactions among recipients are likely to have worn off (Figure 4). Figure 4 shows a meta-analysis of these studies. For instance, cash transfers to Kenyan households equivalent to \$400 to \$1,500 in total at purchasing power parity (about 3 to 12 months of household income) increased consumption and happiness, while reducing depression, stress, and worries (Haushofer and Shapiro, 2016, 2018). Scores on a depression scale were 0.12 standard deviations (SD, closely related to Cohen's d) lower four months after completion and 0.16 SD lower after almost three years, with larger transfers causing substantially larger effects.

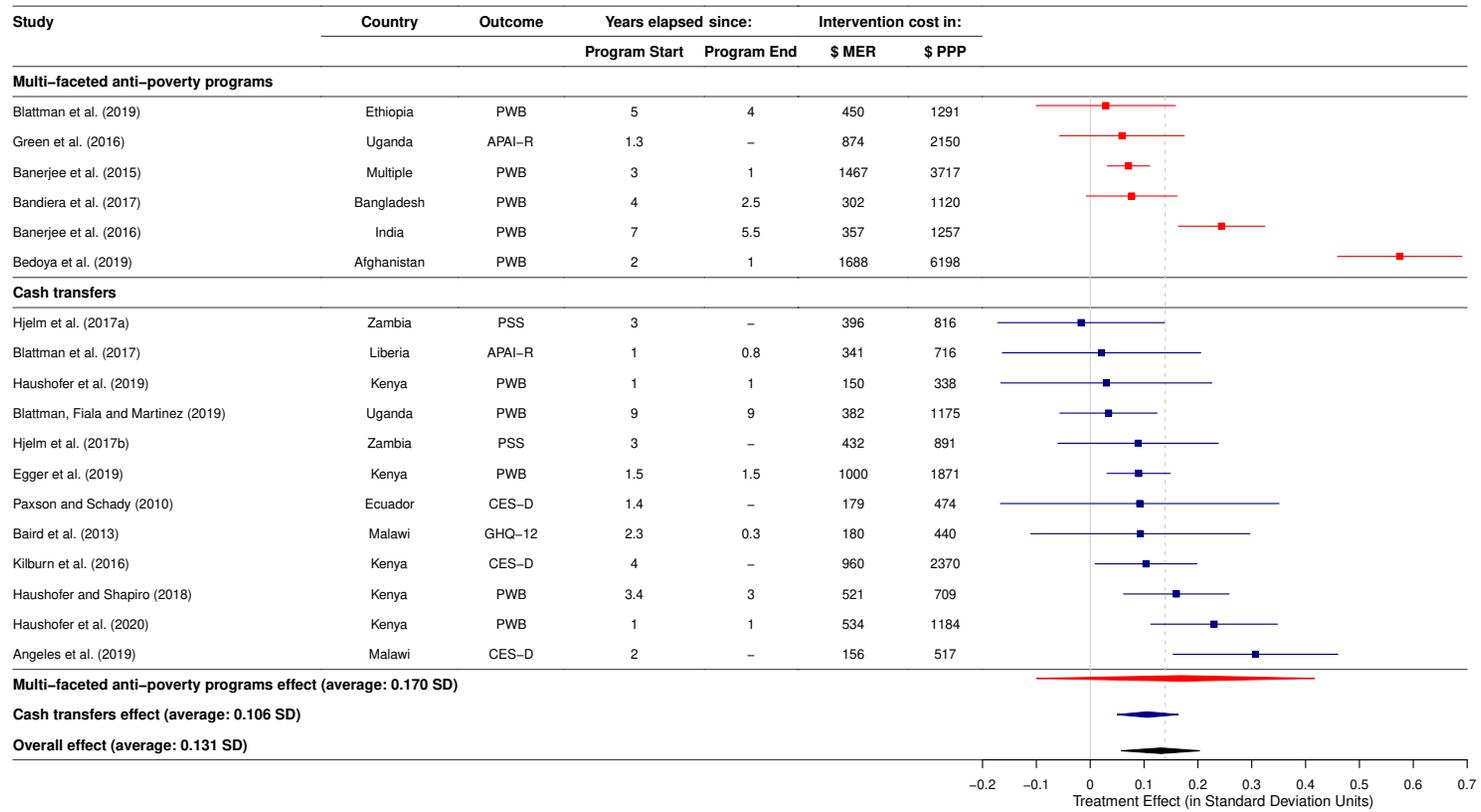


Figure 4: The Impacts of Anti-Poverty Programs on Mental Health. This figure plots the estimated treatment effects of RCTs evaluating various anti-poverty programs in low- or middle-income countries on indices of mental health. Outcomes are defined such that positive treatment effects imply better mental health. ‘Cash Transfers’ refers to studies of unconditional cash transfers to low-income households, with the exception of Baird et al. (2013) who study a conditional cash transfer program. ‘Multi-Faceted Anti-Poverty Programs’ refers to interventions which aimed to lift people out of poverty by providing a range of elements, typically including asset transfers, skills training, cash support, and access to savings and healthcare opportunities. Treatment effects are in standard deviation units (SD). If multiple follow-up measures were available, this figure shows the final measure. The outcomes vary across studies, and include screening instruments to detect common mental illnesses (GHQ-12) and symptoms of depression (CES-D, APAI-R), indices of psychological well-being (PWB), and a perceived stress scale (PSS). ‘Intervention cost’ refers to the total cost of the intervention, including implementation costs, when this is available; when implementation costs are unavailable (as with most of the cash transfer studies) it refers to the total undiscounted value of the transfer. ‘MER’ stands for Market Exchange Rates and ‘PPP’ stands for Purchasing Power Parity (which adjusts exchange rates to reflect the true cost of living). A missing value of years elapsed since program end means the transfer was still ongoing when outcomes were measured. A complete description of the methodology of this analysis and details on each of the studies is provided in the appendix.

Similarly, multifaceted anti-poverty programs beyond cash transfers yield mental health benefits. A recent large-scale randomized evaluation of a “graduation program” in six countries that provided extremely poor participants with a mix of assets, intensive training, temporary cash support, savings incentives and help to access healthcare, found increases in consumption and assets three years later. The program also improved an index of psychological well-being by 0.1 SD, which was driven by an increase in happiness and a decrease in mental distress (Banerjee et al., 2015). Programs in other settings with similar approaches have found similar effects (Bandiera et al., 2017; Bedoya et al., 2019). Longer-run effects of such programs, when measured, appear to be even larger for both economic outcomes and mental health. In India, for example, an index of psychological well-being was 0.24 SD higher in the treatment group seven years after the completion of the aforementioned graduation program (Banerjee et al., 2016).

In summary, across a wide range of populations and study designs, positive economic shocks to individuals can improve mental health. By contrast, negative economic shocks undermine mental health. This robust evidence on the effects of changes in economic circumstances suggests that poverty can cause mental illness. However, with two exceptions (Lindqvist et al., 2018; Banerjee et al., 2016), the above studies consider relatively short-term consequences of changes in economic status, of a few years at most. An important question is whether these short-run effects persist or perhaps even grow over time. For instance, some of the causal mechanisms discussed below could take decades to manifest. On the other hand, there may be a hedonic adaptation effect in which mental health eventually adapts to the change in circumstances, so that even permanent increases in one’s income level has only limited long-run effects. Ongoing long-run evaluations of cash-transfer programs are expected to provide evidence on this question (Banerjee et al., 2019).

2.1 Mechanisms for Poverty Causing Mental Ill-Health

How does poverty cause mental illness? We discuss several plausible causal mechanisms and the limited existing evidence for each. The worries and uncertainty that come with living in poverty seem to be an important driver of the effect, as do the effects of poverty on childhood development and one’s living environment. We have limited causal evidence on other plausible channels, running through the worsening of physical health caused by poverty, increased exposure to violence or crime, and the effects of low relative social status and social isolation. Understanding which of these mechanisms are important may have implications for policy. For instance, if worries and uncertainty play a major role, then providing health and unemployment insurance may be crucial, while if early-life conditions are the key drivers, then cash transfers to parents of young children would be the appropriate policy response.

Worries and uncertainty. The anticipation of economic shocks, not just their occurrence, may cause mental illness. People living in poverty face substantial uncertainty and income volatility, and juggle what are, in effect, complex financial portfolios, often without access to formal insurance (Collins et al., 2009). Sustained long-run exposure to stress from managing this volatility may threaten mental health (Staufenbiel et al., 2013). Consistent with this hypothesis, a large-scale randomized experiment among low-income individuals in

Oregon found that receiving largely free health insurance worth \$550-\$750 per year reduced rates of depression by about a quarter within a few months (Finkelstein et al., 2012). This effect did not appear to be explained by increased mental health care or changes in physical health. While the increase in recipients' effective income may have played a role, it represented a much smaller relative increase than the cash transfer programs described above, and yet generated a similar effect size on depression. Further suggestive evidence for uncertainty as a mechanism comes from the small or zero effect of wealth shocks on mental health in countries with generous and comprehensive systems of social insurance, such as Sweden (Cesarini et al., 2016; Lindqvist et al., 2018).

Environmental factors. Those living in poverty are generally more exposed to environmental irritants such as pollution, temperature extremes, and challenging sleep environments (Dean et al., 2018). Many of these factors have been linked directly to mental illness. Days with extreme heat see worse self-reported mental health and increased rates of self-harm and suicide (Ding et al., 2015; Williams et al., 2016). Similarly, sleep deprivation is widespread among the urban poor in developing countries (Bessone et al., 2020), and sleep is thought to be a mechanism affecting mental health (Harvey, 2011). Some evidence exists that clinical interventions to improve sleep reduce depression (Bessone et al., 2020; Manber et al., 2008). The poor may also be more likely to be exposed to air pollution, which may influence mental health through multiple channels, such as restriction of physical activity or directly due to neurotoxicity (Jia et al., 2018). For instance, changes in air pollution in China were associated with changes in mental health (Xue et al., 2019). In the US, randomly selected low-income households that were paid to move to more affluent neighborhoods saw reductions in depression and anxiety despite little effect on income (Ludwig et al., 2012). However, it is not clear whether environmental factors or other features of high-income neighborhoods generated this effect.

Physical health. Lower income is robustly associated with worse physical health (Cutler et al., 2008). Poverty increases exposure to the environmental factors described above, and often also implies lower access to health care, increasing the burden of acute and chronic health conditions. Worse physical health may impact mental health through various channels. Chronic pain, worries about health and mortality, the financial costs of illness, and reduced physical activity may all worsen mental health. It is therefore unsurprising that physical ill-health often co-occurs with depressive and anxiety disorders (Scott et al., 2016). To date, there exists only limited causal evidence of poverty impacting mental health via changes in physical health. Many of the randomized interventions described in the previous section had no detectable effect on physical health even as they reduced mental illness (Haushofer and Shapiro, 2016; Egger et al., 2019; Banerjee et al., 2015). However, changes in physical well-being may manifest over a longer timeframe, which may not be captured by these short-run studies.

Early-life conditions. Exposure to poverty early in life can threaten mental health in later years. Such effects can be generated in utero, by exposing pregnant women to malnutrition or stress. For instance, the death of a mother's relative during pregnancy (compared to after childbirth) predicts depression and anxiety among her grown children later in life

(Persson and Rossin-Slater, 2018). Poverty may also disproportionately expose children to adverse shocks while their brains are highly plastic and thus profoundly impact brain development, cognitive ability, and mental health in adolescence and adulthood (Noble et al., 2015; Blair and Raver, 2016). Economic stresses around the time of birth can have long-term mental health costs: in Ghana, a decrease in crop prices by 1 SD at an individual’s time of birth was found to increase incidence of anxiety or depression in adulthood by 50%, with likely mechanisms including maternal nutrition, breastfeeding duration, vaccination rates and improved adult health (Adhvaryu et al., 2019). These results imply that programs that provide financial support for households with pregnant women or young children may have high long-run mental health and economic returns.

Trauma, violence and crime. Living in poverty disproportionately exposes individuals to crime, including violent offenses (Sharkey et al., 2016). People living in poverty are also more likely to suffer traumatic events such as the early deaths of loved ones (Marmot, 2005). Likewise, within the household, women and children in poor households are disproportionately affected by intimate partner violence (Cunradi et al., 2000). The relationship between poverty and experiencing violence itself may be causal: cash transfers to households reduce intimate partner violence (Haushofer et al., 2019). In turn, exposure to violence within the household predicts depression and other mental illnesses (Goodman et al., 2009). Causal evidence on the effect of reductions in crime and violence on mental illness is needed to shed further light on this mechanism.

Social status, shame, and isolation. Relative poverty, i.e., consumption or income relative to others in one’s society, may play a role in the relationship between poverty and mental illness, through the resulting social status and interpersonal comparisons. In an interesting natural experiment, Norwegian tax records were posted online in 2001, making citizens’ income easily searchable. Using survey data from 1985-2013, a study showed that the gap in happiness and life-satisfaction between the rich and poor in Norway (but not in a comparison country) increased sharply once relative income became easily visible (Perez-Truglia, 2019). While similar causal evidence is lacking for mental illness, it is plausible that diminished social status resulting from poverty causes or exacerbates depression and anxiety. Frequent marginalization of people living in poverty may also result in social isolation and loneliness (Walker and Bantebya-Kyomuhendo, 2014), which in turn are correlated with depression (Cacioppo et al., 2006).

3 The Causal Impact of Mental Ill-Health on Poverty

Mental illness predicts worse labor market outcomes later in life. Following a diagnosis of depression or anxiety, employment rates and incomes have been estimated to fall by as much as half relative to the non-depressed (Hakulinen et al., 2019; Mojtabai et al., 2015). Beyond such comparisons, which may be driven in part by omitted factors such as physical health, there is little evidence from natural experiments linking depression or anxiety to incomes. A study showed that the approval of lithium for treatment of bipolar disorder reduced the earnings penalty associated with bipolar illness by a third in Denmark, from 38 to 26 percent,

with larger effects in the lower half of the earnings distribution (Biasi et al., 2019). Studying similar natural experiments for depression and anxiety would be valuable.

Box 3: An Example of a Psychotherapy Intervention With Positive Economic Effects

Patel et al. (2017) conducted an RCT of a brief behavioral activation therapy (BA) program, administered by non-specialist counsellors in a sample of 495 depressed adults in Goa, India. Compared to a control group which received enhanced usual care, Treated patients were over 60% more likely to be in remission three months later (64% versus 39%), as measured by a PHQ-9 score below 10, and maintained these gains after 12 months.

Those patients also reported being able to work 2.3 more days per month on average ($p=0.004$) and reduced health costs, excluding intervention costs, of \$20 per month ($p=0.07$) (Figure 5). For comparison, a month's wages for a low-skilled worker in the study context was around \$415. Given an average intervention cost of \$66 per patient, in economic terms the intervention was highly cost-effective and may have paid for itself within a few months. After 12 months, the fall in treated patients' health costs alone had already significantly outpaced the cost of intervention, although the difference in days worked was no longer significant (Weobong et al., 2017).

Other evaluations of inexpensive psychotherapies implemented by non-specialist counsellors in low-income settings have found similarly large effects on mental health (Singla et al., 2017). More evidence on the effect of such psychological interventions on broader economic outcomes would be highly valuable. For instance, future trials could be linked to administrative or standardized survey data on wages, earnings, and consumption.

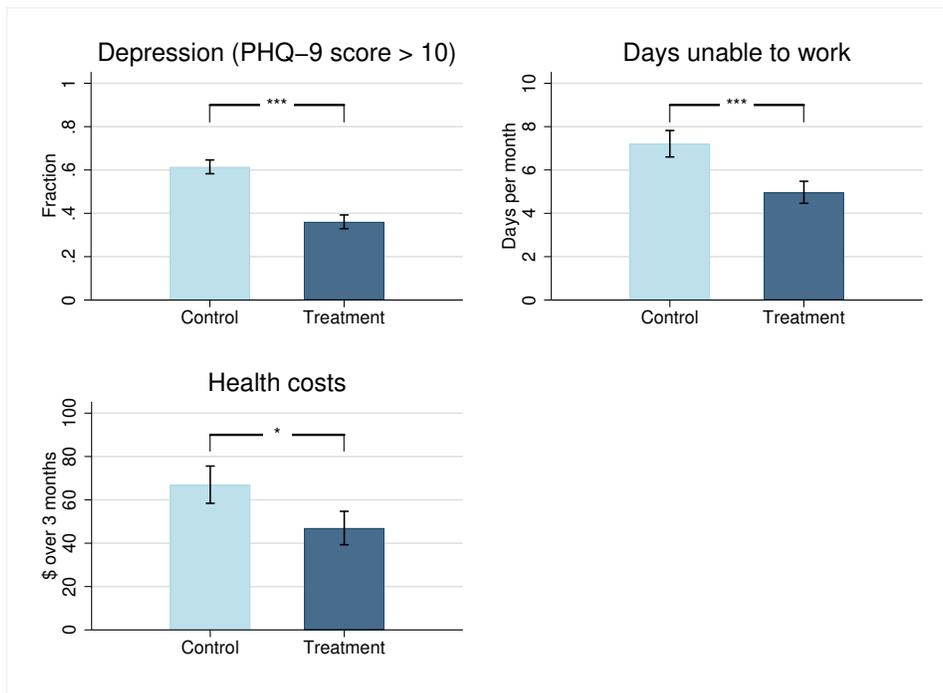


Figure 5: Impacts of Behavioral Activation on Depression, Labor Supply, and Health Costs. This figure shows the mean values for the treatment and control groups of depression (measured by a PHQ-9 score greater than 10), days unable to work, and health costs (excluding the intervention cost) at 3 months. Error bars denote ± 1 SEM. Stars above the bars denote a significant difference between treatment and control after adjusting for covariates. ***: $p < 0.01$; **: $p < 0.05$; *: $p < 0.1$.

There is, however, a substantial body of experiments showing a causal effect of treating mental illness on employment. A meta-analysis aggregating results across 36 RCTs in developing countries showed a positive average effect of various interventions to treat mental illness on labor supply Lund et al. (2019). Among these interventions, pharmacological and

psychological treatments had similar positive effects on labor supply (0.1 to 0.15 SD), while combining both types of treatments had even larger effects (0.34 SD). For instance, a cheap and scalable cognitive behavioral therapy (CBT) administered in India reduced depression by 25 percentage points compared to the control group, and in turn increased reported days of work by 2.3 days per month (Box 3). While these studies do not directly show that treating mental illness reduces poverty rates, higher labor supply and earnings naturally reduce the likelihood of living in poverty. Whether treating mental illness has larger long-run effects on consumption per unit cost than the cash transfers described above is unknown (Lund et al., 2019).

3.1 Mechanisms for Mental Ill-Health Causing Poverty

Cognitive function. Like any illness, depression and anxiety may have economic effects because they directly lower individuals' ability to work. Unlike most physical conditions, however, depression and anxiety also directly affect the way people think. Poverty itself can influence cognitive function by capturing attention and taxing mental bandwidth (Mani et al., 2013; Kaur et al., 2019). Mental illness could operate along the same lines, by capturing attention, causing excessive rumination and distorting people's memories and beliefs about their abilities (Gotlib and Joormann, 2010). Such cognitive impacts could alter a range of economic decisions and outcomes, from finding jobs to saving to education, and by exacerbating 'behavioral biases' that economists increasingly recognize as important (Kremer et al., 2019). For instance, depressed individuals might avoid making active choices and may stick with 'default options', may have decreased sensitivity to incentives due to anhedonia or may have difficulty choosing among a large number of options. Understanding the importance of this mechanism relative to more 'direct' economic effects through disability or health expenditures is crucial for correctly measuring the economic burden of mental illness and designing economic policy for those whose mental health is compromised.

Beliefs. Beliefs about one's own and others' abilities, circumstances, and actions are central to economic decision-making. Mental illness may distort such beliefs in various ways. Depression is associated with more negative beliefs about oneself and the external world (Beck, 1967; de Quidt and Haushofer, 2016). Depressed individuals are more likely to remember negative stimuli and have trouble disengaging from negative information once it grabs their attention (Gotlib and Joormann, 2010). As such, while healthy individuals tend to protect overly optimistic beliefs about themselves by ignoring negative information (Eil and Rao, 2011), correlational evidence suggests that the depressed update their beliefs more pessimistically (Korn et al., 2014). Anxiety, meanwhile, is associated with greater selective attention towards threatening stimuli (Armstrong and Olatunji, 2012), which could lead to overestimation of risks and thus reduced risk-taking. Such evidence is consistent with mental illness causing pessimistic beliefs, pessimistic beliefs causing mental illness, or both. Causal evidence on how treating depression or anxiety affects beliefs would help disentangle these potential explanations.

Preferences. Mental illness may affect economic preferences, such as the extent to which people are willing to defer gratification (time preferences), tolerate risk for higher expected re-

wards (risk preferences), or split rewards between themselves and others (social preferences). For instance, depression may lower a person’s patience and altruism. Similarly, anxiety disorders may reduce people’s willingness to take on even modest levels of potentially profitable risk. Such impacts could in turn change a variety of economic behaviors, such as labor supply decisions, savings and investment choices, consumption behavior, and the take-up of social programs. The limited evidence on correlations between mental illness and economic preferences is mixed (Bayer et al., 2018; Cobb-Clark et al., 2019).

Labor supply and productivity. Depression and anxiety often affect individuals in the prime of their economic lives, and are additionally highly recurrent (Kessler et al., 2007). The depressed beliefs and distorted preferences described above may reduce their motivation and labor supply. In addition, depression can have a direct effect on productivity through reduced ability, e.g. through increased fatigue and worse concentration. Depressed individuals may therefore work fewer and shorter days and produce less per hour (Mall et al., 2015). Depressed workers might also be more easily discouraged during their job search, or when facing setbacks at work. As described above, substantial causal evidence exists that treating mental illnesses increases employment (Lund et al., 2019). However, there is little evidence on whether this happens through higher at-work productivity, greater job search intensity, changed beliefs, or other mechanisms.

Stigma. Mentally ill individuals contend with substantial social stigma and negative stereotyping (Pescosolido et al., 2013). This may result in discrimination in employment (Sharac et al., 2010), which could lower wages and limit employment opportunities relative to equally productive mentally-healthy workers. On top of this, mental illness sufferers are excluded from disability benefit schemes in many low-income countries (Saxena et al., 2006). More generally, others’ reluctance to interact socially with mentally ill people (Pescosolido et al., 2013) may exclude them from social networks which provide economic opportunities. Stigma may also affect the formation and dissolution of households in ways that disadvantage the mentally ill (Lauber and Rössler, 2007). Depression and anxiety may come with a ‘discount’ on the marriage market, causing mentally ill individuals to form households with less well-off partners, increasing the chances of living in poverty.

Health expenditures. Mental illness may deepen poverty through its impacts on health and health expenditures. Globally, people living in poverty usually pay most of their health costs out of pocket (Duflo and Banerjee, 2007). 150 million people globally are estimated to have catastrophic health expenditures each year, defined as health care payments totaling over 40 percent of a household’s non-subsistence expenditures (Xu et al., 2007). Costs associated with treating mental illness rarely account for large shares of individuals’ budgets, as most affected individuals remain untreated. However, depression and anxiety frequently co-occur with other health conditions (Scott et al., 2016), and such comorbidity with depression is associated with substantially higher health expenditures for a range of health conditions (Vamos et al., 2009; Shen et al., 2008). Indeed, treating depression has been found to lower overall health care costs (Weobong et al., 2017).

Women’s empowerment. The burden of mental illness falls disproportionately on

women (James et al., 2018). A large-scale (N=903) RCT evaluating cognitive behavioral therapy intervention for depressed pregnant women in Pakistan found a 17-percent reduction in depression rates compared with a control group seven years after the intervention (Baranov et al., 2017). Reduced depression among these women was accompanied by increased economic empowerment by 0.29 SD as measured by increased control over household and personal expenditures. Such impacts may have implications for women’s consumption and relative poverty within the household.

Intergenerational effects. Improving a parent’s mental health can benefit the next generation. In the above study in Pakistan, women who had received the intervention sent their children to better schools and had more learning materials in the home. Similarly, other RCTs found that treating mothers’ depression improves their interaction with their children, and their children’s mental health (Cuijpers et al., 2015). While little direct evidence shows that such interventions lead to improved educational outcomes or earnings, there is reason to believe they may. A significant body of work from other contexts shows that early-childhood investments have large effects on children’s income as adults (Heckman and Mosso, 2014).

Human capital accumulation. The onset of common mental illnesses often coincides with secondary and tertiary education and the early stages of an adult’s work career (Kessler et al., 2007). Mental illness may therefore cause long-run economic hardship by reducing school and college completion rates, worsening early-career job placements, and hindering skill acquisition (Patton et al., 2016). This suggests the possibility of particularly high economic returns from improving mental health among adolescents and young adults. While longitudinal studies show a substantial correlation between mental illness among students and subsequent educational outcomes, there is little experimental evidence to date that treating depression or anxiety among adolescents leads to improved educational outcomes (Prinz et al., 2018).

4 Outlook

We now turn to a more speculative discussion of how the relationship between poverty and mental illness may evolve in the future, the resulting policy challenges, and open research questions.

Aggregate economic conditions. Economic growth and other ongoing global trends are unlikely to improve mental health by themselves. Higher income causes better mental health at the individual level, yet the prevalence of mental illness is not lower on average in rich countries. In fact, the existing evidence shows a higher prevalence of common mental illness in richer countries (Figure 6) (Dückers et al., 2019). This cross-country difference cannot be interpreted causally, and concerns remain about differences in methodology, diagnosis, or reporting across contexts (Brhlikova et al., 2011). However, one way to reconcile the contrasting within-country and cross-country relationships is the possibility that relative rather than absolute poverty is the more relevant cause of mental illness. Risk factors discussed above, such as inequality and relative poverty, or the stresses of urban environ-

ments, may deteriorate rather than improve as whole economies expand. Within-country inequality has increased in many countries in recent decades, despite significant reductions in extreme poverty and global inequality (Milanovic, 2016). Complacency about mental health among the poor is therefore not warranted even in the presence of aggregate economic growth.

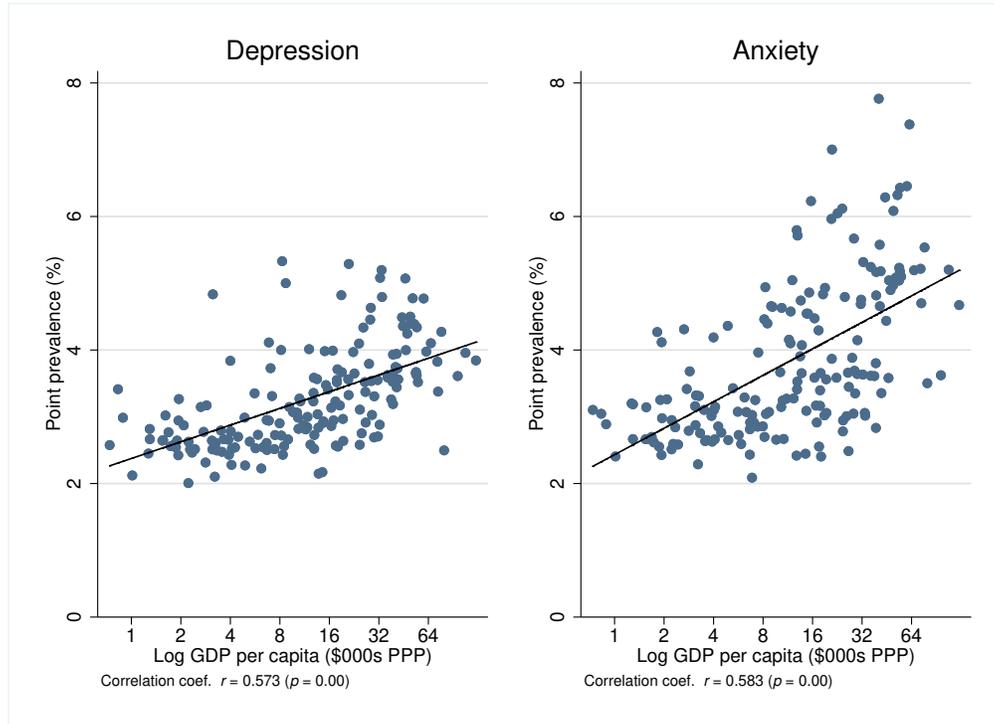


Figure 6: Prevalence of common mental illnesses by country. This graph plots, for each country, the percentage of the population estimated to have a depressive disorder (left panel) or anxiety disorder (right panel) at a given point in time against that country’s log GDP per capita. Each scatter point represents one country. The line shown is an Ordinary Least Squares regression line of country prevalence rates on a constant and log GDP per capita. Prevalence rate data come from the *Global Burden of Disease Study, 2017*, accessible at: <http://ghdx.healthdata.org/gbd-results-tool>. GDP per capita data are for 2017, measured in constant 2011 international \$, and come from the *World Bank’s World Development Indicators* dataset, accessible at: <https://databank.worldbank.org/source/world-development-indicators/>.

Climate change. The more frequent occurrence of extreme heat due to climate change is anticipated to exacerbate mental illness (Masson-Delmotte, 2018; Trang et al., 2016). Similarly, the increased frequency of weather-related disasters, such as floods and hurricanes, poses a threat to mental health through greater exposure to trauma (Berry et al., 2018). Climate change also threatens mental health through its negative economic consequences, including increases in conflict and migration. These economic consequences are likely to be more pronounced in low-income countries (Masson-Delmotte, 2018). Crop-damaging high temperatures during the agricultural growing season have already caused an increase in suicides in agricultural regions in India (Carleton, 2017). Climate change is expected to lead to increased violence and political conflict over the next century through increased pressure on resources such as productive land and, possibly, psychological effects of heat on aggression (Burke et al., 2015). This combination of economic and political consequences of climate

change may increase the flow of refugees and economic migrants, with concomitant challenges to mental health (McMichael et al., 2012).

Pandemics. Public-health crises such as the ongoing COVID-19 pandemic tend to disproportionately affect those living in poverty (Adams-Prassl et al., 2020). They may worsen mental health on average, and particularly among the poor. First, income and employment losses can be large, which in turn can reduce mental health through the mechanisms described above. In addition, the exposure to trauma, increased worries and uncertainty, and worse physical health will tend to reduce mental health, in turn reducing income and employment. Interventions to provide both economic and psychological support to those living in poverty are a critical response to such pandemics and natural disasters.

Technological change and globalization. For many of those in poverty across the world, technological change and globalization offer enormous economic opportunities; however, both phenomena produce winners and losers. The costs to losers, especially low-wage workers in high- and middle-income countries who lose jobs as a result of changes in patterns of trade or automation, can be long-lasting and substantial (Autor et al., 2016), resulting in significantly worse mental health (Kuhn et al., 2009; Pierce and Schott, 2016). Offering social insurance and welfare, skills training, and job transition programs, including psychotherapies for workers exposed to the harmful effects of technological change and globalization will be important to protect mental health. While most economic research on these topics focuses on rich countries, there is an urgent need to understand the mental-health effects of these economic changes in poorer countries.

Social media. The spread of mobile phones and the internet opens up new opportunities for poverty alleviation (Suri and Jack, 2016) and novel ways to deliver mental health care. However, some of these technologies may pose new threats to mental health. While more causal evidence is needed, some studies have found that depression is correlated with internet addiction and with the intensity of use of social media among young adults and adolescents (Ha et al., 2007; Lin et al., 2016). Recent randomized interventions show that deactivating social media accounts for four weeks led to 0.1 SD reductions in depression and anxiety scores (Allcott et al., 2019; Mosquera et al., 2019).

4.1 Implications for Research and Policy

Since mental health and poverty are intimately linked, interdisciplinary collaborations between mental-health researchers and social scientists studying poverty are essential. Evaluations of economic interventions should carefully measure impacts on mental health using standard tools developed by psychiatrists, as discussed in Box 1 (Patel et al., 2008). Such measurements are particularly needed for likely economically beneficial interventions that may increase risk or uncertainty and therefore entail adverse psychological effects, such as policies that increase market integration or technology adoption. Similarly, evaluations of psychological interventions should embed the standard measurement tools from development and behavioral economics used to evaluate anti-poverty programs.

Policy tools. Based on the existing research, a mix of economic and mental-health tools is available to policymakers (Lund et al., 2011). On the economic side, recent work in development economics has shown the effectiveness of cash transfers and other anti-poverty programs. On the mental health side, there is a strong economic case for investing in the mental health of people in poverty. In a recent meta-analysis, the mental health interventions considered were an order of magnitude less expensive than many economic interventions and yet had similar (sometimes larger) effects on employment (Lund et al., 2019). Accordingly, at least among the subset of people who are mentally ill, mental-health treatments could be the most cost-effective anti-poverty intervention. However, we know little about how to optimally combine, dose, sequence, and target these two types of interventions. Improved mental health may increase the economic returns of cash or asset transfers by improving decision-making and productivity. Similarly, psychotherapy might more effectively and durably improve mental health for individuals who also receive treatments to improve their economic circumstances.

Recently, innovative studies have compared the effects of providing psychotherapy, cash support or both among low-income populations without restricting the sample to those suffering from depression or anxiety. An exemplar paper cross-randomized eight weeks of cognitive behavioral therapy and \$200 in cash support to a thousand criminally-engaged men in Liberia (Blattman et al., 2017). While the psychotherapy was not designed to treat mental illness but instead targeted antisocial behavior, the study found that the combination of cash transfer and psychotherapy improved an index of self-regard and mental health by 0.2 SD a year later ($p=0.024$), with a modest reduction in depression and psychological distress (-0.11 SD, $p=0.24$). The combined treatment also reduced antisocial behavior and increased patience and self-control, while neither cash nor therapy by themselves had detectable effects on any of the above outcomes. However, none of the treatments had one-year impacts on economic outcomes such as consumption or income. More evidence along these lines would be a valuable next step.

Treatment gaps. Closing the massive existing treatment gaps for mental health is a key priority: in poor countries, the fraction of diagnosed individuals who do not receive treatment often exceeds 90 percent for depression and anxiety (Chisholm et al., 2016; Patel et al., 2009; Wang et al., 2007; Kohn et al., 2004). Such treatment gaps likely result from a combination of poor supply and low demand for mental health services, thus warranting interventions that increase supply and stimulate demand.

Increasing supply. Resources for mental health care are extremely limited in low-income countries (Figure 7) and people living in poverty often lack access to basic mental health care (Thirunavukarasu and Thirunavukarasu, 2010). However, cost-effective and scalable strategies for treating mental illness in low-resource settings do exist. A substantial evidence base from multiple countries shows that ‘psychosocial’ treatments, such as manualized talk therapies can be highly effective at low cost, even when delivered by non-specialist community health workers (Singla et al., 2017; Patel et al., 2011). Digitally delivered psychological therapies also show promise (Carlbring et al., 2018). Such technologies could highly cost-effectively improve mental health at scale, with future research examining implementa-

tion factors which influence population-level effectiveness.

Stimulating demand. Even in settings with affordable and effective mental health services, many people do not seek or adhere to treatment (Patel et al., 2016). People often lack mental health literacy i.e., basic information about mental health conditions and their risk factors, symptoms, and potential treatment options (Jorm, 2000). Stigma and shame can further depress demand for mental health services. Examples exist of successful community-based programs to increase mental-health literacy and boost the share of mentally-ill individuals who seek treatment (Shidhaye et al., 2017). A priority for future work should be the evaluation of such programs at scale, as well as testing novel approaches such as bundling mental health treatments with other unstigmatized services, subsidizing or even rewarding take-up of treatment, or using remote technologies such as app-based therapy that are less prone to stigma.

Poverty traps. Despite the wealth of evidence described above, we are still only beginning to understand the long-run effects of different interventions and policies targeting mental illness among those living in poverty and the impact of economic policies on population mental health. The bi-directional relationship between poverty and mental ill-health points to the existence of a psychological poverty trap i.e., the idea that some of those living in poverty are ensnared in a vicious cycle of poverty and mental illness (Lund et al., 2010). The underlying idea is that poverty reinforces itself by interfering with people’s ability to earn income and to accumulate wealth, in this case through causing poor mental health, which in turn hinders earnings. If these feedback effects are strong enough, a one-time intervention of sufficient magnitude could ‘push’ people into a state of permanently higher income and better mental health. While intuitive, the quantitative condition for poverty traps is fairly demanding: a steep relationship in both directions is required (Barrett et al., 2016). Recent evidence from ultra-poor graduation programs is consistent with the existence of poverty traps, but the underlying mechanisms are not well-understood (Bandiera et al., 2017; Banerjee et al., 2016). Mental health could play a key role. More interdisciplinary research is needed to understand the root causes and long-run solutions to poverty and mental illness.

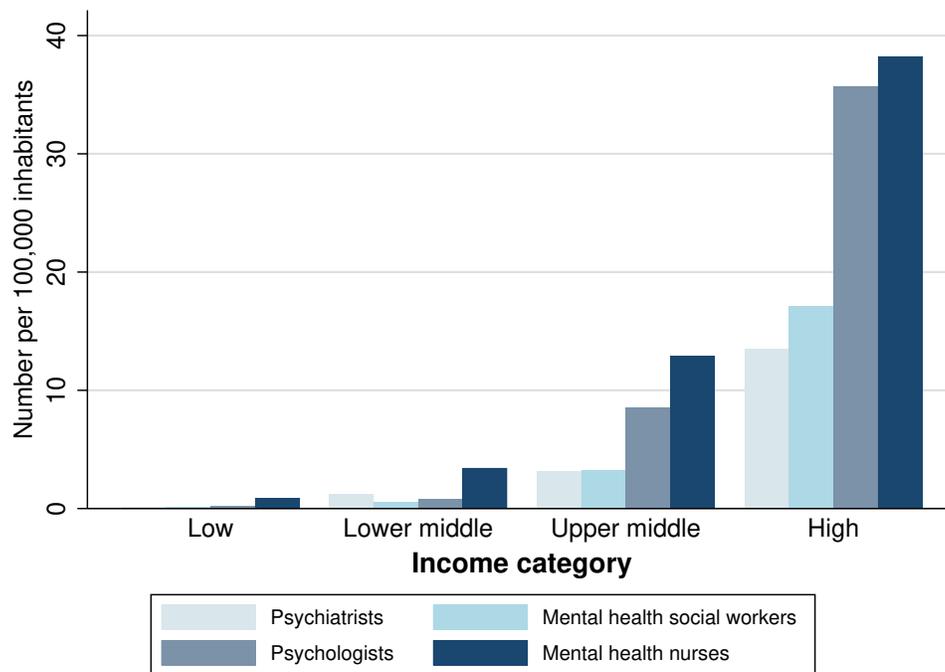


Figure 7: Availability of Mental Health Workers across Countries. This graph plots the mean numbers of psychiatrists, social workers, psychologists and nurses working in the mental health sector (per 100,000 people) for countries in each of the four income categories used by the World Bank. Data on mental health workers comes from the WHO’s Global Health Observatory, accessible at <http://apps.who.int/gho/data/node.main.MHHR?lang=en>, and is for the most recent year available (which ranges from 2013-2017).

Box 4: Priorities for Future Research on Poverty and Common Mental Illnesses

1. Measurement of mental health in economic surveys to estimate:
 - The comparative impacts of diverse economic interventions such as insurance, social safety, and employment support, relative to cash transfers
 - The longer-run effects of anti-poverty programs
 - The effects of absolute versus relative poverty
 - The effect of technological change and globalization on high and low-wage workers
 - The impact of the looming economic recession resulting from COVID-19
2. Measurement of economic outcomes in intervention studies for depression and anxiety, including:
 - Income, labor supply, productivity and profits from self-employment
 - Economic preferences and beliefs; investment and savings behaviors
 - Household expenditures and consumption, including within-household allocation of resources
3. Evaluations of interventions to reduce stigma and to boost demand for mental health care, including:
 - Diverse mental health literacy approaches, from mass-media campaigns to grass-root awareness building
 - Subsidies and incentives for seeking and engaging with mental health care
 - The effects of interventions on marginalized and under-served communities
4. Evaluating technologies to increase the coverage of effective psychotherapies, including:
 - Text, phone or video-delivery
 - Digital approaches to training, supervision, and quality assurance for front-line providers
 - AI bot-based and other guided self-help approaches, adapted to different languages and cultural contexts
5. Evaluating interventions to interrupt the intergenerational transmission of poverty and mental illness, for example through:
 - School mental health promotion programs, measuring effects also on educational attainment, labor supply, productivity, and earnings
 - Treating parental mental illness, measuring effects on children's cognitive and educational outcomes

References

- Adams-Prassl, Abi, Teodora Boneva, Marta Golin, and Christopher Rauh**, “Inequality in the Impact of the Coronavirus Shock: Evidence from Real Time Surveys,” 2020.
- Adhvaryu, Achyuta, James Fenske, and Anant Nyshadham**, “Early Life Circumstance and Adult Mental Health,” *J. Polit. Econ.*, August 2019, *127* (4), 1516–1549.
- Allcott, Hunt, Luca Braghieri, Sarah Eichmeyer, and Matthew Gentzkow**, “The Welfare Effects of Social Media,” Technical Report, National Bureau of Economic Research, Cambridge, MA January 2019.
- Alloush, Mohamad**, “Income, psychological well-being, and the dynamics of poverty: Evidence from South Africa,” 2018.
- Angeles, Gustavo, Jacobus de Hoop, Sudhanshu Handa, Kelly Kilburn, Annamaria Milazzo, and Amber Peterman**, “Government of Malawi’s unconditional cash transfer improves youth mental health,” *Soc. Sci. Med.*, 2019, *225* (C), 108–119.
- Apouey, Benedicte and Andrew E Clark**, “Winning Big but Feeling no Better? The Effect of Lottery Prizes on Physical and Mental Health,” *Health Econ.*, May 2015, *24* (5), 516–538.
- Armstrong, Thomas and Bunmi O Olatunji**, “Eye tracking of attention in the affective disorders: A meta-analytic review and synthesis,” *Clin. Psychol. Rev.*, December 2012, *32* (8), 704–723.
- Arvind, Banavaram Anniappan, Gopalkrishna Gururaj, Santosh Loganathan, Senthil Amudhan, Mathew Varghese, Vivek Benegal, Girish N Rao, Arun Mahadeo Kokane, B S Chavan, P K Dalal, Daya Ram, Kangkan Pathak, Lenin Singh R K, Lokesh Kumar Singh, Pradeep Sharma, Pradeep Kumar Saha, C Ramasubramanian, Ritambhara Y Mehta, and T M Shibukumar**, “Prevalence and socioeconomic impact of depressive disorders in India: multisite population-based cross-sectional study,” *BMJ Open*, June 2019, *9* (6), e027250.
- Autor, David H, David Dorn, and Gordon H Hanson**, “The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade,” *Annu. Rev. Econom.*, October 2016, *8* (1), 205–240.
- Baird, Sarah, Jacobus de Hoop, and Berk Özler**, “Income Shocks and Adolescent Mental Health,” *J. Hum. Resour.*, March 2013, *48* (2), 370–403.
- Bandiera, Oriana, Robin Burgess, Narayan Das, Selim Gulesci, Imran Rasul, and Munshi Sulaiman**, “Labor Markets and Poverty in Village Economies,” *Q. J. Econ.*, May 2017, *132* (2), 811–870.

- Banerjee, Abhijit, Esther Duflo, Nathanael Goldberg, Dean Karlan, Robert Osei, William Parienté, Jeremy Shapiro, Bram Thuysbaert, and Christopher Udry**, “A multifaceted program causes lasting progress for the very poor: Evidence from six countries,” *Science*, May 2015, 348 (6236).
- , – , **Raghavendra Chattopadhyay, and Jeremy Shapiro**, “The long term impacts of a “Graduation” program: Evidence from West Bengal,” *Unpublished paper, Massachusetts Institute of Technology, Cambridge, MA*, 2016.
- , **Paul Niehaus, and Tavneet Suri**, “Universal Basic Income in the Developing World,” Technical Report, National Bureau of Economic Research, Cambridge, MA February 2019.
- Banks, Lena Morgon, Hannah Kuper, and Sarah Polack**, “Correction: Poverty and disability in low- and middle-income countries: A systematic review,” September 2018.
- Baranov, Victoria, Sonia R Bhalotra, Pietro Biroli, and Joanna Maselko**, “Maternal Depression, Women’s Empowerment, and Parental Investment: Evidence from a Large Randomized Control Trial,” December 2017.
- Barrett, Christopher B, Teevrat Garg, and Linden McBride**, “Well-Being Dynamics and Poverty Traps,” *Annu. Rev. Resour. Econ.*, October 2016, 8 (1), 303–327.
- Bayer, Ya’akov M, Ze’ev Shtudiner, Oxsana Suhorukov, and Nimrod Grisaru**, “Time and Risk Preferences, and Consumption Decisions of Patients with Clinical Depression,” July 2018.
- Beck, Aaron T**, *Depression*, University of Pennsylvania Press, 1967.
- Bedoya, Guadalupe, Aidan Coville, Johannes Haushofer, Mohammad Isaqzadeh, and Jeremy Shapiro**, “No Household Left Behind: Afghanistan Targeting the Ultra Poor Impact Evaluation,” June 2019.
- Berry, Helen L, Thomas D Waite, Keith B G Dear, Anthony G Capon, and Virginia Murray**, “The case for systems thinking about climate change and mental health,” *Nat. Clim. Chang.*, April 2018, 8 (4), 282–290.
- Bessone, Pedro, Gautam Rao, Frank Schilbach, Heather Schofield, and Mattie Toma**, “The Economic Consequences of Increasing Sleep Among the Urban Poor,” February 2020.
- Biasi, Barbara, Michael S Dahl, and Petra Moser**, “Career Effects of Mental Health,” October 2019.
- Blair, Clancy and C Cybele Raver**, “Poverty, Stress, and Brain Development: New Directions for Prevention and Intervention,” *Acad. Pediatr.*, April 2016, 16 (3), S30–S36.
- Blattman, Chris, Simon Franklin, and Stefan Dercon**, “Impacts of industrial and entrepreneurial jobs on youth: 5-year experimental evidence on factory job offers and cash grants in Ethiopia,” April 2019.

- Blattman, Christopher, Eric P Green, Julian C Jamison, M Christian Lehmann, and Jeannie Annan**, “The Returns to Microenterprise Support Among the Ultra-Poor: A Field Experiment in Post-War Uganda,” June 2015.
- , **Julian C Jamison, and Margaret Sheridan**, “Reducing Crime and Violence: Experimental Evidence from Cognitive Behavioral Therapy in Liberia,” *Am. Econ. Rev.*, April 2017, *107* (4), 1165–1206.
- , **Nathan Fiala, and Sebastian Martinez**, “The Long Term Impacts of Grants on Poverty: 9-Year Evidence from Uganda’s Youth Opportunities Program,” April 2019.
- Bleakley, Hoyt**, “Health, Human Capital, and Development,” *Annu. Rev. Econom.*, September 2010, *2* (1), 283–310.
- Brhlikova, Petra, Allyson M Pollock, and Rachel Manners**, “Global Burden of Disease estimates of depression – how reliable is the epidemiological evidence?,” *J. R. Soc. Med.*, January 2011, *104* (1), 25–34.
- Burke, Marshall, Solomon M Hsiang, and Edward Miguel**, “Climate and Conflict,” *Annu. Rev. Econom.*, August 2015, *7* (1), 577–617.
- Cacioppo, John T, Mary Elizabeth Hughes, Linda J Waite, Louise C Hawkey, and Ronald A Thisted**, “Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses,” *Psychol. Aging*, March 2006, *21* (1), 140–151.
- Carlbring, Per, Gerhard Andersson, Pim Cuijpers, Heleen Riper, and Erik Hedman-Lagerlöf**, “Internet-based vs. face-to-face cognitive behavior therapy for psychiatric and somatic disorders: an updated systematic review and meta-analysis,” *Cogn. Behav. Ther.*, January 2018, *47* (1), 1–18.
- Carleton, Tamma A**, “Crop-damaging temperatures increase suicide rates in India,” *Proc. Natl. Acad. Sci. U. S. A.*, August 2017, *114* (33), 8746–8751.
- Case, Anne and Angus Deaton**, “Deaths of Despair and the Future of Capitalism,” 2020.
- Cesarini, David, Erik Lindqvist, Robert Östling, and Björn Wallace**, “Wealth, Health, and Child Development: Evidence from Administrative Data on Swedish Lottery Players,” *Q. J. Econ.*, May 2016, *131* (2), 687–738.
- Chisholm, Dan, Kim Sweeny, Peter Sheehan, Bruce Rasmussen, Filip Smit, Pim Cuijpers, and Shekhar Saxena**, “Scaling-up treatment of depression and anxiety: a global return on investment analysis,” *The Lancet Psychiatry*, May 2016, *3* (5), 415–424.
- Christian, Cornelius, Lukas Hensel, and Christopher Roth**, “Income Shocks and Suicides: Causal Evidence From Indonesia,” *Rev. Econ. Stat.*, December 2019, *101* (5), 905–920.
- Cobb-Clark, Deborah A, Sarah Dahmann, and Nathan Kettlewell**, “Depression, risk preferences and risk-taking behavior,” Technical Report 12285, Institute for the Study of Labor (IZA) May 2019.

- Collins, Daryl, Jonathan Morduch, Stuart Rutherford, and Orlanda Ruthven,** *Portfolios of the Poor: How the World's Poor Live on \$2 a Day*, Princeton University Press, 2009.
- Cuijpers, Pim, Erica Weitz, Eirini Karyotaki, Judy Garber, and Gerhard Andersson,** "The effects of psychological treatment of maternal depression on children and parental functioning: a meta-analysis," *Eur. Child Adolesc. Psychiatry*, February 2015, *24* (2), 237–245.
- Cunradi, Carol B, Raul Caetano, Catherine Clark, and John Schafer,** "Neighborhood Poverty as a Predictor of Intimate Partner Violence Among White, Black, and Hispanic Couples in the United States: A Multilevel Analysis," *Ann. Epidemiol.*, July 2000, *10* (5), 297–308.
- Cutler, David M, Adriana Lleras-Muney, and Tom Vogl,** "Socioeconomic Status and Health: Dimensions and Mechanisms," September 2008.
- Das, Jishnu, Quy-Toan Do, Jed Friedman, and David McKenzie,** "Mental Health Patterns and Consequences: Results from Survey Data in Five Developing Countries," *World Bank Econ. Rev.*, January 2009, *23* (1), 31–55.
- de Quidt, Jonathan and Johannes Haushofer,** "Depression for Economists," Technical Report, National Bureau of Economic Research, Cambridge, MA December 2016.
- Dean, Emma Boswell, Frank Schilbach, and Heather Schofield,** "Poverty and cognitive function," *The economics of poverty traps*, 2018, pp. 57–118.
- Desjarlais, Robert,** *World Mental Health: Problems and Priorities in Low-income Countries*, Oxford University Press, 1995.
- Ding, N, H Berry, and L O'Brien,** "The Effect of Extreme Heat on Mental Health – Evidence from Australia," *Int. J. Epidemiol.*, October 2015, *44* (suppl_1), i64–i64.
- Dücker, Michel L A, Lennart Reifels, Derek P De Beurs, and Chris R Brewin,** "The vulnerability paradox in global mental health and its applicability to suicide," *Br. J. Psychiatry*, October 2019, *215* (4), 588–593.
- Duflo, Esther and Abhijit Banerjee,** "The economic lives of the poor," *J. Econ. Perspect.*, 2007, *21* (1), 141–167.
- Egger, Dennis, Johannes Haushofer, Edward Miguel, Paul Niehaus, and Michael W Walker,** "General Equilibrium Effects of Cash Transfers: Experimental Evidence from Kenya," December 2019.
- Eil, David and Justin M Rao,** "The Good News-Bad News Effect: Asymmetric Processing of Objective Information about Yourself," *American Economic Journal: Microeconomics*, May 2011, *3* (2), 114–138.

- Finkelstein, Amy, Sarah Taubman, Bill Wright, Mira Bernstein, Jonathan Gruber, Joseph P Newhouse, Heidi Allen, Katherine Baicker, and Oregon Health Study Group**, “The Oregon health insurance experiment: Evidence from the first year,” *Q. J. Econ.*, August 2012, *127* (3), 1057–1106.
- Frasquilho, Diana, Margarida Gaspar Matos, Ferdinand Salonna, Diogo Guerreiro, Cláudia C Storti, Tânia Gaspar, and José M Caldas de Almeida**, “Mental health outcomes in times of economic recession: a systematic literature review,” *BMC Public Health*, February 2016, *16* (1), 115.
- Goodman, Lisa A, Katya Fels Smyth, Angela M Borges, and Rachel Singer**, “When Crises Collide: How Intimate Partner Violence and Poverty Intersect to Shape Women’s Mental Health and Coping?,” *Trauma Violence Abuse*, October 2009, *10* (4), 306–329.
- Gotlib, Ian H and Jutta Joormann**, “Cognition and Depression: Current Status and Future Directions,” March 2010.
- Green, E P, C Blattman, J Jamison, and J Annan**, “Does poverty alleviation decrease depression symptoms in post-conflict settings? A cluster-randomized trial of microenterprise assistance in Northern Uganda,” *Global Mental Health*, 2016, *3*.
- Ha, J H, S Y Kim, S C Bae, S Bae, H Kim, M Sim, I K Lyoo, and S C Cho**, “Depression and Internet Addiction in Adolescents,” *Psychopathology*, 2007, *40* (6), 424–430.
- Hakulinen, C, M Elovainio, M Arffman, S Lumme, S Pirkola, I Keskimäki, K Manderbacka, and P Böckerman**, “Mental disorders and long-term labour market outcomes: nationwide cohort study of 2 055 720 individuals,” *Acta Psychiatr. Scand.*, October 2019, *140* (4), 371–381.
- Harvey, Allison G**, “Sleep and Circadian Functioning: Critical Mechanisms in the Mood Disorders?,” March 2011.
- Haushofer, Johannes and Ernst Fehr**, “On the psychology of poverty,” 2014.
- **and Jeremy Shapiro**, “The Short-term Impact of Unconditional Cash Transfers to the Poor: Experimental Evidence from Kenya*,” *Q. J. Econ.*, November 2016, *131* (4), 1973–2042.
- **and –**, “The long-term impact of unconditional cash transfers: experimental evidence from Kenya,” *Busara Center for Behavioral Economics, Nairobi, Kenya*, 2018.
- **, Charlotte Ringdal, Jeremy P Shapiro, and Xiao Yu Wang**, “Income Changes and Intimate Partner Violence: Evidence from Unconditional Cash Transfers in Kenya,” March 2019.
- **, Robert Mudida, and Jeremy Shapiro**, “The Comparative Impact of Cash Transfers and Psychotherapy on Psychological and Economic Well-being,” February 2020.

- Heckman, James J and Stefano Mosso**, “The Economics of Human Development and Social Mobility,” *Annu. Rev. Econom.*, August 2014, *6* (1), 689–733.
- Hjelm, Lisa, Sudhanshu Handa, Jacobus de Hoop, and Tia Palermo**, “Poverty and perceived stress: Evidence from two unconditional cash transfer programs in Zambia,” *Soc. Sci. Med.*, March 2017, *177*, 110–117.
- Iemmi, Valentina, Jason Bantjes, Ernestina Coast, Kerrie Channer, Tiziana Leone, David McDaid, Alexis Palfreyman, Bevan Stephens, and Crick Lund**, “Suicide and poverty in low-income and middle-income countries: a systematic review,” *The Lancet Psychiatry*, August 2016, *3* (8), 774–783.
- James, Spencer L, Degu Abate, Kalkidan Hassen Abate, Solomon M Abay, Cristiana Abbafati, Nooshin Abbasi, Hedayat Abbastabar, Foad Abd-Allah, Jemal Abdela, Ahmed Abdelalim, and Others**, “Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017,” *Lancet*, 2018, *392* (10159), 1789–1858.
- Jia, Zhen, Yongjie Wei, Xiaoqian Li, Lixin Yang, Huijie Liu, Chen Guo, Lulu Zhang, Nannan Li, Shaojuan Guo, Yan Qian, and Zhigang Li**, “Exposure to Ambient Air Particles Increases the Risk of Mental Disorder: Findings from a Natural Experiment in Beijing,” *Int. J. Environ. Res. Public Health*, January 2018, *15* (1), 160.
- Jorm, A F**, “Mental health literacy: Public knowledge and beliefs about mental disorders,” *Br. J. Psychiatry*, November 2000, *177* (5), 396–401.
- Kaur, Supreet, Sendhil Mullainathan, and Frank Schilbach**, “Does Financial Strain Lower Productivity?,” 2019.
- Kessler, Ronald, G Amminger, Sergio Aguilar-Gaxiola, Jordi Alonso, Sing Lee, and T Ü**, “Age of onset of mental disorders: a review of recent literature,” *Curr. Opin. Psychiatry*, July 2007, *20* (4), 359–364.
- Kilburn, Kelly, Harsha Thirumurthy, Carolyn Tucker Halpern, Audrey Pettifor, and Sudhanshu Handa**, “Effects of a Large-Scale Unconditional Cash Transfer Program on Mental Health Outcomes of Young People in Kenya,” *J. Adolesc. Health Care*, February 2016, *58* (2), 223–229.
- Kohn, Robert, Shekhar Saxena, Itzhak Levav, and Benedetto Saraceno**, “The treatment gap in mental health care,” *Bull. World Health Organ.*, November 2004, *82*, 858–866.
- Korn, C W, T Sharot, H Walter, H R Heekeren, and R J Dolan**, “Depression is related to an absence of optimistically biased belief updating about future life events,” *Psychol. Med.*, February 2014, *44* (3), 579–592.

- Kremer, Michael, Gautam Rao, and Frank Schilbach**, “Chapter 5 - Behavioral development economics,” in B Douglas Bernheim, Stefano DellaVigna, and David Laibson, eds., *Handbook of Behavioral Economics: Applications and Foundations 1*, Vol. 2, North-Holland, January 2019, pp. 345–458.
- Kroenke, Kurt and Robert L Spitzer**, “The PHQ-9: a new depression diagnostic and severity measure,” *Psychiatr. Ann.*, 2002, *32* (9), 509–515.
- Kuhn, Andreas, Rafael Lalive, and Josef Zweimüller**, “The public health costs of job loss,” *J. Health Econ.*, December 2009, *28* (6), 1099–1115.
- Lauber, Christoph and Wulf Rössler**, “Stigma towards people with mental illness in developing countries in Asia,” *Int. Rev. Psychiatry*, January 2007, *19* (2), 157–178.
- Layard, Richard, John F Helliwell, and Jeffrey D Sachs**, “World Happiness Report 2012,” Technical Report, Earth Institute, Columbia University 2012.
- Lin, Liu Yi, Jaime E Sidani, Ariel Shensa, Ana Radovic, Elizabeth Miller, Jason B Colditz, Beth L Hoffman, Leila M Giles, and Brian A Primack**, “Association Between Social Media Use and Depression Among U.S. Adults,” *Depress. Anxiety*, April 2016, *33* (4), 323–331.
- Lindqvist, Erik, Robert Östling, and David Cesarini**, “Long-run Effects of Lottery Wealth on Psychological Well-being,” May 2018.
- Ludwig, Jens, Greg J Duncan, Lisa A Gennetian, Lawrence F Katz, Ronald C Kessler, Jeffrey R Kling, and Lisa Sanbonmatsu**, “Neighborhood Effects on the Long-Term Well-Being of Low-Income Adults,” *Science*, September 2012, *337* (6101), 1505–1510.
- Lund, Crick, Alison Breen, Alan J Flisher, Ritsuko Kakuma, Joanne Corrigall, John A Joska, Leslie Swartz, and Vikram Patel**, “Poverty and common mental disorders in low and middle income countries: A systematic review,” *Soc. Sci. Med.*, August 2010, *71* (3), 517–528.
- , **Kate Orkin, Marc Witte, Thandi Davies, Johannes Haushofer, Judy Bass, Paul Bolton, Sarah Murray, Laura Murray, Wietse Tol, Graham Thornicroft, and Vikram Patel**, “The economic effects of mental health interventions in low and middle-income countries,” Technical Report, Working Paper 2019.
- , **Mary De Silva, Sophie Plagerson, Sara Cooper, Dan Chisholm, Jishnu Das, Martin Knapp, and Vikram Patel**, “Poverty and mental disorders: breaking the cycle in low-income and middle-income countries,” *Lancet*, October 2011, *378* (9801), 1502–1514.
- , **Stephen Stansfeld, and Mary De Silva**, “Social determinants of mental health,” *Global mental health: Principles and practice*, 2014, pp. 116–136.

- Mall, Sumaya, Crick Lund, Gemma Vilagut, Jordi Alonso, David R Williams, and Dan J Stein**, “Days out of role due to mental and physical illness in the South African stress and health study,” *Soc. Psychiatry Psychiatr. Epidemiol.*, March 2015, *50* (3), 461–468.
- Manber, Rachel, Jack D Edinger, Jenna L Gress, Melanie G San Pedro-Salcedo, Tracy F Kuo, and Tasha Kalista**, “Cognitive Behavioral Therapy for Insomnia Enhances Depression Outcome in Patients with Comorbid Major Depressive Disorder and Insomnia,” *Sleep*, April 2008, *31* (4), 489–495.
- Mani, Anandi, Sendhil Mullainathan, Eldar Shafir, and Jiaying Zhao**, “Poverty Impedes Cognitive Function,” *Science*, August 2013, *341* (6149), 976–980.
- Marmot, Michael**, “Social determinants of health inequalities,” *Lancet*, March 2005, *365* (9464), 1099–1104.
- Masson-Delmotte, Valérie**, *Global Warming of 1.5 OC: An IPCC Special Report on the Impacts of Global Warming of 1.5 degrees C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*, World Meteorological Organization, 2018.
- McMichael, Celia, Jon Barnett, and Anthony J McMichael**, “An Ill Wind? Climate Change, Migration, and Health,” *Environ. Health Perspect.*, May 2012, *120* (5), 646–654.
- Milanovic, Branko**, *Global Inequality: A New Approach for the Age of Globalization*, Harvard University Press, April 2016.
- Mojtabai, Ramin, Elizabeth A Stuart, Irving Hwang, Ryoko Susukida, William W Eaton, Nancy Sampson, and Ronald C Kessler**, “Long-term effects of mental disorders on employment in the National Comorbidity Survey ten-year follow-up,” *Soc. Psychiatry Psychiatr. Epidemiol.*, 2015, *50* (11), 1657–1668.
- Mosquera, Roberto, Mofioluwademi Odunowo, Trent McNamara, Xiongfei Guo, and Ragan Petrie**, “The economic effects of Facebook,” *Exp. Econ.*, 2019, pp. 1–28.
- Murray, Christopher J L, Alan D Lopez, World Health Organization, and Others**, “The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries, and risk factors in 1990 and projected to 2020: summary,” Technical Report, World Health Organization 1996.
- Noble, Kimberly G, Suzanne M Houston, Natalie H Brito, Hauke Bartsch, Eric Kan, Joshua M Kuperman, Natacha Akshoomoff, David G Amaral, Cinnamon S Bloss, Ondrej Libiger, Nicholas J Schork, Sarah S Murray, B J Casey, Linda Chang, Thomas M Ernst, Jean A Frazier, Jeffrey R Gruen, David N Kennedy, Peter Van Zijl, Stewart Mostofsky, Walter E Kaufmann, Tal Kenet, Anders M Dale, Terry L Jernigan, and Elizabeth R Sowell**, “Family income, parental education and brain structure in children and adolescents,” *Nat. Neurosci.*, May 2015, *18* (5), 773–778.

- Olesen, Sarah C, Peter Butterworth, Liana S Leach, Margaret Kelaher, and Jane Pirkis, “Mental health affects future employment as job loss affects mental health: findings from a longitudinal population study,” *BMC Psychiatry*, May 2013, *13* (1), 144.
- Patel, V, R Araya, N Chowdhary, M King, B Kirkwood, S Nayak, G Simon, and H A Weiss, “Detecting common mental disorders in primary care in India: a comparison of five screening questionnaires,” *Psychol. Med.*, February 2008, *38* (2), 221–228.
- Patel, Vikram, Benedict Weobong, Helen A Weiss, Arpita Anand, Bhargav Bhat, Basavraj Katti, Sona Dimidjian, Ricardo Araya, Steve D Hollon, Michael King, Lakshmi Vijayakumar, A-La Park, David McDaid, Terry Wilson, Richard Velleman, Betty R Kirkwood, and Christopher G Fairburn, “The Healthy Activity Program (HAP), a lay counsellor-delivered brief psychological treatment for severe depression, in primary care in India: a randomised controlled trial,” *Lancet*, January 2017, *389* (10065), 176–185.
- , Gregory Simon, Neerja Chowdhary, Sylvia Kaaya, and Ricardo Araya, “Packages of Care for Depression in Low- and Middle-Income Countries,” *PLoS Med.*, 2009, *6* (10), e1000159.
- , Neerja Chowdhary, Atif Rahman, and Helen Verdelli, “Improving access to psychological treatments: Lessons from developing countries,” *Behav. Res. Ther.*, September 2011, *49* (9), 523–528.
- , Shuiyuan Xiao, Hanhui Chen, Fahmy Hanna, A T Jotheeswaran, Dan Luo, Rachana Parikh, Eesha Sharma, Shamaila Usmani, Yu Yu, Benjamin G Druss, and Shekhar Saxena, “The magnitude of and health system responses to the mental health treatment gap in adults in India and China,” *Lancet*, December 2016, *388* (10063), 3074–3084.
- Patton, George C, Susan M Sawyer, John S Santelli, David A Ross, Rima Affi, Nicholas B Allen, Monika Arora, Peter Azzopardi, Wendy Baldwin, Christopher Bonell, Ritsuko Kakuma, Elissa Kennedy, Jaqueline Mahon, Terry McGovern, Ali H Mokdad, Vikram Patel, Suzanne Petroni, Nicola Reavley, Kikelomo Taiwo, Jane Waldfogel, Dakshitha Wickremarathne, Carmen Barroso, Zulfiqar Bhutta, Adesegun O Fatusi, Amitabh Mattoo, Judith Diers, Jing Fang, Jane Ferguson, Frederick Ssewamala, and Russell M Viner, “Our future: a Lancet commission on adolescent health and wellbeing,” *Lancet*, June 2016, *387* (10036), 2423–2478.
- Paxson, Christina and Norbert Schady, “Does Money Matter? The Effects of Cash Transfers on Child Development in Rural Ecuador,” *Econ. Dev. Cult. Change*, 2010, *59* (1), 187–229.
- Perez-Truglia, Ricardo, “The Effects of Income Transparency on Well-Being: Evidence from a Natural Experiment,” February 2019.

- Persson, Petra and Maya Rossin-Slater**, “Family Ruptures, Stress, and the Mental Health of the Next Generation,” *Am. Econ. Rev.*, 2018, *108* (4-5), 1214–1252.
- Pescosolido, Bernice A, Tait R Medina, Jack K Martin, and J Scott Long**, “The “Backbone” of Stigma: Identifying the Global Core of Public Prejudice Associated With Mental Illness,” *Am. J. Public Health*, May 2013, *103* (5), 853–860.
- Pierce, Justin R and Peter K Schott**, “Trade Liberalization and Mortality: Evidence from U.S. Counties,” November 2016.
- Prinz, Daniel, Michael Chernew, David Cutler, and Austin Frakt**, “Health and Economic Activity Over the Lifecycle: Literature Review,” Technical Report, National Bureau of Economic Research, Cambridge, MA July 2018.
- Rubin, Donald B**, “Estimation in Parallel Randomized Experiments,” *J. Educ. Behav. Stat.*, December 1981, *6* (4), 377–401.
- Sareen, Jitender, Tracie O Affi, Katherine A McMillan, and Gordon J G Asmundson**, “Relationship Between Household Income and Mental Disorders: Findings From a Population-Based Longitudinal Study,” *Arch. Gen. Psychiatry*, April 2011, *68* (4), 419–427.
- Saxena, Shekhar, Pratap Sharan, Marco Garrido, and Benedetto Saraceno**, “World Health Organization’s Mental Health Atlas 2005: implications for policy development,” *World Psychiatry*, October 2006, *5* (3), 179–184.
- Scott, Kate M, Carmen Lim, Ali Al-Hamzawi, Jordi Alonso, Ronny Bruffaerts, José Miguel Caldas de Almeida, Silvia Florescu, Giovanni de Girolamo, Chiyi Hu, Peter de Jonge, Norito Kawakami, Maria Elena Medina-Mora, Jacek Moskalewicz, Fernando Navarro-Mateu, Siobhan O’Neill, Marina Piazza, José Posada-Villa, Yolanda Torres, and Ronald C Kessler**, “Association of Mental Disorders With Subsequent Chronic Physical Conditions: World Mental Health Surveys From 17 Countries,” *JAMA Psychiatry*, February 2016, *73* (2), 150–158.
- Sharac, Jessica, Paul Mccrone, Sarah Clement, and Graham Thornicroft**, “The economic impact of mental health stigma and discrimination: A systematic review,” *Epidemiol. Psychiatr. Sci.*, September 2010, *19* (3), 223–232.
- Sharkey, Patrick, Max Besbris, and Michael Friedson**, “Poverty and Crime,” in David Brady And Linda, ed., *The Oxford Handbook of the Social Science of Poverty*, Oxford University Press, May 2016.
- Shen, Chan, Usha Sambamoorthi, and George Rust**, “Co-occurring Mental Illness and Health Care Utilization and Expenditures in Adults with Obesity and Chronic Physical Illness,” *Dis. Manag.*, June 2008, *11* (3), 153–160.

- Shidhaye, Rahul, Vaibhav Murhar, Siddharth Gangale, Luke Aldridge, Rahul Shastri, Rachana Parikh, Ritu Shrivastava, Suvarna Damle, Tasneem Raja, Abhijit Nadkarni, and Vikram Patel**, “The effect of VISHRAM, a grass-roots community-based mental health programme, on the treatment gap for depression in rural communities in India: a population-based study,” 2017.
- Singla, Daisy R, Brandon A Kohrt, Laura K Murray, Arpita Anand, Bruce F Chorpita, and Vikram Patel**, “Psychological Treatments for the World: Lessons from Low- and Middle-Income Countries,” *Annual Reviews*, May 2017.
- Spitzer, Robert L, Kurt Kroenke, Janet B W Williams, and Bernd Löwe**, “A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7,” *Arch. Intern. Med.*, May 2006, *166* (10), 1092–1097.
- Staufenbiel, Sabine M, Brenda W J H Penninx, Anne T Spijker, Bernet M Elzinga, and Elisabeth F C van Rossum**, “Hair cortisol, stress exposure, and mental health in humans: A systematic review,” *Psychoneuroendocrinology*, August 2013, *38* (8), 1220–1235.
- Suri, Tavneet and William Jack**, “The long-run poverty and gender impacts of mobile money,” *Science*, December 2016, *354* (6317), 1288–1292.
- Tampubolon, Gindo and Wulung Hanandita**, “Poverty and mental health in Indonesia,” *Soc. Sci. Med.*, April 2014, *106*, 20–27.
- Thirunavukarasu, M and P Thirunavukarasu**, “Training and National deficit of psychiatrists in India - A critical analysis,” *Indian J. Psychiatry*, January 2010, *52* (7), 83.
- Trang, Phan Minh, Joacim Rocklöv, Kim Bao Giang, Gunnar Kullgren, and Maria Nilsson**, “Heatwaves and Hospital Admissions for Mental Disorders in Northern Vietnam,” *PLoS One*, 2016, *11* (5), e0155609.
- Vamos, Eszter Panna, Istvan Mucsi, Andras Keszei, Maria S Kopp, and Marta Novak**, “Comorbid Depression Is Associated With Increased Healthcare Utilization and Lost Productivity in Persons With Diabetes: A Large Nationally Representative Hungarian Population Survey,” *Psychosom. Med.*, June 2009, *71* (5), 501.
- Walker, Robert and Grace Bantebya-Kyomuhendo**, *The Shame of Poverty*, Oxford University Press, 2014.
- Wang, Philip S, Sergio Aguilar-Gaxiola, Jordi Alonso, Matthias C Angermeyer, Guilherme Borges, Evelyn J Bromet, Ronny Bruffaerts, Giovanni de Girolamo, Ron de Graaf, Oye Gureje, Josep Maria Haro, Elie G Karam, Ronald C Kessler, Viviane Kovess, Michael C Lane, Sing Lee, Daphna Levinson, Yutaka Ono, Maria Petukhova, José Posada-Villa, Soraya Seedat, and J Elisabeth Wells**, “Use of mental health services for anxiety, mood, and substance disorders in 17 countries in the WHO world mental health surveys,” *Lancet*, September 2007, *370* (9590), 841–850.

- Weobong, Benedict, Helen A Weiss, David McDaid, Daisy R Singla, Steven D Hollon, Abhijit Nadkarni, A-La Park, Bhargav Bhat, Basavraj Katti, Arpita Anand, and Others**, “Sustained effectiveness and cost-effectiveness of the Healthy Activity Programme, a brief psychological treatment for depression delivered by lay counsellors in primary care: 12-month follow-up of a randomised controlled trial,” *PLoS Med.*, 2017, *14* (9).
- Williams, Matt N, Stephen R Hill, and John Spicer**, “Do hotter temperatures increase the incidence of self-harm hospitalisations?,” *Psychol. Health Med.*, February 2016, *21* (2), 226–235.
- Wolfe, Barbara, Jessica Jakubowski, Robert Haveman, and Marissa Courey**, “The Income and Health Effects of Tribal Casino Gaming on American Indians,” *Demography*, May 2012, *49* (2), 499–524.
- World Health Organization**, “Promoting mental health: concepts, emerging evidence, practice: a report of the World Health Organization, Department of Mental Health and Substance Abuse,” Technical Report, WHO/Victorian Health Promotion Foundation/University of Melbourne 2005.
- Xu, Ke, David B Evans, Guido Carrin, Ana Mylena Aguilar-Rivera, Philip Musgrove, and Timothy Evans**, “Protecting Households From Catastrophic Health Spending,” *Health Aff.*, July 2007, *26* (4), 972–983.
- Xue, Tao, Tong Zhu, Yixuan Zheng, and Qiang Zhang**, “Author Correction: Declines in mental health associated with air pollution and temperature variability in China,” *Nat. Commun.*, December 2019, *10* (1).

A Meta-Analysis of the impact of poverty alleviation programs on mental health

We focused our review on experimental studies that examined the impact of two types of poverty alleviation programs across low- or middle-income countries and measured a mental health outcome. We identified RCTs that studied the impact of unconditional cash transfers or multi-faceted anti-poverty programs on mental health outcomes: depression, anxiety, stress, a mental health index, and/or psychological well-being index. We employed JSTOR, Google, and Google Scholar and used combinations of the keywords: “*cash transfer*” and “*poverty alleviation*”, with “*mental health*” and “*RCTs*”. We also reviewed the literature cited in each of the studies that met our criteria to identify additional studies. We identified 18 studies that met our criteria.

We conducted a meta-analysis using a Bayesian random effects model that was implemented using R’s baggr Rubin (1981) model with normal priors (0,0.1) on the hyper-standard deviation. Figure 4 in the main text shows the estimated treatment effects using this model, and the overall impact of anti-poverty programs was 0.131 SD (95% CI: 0.058, 0.203). Baird et al. (2013), Banerjee et al. (2015), and Banerjee et al. (2016) included multiple follow-up measures, and Haushofer and Shapiro (2018) examine the long-term impact of the study conducted by Haushofer and Shapiro (2016). In Figure 4, we only consider the final measure of each study that features multiple follow-up surveys.

Figure 8 below shows the estimated treatment effects using the model, including all available follow-up measures. The overall impact of anti-poverty programs was 0.127 SD (95% CI: 0.036, 0.213).

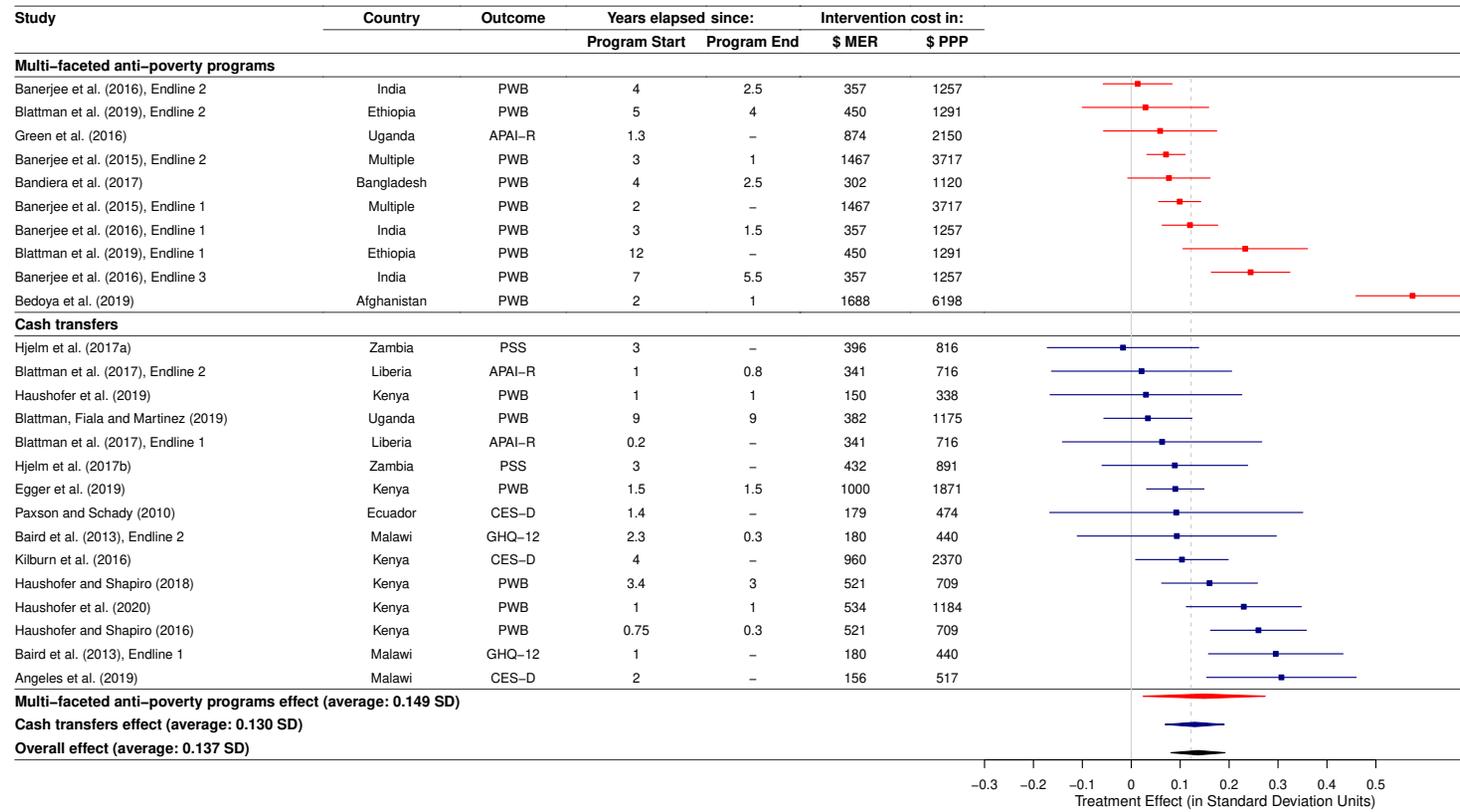


Figure 8: The impacts of anti-poverty programs on mental health. This figure plots the estimated treatment effects of RCTs evaluating various anti-poverty programs in low- or middle-income countries on indices of mental health. Outcomes are defined such that positive treatment effects imply better mental health. ‘Cash Transfers’ refers to studies of unconditional cash transfers to low-income households, with the exception of Baird et al. (2013) who study a conditional cash transfer program. ‘Multi-Faceted Anti-Poverty Programs’ refers to interventions which aimed to lift people out of poverty by providing a range of elements, typically including asset transfers, skills training, cash support, and access to savings and healthcare opportunities. Treatment effects are in standard deviation units (SD), with positive scores indicating improvements in mental health. If multiple follow-up measures were available, this figure shows all the measures. The outcomes vary across studies, and include screening instruments to detect common mental illnesses (GHQ-12) and symptoms of depression (CES-D, APAI-R), indices of psychological well-being (PWB), and a perceived stress scale (PSS). ‘Intervention cost’ refers to the total cost of the intervention, including implementation costs, when this is available; when implementation costs are unavailable (as for most of the cash transfer studies), implementation costs refer to the total undiscounted value of the transfer. ‘MER’ stands for Market Exchange Rates and ‘PPP’ stands for Purchasing Power Parity (which adjusts exchange rates to reflect the true cost of living). A missing value of years elapsed since program end means the transfer was still ongoing when outcomes were measured.

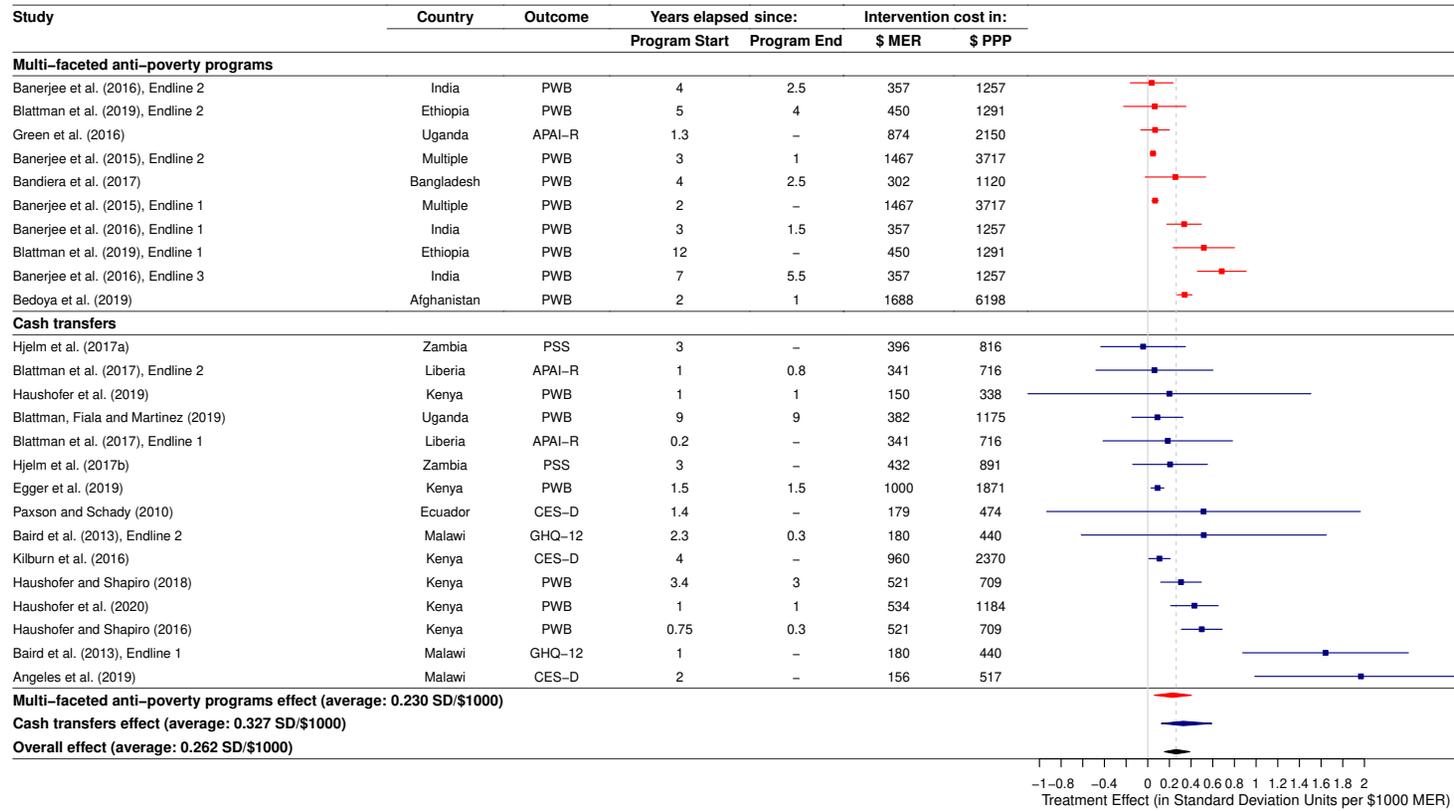


Figure 9: The impacts of anti-poverty programs on mental health, per dollar spent (at market exchange rates).

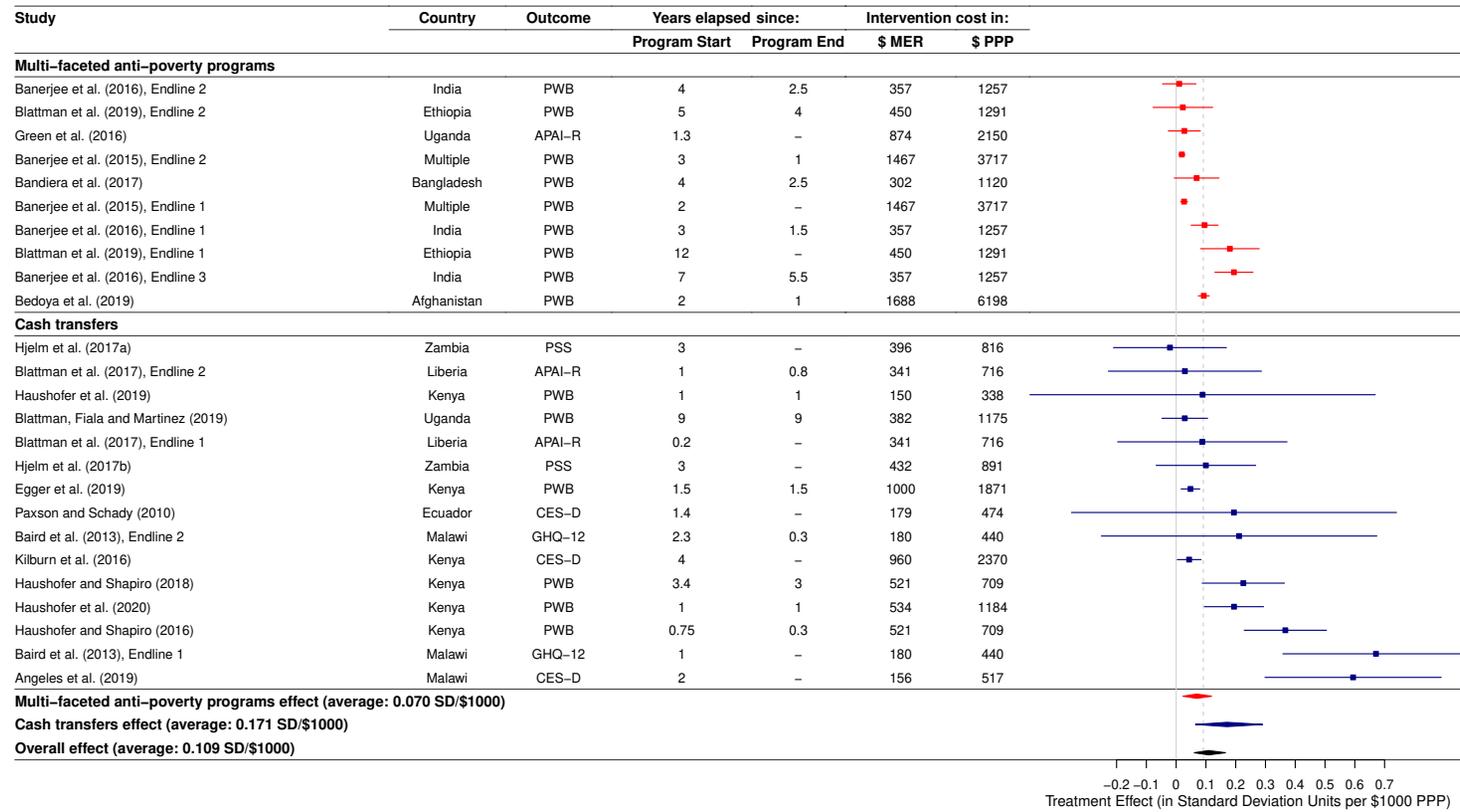


Figure 10: The impacts of anti-poverty programs on mental health, per dollar spent (at purchasing power parity).

A.1 Multi-Faceted Anti-Poverty Programs

1. **Blattman et al. (2019a)**. This study compared the impact of an industrial job offer to young, mostly female job seekers in Ethiopia with a package consisting of a cash grant (worth about \$300) and five days of microenterprise training. The number reported in this meta-analysis is the effect of the cash grant and training package on a mental health and subjective well-being index, which includes measures of depression and generalized anxiety symptoms.

The total operating cost of the cash grant and training package was \$450 MER.

2. **Green et al. (2016)**. This study examines the impact of a poverty alleviation program, Women's Income Generating Support (WINGS), on economic security and symptoms of depression of vulnerable women in Northern Uganda. The program consisted of transfers of: (i) business skills training, (ii) individual start-up grant worth \$150, and (iii) home visits to provide advice and encouragement to use the grant. The follow-up survey was conducted 1.3 years after the intervention was rolled out. They used APAIR, a locally developed short survey instrument to measure symptoms of depression.

The average cost of the program per household was \$2,150 PPP Blattman et al. (2015), and includes individual start-up grant, targeting and disbursement, supervisory visits, training (business and group dynamics), and other costs.

3. **Banerjee et al. (2015)**. This study examines the results from six RCTs that study the impact of transfers: productive asset (one time transfer), consumption support, technical skills training, high-frequency home visits, savings, and some health education. This was conducted across six different countries: Ethiopia, Ghana, Honduras, India, Pakistan, and Peru. The key outcome measures include consumption, assets, food security, finance, time use, income, physical health, mental health, political involvement, and women's decision-making. Two follow-up surveys were conducted: 2 years after the intervention (endline 1), and 3 years after the intervention (endline 2). The psychological well-being index was measured as an average of self-reported happiness, stress index, and a binary measure for experiencing anxiety (lasted more than 30 days) in the past year.

The average cost of the program per household, pooled across the six programs, was \$3,717 PPP (Table 4 in Banerjee et al. (2015)), and includes direct transfer costs (asset cost and food stipend), supervision costs, and indirect costs.

4. **Bandiera et al. (2017)**. This study evaluates an anti-poverty program in Bangladesh that transfers a productive asset (livestock) and skills to poor women, who mostly engage in seasonal casual labor. The intervention was randomized across 21,000 households (6,700 ultra-poor) in 1,309 villages. The key outcome measures include labor

supply and earnings of women, consumption, household, financial assets, and mental health. The follow-up survey was conducted 4 years after the intervention was started. The psychological well-being index was measured as an average of self-reported happiness and a binary measure for experiencing anxiety (lasted more than 30 days) in the past year.

The average cost of the program per household was \$1,120 PPP (Table 9 in Bandiera et al. (2017)).

5. **Banerjee et al. (2016)**. This study examines the long-run impact of an anti-poverty program, Bandhan’s “*Targeting the Hard Core Poor program*”, in West Bengal, India. The beneficiaries part of the program receive a productive asset, consumption support, technical skills training, general life skills coaching, savings, and some health education. The follow-up surveys were conducted at various stages: 1.5 years after the intervention (endline 1), 3 years after the intervention (endline 2), and 7 years after the intervention (endline 3). The psychological well-being index was measured as an average of self-reported happiness, stress index, and a binary measure for experiencing anxiety (lasted more than 30 days) in the past year.

The average cost of the program per household was \$1,257 PPP, and includes direct transfer costs (asset cost and food stipend), supervision costs, and indirect costs. This was estimated from Table 4 in Banerjee et al. (2015).

6. **Bedoya et al. (2019)**. This study examines the impact of a graduation program (TUP package) — consisting of a transfer of a productive asset, monthly cash transfer, basic training, health subsidy, and mentoring visits — in the Balkh region in Afghanistan. They conducted a household-level randomization of 1219 households in 80 villages, where 491 households received the TUP package. The key outcome measures include consumption, assets, financial inclusion index, psychological well-being index, women’s empowerment index, and time spent working. The program lasted for 12 months and the follow-up surveys were conducted 1 year after the program was completed. The psychological well-being index was measured as a weighted average of scores on the CES-D, the happiness and life satisfaction questions from the World Values Survey (WVS), Cohen’s stress scale, and the log cortisol levels obtained from saliva samples.

The average cost of the program per household is \$6,198 PPP (Table 9 in Bedoya et al. (2019)), and includes direct transfer costs (asset cost, food stipend, and health voucher), supervision costs, and indirect costs.

A.2 Cash Transfers

1. **Hjelm et al. (2017)**. This study uses secondary data to examine the impact of two unconditional cash transfer programs: (i) Zambia Child Grant Program (CGP) that targets households with a child under the age of five, and (ii) Zambia Multiple Cat-

egory Cash Transfer Program (MCP) that targets households under different categories.

In the figures, Hjelm et al. (2017a) is the estimated treatment effect of CGP, and Hjelm et al. (2017b) is the effect of MCP.

These programs were conducted by the Zambian Government. CGP was randomized across 90 communities and across households within treated communities, for a total sample size of 2515 households. MCP was randomized across 92 communities and across households within treated communities, for a total sample size of 3078 households. Follow-up surveys were conducted 3 years after the intervention was rolled out. The key outcome measures include stress, consumption, food security, and non-productive assets. Stress was measured using the negatively worded items from Cohen’s perceived stress scale (PSS), which (in brief) asks respondents how often they have felt upset, stressed, or that difficulties were out of control in the past 4 weeks.

Households included in the CGP and MCP programs received \$11 and \$12 per month respectively for 36 months. The average cash transfer per household under the CGP and MCP program was \$396 MER and \$432 respectively. Cost of implementation data was not available.

2. **Blattman et al. (2017)**. This study examined the effects of a cognitive behavioral therapy (CBT) program cross-randomized with an unconditional cash grant of around \$200. Key outcome measures included antisocial behavior such as crime and economic performance and preferences. In our meta-analysis we include the effects of the cash grant for those who did not receive the CBT intervention on an index of depression and mental distress, which asked about depressive symptoms, bad thoughts or feelings, and worry.

The authors report the average size of the cash grant as \$216 and the registration and administration costs for both programs as \$125, at market exchange rates. We conservatively assume that all of the latter costs are fixed and thus estimate the implementation cost of the cash transfer program as $\$216 + \$125 = \$341$.

3. **Haushofer et al. (2019)**. This study examines the impact of cash transfers and health insurance on 789 informal Kenyan workers. The workers were randomized into three groups: (i) received a free health insurance policy (ii) an unconditional cash transfer (worth the price of the policy) (iii) no intervention. The key outcome measures include insurance ownership, assets, willingness to pay for insurance, labor mobility, labor productivity, job risk, psychological well-being index, and log cortisol levels. The coverage was for 1 year and follow-up surveys were conducted a year after the completion of the program. The psychological well-being index was measured as self-reported well-being (stress and depression) and log cortisol levels.

The average cash transfer per household was \$338 PPP.

4. **Blattman et al. (2019b)**. This study revisited a randomized cash grant program, the Youth Opportunities Program (YOP) in Uganda to examine its long-term effects. While applicants had to apply in small groups and submit a business proposal, the grants were unconditional once awarded. About half of 535 eligible groups were randomized to receive the money, which for most was between \$200-\$600 per person. Key outcomes included employment, earnings, and consumption.

Implementation cost data was not available for this program; instead, we use the average grant per participant (\$382 MER).

5. **Egger et al. (2019)**. This study examines the impact of the GiveDirectly Cash Transfer Program in Kenya, across 653 villages using a two-level randomization. All households in the treatment villages, received a one-time cash transfer (\$1000 MER). The key outcome measures include economic activities, asset ownership, psychological well-being, health and nutrition. The follow-up survey was conducted 1.5 years after the intervention was rolled out. The psychological well-being index was measured using depression, happiness, life satisfaction, and stress scales.

The households received transfers in three payments: \$151 PPP for completion of enrollment, and \$860 PPP each in two installments. The average cash transfer per household was \$1871 PPP.

6. **Paxson and Schady (2010)**. This study examines the effect of an Ecuadorian cash transfer program, the *Bono de Desarrollo Humano (BDH)*, which provided unconditional cash transfers averaging \$10.51 per month to eligible mothers. The program was randomized across 77 rural and 41 urban parishes (small administrative units), though the authors only report results among rural parishes. Key outcome measures are cognitive, behavioral, and physical outcomes for children. The paper also reports effects of *BDH* on mothers' mental health as measured by the CES-D depression scale.

As implementation costs were not available, we report a rough estimate of average transfer value: $\$10.51/month \times 17months = \$179MER$ on average from start to endline.

7. **Baird et al. (2013)**. This study examines the effects of a cash transfer program — unconditional and conditional cash transfers — in Malawi on the mental health among adolescent girls. The key outcome measures include psychological well-being and school attendance. Randomization was conducted at enumerator-area level, and a sample of 3796 young women were stratified into two groups: baseline school dropouts and baseline schoolgirls. Two follow-up surveys were conducted: 1 year after the intervention was rolled out (endline 1), and 2 years after the intervention was rolled out (endline 2). In both the follow-up surveys, GHQ-12 instrument was used to measure psychological well-being; and in endline 2, MHI-5 was also used.

The monthly transfer amount varied according to the enumeration area (4to10) and the school-age (\$1 to \$5). They also covered the school fees for the girls in secondary

school, which amounted to \$60. This program was for a year. The average transfer amount per household was \$180 MER.

8. **Kilburn et al. (2016)**. This study examines the effects of Kenya’s Cash Transfer Program for Orphans and Vulnerable Children. The program was randomized across 28 locations, covering 1960 households. Treated households received monthly transfers of \$20. The key outcome measure is an indicator of depressive symptoms using the 10-question CES-D scale. The treatment effect we report in our meta-analysis is derived from the unadjusted means in the treatment and control groups reported in Table 2 of Kilburn et al. (2016). (Note standard errors are not adjusted for clustering).

Implementation cost data was not available; thus, we use the total undiscounted value of the transfer: $\$20/month \times 48months = \$960MER$.

9. **Haushofer and Shapiro (2016)**. This study examines the short-term effects of an unconditional transfer program from GiveDirectly in Kenya on poor households. Randomization was conducted at both household and village level, and within the treatment groups: gender of recipient, timing of transfer, and size of transfer. The key outcome measures include consumption, assets, financial inclusion index, and psychological well-being index. Follow-up surveys were conducted 9 months after the intervention was rolled out. The psychological well-being index was measured as a weighted average of scores on the CES-D, WVS, Cohen’s stress scale, and the log cortisol levels obtained from saliva samples.

The households received transfers in varied magnitudes: \$404 PPP and \$1,525 PPP. The average transfer amount was \$709 PPP.

10. **Haushofer and Shapiro (2018)**. This is a follow-up study to Haushofer and Shapiro (2016), and examines the long-term impacts of transfers on economic and psychological outcomes 3 years after the program by GiveDirectly in Kenya.
11. **Haushofer et al. (2020)**. This study looks at the effects of an unconditional cash transfer program in Kenya cross-randomized with five weeks of psychotherapy among 5,756 people in rural Kenya. Key outcome measures include consumption, assets and psychological well-being. Their psychological well-being index consists of the GHQ-12, Cohen’s perceived stress scale, and the happiness and life satisfaction questions from the WVS.

The value of the transfer was \$1076 PPP (\$485 MER). The authors conservatively assume a cost of delivery of 10% of the transfer value (section 4.4), reasonably given that the transfers are delivered by mobile money, implying a total implementation cost of \$1184 PPP (\$534 MER).

12. **Angeles et al. (2019)**. This study examines the impact of the Malawi Government’s Social Cash Transfer Program (SCTP) on youth mental health, with 2782 households across 29 villages. 1678 households across 14 villages received unconditional cash transfers and the recipients were encouraged to invest it in the human capital of their children

and basic needs of the households. The program spanned for 2 years and included bi-monthly payments. The follow-up surveys were conducted 2 years after the program was rolled out with the youth of the households (aged 15 - 22 year olds during follow-up). CES-D was used to measure psychological well-being.

The monthly cash transfer value varied with household size (3–7) and composition (\$1 and \$2) per primary and secondary school aged child). The program spanned two years. The average transfer amount per household was \$156 MER.