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My research agenda explores the relationship between poverty and economic behavior by investigating factors associated with poverty, including mental distress, sleep deprivation, and substance abuse. In a second line of research, I study behavioral barriers to the diffusion of information in developing countries. My work advances a broader research agenda that seeks to integrate insights from psychology and related fields into development economics. In **Behavioral Development Economics** (*Handbook of Behavioral Economics*, 2019), we review this rapidly growing body of work and the extent to which integrating insights from other fields into economic models can help answer key questions in development economics.

(I) The Psychological Lives of the Poor

I seek to uncover the determinants of decision-making, productivity, and well-being among the poor. In recent decades, development economics research has improved our understanding of nearly every aspect of the economic lives of the poor, ranging from agricultural decisions to health and education. Much progress has been made in designing and evaluating policies such as incentive schemes and information provision. However, little attention has been paid to people's *psychological* lives: How do people's mental states affect their economic behavior, and how are those states shaped by their social and economic environments? How does the experience of poverty affect people's decision-making and productivity?

I form hypotheses by paying close attention to the factors that people think most affect their own lives and by observing people's everyday behaviors in their social and economic environments. Through this, I have learned about many aspects of the poor's lives that *they* consider important: many face highly challenging sleeping environments; they often experience high levels of mental and physical pain; many low-income men in India drink heavily nearly daily; and the elderly poor are often extremely isolated and lonely. These factors do not feature in traditional economic models, yet the poor themselves bring them up again and again, thus articulating valuable hypotheses about the determinants of their economic behavior and well-being. I take these hypotheses seriously and rigorously test their importance via field experiments. Beyond being key predictors of well-being, these factors' unifying feature is that each might affect people's productivity, how they think, and how they make decisions. A broader goal of my work is thus to reveal the underlying "fundamentals" of decision-making, productivity, and well-being.

Given the dearth of existing data on topics such as alcohol consumption, sleep, and mental health, two important contributions of my work are carefully measuring their prevalence among low-income populations and finding ways to alter them in people's natural environments to study their causal impacts. Given the novelty of these topics, a key challenge is that each project starts with weak priors about the most effective interventions and the most relevant outcomes. Thus, some of my studies have an exploratory flavor and collect a wide range of outcomes while implementing somewhat coarse interventions. Future work will seek to refine these interventions and hone in on the subset of outcomes found to be particularly affected by the interventions. The ultimate goal is to establish a sufficiently thorough understanding of these factors to integrate them into economic models and guide policies to robustly improve people's lives.

ALCOHOL. Heavy alcohol consumption has long been associated with poverty, but the causes and economic consequences of this relationship are poorly understood. We know little about why people drink heavily and the impact of interventions to curb excessive drinking. In **Alcohol and Self-Control: A Field Experiment in India** (*American Economic Review*, 2019), I first document that most low-income men in Chennai across ten different professions report drinking large

quantities of alcohol—over five standard drinks—nearly every day and spend about 20 to 30 percent of their household income on alcohol. Breathalyzer tests during regular work hours further demonstrate that day drinking is common in some professions involving hard physical labor. I then run a three-week randomized field experiment with cycle-rickshaw drivers to better understand some of the causes and consequences of these drinking patterns. The majority of workers in my sample are willing to forego substantial monetary payments in order to set incentives for themselves to remain sober, thus revealing more awareness of and willingness to overcome self-control problems than found in most other settings, such as smoking or savings. I find no evidence of higher daytime sobriety significantly changing labor supply, productivity, or earnings. In contrast, increasing sobriety raises savings by 50 percent, an effect that does not appear to be solely explained by changes in income net of alcohol expenditures.

SLEEP. The urban poor in developing countries face highly challenging sleeping environments. Noise, heat, mosquitoes, pain, worries, and physical discomfort all interfere with their sleep. In **The Economic Consequences of Increasing Sleep Among the Urban Poor** (*Quarterly Journal of Economics*, 2021), we provide among the first objective measurements of sleep patterns among the poor in developing countries and document severe sleep deprivation among low-income workers in Chennai, India. Despite spending over eight hours per night in bed on average, people sleep just over 5.5 hours, well below the levels recommended by sleep experts. These measures imply a low sleep efficiency—time asleep divided by time in bed—of 70 percent, implying dramatically lower sleep quality than in wealthier settings. We then test interventions to increase sleep and find no economic benefits of additional night sleep, contrary to expert predictions and research findings from sleep labs. Short afternoon naps, however, improve productivity, attention, well-being, and savings, thus highlighting the potential for sleep to have powerful impacts in this setting. Taken together, we establish new facts about sleep among the urban poor and highlight the importance of field studies. We hypothesize that low night-sleep quality is a key reason that increasing the quantity of night sleep has low economic returns in our setting, so interventions that seek to increase sleep quality are a natural next step. To foster interdisciplinary dialogue with sleep scientists, we collaborated with a leading sleep scientist to write a short policy piece discussing the value of using field experiments and of viewing sleep through an economic lens (**Informing Sleep Policy Through Field Experiments**, *Science*, 2021).

MENTAL HEALTH. The poor are disproportionately affected by depression and anxiety, the most common mental illnesses and two of the leading causes of disability worldwide. Despite a rich literature in medicine and psychology, our understanding of the relationship between mental illness and economic outcomes is limited. In **Poverty, Depression, and Anxiety: Causal Evidence and Mechanisms** (*Science*, 2020), we conduct an interdisciplinary review of the literature on the causal relationship between poverty and mental health with a leading psychiatrist. Recent work has established causal effects in both directions. Negative economic shocks cause mental illness, and anti-poverty programs can thus improve mental health. Similarly, mental illness lowers people's ability to work, and interventions to improve mental health can thus have economic benefits. We then review the nascent literature on the underlying mechanisms and outline a research agenda on establishing causal effects of the various candidate mechanisms.

One key mechanism could be that mental distress affects people's beliefs and preferences, two fundamentals of economic behavior. In **The Long-Run Effects of Psychotherapy on Depression, Beliefs, and Economic Outcomes** (Working Paper, 2022), we study therapy's long-run impacts among depressed adults in Goa, India. In an interdisciplinary collaboration, we follow up on two RCTs that had implemented 6 to 8 sessions of simplified psychotherapy for depression delivered by lay workers. Five years after the end of the treatment, we find that those who received therapy remain 12 percentage points less likely to suffer from depression. The intervention averted 9 months

of depression on average over five years and cost only $66. Our follow-up study reveals that therapy changed people's beliefs about themselves in three ways. First, it reduced their likelihood of seeing themselves as a failure or feeling bad about themselves. Second, when faced with a novel work opportunity, therapy reduced over-optimistic belief updating and thus reduced overconfidence. Third, it increased self-assessed levels of patience and altruism. Therapy did not increase levels of employment or consumption, possibly due to other constraints on employment in the largely female study sample.

Mental distress could also reduce people's capacity to work productively. For example, workers who are worried about their personal finances may find it hard to focus at work, which may lower their productivity. In **Do Financial Concerns Make Workers Less Productive?** (conditionally accepted at *Quarterly Journal of Economics*), we test this hypothesis in a sample of low-income Indian piece-rate manufacturing workers. We stagger when wages are paid out: some workers are paid earlier and receive a cash infusion, while others remain liquidity constrained until the end of the contract period. The cash infusion leads workers to reduce their financial concerns by paying off debts and buying household essentials. These workers become more productive at work: their output increases by 7%, and they make fewer costly, unintentional mistakes. Workers with more cash-on-hand thus not only work faster but also more attentively, suggesting improved cognition. These effects are concentrated among more financially constrained workers. We argue that mechanisms such as gift exchange or nutrition cannot account for our results. Instead, our findings suggest that financial strain, at least partly via psychological channels, can reduce earnings exactly when money is needed most.

In another set of papers on mental health, we study the elderly poor. Beyond direct transfers, there is limited scope for interventions to reduce poverty in this population, e.g., by increasing productivity or human capital investments. Instead, the key policy objective is to improve elderly well-being and mental health. In close collaboration with the Tamil Nadu government, we have been collecting a unique panel dataset of 5,000 elderly adults over age 60. This representative sample experiences alarmingly high levels of mental distress: about 30 to 40% are depressed and lonely, and nearly 15% live alone, with especially high rates among women. The resulting social isolation strongly predicts mental distress. In **Depression and Loneliness Among the Elderly Poor** (invited for consideration at the *Journal of Economic Perspectives*), we document these patterns and lay out a research agenda to improve the well-being and mental health of the elderly. Combining data from the health and retirement family of surveys in seven developing countries, we again find a high prevalence of depressive symptoms among those aged 55 and above, and a sharp increase in these symptoms with age. Depressive symptoms in one survey wave are associated with a higher probability of death and greater decline in functional abilities in the next wave. Using the Tamil Nadu panel data, we show that social isolation, poverty, and health challenges are three of the leading correlates of depression, suggesting that economic and social conditions are key to mentally healthy aging. We then discuss potential policy interventions in these three domains.

Based on these insights, we are testing interventions to improve the well-being of the elderly, including economic support (pensions), psychosocial interventions to reduce depression and loneliness, and health interventions that bring healthcare to elders' doorsteps. In **Impacts of CBT and Cash Transfers on Depression and Impairment of Elderly Living Alone: An RCT in India** (draft available; revise and resubmit, *Annals of Internal Medicine*), we study the impact of phone-delivered cognitive behavioral therapy and cash transfers in a sample of low-income elders living alone in India. Each of the three treatment arms—therapy-only, therapy-plus-cash, and cash-only—reduces depression and functional impairment three weeks post-treatment, but these treatment effects do not persist three months after intervention, suggesting that generating persistent improvements may require complementary interventions to reduce social isolation.

(II) Barriers to Information Diffusion

In a second line of research, I investigate determinants of the generation and diffusion of information in developing countries.

In a series of lab and online experiments, we develop a novel experimental design to study how people aggregate information they have discovered themselves with information from others. Using this design, we demonstrate that people often fail to learn from others and that such inefficient learning occurs even between spouses. In **Not Learning from Others** (revised and resubmitted, *Econometrica*), we run a series of incentivized lab and online experiments in which participants are asked to guess the color composition of balls in an urn after drawing balls with replacement. Our main finding is that participants' guesses are substantially less sensitive to draws made by another player compared to draws made themselves when others' signals must be learned through discussion, when they are perfectly communicated by a third party, and even when participants see their teammate drawing balls from the urn with their own eyes. We rule out distrust, confusion, errors in probabilistic thinking, and imperfect memory as channels. This phenomenon might pose a powerful barrier to social learning and may play a role in many cases of incomplete social learning, such as farmers learning little from their neighbors or central bankers overly weighting their own personal experiences beyond aggregate data. In **Learning in the Household** (Working Paper, 2022), we show that inefficient learning also occurs among spouses. Husbands neglect information discovered by their wives, while wives respond equally to information discovered by their husbands and by themselves. This asymmetric learning contrasts with standard household models, which assume full information pooling. In a second experiment, we find that both men and women heavily discount their teammate's information relative to their own when paired with strangers, suggesting that men and women do not differ in their general tendency to underweight information coming from others. Rather, the marital context creates a countervailing force for women, resulting in a gender difference in learning (only) in the household

A second set of papers focuses on information diffusion and technology adoption among smallholder farmers. In **Blue Spoons: Sparking Communication about Appropriate Technology Use** (Working Paper, 2022), we study an enduring puzzle in technology adoption in developing countries: new technologies often diffuse slowly through the social network. Two key predictions of the canonical epidemiological model of technology diffusion are that forums to share information and higher returns to technology should both spur social transmission. We design a large-scale experiment to test these predictions among farmers in Western Kenya and find support for neither. In the same context, we introduce a technology that diffuses rapidly: a simple kitchen spoon (painted blue) to measure how much fertilizer to use. We develop a model that explains both the failure of standard approaches and the surprising success of this new technology. The core idea of the model is that not all information is reliable, and farmers are reluctant to develop a reputation for passing along false information. The model and data suggest that there is value in developing simple, transparent technologies to facilitate communication. In **Realizing the Potential of Digital Development: The Case of Agricultural Advice** (*Science*, 2019), we review the literature on interventions to raise agricultural productivity, with a focus on digital interventions such as phone-delivered advice. Our meta-analyses suggest that providing agricultural information via digital technologies increases yields by 4% and the odds of adopting recommended inputs by 22%, implying that benefits likely exceed the cost of information transmission by an order of magnitude. The spread of GPS-enabled smartphones could increase these benefits by enabling customized information, thus incentivizing farmers to contribute information to the system. Well-known distortions in markets for information limit such systems' ability to reach the socially efficient scale through purely commercial means, suggesting a clear role for public support for digital agricultural extension.

(III) Teaching, Advising, and Service to MIT

In my seven years at MIT, I have taught three courses, each nearly every year: undergraduate behavioral economics (14.13: Psychology & Economics); graduate behavioral economics (14.160: Behavioral Economics); and undergraduate development economics (14.73: The Challenge of World Poverty). I greatly enjoy teaching and am proud that I was awarded the ***2022 "Teacher of Year" award by the MIT Undergraduate Economics Association***.

Teaching in behavioral economics. I developed my undergraduate behavioral economics course from scratch. The class had not been taught at MIT since 2009, so existing materials did not capture the rapidly evolving field of behavioral economics. There was strong initial interest, with 46 and 57 enrolled students in fall 2016 and 2017, respectively. Enrollment has nearly quadrupled since then, with 222 enrolled students in spring 2022, the highest number of any economics elective course at MIT. Each year, my course evaluations have been positive (6.4, 6.6, 6.8, and 6.5 out of 7.0). Joint with Abhijit Banerjee, I also developed a graduate behavioral economics course, which had not been taught since 2010. Since then, I have taught this class with various co-teachers, and the class has received great interest among PhD students, with an average enrollment of 12 students per semester over the past four years. My evaluations have been positive throughout (6.6, 7.0, 6.8, 6.8, and 7.0).

Teaching in development economics. I have also taught two variants of an undergraduate development economics course (14.73). The first variant, which was joint with David Atkin and followed the design of previous years, was targeted toward juniors and seniors and enrolled 15 students. Esther Duflo and I substantially revised the course in fall 2016 to admit first-year students and allow students to take the course toward CI-H fulfillment. This altered version enjoyed high demand; over 90 students attempted to register for the class, of whom we were able to accommodate 53 (due to TA constraints). The class has been vastly oversubscribed ever since, with over 100 students typically on the wait list. My evaluations for both variants of the course have been positive throughout (6.1, 6.1, 6.3, 6.1, 6.6, and 6.2).

Graduate advising. It has been my great privilege to co-advise a large number of MIT economics PhD students in development and behavioral economics across the full range of academic talent. I was part of the advising team of ten MIT students who completed their PhD. I am currently closely advising ten PhD students on whose thesis committees I expect to serve. I have been fortunate to work with highly talented students such as Matt Lowe (placed at UBC), Gabriel Kreindler (Harvard Economics), Joshua Dean (Chicago Booth), Maddie McKelway, (Dartmouth), and Matthew Ridley (Warwick). Most of these students work in (behavioral) development economics, but more recently, I have also advised students across a range of fields such as behavioral public economics (e.g., Charlie Rafkin, Adam Solomon) and behavioral education (Hannah Ruebeck, Salome Aguilar). Beyond this, I have also devoted great efforts to supporting students who were struggling to complete their PhD, which was particularly needed during the Covid-19 pandemic.

I regularly attend the PhD student workshops in development economics. Since in fall 2020, I have initiated and organized the PhD student workshop in behavioral economics in response to great interest among PhD students in this field. For the past two summers, I have also organized a "behavioral tea," an informal environment meant to generate feedback on preliminary ideas. Teaching and advising has been an incredible learning experience and complementary to my research. I am particularly proud of receiving the ***MIT Economics PhD Advisor of the Year Award in 2018 and 2022***. I was also honored to have been awarded the ***Institute-wide Frank E. Perkins Award for Excellence in Graduate Advising at MIT in 2022***, with nomination letters from 17 current and former PhD students.

Undergraduate advising and other service. Within the MIT economics department, I have served as an advisor to the class of 2018 undergraduate majors, a cohort that grew from one sophomore student in 2015 to 18 students graduating in 2018. I have employed, trained, and mentored 28 MIT undergraduates as part of the Undergraduate Research Opportunities Program (UROP), some of them over the course of several semesters. I have written letters of recommendation for over 40 previous UROPs, pre-docs, and other research assistants for economics PhD and other academic programs. Many of these students have been admitted to top economics PhD programs. I co-organized the development economics seminar in spring 2016, 2018, and 2020 and served on the admissions committee this past admissions cycle (2021-22).

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