

[SQUEAKING][RUSTLING][CLICKING]

**FRANK
SCHILBACH:**

All right, so welcome. This is lecture 21 of 14.13. We're going to talk about poverty, as seen through the lens of psychology. What are we going to do? I'm going to give you some broad overview. We're going to particularly talk about this work on scarcity by Mani et al., which is the idea that thinking-- our thoughts about poverty captures people's minds, which in turn leaves less capacity in people's minds to do other things.

And then we're going to talk a little bit at the end, at least briefly, about other deprivations that poverty entails. Some of this is what I have done. Some of this work by others.

So I want to start with a simple observation that is sort of at the heart of a lot of this literature. And the observation is that when you look around in the world and look for evidence, and when you work on poverty-related issues, you'll see or observe quite a few seemingly suboptimal behaviors among the poor. This would be things like lack of investment or taking advantage of high return investment opportunities. This would be like investment in fertilizer or health investments or machines or low savings, in particular some things like precautionary savings, like being ready for shocks, saving for the future, for retirement, and so on.

At the same time, sort of high return or high interest rate credit, people take very high interest loans. In part-- what I've shown you earlier in the class, that's particularly prevalent among the poor. There's some evidence of worse performance of parenting among poor parents, including things like violence against children and so on.

There is some evidence of lower productivity, punctuality, lower medical adherence for drugs that are sort of even very high stakes drugs that are lifesaving. There's some evidence of food and drug consumptions in terms of healthy eating or excessive drug use and the like. All of those things tend to be correlated one way or the other with different forms of income or poverty.

So now you might say, well that's interesting, but now what explains these behaviors? How do we think about this? What [AUDIO OUT] plausible explanation kinds of autocorrelations. To be very clear, these are correlations, not causal effects.

So education could explain quite a few of those things. It could explain potentially productivity and it could explain potentially parenting and it could explain some form of financial investments. It could also explain things like medical insurance. For example, if you look at in some settings where people have not sort of learned in school any basics of medicine or biology and so on and sort of and it's not obvious that you should take medicine from a traditional doctor versus from some healer in the village, because how would you know what's better and what's worse. And sort of presumably some of these things you would learn in school. So one broad explanatory factor is sort of like, [INAUDIBLE] variables if you want, and one of them is potentially education.

It's not about omitted variable. This is about a treatment effect of poverty itself. And I'm going to be more specific about that. But essentially it's something about being in poverty itself affects people's behaviors. So it causes them-- some of these outcomes, some of these things that we've seen here. We'll talk about that in detail, but that's exactly right. In some ways, people would say, even for-- if you take credit for example, or for some things, you probably can't explain.

But for high return investment, you would say, while there's uncertainty and there's a good chance that there might be losses at the end of the day, and if you're really close to subsistence, you might not want to invest in stocks, because if a bad shock happens, that's really bad. So I think some of that is right.

And punctuality, for example, could also be in some way uncertainty. It's like you try to take a bus to work and the bus just comes every hour, and then sometimes it comes a half an hour early and sometimes it comes later. And it's really hard to be actually punctual. Could just be some people are not productive and are just bad at doing stuff. And therefore, they become poor and then they end up being poor because of that. So that's essentially, I think, that we covered pretty much everything.

So one is it could be sort of environmental conditions, which is transportation, it's really hard to get to work on time, or have the commute for two hours and then you're really tired and that makes you less productive. Things like predatory lending sort of tricks you into lending.

There could be some things about institutional structures, which is to say, I told you for example at MIT, there's a default-- or at other places, there's defaults for people to save money. And there's a default to get health insurance. And there's defaults for all sorts of good behaviors, like for vaccinations and so on and so forth. We are sort of essentially pushed by society, by the environmental conditions that we face into doing the right thing or whatever good behaviors, whatever you want to call it.

And so the poor might just not have those things. So for example, having a bank account might be like if you paid daily or you can buy by trip. The rickshaw drivers that I was showing you earlier in the semester, they paid trip by trip and then they'd pass by the liquor stores, essentially daily, and have a bunch of cash on hand. Well, that's much trickier to sort of resist sometimes, since if you were particularly also prone to physical pain, and then sort of to use alcohol as a way to deal with your physical pain. As opposed to somebody who paid monthly and half of the money goes into the rent anyway and then other expenses and so on, which is much easier to manage. So that's kind of broadly I would summarize it as environmental conditions.

Then there's selection and omitted variables, which is, I think Joseph has mentioned education, which is a very good one. There's things like intelligence, talent, effort, mistakes, and so on. You might say, well, if you are more prone-- if you're less productive, for example, if you're prone to making mistakes and so on, well that sort of leads to worse outcomes and that makes you end up being poor. And that's really sort of in some sense, a right wing kind of view, that people are-- they should do whatever they want to do and if the end of being poor, it's sort of their fault, and so on.

That's of course not what we're going to argue here. What we're interested in-- or what I'm trying to argue [AUDIO OUT] show you some evidence off this that there's a treatment effect of poverty itself potentially. Which is to say that being poor itself causes these behaviors. And again, I'll show you the evidence in two ways. One is by inducing thoughts about money, essentially thinking about can you pay school fees, can you pay your rent, can you get groceries for your children, are your children going to be hungry tonight, and so on.

These are all kind of thoughts that invade people's minds involuntarily. And by doing so, they capture people's attention. And then since attention overall is limited, people have less attention available for other things. That's sort of one broad theory. And I'll focus on that mostly which people refer to it under the name of scarcity.

And then there's a bunch of other aspects of poverty as well that might be competing with people's cognitive function, their attention, that tire them out. They're just not sleeping well, be in pain, being exposed to pollution, environmental pollution, noise pollution, and so on, and so forth.

And so now what's the underlying idea here? Well again, the underlying idea is that there might be what's called - people might want to call it behavioral poverty trap. And the broad line of argument is that poverty affects people's cognition, decision making, or productivity. These factors in turn then influence people's future poverty, because if you're not productive and you can't save money and so on, you're going to be more poor in the future. And if those things are going on, there is essentially some form of a vicious cycle going on, which makes it difficult, if not impossible, for a person to become rich.

Now notice at the very least, that will lower mobility. Sometimes if you're poor and you want to become richer, you have got to deal with a bunch of bad stuff that happens to you every day. But [INAUDIBLE] mobility is low, [INAUDIBLE] might be actually a trap. It's just next to or actually impossible to become richer, because all these forces are too strong to overcome for people.

So today I'm going to talk about two broad lines of research. I'm going to focus mostly on the first one, which is monetary concerns capture people's cognitive function. I'm going to talk a little bit about other poverty-induced deprivation of behaviors which might have sort of similar effects overall.

So now I want to do a simple test with you. So what I'd like you to do is to-- sorry, one second. I'm trying to-- give me a sec. I'd like you to-- hold on one second. One second.

All right. Ready? Don't write anything down. Just try to remember it and then try to recall it in a bit. I'm going to start reading. Bed, rest, dream, doze, snore, slumber, blanket, snooze, wake, nap, awake, tired. OK, now please write down as many words as you remember.

10 more seconds.

All right, so done. So usually I would have people raise their hands, which is a little tricky. But I'm going to just read you the list of words and you can nod to me-- I can see some of you, at least. You can nod and tell me whether you remember the words that I read. OK, I'm going to start. Bed, rest-- pretty good-- dream, doze, snore-- no? Slumber, sleep, blanket, snooze, wake, nap, awake, tired.

So I know this is making everybody sleepy and want to take a nap. Me, too. So here's the list of words that I asked you to remember. Now one thing that's kind of nice [INAUDIBLE] most people remembered quite a few things. The majority, for example, remembers bed and so on and so forth. Now what's quite interesting about these words is that while I remember-- I put all these names up here, which is-- these are the words that I actually read.

Now one word that's actually missing in this list here is sleep. And so you sort of-- I snuck this in here on-- this is why I had to go back. It turns out I actually didn't read the word sleep, but quite a few of you were nodding happily when I asked you about sleep. And what's the reason why you remembered sleep?

So all of these words is like-- they all around sleep. So it's really like sleep should have been there. It's kind of the type of thing where people would ask you, have you been to the party last week, where people just assume-- where essentially all of the friends were there-- people just assume that you were there, as well, because you're supposed to be there. It's like sleep is supposed to be in this list, but we didn't put it there.

And this is what is called false memory tests. And there's quite a bit of work on actually false memories. And people's minds essentially make up things. In particular, stuff that's sort of-- or where you have all situations that you think that should be the case. You can do the same with man and other lists and so on.

And now psychologists have been doing studies for the rich and the poor. And so here's two lists. One is about sort of money-related stuff. And one is about sort of just anything that's related to, I guess, man or gender in some ways. And they looked at how many people have certain false memory. And what these studies show is essentially that when you take this list for a man and you do this with high income and low income people, the fraction who remember a man wrongly is about 15% to 20%.

The fraction among the poor who remember money is similarly high. Among the rich, that's not the case. Now why is that? Well, it seems to be that for the poor, when you read lists like groceries, expense, bill, gas, et cetera, what they think about is essentially, how I'm going to pay for this. And they think about money. When for the rich,

Instead, when you say groceries or whatever, they think about what I'm going to buy for dinner and what are the nice things I'm going to do. And for them, this is really not top of mind. So this is essentially at least one piece of evidence that money captures the minds of the poor more so than for the rich.

Now, a second study is a study about the doctor's visit. So this is a study where the participants were asked about the following situation, which is imagine that you have been feeling sick lately and finally decided to go see a doctor about it. The doctor explains that you have a serious condition that requires immediate attention. The good news, however, is you are virtually guaranteed to make a full recovery.

The doctor writes several prescriptions. You will also need to make several appointments. What would be on your mind or how would you feel about when you hear this news? What are the three things that you think about it? Or you can think about for a second what is it that you would feel, and what are you thinking about when you see this.

And what's particularly interesting is how when you look at people's responses some people say wife, son, co-worker. Some people are scared, afraid, worried, relief, hope, joy, so like emotions or just of relationships and other people. Not exactly sure what the co-workers doing there but anyway, but what's particularly interesting is the fraction of people who say costs.

And as you can imagine, when you do this by low and high income when you think about medical conditions for the rich, this is much more about emotions about their health, about their relationships, their loved ones, and so on. And when the poor think about health or health expenditures or health issues, they think very much about health expenditures, and that is essentially what's top of mind for them.

And so again, when you split the sample by low and high income people, the poor have much higher proportions of money really good thoughts as reported by these kinds of questions compared to the rich. The third study-- the last thing I'm going to show you is the study that I showed you very much at the beginning of the class, which was a study about imagine you are about to purchase an iPad for \$500. The salesman says you can get the same iPad, exact same iPad for \$15 off. Would you walk for 30 minutes in total for \$15. Would you go for the other store?

And similarly, you'd have to do the same thing for an iPad case. And so the result that we found in this class and like the other studies have found is that people are way more likely to report that they would walk for the iPad than for the iPad itself. And the explanation, of course, is that people evaluate things in relative terms, right. So if you think about the iPad case, \$15 is really high relative to like \$30 in the iPad cases of value, while for the iPad itself, \$15 compared to \$500 is not very much. Now that's some form of money illusion or some form of community confusion or the like, because at the end of the day you should just be willing to walk for 30 minutes for either \$15 or not. That's not going to change depending on whether you buy an iPad or an iPad case.

Now many studies have found the kind of patterns including like in this class, but once you do that with the poor, they're much less likely if at all to engage in this kind of behavior, which seems to suggest that the poor, in fact, are less prone to this, kind of, labeling or, sort of, like monetary sort of comparisons. For them essentially \$1 is \$1 and they, sort of, understand that, like, \$15 is valuable regardless of what is surrounding comparisons like. And so if I have to summarize what I've just shown you very quickly is that thoughts about money tend to capture or take much more space in the poor's minds instead of the first two studies that I showed you, and second, the extra focus on money has actually some positive consequences in some sense.

In some sense, you can say here this is an irrational decision to say, yes, that you will go for the iPad case compared to the iPad or some of this optimization going on. So the poor are actually doing better or the less prone to these kinds of errors compared to the rich. I think that's a good thing for like potentially better monetary decisions here. So there's some positive consequences for impacts based on that.

But now, and this is where we're going to go, is, well, are there also some negative effects potentially? The reason being that if you have a certain amount of attention available overall, or cognitive resources available, if your brain is taken up by essentially these thoughts about money, then there will be less available resources for other stuff. Any questions on this so far?

OK, so then let's talk about the scarcity work specifically. So scarcity is actually defined generally here as not having enough of something. This could be money, friends, hair, time, et cetera. It's very general, actually. And so the idea is just like if you have something that you think you don't have enough. Notice that the definition is pretty vague in the sense that like it's not just saying like having low income, but it's sort of thinking that you don't have enough income, which could be also like in relative terms and so on.

And then the hypothesis is that scarcity captured people's mental cognitive capacity, their bandwidth, as they call it. This happens automatically and not intentionally. That is to say, that it's not people choosing to spend a lot of time on thinking about money, but rather, money captures their minds, and then they have trouble thinking about other things.

Think about this as like, it would be like suppose you have like some fights with a good friend of yours, or a partner or the like, and then you have an important job interview. It's really not productive to think about the fight with your friend or family member or partner or the like. During the job interview, there's nothing productive about doing that. You should be focusing on the interview and try to do your best.

But it might be that like essentially, these thoughts invade your minds and you sort of get really distracted unintentionally, and then do worse in those kinds of-- And that's the idea here similarly here as well, which is that essentially, there might be some benefit of figuring out monetary problems and figuring out how to pay the bills and so on and so forth. But overall, these benefits might be overwhelmed by taking over people's brain that leaves less resources for other things, the decisions or productivity that people have to do in life.

And so in particular, poverty now, so this is a general introduction. Poverty specifically makes monetary concerns top of mind, so the poor might be acting more rational in some ways, in some sense, in financial choices, which is kind of what the evidence that I just showed you in there, several studies that try to make that point. But you know, scarcity might then deteriorate performance at other cognitive tasks.

Now, here's sort of a PowerPoint version of that, which, you know, people may think about many things in life. They might think about rent. They might think about the kids doing well, eating healthy, utilities, car payments, and so on. But what does scarcity do? It magnifies, essentially, people's thoughts about rent, car payments and utility bills. These are all monetary things that people think about a lot, and then it might sort of like drown out or like force out other thoughts about other things, about eating healthy or about taking care of the kids in other ways than paying the bills, OK.

And so now, I'm going to show you evidence of two studies that sort of support this point. The first one, the paper is called "Poverty impedes cognitive function." That was the reading for today. The first one is called the mall study. So what does this mall study do? It's kind of like a lab experiment, but it's sort of in some sense like a field experiment.

So it's a major Jersey mall that asks shoppers or stops shoppers with a median household income of roughly \$70,000, so sort of richer than the average American, but with quite a bit of range of income overall. So there's like very rich people and fairly poor people. And then there's a sequence of three events, essentially, which is, people are asked hypothetical questions involving money. Some are hard and some are easy.

And then people are asked to do cognitive tests, a non-verbal test that sort of measures people's fluid intelligence, which is Raven's Matrices, which you might be familiar with. They're sort of IQ type tests. And some form of cognitive control, which essentially is about like, are you able to overwrite automatic responses when doing cognitive tasks.

And then number three, then, is like people that answer the hypothetical questions. So what does this look like? A hypothetical question is involving money, which is the following. Your car is having some trouble and requires x dollars to be fixed. You can pay in full, take a loan or take a chance and forgo the service at the moment. How would you go about making this decision?

And so then, people ask this question and they say, well, you can think about this for a while. And afterwards, I'm going to ask you about the answer to that question. And then there's a hard version and an easy version. The idea is that the experiment wants to keep everything the same for like across treatments, and the idea is that \$150 for the average American is not that much money, so it's not going to be a huge problem for most people, at least in normal times of their lives.

But \$1,500 is actually a lot of money for like a low income person in the US, but perhaps not that big of a deal for a rich person. Like for a rich person, the \$1,500 or \$150 are both fine. They're going to have some money in the bank account, and they're going to deal with it somehow. It's not a huge issue. For the poor person, \$150 is not great, but not a huge problem or not a huge headache. But \$1,500 surely is really bad.

That's sort of the idea here, right. Now what the study that finds is that-- and let me walk you through these graphs. Let's look on the left side. On the right side is quite similar. You'll see here always four bars. The dark bars are how people are doing after the hard task, and the lighter bars after the easy task.

Let's start with the light gray bars, comparing the poor versus the rich. And what you essentially see is the poor and the rich are doing pretty much the same after doing the easy task. But to be clear, what's poor versus rich is essentially being split by the median income. So if you're above the median, you're called rich. If you're below the median, you're called poor for the purpose of this study.

Now, for the easy task here, this is like the rich do essentially as well or as badly as the poor do. They get about 40% correct in these Raven's puzzles, and the poor do essentially the same. So there's no difference after the easy task. Now, after the hard task, for the rich, essentially it's the same. If anything, they do a little bit better. The difference is not statistically significant.

In contrast, you see like a clear drop in performance among the poor, OK. They do about like 12 percentage points worse. This is really like a huge difference in how well people-- so this is for Raven's Matrices. This is for what's called hearts and flowers for cognitive control, which is essentially how good are people at controlling their attention or resources.

And what you see is essentially more or less the same pattern, that for the easy task, the rich and the poor do pretty much the same. The hard task compared to the easy task does nothing for the rich. This is actually, the performance is the same or slightly different but not statistically significantly so. For the poor, there is a large drop in performance compared to the rich. Any questions on that?

OK, So then I'm going to show you the second study that's related to this. So one thing you might sort of say, well, we're going to show you, already, a study, so why do we need another study when we already did one. We showed you that like poverty and thinking about poverty affects people's cognition, so why do we need more evidence. .

So effort is an interesting issue that-- so there's, in fact, this study has-- and I took this out of the slides because I had too many. There's an incentivized version of this task.

And the authors do find that, even once you incentivize these tasks, we find the same patterns. But even there, it's a bit sort of like a task that is not a task that people do in their real life. And in a way, which is actually not what the harvest study is addressing, you might wonder. Does this translate into real world choices and decisions that actually have consequence for people's behaviors?

To be clear, these effects here, these differences in cognitive performances, are very large. This is like the order of magnitude something like 10 IQ points, which is really huge. So you might sort of argue that we think that IQ, et cetera, matters a lot.

So in some sense, that's what Mullainathan and Shafir would argue. But, no, I agree with you. In some sense, we would like to see does this translate into real world choices that we see in people's everyday lives. Now, I think we talked about a few of those things.

So one is external validity concerns, which is to say, look, we did this study in the mall, which is a little bit of a funny thing to do. And you hear about the scenario, which is kind of weird and maybe tricks you out. And maybe the poor are more freaked out than the rich for some reason.

But really, if you think about paying back your debt or any sort of school fees or just not having money, that's a repeated exposure of something that know in your real life. For example, not having harvest versus harvest is a thing that you experience every year or every twice a year even. And so you think some of these things might sort of go away with repeat exposure.

And so we kind of would like to have a real world setting where we have actually real world natural variation or sort of experimental variation potentially as opposed to the somewhat weird feature in some mall somebody talks you up and asks you some questions, which people might find funny and might not be representative for what people do with their lives.

And then the second part is kind of how do we interpret magnitudes, right? So I showed up and said, look, these effects are really large. After the hard task, the poor do worse than the rich.

But we have no idea how we should scale this in terms of what does it actually mean for actual effects of poverty. Suppose I give somebody \$1,000 or \$10,000, what does it do to people's performance? It essentially, what this shows, is that the poor are more sort of frazzled by these financial questions.

But it gives you essentially-- and that seems to be important because the magnitude is large and these effects. But there's no way to actually scale these effects in some sense in thinking about what is this priming intervention actually correspond to in the real world in terms of dollars and how rich or poor people are. So that's another sort of reason why you might want to do another study.

OK. So what is the other study? As Lauren was already saying, it's a study with 464 sugarcane farmers in 54 villages in Tamil Nadu. These are small scale farmers that earn at least the majority of 60% of income from sugarcane. So these are mostly sugarcane farmers.

And crucially for the study, the harvest is staggered over a three to five month period set by the sugar mills due to capacity constraints. So it's not some people harvest earlier than others because they decide to do so maybe because they need more cash. But it's rather because of capacity constraints. The sugar mill is essentially deciding who to harvests early and who harvests late.

And so, now, what this study explored is that the sugarcane harvest cycle takes about 18 months. It's extremely long. And as a result, farmers tend to be relatively poor pre-harvest. Think of that this is like grad school and undergrad stipends.

If you have that money for the month or the semester or the like, the beginning of the semester is always amazing-- or month, for that matter, is always amazing. You have lots of cash. And you can do lots of nice things. And then towards the end of the month or semester, people tend to run out of cash, at least when I was a grad student or student in general.

Similar things are true for food stamps or other sort of cash programs. There's quite a bit of evidence that shows, at the beginning of the month, people are doing a lot better than at the end, which seems to suggest that people have trouble smoothing their income over time, which presumably has to do with some form of self-control or other problems. But so for the purpose of this study, farmers are relatively poor pre-harvest.

And that now allows the authors to look at within person comparisons of people, sometimes when they're poor and sometimes when they're rich, at looking at the cognitive performance, by looking at people pre and post harvest. Now, first, you want to kind of see some evidence that farmers' financial situation is actually worse pre-harvest. And so there's quite a few-- and you can focus on the first column here-- pieces of evidence.

People are more likely to have their belongings pawned. They're more likely to have loans outstanding. They also have more loans outstanding.

They're also more likely to say yes to the question or higher scores to the question about their ability to cope with ordinary bills in the past 15 days post-harvest. And so all of these things sort of are saying, essentially, before harvest, farmers are in a financially tricky situation. And after harvest, that gets better because they get, essentially, a bunch of cash from this harvest.

Because, essentially, it's a cash crop. You sell your sugarcane, and then you get a bunch of money that you can use over the next 18 months. Now, then the authors find, again, using Raven's matrices and some measures of cognitive control, that people are doing a lot worse pre-harvest compared to post-harvest.

In terms of Raven's matrices, this is accurate. Essentially, people do better than getting more Raven's matrices correct compared to the control group. They also are doing better in terms of cognitive control.

Post-harvest response times go down, which is a good thing here. And post-harvest, also, people's errors go down in these measures. And there's a lot of detail related to that. But in some sense, that doesn't matter much for you right now.

People, essentially, are doing better post-harvest when they have more cash. Now, what confounds can you think about? What are potential problems with this result?

Actually, this is consistent with poverty impeding cognitive function, but there could be other things going on. And what are these other things? I think there's some good evidence-- or one good thing is that it would have to be a very specific shock that has to do with harvest.

Because, essentially, the harvest period was staggered over several months. So it's not like, at some point, the weather got worse or the weather got better. Because some people actually harvest earlier than others, and there's a pre-post comparison. But there could be other stuff, time trends or something, going on at least in some ways.

In a way, I think a confound or, in a way, it's also just a different interpretation perhaps in some ways in the sense of saying, well, it's not just worries about the level of income. But it's also worries about, essentially, risk or anxiety, essentially. And so that's slightly different, but the anxiety could also sort of capture people's minds in some ways.

Of course, then you would want to see something, like maybe that's worse for the rich compared to the poor or things like that. But that's exactly right. So there could be essentially labor costs or any sort of other distractions related to the harvest, which-- this is kind of related to what [INAUDIBLE] was saying, which is the harvest itself might have these kinds of effects.

OK, I think we mentioned most of the things that I have on my list. So there's first one is calorie consumption, which is sort of the typical thing that development economists can study a lot, which is to say, poor nutrition might make people do worse. It's bad for attention.

We talked a little bit about shopping on a hungry stomach, but also think about doing tests or exams on an empty stomach is probably not a good idea. The authors have some evidence that the food expenditures are pretty similar pre and post high harvest from some other sample. Overall, malnutrition doesn't seem to be a huge issue in this area.

Having said that, I think it's also reasonable to think that pre and post harvest you should have, actually, more money. And then you've got to spend the money on something. And presumably, some of that would go on food. So the authors argue that nutrition is not a big issue.

Then there's sort of two broad issues, which I think was Joseph and Katherine's comments, which is about the uncertainty of the harvest size and some issues related to labor effort. And so, here, the authors have some evidence from post-harvest pre-payment sample. What does that mean?

This is a sample that these are people who have harvested already, so they have already exerted the labor effort. And they also know already their approximate payment. And-- sorry. I was getting confused by this.

So these are people who have already done their harvest. They have done all the work already. They know already what the harvest size will be like.

But those people, essentially, are still not doing better compared to the people who have received their cash. So that essentially is to say, even once you have done all the effort and so on, that doesn't seem to help in a sense of you're fully doing, you're not exhausted from the work already. You already have all your harvest there.

You already know how big your harvest is, but you haven't really received the money yet. And you know already what the harvest size is. It can't really be about anxiety of the harvest size.

Yet if you compare those people to the people that received the money, you saw few differences between those people and the people who have done already the harvest. And so that argues that essentially it's not about anxiety, per se, about the harvest size, but rather about just having money in your pocket versus not.

Let me see what the-- is this the correct graph? I see. So this is a little bit misleadingly labeled. What this is supposed to say is this is post-harvest and pre-harvest.

But what they mean by post-harvest and pre-harvest, post-harvest is meant by you have received the cash versus not. But both of these are actually both post-harvest in the sense that they have done already the work. Anyway, sorry, that's a bit confusing.

But essentially, what they're trying to say is essentially what really matters is not the work around the harvest, per se, or the uncertainty around the harvest. It's really about receiving the cash versus not. And then there's another problem, which you haven't really brought up which is the issue of learning effects, right?

When people do the task several times, presumably when you do a test twice, you're going to do better. But to address this issue, they also have what's called a hold-out sample that takes the cognitive tests for the first time post-harvest. So what I showed you before was proposed for both people that have both of these tests.

There are some samples that's only done the task once post-harvest. And they don't perform worse than people who do the task for the second time, which seems to say it's not really about learning. Having said that, that is essentially only a small subsample.

Comparison really seems mostly underpowered. And there are some concerns, surely, about still effects. Any questions on these?

OK. So this is a study from a few years ago. So then what kind of follow up is there that sort of considers further evidence? So there's one very nice study by Carvalho et al. in 2015 that looks at the same issue in the US.

And they looked at cognition and decision making of US households around paydays. And essentially, they find no cognitive effects whatsoever. They also find no effects of decision making as one would have expected.

It raises the question about what's going on here. And [INAUDIBLE] what's going on. So it could be that this is an external validity issue in some sense. In a sense, really what is needed here is really extreme poverty and really large differences in people's income or the amount of money that they have available.

And when you look at US households, at least the households that were considered in the Carvalho study about payday, well, there's differences in how much money they have, cash on hand they have. The difference is actually not that huge. And so that might just be not sufficiently [INAUDIBLE] around those paydays to be able to generate those type of effects. It could also be that these effects don't really replicate in a sense of it's a replicability issue, which could be a concern as well.

There's a nice study-- and this gets to the issue that I think Joseph mentioned, which is a study by Lichand and Mani looking at drought insurance. And what they essentially argue is that, when you [? provide ?] [? people with ?] insurance-- so usually insurance, or people would argue, is useful. If a bad state happens in the world, you can essentially get-- might get a payment, right?

If I get some health shock or if my harvest is bad or the like, I get some money from the insurance company. And that is good. Because in the bad state, the marginal utility is really high of receiving money. And so I am willing to pay for insurance right now, in the future receiving-- so I'm willing to pay for insurance now. Because in the future, in a bad state of the world, I value that money more than in a good state of the world. So in a good state [INAUDIBLE] willing to pay for insurance.

Now, what Lichand and Mani are instead arguing is, well, there's an additional value of insurance, which essentially it's helping reduce their anxiety and worries about money ex ante in all states of the world. That is to say, if I'm really worried about bad harvest shocks or other stuff, health shocks happening in the future, that might really frazzle me and really sort of worry you all the time, which in turn might affect people's cognitive performance.

Well, that's in all states of the world. Even when you're doing well right now, even if nothing bad ever happens, you're going to do worse today because you're worried about these things. And sort of providing insurance, therefore, might help people better even in good states of the world or in all states of the world in addition to sort of having the insurance value of helping people in that state of the world.

Well, they have some evidence of it. There is some mixed evidence overall. But I think the idea of insurance being helpful for the poor, for anybody, not just because it helps in bad states, but it helps people worry about bad states, is a very nice one that hopefully will be explored further.

Now, then another question that I think Jose was bringing up is to say, well, there are these cognitive tasks. Well, I showed you so far that there are these tasks and Raven's matrices and cognitive control. And sort of, arguably, IQ tests are important then and helpful. And we think that's helpful and maps to something useful for the world.

But it's a little bit hard to tell. Does this actually matter for income? Is this really important or not important? And how much does it-- so in a paper with [INAUDIBLE] we looked at this in a field setting where the workers in Orissa and rural areas in India.

And what we did there is we hired people for about two weeks to do a simple labor cast where they were doing leaf plates, so essentially putting together leafs into plates, which are sort of used in many settings, by stitching them together using little wooden sticks. And so people are hired for two weeks. And then for the sample, we varied. Some people were paid earlier, and some people were paid later.

So everybody was paid exactly the same, conditional on showing up and conditional on how much they produced. So their piece rates, how much they were paid, were the same. And their attendance paid for showing up. The only difference was that some people were paid earlier, and some people were paid later. So that allows us then look at how do people, the same people, how would they perform when they're paid already versus not, compared to another group that is essentially only paid later.

And this is a period in the lean period when people are extremely financially constrained. So people are really short on cash. And you can look, essentially, really at the impact of transfers or cash constraints in this setting.

What we find is a relatively clear evidence that paying people early makes people a lot more productive. And moreover, these effects are the largest for the poorest workers. So essentially, when you sort of divide the sample in two, along the people who are richer and poorer to start with, people who are particularly poor have the largest impacts in the sample.

And this have sort of pretty large effects. It's about 5% to 10% of the productivity, which is doesn't sound that large in absolute terms. But in relative terms or in terms of when you double people's wages, people's earnings go up only as much or not much more.

So really increasing people's productivity is very, very hard in these settings. And relatively minor interventions, such as the one that we did, had pretty large effects in the real world setting for people for whom this is really their real jobs in their real life for about two weeks. So suppose you hired somebody for a year. Should you pay them daily, weekly, monthly, or what?

And so what I'm arguing or what our evidence shows, that when you hire people for two weeks, paying people twice, as in paying people once after a week and then the rest at the end, makes workers more productive than paying workers only at the very end. And assuming, you know, depending on the interest rate-- but that seems to be a thing the company should do. But of course, if you hire people for a year, then paying people weekly versus monthly or biweekly, the comparison becomes quite different. Because essentially, the control group, that's paid after two weeks.

Now, after two weeks, of course, they have a lot more money because they haven't spent it compared to the treatment group who's paid earlier. And I think there, essentially, we can't really speak to that. In some sense, our design is not really set up to do this.

You would have to do at least another week or two to measure how is the control group now doing compared to the treatment group or do it repeatedly. And there might also be some effects on over time, repeatedly, some of these effects might be going away because workers learn and so on and so forth. I think of this evidence much more as a proof of concept that, A, providing cash or alleviating cash constraints among workers, either through some low interest rate loans or some early payments or some form of UBI or cash transfers, unconditional or conditional cash transfers, essentially improving workers financial situation in some ways, can be productive for firms.

Now, how the firm then actually does that we don't necessarily know. And this is sort of too small, short, of an experiment to show that. But it's sort of proof of concept that, in a real world setting with very high stakes for workers-- this is their real earnings-- there seem to be these effects.

So for firms, it might be, well, do they have to, in fact, try to improve their financial situation [INAUDIBLE]. Or for governments, it might be valuable to think about cash transfers as a way to do-- so usually, when you think about cash transfers-- so let me actually just talk about this for a second. And then we can talk about other confounds of the study.

So usually, when you think about the public debate about cash transfers and about sort of welfare programs for the poor, often sort of the right-wing response is, well, aren't the poor going to be lazy? And they're not going to work. And then what about effort and so on and so forth? And they get used to the money. And then don't work hard enough eventually.

Well, the evidence that we have here in our paper seems to say, in fact, the opposite. That is to say workers, when you alleviate their financial constraints, when you give them cash, they become more productive. And they work harder than otherwise.

Granted, we don't have any labor supply response. What I'm showing you here is essentially productivity, which is how hard a worker's working or how much work a worker is producing per hour worked. But I think similar things could be true for cash transfers.

And there's some quite interesting evidence on cash transfer programs. So both cash transfer and, in particular, what's called ultra-poor programs, which are sort of these multi-faceted asset programs, leads to large and sustained increases in asset, savings, consumptions, et cetera. That is to say, once you provide people with financial resources when they're very poor, not only do they better in the short run.

But in the case of the ultra-poor programs, in the long run three to five years later, people are doing better in terms of having more assets, saving more, consuming more, and so on. And that seems to say that there might be an issue going on and some form of a poverty trap going on. And somewhere of the underlying potential channels might be things like scarcity, stress, mental health, and so on. We're going to talk a little bit about mental health and stress in a second.

But essentially, if there are these types of effects going on for the government or any other sort of public policy, these kinds of programs, conditional cash transfers, in addition to having the advantage of improving people's well-being and having the high marginal utility of money when they're very poor, it might also, in addition, make people more productive as opposed to a working less or the like. So I think those two things, I think, are sort of the takeaways.

If one wanted to understand optimal pay structures, one would have to do longer run types of experiments, as Natalie pointed out. So essentially, the way we set this up is we essentially pay people-- sorry. This is my Slack making noise-- pay people to-- sorry, [INAUDIBLE]-- people through the employer.

Essentially, we said, OK, the employer is paying, now, earlier versus later. And naturally, then the worker might just [INAUDIBLE] happier or doing better financially, but also like the employer better and saying, look, you just paid me early. I now trust you more that you're going to be paying me in the future. Maybe that's some form of gift giving or reciprocity, again, sort of happy about things, [INAUDIBLE] work harder to make the employer happy.

There are several things to get at this. And the most important part, perhaps, you also have that we announced essentially the structure a few days before the actual payment is made. That is to say, on day five, we announce and say, on the 8th, you're going to be paid versus we don't announce it. We say you're going to be paid only later at the end of the study.

And so if you think this is about reciprocity or feelings towards the employer, you would think that then workers should then already be working harder once they hear about when they get these kind of announcement effects. And it seems to be the case that there's essentially no announcement effect whatsoever. Workers only become productive pretty much precisely once they receive their cash on hand, which is very much consistent with what I showed you earlier, the results from Mani et al., in their study.

It seems to really be the case that knowing that somebody will be paid is really not helping workers or making workers more productive both in the form of their relationship or due to their relationship with the employer, but also due to other effects, including perhaps their worries or concerns that they might have about [INAUDIBLE]

So it seems to be that similarly from the Mani et al. paper, when workers have done their harvest and you have the harvest in front of you and it's worth so many rupees, that doesn't seem to increase their cognitive scores. That's what I was showing you earlier.

Really what it seems to be is you have to be actually paid. So once workers actually have the cash in hand, only then their cognitive function goes up. There seems to be something [INAUDIBLE] about this [INAUDIBLE] example I have for you is suppose you have to pay your bills. Suppose you don't have enough money.

And then, on the first of the month, you're going to be paid your stipend or whatever as a student. There's something distinctly different from having actually been paid the money on your bank account than having it in your possession that is yours or being sent a check or whatever, as opposed to knowing it's going to come in two days and you have your outstanding credit card bills even if you know that you can pay them.

That's, in some sense, from introspection, the best example I have for you. But it seems to be-- and you're right. In some sense, there could have been some effect of just telling workers you're going to be paid early versus later.

But it doesn't seem to be the case. This really seems to be the case of receiving the money, having cash in hand, and then being able to pay the money lender or pay essentially some person that you owe money, some money back, seems to be what's quite important for generating those kinds of effects OK so let's move on

I already talked about this. Essentially, yeah, so there seems to be these large effects of ultra poor programs, which seem to say that there might be some underlying behavioral or other poverty trap going on. And sort of we don't have the answer to that, but one hypothesis is that some of the underlying psychological issues might be responsible for that.

Now, what are other poverty induced deprivation? So poverty entails a bunch of different deprivations beyond money, including malnutrition, high levels of stress, sleep deprivation. People's sleeping conditions tend to be terrible. Noise pollution, the poor are more disproportionately exposed to noise. There's environmental pollution, in particular air, that the poor are much more exposed to.

Heat, the poor often don't have access to heat and/or temperature more generally. The poor are more exposed to high temperature and don't have access to ACs often. There is also some form of stigma and exclusion, which might have certain cognitive and other effects.

There's some evidence of disproportionate substance abuse. I've shown you some evidence of increased excessive drinking. And there's also quite a bit of evidence of increased mental illness, especially among the poor. So within any given location, the poor are disproportionately affected by mental illness, including things like depression and anxiety.

But there's a bunch of research in other settings that shows that each of these factors affect either health and/or cognitive function. And so you might wonder how are these factors then affecting people's decision making and choices. And just to give you some example of this, this is some work that we have done in Chennai.

So to give some sense of what this looks like, the poor essentially tend to have very, very challenging sleeping conditions. There's dust, noise, mosquitoes. People sleep in the same room.

People sleep outside in the middle of the street. And it's hot. There's people sleeping on the floor.

So essentially, any challenging sleeping conditions that you can think of you can find it among the urban poor. And so one question you might ask is, well, then does this lack of good sleep affect people's capacity to work and their decision making? And so in our study, what we do is we objectively measure sleep quantity and quality in Chennai. And we document severe sleep deprivation and alarmingly low quality of sleep in its setting.

What do I mean by this? People sleep on average about 6.5 hours per night. And the quality of this sleep is low, which one measurement of that is their fraction of time that they sleep along the time that they spend in bed is about 70%. That's what's referred to as sleep efficiency.

Sleep efficiency is way higher in rich countries. It's about 85% to 90%. So if the rich spend an hour in bed, they spend about 55 or something minutes asleep. If the poor do that, it's about 40 something minutes.

So essentially, there's lots of awakenings. And as a consequence, in our sample, people seem about 5 and 1/2 hours per night. Now, then what we do is we have two interventions to increase sleep and provide people information, sleep devices, which is mattress, ear plugs, eye shields, and so on. And we increased sleep by quite a bit for about three weeks.

And in this experiment, we also have an intervention of a nap intervention that offers people naps at the office, which provides high quantity and high quality of sleep in that setting. Now, what we find then is, somewhat surprisingly, that actually increasing people's sleep does very little. So people sleep about 20 to 30 minutes more every night for three weeks.

And we measure the labor supply. We hire them for about that time. People are not doing better in any way in terms of people not working more.

People are not more productive. People are not doing better in cognitive tasks. They're not happier and so on and so forth. They also don't make different decisions.

And if anything, you know, they decrease their labor supply. They actually work fewer hours. Why is that? Well, because people are spending so much more time in bed, they have now less time available during the day. And some of that time goes into working fewer hours.

Now, in contrast, the nap treatment has pretty large effects on the productivity, attention, well-being, patience, and so on. So it's not sleep cannot affect people's outcomes in these settings. But rather, a night sleep, as it is does not really do very much, at least the type of night's sleep that people are getting.

And so what we then provide some evidence of that what's really important here or the reason why people's sleep does not do very much in increasing their productivity or improving their outcomes is because the quality of sleep is so low. So let me sort of look at the sample and look at people who sleep better and worse at baseline at the beginning of the study. People who sleep better at the beginning of the study, they actually tend to have reasonably large effects on their productivity.

In contrast, people who have bad sleep to start with, for them, essentially increasing their sleep does nothing and potentially makes things worse. So what did we learn? I do not want you to take away that sleeping does not do anything. MIT students are chronically undersleeping. And you could be probably sleeping more, all of you, or most of you.

Essentially, what we learn from this is that, when people's sleep conditions are really terrible, well, then increasing one's sleep actually doesn't do very much. The return on sleeping is just very, very low. And so what we learn, in some ways, that the poor, at least in this setting, are actually doing as well as they could, in a sense of they do the best they can.

And since sleep is so bad, is so terrible, people sleep really badly, increasing their sleep does not do very much. That's not to say, if you actually fix their sleeping conditions, if you put everybody into a nice hotel or a nice bedroom or give them a nice house and help them sleep better, that wouldn't have potentially large effects. But the study that we conducted was not doing that.

The study that we conducted was essentially saying, take your sleep conditions as given. And look at what happens when you increase people's sleep duration for given sleep quality. And that doesn't do very much.

In contrast, as I showed you or told you, naps seem to be quite effective in having a large number or range of effects, which seems to say that sleep can potentially matter quite a bit. But what really is important is try to figure out how could we perhaps increase people's sleep quality which might have then important effects. Sorry, that was a lot of information, more than I perhaps intended. Any questions on that?

OK, so then the last piece, which I'm going to just sort of say a little bit about, is a paper that we just finished on the relationship between poverty and common mental disorders as they're referred to, which is anxiety and depression. And what we there sort of argue-- and it's a pretty short paper if you're interested. I'll, in fact, put it on my website tonight.

We're looking at, essentially, the relationship between poverty and these two conditions. And what we do is, first, we show the causal effect in both directions. And so there's quite a bit of evidence that, essentially, being poor is bad for people's mental health. And these are causal studies.

So for example, providing people cash transfers improves consistently their mental health. So there's a causal effective from not having money on people's mental health and anxiety and depression. At the same time, there's a causal effect of anxiety and depression on people's ability to earn income and, thus, their poverty.

So for example, if you provide people with CBT or some other forms of psychotherapy, that reduces their depression. And then, in turn, it increases their labor supply, which in turn presumably increases their ability to earn income. So there's causal effects in both directions from poverty to common mental disorders and from common mental disorders to poverty.

And then what the paper does in a lot more detail is then think about what are different mechanisms for this causal relationship and what exactly, what evidence, do they actually have of that. And so on the side from poverty and from economic conditions to mental health, there's a number of different issues that could be quite important ranging from stresses or just being exposed to lots of shocks and, therefore, worries and uncertainty to environmental conditions. In particular, there's quite a bit of emerging evidence of pollution being bad for people's mental health, so essentially pollution causing depression, for example.

There's some potential for physical health, just being in bad health. It might be bad for your mental health in part because it causes physical pain and other illnesses. There's some evidence of early life conditions growing up in poverty tends to be bad for people's mental health. And there's some nice evidence of shocks to mothers' and fathers' income might cause mental illness much later in life for the children.

There's quite a bit of evidence of trauma, violence, and crime, which the poor are disproportionately exposed to, affecting people's mental health. And finally, social status, shame, and isolation, if you sort of stigmatize and isolate from society, that might be bad for your mental health. Particular, sort of relative comparisons could be quite important.

And then at the same time, there are effects in the other directions coming from depression and anxiety. So one profound way in which depression and anxiety affect people's behavior is cognitive function, the way people think. So in contrast to other things such as health, depression and anxiety affect the way people think.

And then that might affect people's beliefs, their confidence, overconfidence, underconfidence, belief updating, all the stuff that we talked about in the class as well as their preferences, and time preferences, risk preferences, social preferences, and so on. It might affect their labor productivity, their labor supply, how much people work, and how productive they are. Of course, people might be very stigmatized and treated badly because of mental illness, which in addition sort of then makes people less likely to seek help potentially.

Because if you're then stigmatized, you might not want to declare to your employer or to anybody else that you're depressed. People tend to have worse health conditions if they're depressed or they suffer from mental illness or other health conditions tend to get worse, health expenditures. There's also some evidence of depression affecting women's empowerment. I think there's two potential channels here.

One is that women are, in fact, disproportionately affected by depression, anxiety, and so on. So the measured prevalence is about twice as high and sort of to the extent that now, if you improve people's mental health, women will disproportionately benefit from that. And then there's evidence that, once you do that, women have higher bargaining power in the household, more say about resources spent and so on and so forth.

And then finally, potentially quite important is effects on young people. This ranges from primary and secondary school age to college students and so on, which is to say that a lot of mental health conditions appear during adolescence. And so those are often when very critical decisions are made when it comes to education. Do you drop out of school? Do you go to college and so on and so forth?

It turns out there's actually quite not a lot of causal evidence on this, but it seems very plausible that this could be quite important. And sort of taking these things together, it seems to be that poverty, through various different channels, including scarcity, which I showed you at the beginning, but also including all these other conditions might affect profoundly the [INAUDIBLE] and how they make decisions and how productive they are at work, which then could reinforced poverty and make it harder for people to become richer.

This is a lot of information. So any questions? I'm happy to discuss or answer any questions that you would have.

I'm not expecting you to remember all of those things. I was just more elaborating for anybody who might be interested. You can also read all of those things in the paper that I'll add to the course website as well.

All right, so on Wednesday, we're going to talk about happiness and mental health. Please read the paper by Kahneman and Deaton. Notice I just changed this in the syllabus. So if you have an old version of the syllabus, please make sure you read the new paper. I think it was very short, so it shouldn't be tricky to read.

Essentially, it's looking at what kinds of things predict whether people are happy or not. And then on Monday, we're going to talk about policy with behavioral agents. Just as a reminder, we have a guest at the end of class next time.

I hope the guests will come at 2:20. I'm hoping for a lama to visit us, but it could also be a goat. We'll see how that goes.

Any questions or comments? When it comes to depression and anxiety, specifically I'm going to talk about it more generally. So one of the things I'm working on, for example, is looking at the impact of cognitive behavioral therapy or other psychotherapies to improve people's mental health and then look at the effects on people's beliefs, how confident are they in themselves, how they update their beliefs. And remember, we have this stuff from [INAUDIBLE] and others about asymmetric belief updating and is that affected, for example, by people's mental health.

Moreover, we look at preferences, which is precisely time preferences, social preferences, risk preferences. And once you improve people's depression, does that affect people's time social and risk preference? More broadly, there's quite a few people trying to do studies-- and I'll run through this fairly quickly-- to look at these types of effects, which, for example, there's some work around malnutrition that shows, once you provide people with more calories, there's some indications of less discounting, which is kind of what you're alluding to.

There's some work on the relationship between stress and discounting. There's actually not much evidence or less evidence than you would expect. For sleep deprivation, for example, we find, when people nap, they're less present biased compared to when they haven't napped.

For example, for alcohol consumption, I do find that people save more. And it seems to be not driven by having more money. So again, that seems to be consistent with people's time preference in some way affected by these conditions.

Overall, there's quite a bit of evidence so far on productivity. So papers essentially show that, when you're disproportionately exposed to heat, people are less productive. People learn less. When you're exposed to noise, people are less productive. When people have less nutrition, they're less productive and so on and so forth.

There's less evidence, so far, on decision making and sort of preferences overall. That's what people are currently working on, but that's exactly the question. Can we sort of explained potentially some of this stuff that I was mentioning at the very beginning of the lecture?

Can we explain potentially certain behavioral biases or certain deviations from the neoclassical model by alleviating or addressing some of the psychological [INAUDIBLE]? We don't have a lot of evidence, but we hope to have some more [INAUDIBLE]. But that's exactly what people are working on.