[SQUEAKING] [RUSTLING] [CLICKING]

FRANK SCHILBACH: All right. Welcome, everyone, to my second lecture on behavioral development economics. Let me just recap briefly what we talked about last time and how this time will be different. So last time, we talked about high return investment opportunities and wrote down an oil equation to try to understand potential reasons why people might not take advantage of them.

And so the idea is, essentially, there's high rates of returns of many different things that people could invest in. And what a part of a large share of behavioral development economics has tried to do in recent years is try to understand using universal psychological features, such as present bias, or loss aversion, or perhaps biased beliefs in some ways, to try and understand why people are not taking advantage of such opportunities, OK?

So here's a fertilizer that you could invest in. Here's machines you could buy. Here's investments in health, et cetera, that people are not taking advantage of. And we try to understand, can behavioral factors, psychological factors, or other types of factors help us understand why people might not be doing that?

Those are universal factors that the rich and the poor might be similarly affected. There are some questions on is it different for the rich and the poor in the sense that in rich settings, there might be a better infrastructure that nudges you into the right decisions. Anyway, but these are not factors that are specifically to a developing country context or low-income populations.

Separately from this-- and this is what we're going to talk about today-- is the question of, is there something specific about the psychology of poverty? Or does poverty itself affect people's behavior in certain ways? And could it be that because people are poor, that has some treatment effect on people's choices and behaviors? And that's what we're going to talk about today. And we're going to talk about three sets of papers-- excuse me-- three sets of papers.

First, we talk about scarcity and financial strain. Second, we talk about sleep. And this is the paper that you have read. And third, we're going to talk a little bit about mental health, more like a broad overview of that area. Any questions about last time or anything else before I start?

OK. All right. So similarly to last time, I wanted to start with the motivation for this type of topic, which is the observation that there's quite a few-- what I'm going to call-- seemingly suboptimal behaviors among the poor, among low-income populations. We talked about some of these already, which are investment savings decision. These are the hybrids of return on the investment opportunities that people could take advantage of and are not necessarily doing that. Similarly, a credit market behavior as people take high interest rate loans and then have to pay them back and often cycle over and over from loan to loan.

But there's also other domains where you see, for example, lower productivity, punctuality, medical adherence, food and drug consumption, healthy eating, parenting behavior, et cetera, where there's lots of correlational evidence that shows that low-income populations tend to do worse in a lot of these metrics that are being collected. Now, if you step away for a bit and forget what I told you for the last two minutes, what is a typical, neoclassical explanation for these types of behaviors? What might you say if you see these types of patterns? What might you say could explain these types of phenomena? Yeah.

AUDIENCE: Misinformation.

FRANK SCHILBACH: Misinformation. And so on what is the underlying, omitted variable, if you want. Why is it that low-income populations are less well-informed?

AUDIENCE: Perhaps, there's [INAUDIBLE] education.

FRANK SCHILBACH: Exactly. Education, schooling, maybe also just peer effects in some ways. But it could essentially be that people just have less information. You can explain at least some of these behaviors. For example, medical adherence-- you might say people understand less how useful certain types of medications are, food and drug consumption as well. Healthy eating, you have to understand calorie content, et cetera, and so on. Anything else?

AUDIENCE: There are institutional structures that benefit from people [INAUDIBLE] a certain way, like payment loans through [INAUDIBLE].

FRANK SCHILBACH: Yeah. So I'm going to call these institutional environmental factors, which are might say, for example, if you have universal health insurance, or if you have savings schemes, 401(k) savings. Your employer signs you up for savings schemes. Well, for me, it's much easier to save because I just don't have to do very much. I have some health insurance, and then-- so I kow MIT, I guess, contributes to my retirement savings. And then, it's relatively easy to set this up.

If on the other hand, you are a rickshaw driver in Chennai, or other places, or just other daily worker, you're going to get cash every day you work for every trip that you take. And then, you have to figure out how to save that. You need a lot more discipline to save because there's lots of temptations on the way and maybe lots of other ways in which you might want to spend your money potentially. There might not even like a bank available. And again, Esther is going to talk with you about savings.

So essentially, environmental features might make it just much more difficult for people to make the right choices. And there's other environmental conditions, for example, transportation. If you live two hours away from the city. You don't have a car. And you have public transportation that's unreliable. Well, of course, you're going to show up less reliably, or it's much harder to be punctual, for example.

There might be predatory lending that tries to trick people into high interest rate loans. And that might be just specifically targeting certain types of populations, perhaps populations with low education or the like. And then, other types of institutional structure, defaults or the like, where essentially society sets up certain structures that make it easy to make right decisions for people. And those are often more developed or more pronounced in richer population.

A second broad class of explanations is selection or omitted variables, which are things like education, intelligence-- by no means endorsing these views-- effort or mistakes and say people might make more mistakes. And those mistakes might lead to poverty. And therefore, you might see that correlation. To be very clear, this is not my view. But in some sense, in principle, you could have that explanation.

Now, today, we're going to discuss a different explanation, as I just told you already. We're going to talk about the treatment effect of poverty itself. So it's not that people-- because of other factors, because they're different in certain ways-- end up being poor and that explains this correlation. The idea is that they happen to be poor because of bad luck, essentially, or the family structure, et cetera.

And then features of their environment might affect people's choices-- their productivity, et cetera, OK? And that's the broad the core of this hypothesis that people have proposed and started to try and test. And this is a fundamentally different view than what we discussed on Monday. Because on Monday, we were saying, look, there's people-- the rich and the poor have certain behavioral biases, and misinformation, or wrong beliefs, et cetera.

And we happen to be particularly interested in developing country population. And using universal psychology might be able to help us understand these patterns. This one is different. This is saying there's something specific about poverty that might affect or might cause certain intermediary outcome. And those, in turn, might affect people's choices.

A slightly different motivation is coming from the work that you discussed with Esther last week about poverty traps. So recent work has shown some evidence of poverty traps, in particular, or evidence of long-run impacts on earnings consumption, et cetera of these ultra poor type intervention, these multifaceted, anti-poverty programs. And we have some evidence that seems to be something unlocked or something that is essentially happening in people's lives after they have received these programs.

But we don't have a great understanding what the underlying channel is. Is it occupational choice, or is it something else? And one broad hypothesis might be that psychological factor could play at least some role. It could be that, for example, mental health has improved through these types of programs. And then, that leads to improved use of money, productivity, decision-making, et cetera.

And so that the broad idea then, as well, there's a behavioral poverty trap if you want that poverty affects cognition, stress, mental health, et cetera. And these factors, in turn, could impede economic decision making and productivity. So for example, savings behavior, insurance choices, but also labor supply, productivity earnings, et cetera. And these then in turn might affect and exacerbate or sustain future poverty.

OK. Any questions on this so far? So then there is different lines of research that in some sense parallel and the very similar overall and look at quite related hypotheses. So the first one, and that's like among the earliest work in this area, which we want to talk about first a little bit is scarcity.

This is work by, in particular, Sendhill Mullainathan and Eldar Shafir are coauthors, which is the idea that monetary concerns capture cognitive function. So essentially, poverty captures people's minds. When people have worries about paying their bills, about feeding their children, about being able to pay school fees, about being able to pay rent, that is very taxing in terms of cognition. And that's, in turn, affecting people's choices, productivity, and so on.

A related hypothesis is, and that's kind of in fact, quite difficult to differentiate or separate is stress. So poverty causes stress and stress causes future poverty. There's some evidence of the former, so like, there's research by Johannes Haushofer and coauthors that shows that when people have negative shocks, we see increased levels of stress as measured by cortisol and other types of levels.

There's less evidence of the latter, at least in the short run. So when you stress people out in the lab, you don't actually find lots of evidence of people doing worse in certain behaviors. And that might be, in part, because stress actually mobilizes resources and attention. And so in some way in the short run, this hypothesis might not be quite right.

However, it might well be that long term stress can impair mental health. So it might be that in the short run, stress is actually beneficial for having attention or being-- so this is kind of the idea, if a tiger runs after you, you are going to be really focused and run really fast. That's good. And you might make actually good decisions, et cetera.

But if you're stressed out for a long time, for many months or years, that might be really bad for your physical or mental health. And that, in turn, might then lead to future poverty. That part of the hypothesis hasn't really been tested that well, in part, because it's really hard to test, because it's really hard to separate this from other types of interventions.

Third, we are going to talk a little bit about sleep deprivation. This is the paper you read, so that the poor are sorry-- this is a typo, but the poor are more likely to be tired. They're also more likely to be in pain or drink excessively.

But so broadly, that's to say, people's sleeping conditions, in particular among the urban poor, are very bad, and that in turn might affect sleep, and sleep might have certain effects. The paper that you read is not supporting that either, but there might be other directions, in particular, when it comes to sleep quality that might lead to more evidence on this.

And then, the fourth hypothesis is broadly mental health in particular, depression and anxiety. And this is kind of in some ways where lots of research recently has been done. Poverty is associated with mental ill health. It's essentially, not having money is really bad for your mental health.

There's lots of evidence of that from cash transfers and other types of interventions, or from like negative income shocks, in particular, when people lose their job, for example, that's bad for their mental health. And so then the question is, well does that lead then in turn to worse outcome?

Then there's a bunch of other factors that have been studied more or less in different settings, things like sadness, lack of hope, self-efficacy, substance abuse, pain, et cetera. These have been studied to some degree, but these could also be quite important, but I'm not going to talk about them too much.

It's important to understand that these things are not mutually exclusive, so they could be all going on for a range of people, different people could be affected by different types of factors. And we need to understand a little bit better how to aggregate these types of factors.

So like the type of idea of how to test for poverty traps that you talked about last week with Esther might not necessarily apply here, because if you see only 5% or 10% of people are affected by each of these factors, if you measure these average as a elasticities of income, unlike say sleep, and then sleep on other factors, that might not be the right thing, the right metric to consider. So I'll return to this at the very end.

Yeah?

AUDIENCE: How exactly do you distinguish-- or is there a clear distinction between number two and number four here? Is stress kind of one subcomponent of mental health broadly, and it seems like there's similar factors at play that [INAUDIBLE]. You're both more stressed out and [INAUDIBLE] the question like, is this something that we can interpret [INAUDIBLE]?

FRANK SCHILBACH: Yeah, that's a good question. In fact, one and two are actually quite hard to empirically distinguish, because if you think about money, that's stressful and worrisome and worries. So I think here, stress one, you can have a strict definition, which is like a biological reaction that you can measure through cortisol or other types of biomarkers.

While here I mean specifically depression and anxiety. Of course, there could be other mental health conditions. And of course, stress this is what I was talking here about stress, long term stress, in fact, leads to mental health problems.

So I wouldn't necessarily see these as mutually exclusive at all. I'm more kind of in some sense, I was giving sort of like a history of like the research that's done in this area. In some sense, these two were kind of like first in the studies by Mullainathan and Shafir here and by Johannes Haushofer and colleagues here.

And then mental health, which has come up most recently, mostly focusing on depression and anxiety, but even depression and anxiety hard to separate the very correlated and very happen in very, often, like effect of same types of people.

Now, there are different concepts, like depression is very different from anxiety in what it does. But empirically, it's actually very hard to separate them because they're so correlated. Yeah, and I think I'm going to talk to you about the next paper, which is in some ways, you can think of like as evidence in favor if you want or scarcity.

In fact, we are not able to distinguish other psychological channels, in part, because that's actually quite hard to do. I'm going to get back to that in a second. Yeah?

AUDIENCE: Feel free to defer this if it's not directly relevant, but how do these types of studies speak to the happy poor hypothesis? It's often commented that people who are poor-- to a particular shock are more resilient or don't react the same way because they're used to it or something like that?

FRANK SCHILBACH: Yeah, so that's-- I think that's like in some sense, like a myth that has persisted for a long time that turns out to be just wrong. So there's lots of evidence, and there's in particular, there's a very nice paper by Johannes Haushofer and Ernst Fehr that looks at the psychology of poverty.

And the work by Justin Wolfers and Betsey Stevenson shows essentially that both in the cross section when you look at across countries, if you look at within countries, if you look at changes over time, income is very strongly associated with psychological well-being. So essentially, being richer makes you happier in various ways.

And there's lots and lots of evidence of that, including cash transfers make people happy. And it's a very robust body of evidence that shows that cash transfers improve psychological well-being as measured by happiness or other types of measures as measured by depression and anxiety and so on.

And so I think part of the reason is, as you're alluding to, is like the poor are exposed to a lot more shocks. Now it might be that each single shock has less of an effect on people, but I think the effect of just being exposed to so many more adverse factors just dwarfs any effect of saying like, maybe people are more resilient. I don't actually know whether there's evidence for that resilience hypothesis. But there's clear evidence that as a whole, being rich or having more money is good for your happiness and psychological well-being on average.

OK. So let me give you a very brief overview of the work on scarcity and the idea behind that. And so the idea is that essentially scarcity is not having enough of something. And you can talk about money. You can talk about can think about time, friends, hair, et cetera, you name it, just anything that you don't have enough of.

If you read that book, the definition of scarcity is a little bit loose in the sense that it says essentially it's a feeling of not having enough of something, which if you think about it, that's empirically kind of a little bit hard to test, because how do I know?

I can tell you how many friends you have, or I can tell you how much time you have or how much money you have. It's much harder to measure whether you feel that you have enough of something. And so the idea then is that scarcity captures people's mental or cognitive capacity, which they call bandwidth.

So importantly, that happens automatically. So it's not like people decide to think about these types of things, but instead, scarcity captures people's minds. So that's to say, when people are unhappy, or suppose people, for example-- one example that they give in the book or in some of their papers is that suppose you get into a bad fight or break up with a loved one or boyfriend or girlfriend or the like, and then you have a job interview.

It's really, really not productive doing that job interview to think about what went wrong during that breakup or what could you have done differently or the like, but these thoughts might just invade your mind. You might not be able to block them overall.

That's not productive thinking in a sense, you should probably figure out how to make amends with your friends or partner or the like. But during that job interview, it's really not a good idea to do that. And so similarly the idea is here that while it might be very productive to think about your finances if you're poor, how to pay your bills or how to pay back your neighbor or how to pay school fees and so on, it's not useful to do that while you are at work.

And so poverty, specifically then makes monetary concerns top of mind because of course, poverty by definition is not having enough money, so it implies, in some ways, that the poor act more rational in financial choices, have greater focus and improved decision making in some ways. And there's some evidence in support of that, that the poor, for example, are better at like knowing prices and the like.

But of course, overall cognitive capacity is limited. There's only so much you can think about at one time. So now if you think more about monetary concerns that essentially implies that you have less cognitive resources available to think about other things.

And so then scarcity deteriorates performance at other cognitive tasks, and therefore, might impede with your decision making, your productivity, and so on. And that's the core of the hypothesis of this type of work. Importantly, this is not rational inattention. So it's not about, you decide to think about monetary issues because you want to solve them, that's really important. But rather, it's like, essentially it captures your mind and distracts you in some inefficient way.

Now, what evidence do we have in favor of this hypothesis? So there is this very influential paper by Mani et al. that looks at or presents two complementary studies, pieces of evidence. One is what's called the "Mall study," which is, in a mall in Trenton, New Jersey, make people think about monetary troubles and find that doing so lowers measured IQ-type cognitive function measures by about 10 IQ points.

So essentially, when you do that with lower income participants, there's large effects. For richer participants, nothing happens. And these effects are large and pronounced. Similarly, in what they call the "Harvest Study," they look at farmers in rural Tamil Nadu in India before and after harvest, and then find that after harvest when people have more money, when they're flush with cash, they have higher cognitive function than before.

So these studies are very much complementary because one is more lobby, the other one is more a field study in sorta view of what settings have been extremely influential overall in affecting people's thinking. At the same, time, we have seen very few successful replication or actually evidence that this is going on in other settings.

For example, Cavalho et al find no differences around paydays among US households. Dietmar Fehr and coauthors find no differences in cognition before and after harvest in Zambia. And in fact, some evidence of when people are poorer, they make better decisions in some ways. There's some evidence recently by Heather Schofield and coauthors that's consistent with the Mall study, but by and large, it's fair to say there's not a lot of evidence that in addition to the original study supports this hypothesis.

And in particular, one broad question is whether scarcity affects economic behavior. And the paper that I'm going to talk about is trying to provide some evidence of scarcity or other factors affecting economic behaviors. And so the starting point of this paper is what I already talked to you about before, which is to say, financial strain or periods of cash shortfalls, these might come from unexpected shocks, but also through predictable cycles.

And when people can't meet their expenses, that is mentally costly. It might cause worry, stress, anxiety, sadness et cetera. And it affects a large fraction of people, including in India and ours a rural setting in the lean season, 86% of people feel being worried about their finances at that time.

Now as I said, there's a literature that looks at the cognitive consequences of this in lab type of settings, mostly looking at things like Raven's matrices type of IQ test. And what we're trying to do in this paper is trying to test whether there is economically important effects.

At the end of the day, you might say, well, the cognitive measures or the IQ tests are important of course for people's everyday lives. But as economists, we kind want to know, does it in fact, have real world economic consequences? And so one particularly important measure is real world worker productivity labor income overall, which of course then might affect future poverty through your ability to work and earn money for your family.

And so the question that we're trying to answer in this paper is, can relieving financial stress make a person more productive at work? This is a field experiment with 408 manufacturing workers in India, where we alleviate financial constraints by varying the timing of income and look at effects on productivity.

We're going to have some measure of attention, which is like in some sense consistent with the hypothesis that scarcity is at play. But actually we cannot, and this is getting back to your question, we cannot really disentangle different psychological mechanisms such as stress, worry effect, sadness, even sleep. Because at the end of the day, we can say people have lower attention at work, but we can't rule out that this is coming from like stress or sadness et cetera and so on.

And if you think about it, it's not entirely clear why we necessarily care that much, in the sense these things are all correlated at play. And in some ways, at the end of the day, maybe we care more about the bottom line, does it actually matter for people's behavior in the real world?

So let me show you some motivational evidence why this is a reasonable hypothesis to test. So this is, in again, rural India and Arisa. These are workers in the lean season. 71% have outstanding loans. People have very low levels of liquidity. When you ask them would you be able to come up with 1,000 rupees for an emergency, 61% of them say they're not-- this would be very difficult for them to do that.

And daily expenses, loans, health issues et cetera loom really large in people's minds. When you ask them, what causes you financial strain, that's the kind of answers that you might get. Lots of people, as I told you already, are worried about money and about their finances. Importantly, also lots of people are in fact worried about those finances during work.

So we asked them at the end on one day, what did you think about during work today? Many people say they think about the work task, which is great. And they should be thinking about the work task, because they were working. But about half of them, in fact, say they think about their finances during work.

And this sort of then motivates our experiments, we try to see, OK, can we reduce people's financial strain and does that lead to improved productivity? So a little bit more on the setting, it's the agricultural lean season in rural Arisa India. People have intermittent, short-term contract jobs, between a day and about two weeks.

The work task is a task where we ask people to make disposable plates for restaurants, which are like solitary leaves. I'll show you that in a second. This is a real world task in the sense that this is the thing that people actually do in that area. When you go to a restaurant in Arisa in rural areas, you might actually get such a leaf plates served to eat your food.

People are incentivized, get piece rate for production. And this is the primary source of income during the experiment. So this is quite a bit of money. These stakes are pretty high for people. So people should be quite motivated to be productive.

So now what we're trying to do is we vary people's timing of when workers receive their expected wage payments, so we'll have essentially variation. And some people have money earlier than others. And we can look at that and when you have money, when you have cash in hand, does it affect your work productivity?

Now you might say, rightly, why should cash arrival ease mental load despite prior money, knowing that money is coming? So we set it up such that you know actually the money is coming. Now, essentially, what it allows people to do, is it allows people to pay for urgent expenses to reduce debt overhang that weighs on people's minds or just feel more vulnerable about potential shocks that might be coming and perhaps also less embarrassed towards your neighbors or people that you owe money to.

Now, if you think about it your student life when at some point towards the end of the month or towards the end of the semester or the beginning of the semester, even if you know that you get a check at the end of the month or the beginning of the month, having actually the money in your bank account and being able to expenses, makes a surprisingly large difference, at least in my life. So anyway, so that's kind of like the idea that we're trying to test.

The experiment in some ways is very simple. What we do is we have a control group and a treatment group. Everybody has the same structure of the experiment. Everybody works for 12 consecutive days. On day one, we get some first payment to insure trusts that help people understand that we actually following through with our payments.

And on day 12, everybody is paid the remaining payments, whatever they haven't been paid until then. And everybody works every day. Everybody is told how much they have produced every day, so there's no uncertainty about how much they get for any single day.

And then the main treatment is that on day eight, the treatment group gets a cash infusion. They get essentially money for whatever they have worked from day two to day seven. And that's quite a bit of money, in part, because we're in the lean season so people have very little cash.

So they get quite a bit of money, which is about three weeks typical earnings in the lean season, just because people have so few jobs during that time, they work something like eight, nine days usually, and somewhat lower paid during that time.

So what that allows us to do then we can look at the post pay period where we can compare the treatment group compared to the control group, and look at now people who are flush with cash, are they working more productively?

Now, as I said, this is not unannounced, so we can actually look-- so we have an announcement day on day five where we can tell people essentially when they're being paid so that this does not come as a surprise. And then we can-- this allows us to test for some other mechanisms that I don't want to get too much into.

We can test for fairness, gift exchange, et cetera, to try to understand whether the effects that we find are due to the effects of having more money, versus the effect of like disliking your employer more or the like because you're grateful, et cetera. We spend a lot of time in the paper trying to address these types of concerns.

So what do we find. So first, as a sanity check, and these are all kind of difference and difference regressions where essentially this is-- so this is just in the cross section. When we measure people's cash expenditures, what do people spend their money on right following the early cash infusion?

People essentially spend quite a bit of money to repay their loans. They also increase their household expenditures. And a lot of this happens essentially on the day of payment or the day after. So essentially, immediately after people get cash, they spend that money on A, paying back credit and loans, and B, household expenditure, household necessities if you want.

So that is essentially saying that people are credit constrained and actually having cash on hand makes a big difference in people's behavior. So and that's-- then you know at least reason to believe that the cash infusion in fact meaningful and reduced financial stress because people are now able to make these types of expenses.

Second, we find relatively large effects on people's productivity. So now these are difference in differences regression. The previous one was a cross-sectional regression, because we have only one point in time. This one is now cash, which is whether we received cash and post pay, whether you're in the post pay period.

And we find that people are more productive about 0.1, 0.12 standard deviations, which is about 6 to 13%, a 6% increases in productivity. These effects are almost entirely confined or concentrated among people with high financial strain, so the people who exhibit the highest financial strain at the beginning before the treatment at baseline, those have the highest treatment effects.

The effects don't seem to be going away immediately, so this is what you can see here. We split the sample into lower and higher financial strain, and what you see in blue is the people with higher financial strain who become more productive upon receiving money.

These effects don't go away after like a day or two, in fact, if anything, they get a little bit larger over time. And that's to say that what you would expect in like gift exchange or other types of models of reciprocity, you might think that people-- what have people found in these types of experiments, that there's a short run effect but that goes away very quickly. But in fact, these effects seem to be persistent over time. Yeah?

AUDIENCE: Wouldn't the treatment group, part of the productivity after the [INAUDIBLE] compare to productivity a day after the first payment?

FRANK SCHILBACH: Sorry, say that again.

AUDIENCE: Within the treatment group, how does productivity a day after the treatment compared to a day after the first payment?

FRANK SCHILBACH: I see. It's hard to make that comparison, because that's very strong learning. So the first payment essentially means day one?

AUDIENCE: Yeah.

FRANK SCHILBACH: So day one, essentially people are essentially learning-- people on day one-- and they want to actually not incentivize, because we're just saying like, this is a training period galore and you get a fixed wage of like 250 rupees. So it's very, very strong learning trends during the first three days, which is partially why we have this baseline period.

So it's hard to, and of course, the treatment and control group gets money. I don't actually know what the difference is, but the trouble is that you have to disentangle learning from treatment effects. And the learning has flattened off at the time when we're giving people's cash by design.

OK. So then, as I told you, so here are some productivity effects. Now, what we also do in the paper is we try to shed some light on the underlying mechanism trying to say, OK, is this really about attention or is it about something else, perhaps effort people just try harder because they have cash, and maybe they're happier, and that leads them to work really hard.

So this is what the leaf plates look like. And they're actually very hard to make well. You have to try to make a round shape. There shouldn't be any holes because people eat curry and having holes in your plate is a really bad idea.

And so this is not. I tried this myself. This is not what my plates look like. This is actually hard to do well and hard to do fast. And so in particular, you need some planning and strategic placement to reduce the amount of work or the effort you have to put in.

So when you plan well how to do this, if you go in the wrong direction and you make extra work and you have to undo your work if you do it really badly, you use like 20 leaves instead of 12 leaves, and that costs you a lot of time and effort because you have to actually put all these leaves together. If you place them well and do it carefully, then you have essentially less physical effort and time for the same piece weight.

And so we measured essentially three markers of attentiveness and production, which is the number of double holes, which is you can see here these little sticks where people make these sticks through the leaves to put them together. And if you make a wrong stitch, then you have to undo it, and then there's like a double hole that you can identify in the leaves.

We measure these pieces, the measures of attentiveness. We take people's production and then measure it unbeknownst to workers, so workers don't even know that we're collecting these. So we measure the double holes. We measure the number of leaves, the number of stitches per plate.

So you have to have a minimum size of the plate, but conditional on that, essentially, you want to use as few leaves as possible. And so these measures-- these measures are essentially measures of attentiveness that tell us how attentively where people are working during that time.

And so when you then collect these measures, what we find is that not only does the treatment affect people's productivity, how fast or how much people produce overall. But they also affect these measures of attentiveness, this attentiveness index or like high attentiveness which tells us that people work faster, but also with fewer mistakes.

So essentially, higher attentiveness, lower number of mistakes is at least one channel that leads to higher productivity. Now, this is consistent as I said, with a range of potential psychological mechanisms, stress, worries, et cetera that we can't necessarily disentangle. But we know that at least attention or attentiveness plays some role in what's going on.

These effects also persist until the end of the contract period. Now, in the paper, and I don't want to get too much into this, we spend a lot of time trying to disentangle a test for other mechanisms, in particular, things like fairness and gift exchange. This is why we have some variation on like when exactly people are paid. We have also some variation the announcement periods and the like.

There's a lot of discussion of that in the paper, specifically that we trying to deal with. That's like a bit of-- there's a careful test for these types of effects that we want to make sure they're not going on. In addition, we also try to rule out investment channels such as nutrition. So while nutrition effects would be quite interesting, that's not the focus of this paper.

We find some effects on like when people are paid. In fact, they do purchase more food. But that's mostly like, I think, things like food for the family or the like. We don't see, for example, that breakfast consumption actually changes across treatment and control group following the treatment.

So what do we learn from this? So we essentially learned that using the payment timing within context of liquidity constrained workers can help us construct a clean test of whether financial strain affects people's productivity. And we find essentially, that the ability to pay for expenses at home boosts productivity and attentiveness at work.

So financial strain itself then can be detrimental for earnings exactly when money is most needed. So exactly when people don't have money, they might be not able to or that might interfere with their ability to work productively. And that in some ways, that's to be very clear, this is not a policy evaluation, this is not a cash transfer program or the like.

It's rather a proof of concept that productivity effects can occur in high stakes setting such as for labor income, affecting labor income, and some potential implication is there might be additional channels through its policy level such as pay structure or social programs could affect productivity.

So and in particular, cash transfer programs could also have productivity benefits. Now there's all sorts of open questions here then, in particular, you want to know, are such effects present in other settings, for example, cash and other transfers programs?

Abhijit Banerjee and coauthors have some evidence of this, I believe, in Ghana. But they find some effects on labor supply and some effects on productivity as well. But I think we need more evidence to test for these types of effects.

Then a natural question to say is, what is the optimal pay structure? If you're an employer, how should you pay workers? Should you pay them weekly or daily or monthly? We can't really test for this because we have only one payment that's being done, so we can't say, now you should pay people differently, because of course, the control group gets paid more at the end of the experiment.

So we can't really say anything about optimal policy, but trying to understand whether certain programs or interventions to improve employees' financial well-being has productivity or other types of effects for worker well-being and their retention et cetera seems really important and a natural thing to do next. Any questions on this paper?

OK. So then let me tell you about sleep. I know, I assume that you have all read this paper, so I'm not going to spend a lot of time talking about the design and the specific of the experiment. But rather about the motivation of why is this a-- why did we start to study this in the first place and why is it an important perhaps thing to engage in?

So first-- at a very basic level of sleep, we spend a lot of time sleeping in our lives. It's about a quarter to a third of our lives, we're asleep. And there's a huge body of sleep medicine that believes that sleep is really important or that shows that sleep is really important for a range of outcomes, including cognition, including happiness, perhaps decision making, health wages, et cetera.

Now, a lot of this work is essentially done in the US and rich countries, and a lot of it is coming from lab setting. So in particular, most of the evidence is here on cognition. In particular, there's thousands of experiments that look at what happens to cognitive function when you sleep well versus not.

Almost all of that is essentially in rich country settings and coming from the lab. And then there's a smaller literature on things like happiness and subjective well-being, decision making, health, and a little bit of work recently on wages, et cetera.

Now, when you read books such as the book on Walker on *Why We Sleep,* you get the impression that if only we slept-- everybody slept an hour more in our lives, that would have transformative effects on society, people would be happier, healthier, safer, smarter, and so on and so forth. And investing in sleep is the biggest thing we could just do.

So now, a natural thing is to say, well, can we test this in field setting, not just in India, but in any type of settings? And there's very little field evidence overall, and we should just try to understand this is actually true in a sense of a lot of the claims, in particular when it comes to productivity, et cetera, are based on correlational evidence.

So now can we test for causal evidence? Now, if you then look at sleep settings in rich versus poor countries and there Gapminder Dollar Street is a beautiful website, but you can have a window into people's lives. If you look at, compare people's sleep conditions, such as here the Howard family or the Shah family.

Howard family in Colorado, and the Shah family in Calcutta, you'll easily see and if you visit people's homes and in particular in urban developing countries settings that sleeping conditions are dramatically different for low income populations compared to the US or other rich settings.

And we know essentially next to nothing about sleep in developing country environments. We have essentially no idea how people sleep in most countries, how much they sleep, how well they sleep, why they don't sleep well, et cetera.

Now, one perhaps obvious observation is while sleep might be worse given the difficult sleeping conditions, the two potentially competing forces. One is people might be sleeping less and the effects of sleep might be concave, so and there's quite a bit of evidence that seems to suggest that.

If you sleep only three hours, the marginal benefit of another hour is larger than if you sleep nine hours or eight hours. But on the other hand, if sleep is so disrupted, the marginal effects or any effects of sleep might be just not very beneficial because you're just not getting deep sleep or any full sleep cycles.

And so, but that's an entirely open question. Our thought initially was to say, and a lot of the consideration about sleep quality that you may have read in the paper are more exposed. We came into this and saying, look people seem to be sleeping only five hours. Couldn't this be one of those factors that I talked about on Monday, some of the high returns that people are not taking advantage of?

It looks like this is really like potentially a very cheap policy to try to increase people's sleep, and that could have really large effects because there's all this evidence from the sleep literature that suggests that. That was the starting point of this paper.

Now, what did we actually do? A good share of this paper is, in fact, descriptive. It's essentially just saying like we're providing some evidence. Among the first evidence from India or other similar countries, how much people are objectively sleeping. This is because sleep self-reports are pretty bad.

And then we have 450 data entry workers or people who are hired to do data entry work, and randomized them into interventions to increase their sleep and measure impact on a range of outcomes. Now, why is this possible? There's lots of progress in the last decades on sleep measurement technologies and those have only gotten better.

So these are Actigraphs, and what they look like, which essentially is like a wristwatch, you can think of this like an Apple Watch or like a Fitbit or the like, that measures sleep through motion. These devices have gotten really good. So they can actually measure sleep pretty well. There are some question of how well do they actually work in settings such as ours, but I think overall, essentially, that's to say we can run field experiments that meaningfully measure sleep and we can measure like first stage on sleep pretty well.

And given that so many people now have these types of devices, it's relatively easy to actually enroll people now in any experiment. Even if you did that on mTurk, you could do that probably and find people that have Apple Watches or Fitbits or the like and run experiments with that.

Importantly, they can measure a sleep quantity pretty well. They also can measure sleep efficiency pretty well, which is the fraction of time that you're asleep when you're in bed. They don't measure sleep quality that well in terms of deep sleep, et cetera.

I think there's progress has been made recently, but it's not great, but for our purposes, I guess, that's good enough. Now, and as I said, a lot of what we're doing is descriptive. The first finding in fact is just how much do people sleep.

And what we find is that well, if you look at self-reported sleep, things look actually not so bad. People sleep about 7.2 hours. That's actually quite similar to the US. But once you look at-- objectively measure sleep, people sleep about 5.5 hours in our study. Lots of people, and these are averages over a week at baseline, lots of people see 5 or 6 hours on average.

So it's not like they have a bad night once in a while. It's like, on average, the typical night of sleep is about 5 or 6 hours. And this seems to be also broadly representative. So you have a little bit of a broader study with a broader sample, but we find similar results.

Now, it's not-- one second-- that's not because people don't try to sleep. People spend lots of time in bed, about eight hours per night, which is, in fact, quite similar to the US. But what seems to be the case is that people sleep efficiency is really low.

That's to say, in the US, when you measure what fraction of time are people asleep when they're in bed, well usually it's about 85%, 90%, 95%. So if you are below 85%, people would say you're a problematic sleeper and you should get some treatment. Here we have 70% on average.

And this is as bad as people with sleep apnea or elderly populations who have really bad sleep. This is the average sleep that we find in these types of settings. So sleep is really, really interrupted, lots of awakenings. And the longest sleep episode that people get is really, really short. Yes? You had a question.

AUDIENCE: What is the variation across days in sleep efficiency or hours of sleep. Like are people sleeping five hours every single day, or is it?

FRANK SCHILBACH: I think so. I actually don't-- it's a great question. I don't know the answer that well. I think there's quite a bit of variation still within person as well. So people sometimes get really terrible sleep. I don't know whether that's different from how it would be in the US, like the women there. All of our data is actually online now, I think so you can check it out. Yes?

AUDIENCE: [INAUDIBLE] sleep actually recommend 7 to 9 hours per night. Is that based on self-reported?

FRANK SCHILBACH: That should be actual sleep. Now, it's a little bit hard to disentangle that. In a sense, like the recommendation in the US are mostly for the US in which countries where people have high sleep efficiency. So then it actually doesn't matter so much whether it's actual sleep or self-reported sleep, because that's quite similar.

The discrepancy between self-reported and actual sleep comes mostly from the time that's awake, because people at nights-- because when people wake up, they often don't remember that they woke up, but then remember like how long they woke up, and so on. And they often also confuse time in bed and time asleep.

But since in the US, that's quite similar, because 95% of the time in bed, people are actually sleeping, it doesn't actually matter so much which of the two statistics you mean. But I think they mean-- their main object-- they mean actually time asleep.

And so I often show the statistic and people kind of look at it and say, well 70%, that seems kind of low, but what's the big deal? And at some point we created this graph, which I think makes things much clearer and makes things more show how dramatically bad people sleep.

This is what a typical night in Chennai looks like. In red, you see times when people are awake. In gray, you see people are sleeping. And you see, essentially, it's riddled with-- and this is like a median person in our sample. This is not a bad night that one person had one time. These are like median values of awakenings, et cetera, and sleep efficiency.

This night is riddled with interruptions. People-- the night is highly fragmented. There's 31 awakenings of at least one minute, but at least 10 awakenings that are longer. And the longest sleep episode, uninterrupted sleep episode, is about 40 to 45 minutes. So essentially, people never get any full sleep cycles.

And for comparison, this is what a good night looks like in our sample and what maybe sleep looks like in the US or other types of-- your sleep might look like. Notice that there is also interruption, people actually wake up often or at least wake up a little bit, but there's also long periods of like uninterrupted sleep where people really get to enjoy their night.

So I think this is like, in fact, if I had to show one graph of this paper, was in fact, this one, is to say sleep is dramatically different in people's lives. And that warrants further investigation. Now, this also happens to be the case, probably my hypothesis, why we find no effects of increasing night sleep, because precisely, it's so interrupted. We didn't realize that until much later, so this is like an exposed hypothesis.

So here's the study timeline. I think you have all seen this. I think one-- the only thing I'm going to say here is that when you randomize sleep, you have to think about what the outside option is. What do people do in that time when they're sleeping or not sleeping, when they're not sleeping?

And so that's why we have in the no-nap condition we randomized work versus break, because that allows us to look at the opportunity costs of sleep. And that's in fact, quite important. And the sleep literature has not really focused on that very much. When you try to think about why are people not sleeping as much as perhaps we think they should, well, often it's because they have high opportunity costs.

So then second, night sleep treatments increased sleep duration, but not sleep efficiency. We had set things up such that we are hoping to increase both. We thought we know it would increase sleep duration, but we thought it would in fact come through increased sleep efficiency, through earplugs, eyeshades, et cetera. It just turns out that that's not really the case.

In some way, that makes things simpler for our analysis, because we can say, look, we really now looking at like sleep duration and holding efficiency constant. And if both of them had actually been increased, it would have been like some way messier.

But in terms of policy or in terms of like, as a policy intervention, that's not what we had intended. Because of course, once you increase people's sleep duration through having people spend more time in bed, now you have opportunity because now people are essentially have less time available for work, et cetera, which we in fact find because people lower their labor supply or time at work.

Now, these effects are sizable compared to other types of intervention, for example, sleeping pills and the like. So this is a meaningful increase in sleep. But as I said, it's entirely coming from increased time in bed. Sleep efficiency essentially stays the same. Yeah?

AUDIENCE: Do you have a sense of if there are kinds of interventions that could increase the efficiency, like sleeping just might be better, or not especially in the setting or?

FRANK SCHILBACH: Yeah? That's a good question. So broadly what our intervention was doing was trying to address environmental factors, you know, earplugs, eyeshades, curtain, table fan, et cetera. Now, you could address a broader set of environmental factors. For example, we didn't do mosquito repellent because we were a little bit worried about exclusion restriction issues with health problems and so on associated with mosquitoes.

You could have, in principle, provided better sleep environments in the sense of like there's still five people in the same room in a very crowded space and so on. So you could have done more to effect environmental factors. And we don't quite know what that would have done.

Second, you could have tried to address psychological factors or internal factors if you want that affect people's sleep. And there's, I'll tell you about this in a few slides. There's quite a bit of evidence that cognitive behavioral therapy for insomnia is, in fact, highly effective.

It's essentially-- it's some form of CBT that target directly to try to help people deal with anxiety of falling asleep and worrying too much about not falling asleep and therefore not falling asleep and therefore not worrying about sleep again. And there's quite a bit of work on that, that shows in fact, that's highly effective.

So any of you. I have sleeping problems, I would look into CBTI as it's called, which is-- there's lots of studies and like meta studies that show this is very effective in doing so. And so that would be a natural thing to try and do. It's not entirely clear that this is helping in the setting because there's also lots of environmental factors, so maybe you have to do both. We're not entirely sure. But that would be the next thing I would like to try.

So then people also like to nap. Lots of people nap, and they nap about 15 minutes at the office. Now here's the overview. And I think it's quite helpful to summarize the effects that way. Essentially, there's no positive effect at all of increasing night sleep on any of the outcomes that we find, nor on the overall index.

And we were like shocked about these effects, and a sense, like we had pretty strong priors that there would be some positive things going on, based on, we had like spend lots and lots of time reading the sleep literature. So this was really surprising at the time and took us quite a while to understand and digest if you want.

And ironically, there's one significant effect that's negative, which is time spent working, which is coming from precisely because of the opportunity cost of sleep. People spent more time in bed, therefore, have less time for other things available. And therefore, part of that goes into reduced work time. Yeah?

AUDIENCE: Do they work at night--

FRANK SCHILBACH: What's that?

AUDIENCE: --asleep, so the type of time-- This is [INAUDIBLE] people.

FRANK SCHILBACH: Yeah, but this is so people spend like an hour or more in bed, either in the evening or in the morning. So now, they have to do all sorts of other things, like, for example, a lot of the majority of our sample are women. So now they have lots of other households and other chores that they have to do, take care of children, et cetera. And so then they arrive later at work because of that. Does that make sense?

Yeah. OK. Now, in contrast, we find a pretty robust evidence that, in fact, naps have positive effects on a range of outcomes, including well being, including cognition, and including work productivity. So the effect on work productivity are not particularly large. This is normal in these types of setting, in a sense of affecting work productivity is quite difficult, or like often, productivity is not particularly elastic.

But again, there's opportunity costs of time. When you nap for half an hour in the afternoon, that takes quite a bit of time of your work time. And therefore, since people don't seem to shift their work hours, they spend the same amount of time at work. And if the nap for half an hour, now, they spend less time working, and therefore it has no effect on earnings. If anything, earnings I think go down a little bit.

So it's not like naps pay for themselves in any way or that's a way to increase your earnings. Now naps look, and this is important to look at the opportunity cost. What are people doing instead? If you think about naps versus breaks, naps look great, because people earn more money, people are happier, people have improved cognition and save more.

But instead, if you look at naps versus taking a break, the labor supply effects are, of course, negative. And the earnings a factor, are also negative. And there's a question of whether that's significant or not, but at the end of the day, it's not-- it's not a thing that you want to do to improve your earnings unless you have some slack time that you could use anyway.

Now, if you're an employer, you want to think about, is it worth? Some of you were asking, is it worth doing for an employer, what's that rationale? Well, on the one hand, it's not clear that you want to do this because it's not like overall output goes up. And that's probably what you care about as an employer.

But perhaps you also care about things like well-being of your employees, you care about retention, potentially. You care about potentially attention or other types of measures that maybe prevent accidents or the like at work. So it might be worth offering, in particular, if they're like breaks that people take anyway that you could essentially crowd out.

So a quick discussion. So as I said, there's no effects on sleep, on night's sleep overall. This is in contrast to expert predictions and our own predictions. The expert predictions turned out to be quite useful for us.

And the reason for that is that-- and some of you were saying the same, people were saying like, well, isn't that obvious that there's no effect? People should adjust. Why do you think that people are making mistakes, et cetera and so on? That's a reasonable perspective, in particular, exposed.

It's not like ex-ante, people were thinking that, including ourselves. So there are, the expert surveys protects us from these kinds of comments in some ways. We even had some referees who are saying, well, that seems obvious.

And then, we could say, well, look in fact, the experts survey, the experts didn't seem to think that including sleep researchers. And there's a large literature that seems to suggest there should be these types of effects. Now, why is there no effect? And we're a little bit unequipped to answer this question because we're really not testing the effects of sleep quality.

What we can test is see the effect of sleep quantity. We don't have any variation, for example, exposed what we should have done perhaps is to say have some variation and good nap quality versus bad nap quality. You nap in a quiet space versus a loud space, and then we could look at the effect of sleep quality on outcomes. We don't quite have that.

So we can't really-- we suspect it's to do with sleep quality, but it could also be that some of the findings from the sleep labs don't generalize to the field in the sense that small increases in sleep might just not have the effects of the effects and sleep labs that often come from estimating the effect of all-nighters on people's performance.

And consistent with that, and we have new evidence that people in our setting under invest in night sleep. So as I said, this is now not another example of people like underinvesting in high return opportunity, at least not in the type of way we were trying to affect it.

That's to say that, given people's environment, sleeping more actually, on average, at least, doesn't seem to be a good idea. Now importantly, that doesn't mean that if you relocated people from like their homes to a really nice home, you couldn't see really large effects. This is to say, if you make marginal adjustments given the condition you're in, it's not worth doing this type of investment or sleeping more.

But if you instead moved everybody to a nice hotel, maybe there could be large effects because now people get much better sleep quality and duration and so on. So we didn't really test that, but within there, what's available in that choice set, we can reject the broad hypothesis that people under invest in nights sleep in these types of settings.

Now, in contrast-- Yeah?

AUDIENCE: I'm just kind of curious because you mentioned there was some ex post reactions of, oh, maybe these findings aren't so surprising because we at least, from referees and stuff, but I'm curious among sleep researchers, how these results were perceived and especially given this implication that potentially some of these findings are not quite robust to actual [INAUDIBLE].

FRANK SCHILBACH: Yeah, that's a good question. I think it's really important with engage with these types of audiences because there's the number of people who work on sleep and sleep research, of course, is way, way larger than in economics.

And so we, actually writing a separate small piece that I put in the syllabus and that can be almost done, I can send it to Ed to put on the website where we try to encourage sleep researchers to-- or more broadly, try to encourage field research on sleep.

And in particular, we try to encourage two things. One is field experiments, improve sleep in people's natural environments, including duration but also things like cognitive behavior therapy for insomnia or the like to improve sleep quality. And in particular, then in settings such as among the urban poor or in the US, but also say in India, in settings where sleep quality is much lower than it is in sleep labs.

And so I think another way to frame this in the way we trying to put this when it comes to the discussion with the sleep researchers is to say, well, they seem to be large benefits in the lab. And now why are people not sleeping as much as perhaps sleep researchers think they should?

Is it the case that either there are some barriers that prevent them? They could be behavioral barriers, could be information, it could be self control or the like. Or is it that for some reason these benefits in fact, don't manifest and perhaps that could be because of sleep quality.

But regardless, we kind want to know, does that affect people's-- how does increasing sleep or affecting sleep affect people's lives? And in particular, and this is what sleep research does tend to not do, we want to measure things like earnings. We want to measure things like time at work, financial well-being, et cetera, economic outcomes, adding these types of outcomes to what sleep researchers would call pragmatic trials that try to improve people's sleep in field settings seems really important.

To be very clear, there's some field experiments that sleep researchers are doing, but usually they measure sleep as the primary outcome as opposed to other stuff. So I think, we very much trying to engage and trying to constructively, and we have a wonderful co-author. Susan Redline is her name. She's a very senior sleep researcher who is very supportive and interested in trying to figure stuff out. Yeah?

AUDIENCE: I'm curious about-- [INAUDIBLE] measure that, we measure the productivity [INAUDIBLE]?

FRANK SCHILBACH: Yeah, we do in fact, we measure that quite precisely. And we find pretty similar effects in the morning and the afternoon. You might have expected the nap effects to be in the afternoon and they're slightly larger in the afternoon.

So you can look at productivity over the course of the day, you see, productivity goes down a little bit right after the nap, which is people are kind of like, they call it, sleep inertia, people are kind of like a little bit out of it after just having taken a nap. And then productivity goes up.

But in fact, we cannot reject that the effects in the morning are the same as the effects in the afternoon. Now why is that? It could be effects from cumulative effects of naps, like you napped yesterday, and therefore today you're more productive.

Or it could be like anticipatory effects. You know at 11:00 AM, that at 1:00 PM you're going to nap in the afternoon, and therefore, you might be working harder than you would otherwise. So you find effects in both of those. For night's sleep, you essentially find no effects at any point in time, even early in the morning.

So it seems to be-- it's not the hypothesis that right after sleeping more in the morning, maybe you're more productive. That doesn't seem to be the case for night's sleep either. There's lots of open questions here, and I'm going to just leave you with those.

In particular, as I said, doing field research on these types of questions seems really important in rich settings, but also in low income settings, in rural settings, and people's natural sleep environments. In particular, sort of the key question that we can't answer is what's the impact of improving sleep quality? As I said, cognitive behavior therapy for insomnia seems to be really promising.

Looking at longer run effects could be important. We look at one month, which is pretty long compared to the typical sleep lab literature. But maybe, the effects of the year, et cetera are different. One particular interesting topic might be sleep and learning for children.

In education, there's lots of evidence that sleep helps with attention, memory consolidation, et cetera. And so that could be a really high return investment in education that's really cheap to do if you got children to sleep more or better if they're in fact are effects on learning.

And then more broadly, there's a question about how do people decide how much to sleep and what are barriers to sleep? There's a nice paper by Avery et al. that tries to get at that.

Let me skip this. You can look at a little bit about why this paper is working or not. Let me tell you a little bit about depression and anxiety, in part, because I think this is, in fact, the most interesting and exciting area that people are now currently are working on.

So we have an overview of paper with Matthew Ridley who is on the job market this year from MIT, as well as Gautham Rao and Vikram Patel, who's a very senior global health and mental health researcher on the relationship between poverty, depression, and anxiety.

And you can read that paper in detail. And I think we try to summarize broadly what we know and what our open research questions. And the first thing I want to emphasize is that when I started working on this topic, I was kind of thinking, like well, can we even measure depression and anxiety? Can we measure these factors?

And it turns out we can actually do that quite well. And there's short screening surveys such as PHQ-9 or GAD-7 for depression and anxiety that are, in fact, highly predictive of the in-depth diagnosis by a trained psychiatrist. So we can actually measure these concepts pretty well in the field.

Now, these are all kind of self-reports, right, so they are inherently self-reports. But I think people come to terms with that this is, in fact, these are pretty good measures, in part, because they're pretty highly correlated with the in-depth diagnosis.

And now more and more papers actually have on the left hand side, depression and anxiety, like GAD-7 or PHQ-9. And economists, including economists seem to be fine with that. Now, how common are these? Actually in some sense, if you look at point prevalence, they're not that common in terms of if you look at anxiety or depression disorder.

But when you look at lifetime prevalence, they're in fact, quite common. And we look at the number of families for example, who have at least one person who is at least at some point depressed, they are in fact, quite high. Prevalence is a lot higher among women and a lot higher among the low income populations.

We don't actually necessarily understand the gender difference that well, and that could be in part some of this could be perhaps reporting. One thing I want to emphasize is you might say, well, what I'm telling you here is the prevalence of depression disorder and anxiety disorder as a clinical definition in some ways. But of course, they might also affect these types of effects or mental health might affect much broader share of the population.

You might have some depressive symptoms in some ways, but you might not be diagnosed with depression and anxiety, and that might affect you well-being and your decision making or your behavior in various ways as well. So things like, [INAUDIBLE] who was also in the job market this year, working on mindfulness, meditation, might apply to a much larger population that are not necessarily have anxiety disorder, but are just are anxious or worried about their lives or about COVID or about unemployment et cetera and so on.

So you might say, well, this number looks kind of low. But in fact, I think a much larger share of the population is affected by mental health one way or the other. Now importantly, there's large treatment gaps, especially in low-income populations. So something like 80%, 90% of people who are--

If you diagnose people with depression and anxiety, we'll essentially see no treatment whatsoever in their lives. And that's a huge number, and that's of course, is also a huge opportunity to try and make progress. Now, why should you study mental health as an economist? Usually I would ask this and wait for a second. But let me just tell you.

The first order answer is like mental ill health makes people profoundly unhappy, like depression, anxiety, et cetera it's like extremely debilitating in their effects on people's lives. And as economists, we're trying to maximize utility, well-being of people.

And so, if you find some interventions that make people happier or less depressed or less anxious, that's like in terms of welfare, that swamps any effects on like productivity or whatever that you might find of like 5% here and there, if you can affect the fraction of people who are depressed for the rest of their lives or at least for a part of their lives. That's got to be welfare relevant and that's something that we should study because it's important.

Now, of course, mental health can also affect economic behavior. And economic forces might affect mental health. And so in that sense, you can try to understand what economic policies might affect mental health. Or we might try to understand well, how does-- how can we understand economic behavior through better understanding mental health?

Now, how might mental health affect economic behavior and outcomes? Broadly speaking, you can think about work outcomes, performance at work, dealing with failure, job surge, labor supply, earnings and the like, classical labor economics topics.

Second, you might kind of study economic permitives about beliefs, about confidence in yourself, about beliefs about whether you find a job or not, updating based on information that you receive, whether you just got rejected from a job application.

If you're depressed, you might think that that's because of you as opposed to were just unlucky and you might give up. Then preferences, time, risk and social preferences. This could be things like patient's risk aversion for example. Think about if you have anxiety disorder and you think about risky choices. Well, presumably that will affect how risk averse you are and understanding these relationships better seem important.

And then other things like decision making, default effects, choice overload, etc. could also be affected. There's a broader set of outcomes that you might be interested in like stigma and discrimination. This is partially what Matthew Ridley is working on, health behaviors, medical adherence, exercising, expenditures.

But other topics such as female empowerment. There's a very nice paper by Baranov et al. that shows effects on spending expenditures and who makes decisions in households as well as other things like human capital accumulation, schooling, intergenerational effects, et cetera, so essentially children's well-being, but also the education and so on might be affected.

At the same time, as I said, economic forces might affect mental health. And so there's lots-- we talk about this in a lot of detail in this paper. There's lots of evidence of things like pollution, losing your job, early life conditions, exposure to trauma, et cetera, all affect people's mental health.

So to try and understand these forces better or perhaps ways in which we can avoid such effects seems important. Now, you might say, well, we have all these treatment gaps. There's potentially these effects. Now what can we actually do?

And so in development in particular, so we know treatments are highly effective. There's lots of evidence of CBT and other interventions working. But there's only very few trained psychiatrists in many settings. And so drugs in particular, often not really available. So what can we do?

So one alternative is inexpensive, scalable psychotherapy interventions that can treat depression and anxiety. And there's actually quite a bit of evidence that these types of interventions work really well. And one of those people is our co-author Vikram Patel, who is dedicated essentially decades of his life to developing these types of interventions and they happen to work really well.

And so then, that's not a scalable thing that we can essentially introduce in many places. And one of the studies for example, that we follow up with, there's like persistent effects on depression, about 10, 15 percentage points five years later after the treatment for an intervention that takes six sessions for $50 per person.

And that's like-- if you think about it, that's like hugely cost effective in terms of just reducing years lived with depression. And so kind of trying to figure out how to scale these types of interventions and then look at potential other benefits seems really important.

The second potential alternative is new technologies using the internet or apps. There's some promising results, but mostly what I would call efficacy trials. So these are kind of trials where people are highly motivated and want to try to engage with their apps, et cetera.

Therapy can be quite effective for those types of population. Key issues here, take up an adherence, how can we get people to actually do this and follow through? There's very little work in developing countries, but it seems clear that in the last next 5 , 10 years this market will explode.

And there will be lots of activity and trying to figure out the right apps for people and trying to figure out how to improve people's mental well-being through that, just because it's so scalable and so broadly available potentially, and everybody has phones.

OK. Let me skip all of that. There's some evidence that essentially mental health can affect economic outcome. Let me just leave you with some open questions in this area. There's lots of exciting and important questions. And one broad question is, how exactly does mental health affect economic outcomes?

We have overall measures of like, when you provide therapy to people, it seems to be that labor supply a few years later seem to go up. But we don't quite know what's going on. Is this about income, productivity, labor supply, earnings? Is it coming through economic preferences, beliefs, decision making? Is it depression? Is it anxiety?

It's really hard to tell what exactly is going on. And so understanding that better really seems important. Second, can we use online tools as a social media tools in some ways or phone tools, apps, to improve mental health and economic well-being? Can we use them to make progress in helping people, not just improve their mental health, but perhaps there are also economic benefits of those?

Third, how can we increase take up. So like once we make these types of interventions available, how can we actually help people make use of them, take them up in the first place, but also adhere to them? There's different interventions that some people have been working on. You can try to reduce stigma. You can increase perceived efficacy, provide incentives, et cetera.

Next, and I think this is one of the most important questions of our time is to say, what are the impacts of different economic interventions relative to cash, other social welfare programs or safety programs? But in particular, what's the psychosocial value of labor?

There's a really nice paper by Reshmaan Hussam and colleagues that essentially looks at the effect of giving cash to people versus jobs. And they find that essentially having jobs people value, having jobs much more than just cash, this is in a refugee setting, I think in Myanmar, I think.

And more broadly, what is the effect of employment programs, so having work versus UBI? And given that there's lots of automation, et cetera, taking over and various places. And people argue, well, let's just give people cash and they'll be happy. Well, that might not be as simple because there's lots of identity in other types of considerations that might affect people's well-being and their mental health and understanding these types of trade offs seems really important.

Related to that is the effect of relative versus absolute poverty. Does inequality harm mental health? We actually don't very much about that because it's notoriously hard to identify. And finally, what is the optimal mix of economic and mental health interventions?

You might say, well, to some degree as-- you might just say, well, let's just do the ultra-poor program and that seems to be working and improving also mental health. But then, there's a fraction of people who have severe mental health conditions, perhaps for that type of population, we should also provide mental health support or we should do combinations of those two.

There are some studies that have started to look at the effect of cash versus therapy, which is Johannes Haushofer and colleagues, and Dean Karlan and colleagues that have started to look at that. But I think at the end of the day, it'll probably be the case that doing combinations of economic and psychological interventions will be optimal.

And depending on what the population looks like, depending what people are most in need. And my guess is at the end of the day, you'll probably want to offer both to some degree. And some of the intervention that Esther showed you already last week, which is the interventions of the ultra poor programs, are in fact, in some sense, providing already a lot of hand-holding and support.

And in some ways, you can almost think of this as like some form. It's not therapy, but it's some form of that gets pretty close, that somebody's providing essentially psychological support for people, and perhaps directly integrating some forms of therapy or techniques would be the most effective tool to do.

That's all I have to say. I'm happy to talk to you afterwards. You are very welcome to come to my office hours to talk about your research or any of the things I have discussed.