The Economic Impact of Depression Treatment in India

Manuela Angelucci
University of Texas at Austin

Daniel Bennett
University of Southern California

April 1, 2022
This Study

Motivation
▶ Depression is correlated with poverty and may contribute to poverty traps.
▶ Policy challenge: both supply and demand are constrained.
▶ What is the role for pharmacotherapy?

Impact Evaluation
▶ Community-based cluster-randomized trial near Bangalore, India.
▶ Community screening to recruit 1000 adults with mild/moderate symptoms.
▶ Cross-randomize pharmacotherapy (PC) and livelihoods assistance (LA).
▶ Assess impacts on depression, socioeconomic outcomes, potential pathways.
▶ Follow pre-specified analysis plan.
Interventions

Psychiatric Care (PC)
- Collaborate with a local social service organization (GASS).
- Eight months of free psychiatric care through Shridevi Research Hospital.
- Most patients received SSRIs.

Livelihoods Assistance (LA)
- Two group meetings: how to earn income, deal with on-the-job challenges.
- Personalized assistance to identify and pursue income-generating activities.
- Job placements, small loans, training, according to the participant’s needs.
Key Outcomes

▶ **Depression severity**: Standardized PHQ-9 score, PHQ-9 < 5 and PHQ-9 < 10 indicators.

▶ **Work time**: Time spent on employment, domestic work, and child care in 24-hour time diaries.

▶ **Earnings**: Weekly earnings from primary and secondary jobs.

▶ **Child human capital investment**: enrollment, attendance days, homework hours, paid work hours. Measured in Rounds 1-4 for children aged 5-18.

▶ **Risk intolerance**: DOSPERT Scale (Blais & Weber 2006); generalized risk self-assessment; incentivized lottery game (Eckel & Grossman 2008).
Impact on Depression Symptoms

During the PC Intervention

After the PC Intervention

Kernel Density

Depression Severity (PHQ-9)

PC/LA  PC  LA  Control
### Impact on Work Time and Earnings

Table 3: Impact on Weekly Work Time and Earnings

<table>
<thead>
<tr>
<th></th>
<th>Hours (1)</th>
<th>Hours (2)</th>
<th>Earnings (3)</th>
<th>Earnings (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A: During the PC Intervention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC/LA</td>
<td>1.07</td>
<td>1.48</td>
<td>37.9</td>
<td>22.4</td>
</tr>
<tr>
<td></td>
<td>(1.66)</td>
<td>(1.60)</td>
<td>(61.3)</td>
<td>(57.7)</td>
</tr>
<tr>
<td>PC</td>
<td>-5.40***</td>
<td>-4.92***</td>
<td>-65.4</td>
<td>-82.9</td>
</tr>
<tr>
<td></td>
<td>(1.70)</td>
<td>(1.64)</td>
<td>(54.2)</td>
<td>(53.1)</td>
</tr>
<tr>
<td>LA</td>
<td>-1.02</td>
<td>-0.50</td>
<td>-32.8</td>
<td>-38.0</td>
</tr>
<tr>
<td></td>
<td>(1.68)</td>
<td>(1.61)</td>
<td>(61.8)</td>
<td>(58.1)</td>
</tr>
<tr>
<td>Control mean of outcome</td>
<td>58.7</td>
<td>58.7</td>
<td>577.1</td>
<td>577.1</td>
</tr>
<tr>
<td><strong>B: After the PC Intervention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC/LA</td>
<td>-3.31*</td>
<td>-2.84</td>
<td>38.7</td>
<td>20.8</td>
</tr>
<tr>
<td></td>
<td>(1.77)</td>
<td>(1.74)</td>
<td>(67.3)</td>
<td>(65.9)</td>
</tr>
<tr>
<td>PC</td>
<td>-1.18</td>
<td>-0.84</td>
<td>-52.8</td>
<td>-63.6</td>
</tr>
<tr>
<td></td>
<td>(1.98)</td>
<td>(1.89)</td>
<td>(61.0)</td>
<td>(57.5)</td>
</tr>
<tr>
<td>LA</td>
<td>-1.52</td>
<td>-1.04</td>
<td>47.9</td>
<td>45.1</td>
</tr>
<tr>
<td></td>
<td>(1.95)</td>
<td>(1.93)</td>
<td>(62.2)</td>
<td>(60.0)</td>
</tr>
<tr>
<td>Control mean of outcome</td>
<td>60.4</td>
<td>60.4</td>
<td>639.2</td>
<td>639.2</td>
</tr>
</tbody>
</table>

**Specification**

<table>
<thead>
<tr>
<th>Observations</th>
<th>ANCOVA</th>
<th>LASSO</th>
<th>ANCOVA</th>
<th>LASSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>3476</td>
<td>3476</td>
<td>3476</td>
<td>3476</td>
</tr>
</tbody>
</table>
## Impact on Child Human Capital Investment

Table 4: Impact on Child Human Capital Investment

<table>
<thead>
<tr>
<th>Child Human Capital Investment Index</th>
<th>Full Sample</th>
<th>Child Age &lt; 12</th>
<th>Child Age ≥ 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>B: After the PC Intervention</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC/LA</td>
<td>0.12</td>
<td>0.12</td>
<td>-0.087</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.13)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>PC</td>
<td>0.19*</td>
<td>0.22**</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.11)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>LA</td>
<td>0.11</td>
<td>0.11</td>
<td>-0.026</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.12)</td>
</tr>
</tbody>
</table>

**H0:** $PC/LA = PC$

**H0:** $PC/LA = PC = LA$

Control mean of outcome

<table>
<thead>
<tr>
<th>Specification</th>
<th>ANCOVA</th>
<th>LASSO</th>
<th>ANCOVA</th>
<th>LASSO</th>
<th>ANCOVA</th>
<th>LASSO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations</td>
<td>2229</td>
<td>2229</td>
<td>1242</td>
<td>1242</td>
<td>987</td>
<td>987</td>
</tr>
</tbody>
</table>

Observations 2229 2229 1242 1242 987 987
Impacts on Socioeconomic Outcomes

(a) ANCOVA

During

- Hygiene/Sanitation
- Durable Goods Index
- Per Capita Consumption

After

- Hygiene/Sanitation
- Durable Goods Index
- Per Capita Consumption

Standard Deviations

-0.4 -0.2 0 0.2 0.4

(b) LASSO

During

- Hygiene/Sanitation
- Durable Goods Index
- Per Capita Consumption

After

- Hygiene/Sanitation
- Durable Goods Index
- Per Capita Consumption

Standard Deviations

-0.4 -0.2 0 0.2 0.4
Impacts on Potential Pathways

(a) ANCOVA

During
- Risk Intolerance
- Cognitive Performance
- Subjective Wellbeing
- Participation in HH Decisions

After
- Risk Intolerance
- Cognitive Performance
- Subjective Wellbeing
- Participation in HH Decisions

Standard Deviations

(b) LASSO

During
- Risk Intolerance
- Cognitive Performance
- Subjective Wellbeing
- Participation in HH Decisions

After
- Risk Intolerance
- Cognitive Performance
- Subjective Wellbeing
- Participation in HH Decisions

Standard Deviations
Discussion

Interpretation of Pathways

- No evidence of a productivity pathway in this sample.
- A preference pathway may explain the joint effects on human capital investment and risk intolerance.

Policy

- It is feasible to provide pharmacotherapy with local resources.
- LA strengthens the impact of PC on depression and protects against some transitory effects of PC.
- Adding LA ($9 per participant) is cost effective.
Depression and the Demand for a Novel Health Product: Evidence from India

Manuela Angelucci  
University of Texas at Austin

Daniel Bennett  
University of Southern California

April 1, 2022
Introduction

Two Puzzles

▶ Many poor people have low demand and high elasticity of demand for health products (bed nets, water purifiers, clean cook stoves).
▶ There is a low correlation between product use and willingness to pay.
▶ Implication: it is difficult for interventions to achieve sustainability.
▶ Many possible explanations: liquidity constraints, information, behavioral biases.
The Demand for Health Products

Dupas and Miguel (2017): *Handbook of the Economics of Field Experiments*
The Role of Depression?

Depression May Limit the Demand for Novel Health Products

- Depression may shift in the budget constraint by reducing productivity.
- Depression may interfere with learning about a novel product.
- Depression may create barriers to action.
  - Anhedonia may reduce the utility from adopting a new technology.
  - Pessimism may reduce the *perceived* utility of adoption.
  - Indecisiveness may make it more difficult to decide whether to adopt.
Research Questions

1. Does depression affect the demand for a novel health product?
2. If so, which pathways may be important?
The Product

- Hand sanitizer is a novel health product.
- Particularly useful for people with limited access to soap and running water.
- Available in local pharmacies but not commonly used.
- 80 rupees ($1.17), <1% of monthly household budget
Trial Design

Step 1: Community-based Depression Treatment (DT)

Step 2: Free Provision of Hand Sanitizer (FP) (six months after Step 1)
  - 80% of participants received 600ml of sanitizer for free.
  - Cross-randomized individually with DT.

Step 3: Measure Sanitizer Use (six months after Step 2)

Step 4: Elicit Willingness to Pay for Sanitizer (six months after Step 3)
Measurement

Willingness to Pay

- BDM incentive-compatible WTP elicitation: the participant states and “offer price” and the surveyor randomly selects a “draw price”. If the offer price exceeds the draw price, the participant buys the good for the draw price.
- BDM occurs after most FP participants have depleted the free sanitizer.

Product Use

- Participants self-report whether they use sanitizer at least daily.
- Validation: observe the quantity remaining for FP participants.
- We observe use while most FP participants still have some sanitizer left.
DT Increases Sanitizer Demand

Impact of Free Provision on Demand

Angelucci and Bennett (Texas and USC) Depression and the Demand for a Novel Health Product
DT has different effects on WTP and use

Table 3: Empirical Tests of Potential Pathways

\[ Y_{ij}^p = \eta_p + \delta_p DT_j + \theta_p FP_{ij} + \lambda_p (DT_j \times FP_{ij}) + X_j' \psi_p + \epsilon_{ij}^p \]

<table>
<thead>
<tr>
<th></th>
<th>Individual Earnings</th>
<th>Daily Use</th>
<th>Familiar with Product</th>
<th>WTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\delta^p)</td>
<td>-41.7</td>
<td>0.092</td>
<td>0.021</td>
<td>5.07*</td>
</tr>
<tr>
<td>(92.5)</td>
<td>(0.091)</td>
<td>(0.061)</td>
<td></td>
<td>(2.65)</td>
</tr>
<tr>
<td>(\theta^p)</td>
<td>54.3</td>
<td>0.40***</td>
<td>0.81***</td>
<td>1.74</td>
</tr>
<tr>
<td>(68.4)</td>
<td>(0.069)</td>
<td>(0.041)</td>
<td></td>
<td>(2.04)</td>
</tr>
<tr>
<td>(\lambda^p)</td>
<td>-24.0</td>
<td>-0.16</td>
<td>-0.013</td>
<td>-2.50</td>
</tr>
<tr>
<td>(104.9)</td>
<td>(0.10)</td>
<td>(0.066)</td>
<td></td>
<td>(3.00)</td>
</tr>
</tbody>
</table>

\[ \delta^p + \lambda^p \]  
P-Value: [0.18] [0.14] [0.75] [0.07]

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months since free provision</td>
<td>12</td>
<td>6</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Control mean</td>
<td>316</td>
<td>0.15</td>
<td>0.09</td>
<td>60.6</td>
</tr>
<tr>
<td>Observations</td>
<td>794</td>
<td>794</td>
<td>794</td>
<td>794</td>
</tr>
</tbody>
</table>
Pathways

Summary

X income (no effects of DT on earnings/income/consumption)
X experiential learning (free provision does not moderate the effect of DT)
? preferences (Cannot reject that demand and use have the same sign)
✓ cost of action (DT increases demand but not use; no impact on WTP for a non-novel product.)

Most alternative pathways lead to parallel effects on product demand and use.
Placebo Test for a Non-Novel Product

- Biscuits (cookies) are common and familiar.
- 30 rupees ($0.46) for a package.
A Small and Insignificant Impact of DT on Demand for Biscuits ($p = 0.12$)
Policy Implications for Settings with Endemic Depression

- Free distribution may dominate cost sharing.
- By affecting demand but not use, depression undermines the effect of “screening” benefit of charging positive prices.
- Minimize psychic costs by bringing the product to users (avoid “ordeal mechanisms”).
- Point-of-use distribution may achieve greater adoption than cost-sharing for a given budget.
Free Provision Does Not Increase Demand
Heterogeneity in the Impact of DT

Differential Impact on PHQ-9

Differential Impact on WTP

Angelucci and Bennett (Texas and USC)  Depression and the Demand for a Novel Health Product  April 1, 2022  22 / 22
Heterogeneity in the Impact of FP

Differential Impact on WTP

- Young - Old
- Men - Women
- Married - Unmarried
- HH Head - Not HH Head
- Low Education - High Education
- Positive Earnings - Zero Earnings
- Low Income - High Income
- Low Consumption - High Consumption
- Young Children - No Young Children
- Large HH - Small HH

Rupees