

Does AIDS Treatment Stimulate Negative Behavioral Response? A Field Experiment in South Africa

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ARV Provision and Simple Facts

- 1 South Africa - 18.3% prevalence of the 15-49 age population
- 2 Started in 2004, rapidly expanding access to ARV treatment in Africa mainly through the public sector
 - ▶ In South Africa in 2009, 975,566 people were on ARV
- 3 Based on the U.S. HAART program, randomized clinical trials conclusively mortality reduction by 68 percent and extends life expectancy



...but no previous research on whether ARV treatment distorts incentives for good behavior!

Research Questions

- 1 Does ARV provision induce more demand for subsequent unsafe sexual activity by *HIV*⁺ individuals?
 - ▶ own sexual behavior
 - ▶ family members' sexual behavior
- 2 Does ARV provision induce more future demand for schooling?
 - ▶ own educational investment

Why Care?

Particularly worrisome is the possibility of potential increase in unsafe sex in response to ARV treatment!

1 Welfare Economic Consequences

- ▶ How should we think about the welfare benefit of extending treatment to current population at a welfare cost of potential future infections among *HIV* – individuals?

2 Public Health

- ▶ What if the increase in unsafe sex in response to ARV provision is so high that actual HIV prevalence increases?

Margins of Behavior Change

- 1 First, holding testing likelihood constant, ARVs lower the future cost of getting HIV
 - ▶ this is the direct and most straightforward effect (let's call this **margin (a)**).
- 2 ARVs also improve morbidity
 - ▶ this is the direct epidemiological effect (**margin (b)**).
- 3 As treatment quality improves, the increase in the proportion of healthier *HIV+* individuals present in the market for risky exposures
 - ▶ this is the indirect effect (call this **margin (c)**).
- 4 ARVs reduce the average concentration of virus
 - ▶ this lowers the risk of transmission per risky act (**margin (d)**).

Margins (a), (b) and (d) suggest more risk-taking while margin (c) suggests less:

- **which will dominate is theoretically ambiguous *ex ante!***

Study Design

- Open enrollment into an experimental study at 12 ART clinics (n=648) in the Free State starting in October 2007
- Eligibility criteria: age 18+, commenced ART in past month, living in community where ART clinic located
- The criteria for ARV initiation in adults and adolescents was CD4 < 200 cells/mm³ irrespective of stage **or** WHO Stage IV AIDS-defining illness, irrespective of CD4 count
- Three survey rounds comprising data for both adults and children



Study Design

We randomly assign *HIV*+ individuals to one of three treatment arms in 2007:

- 1 Individual receives ARV treatment only (n=216) [Group A or Treatment Arm 1]
- 2 Individual receives ARV treatment AND a trained peer adherence supporter during twice weekly visits to the patient (n=216) [Group B or Treatment Arm 2]
- 3 Individual receive ARV treatment AND a trained peer adherence supporter during twice weekly visits to the patient AND nutritional supplementation (n=216) [Group C or Treatment Arm 3]

Also, the study randomly selects households from the general community served by the selected health facility, excluding households where someone is known to receive ARV treatment (n=180) [Group D]

So how can we estimate an unbiased average treatment effect among compliers to treatment?

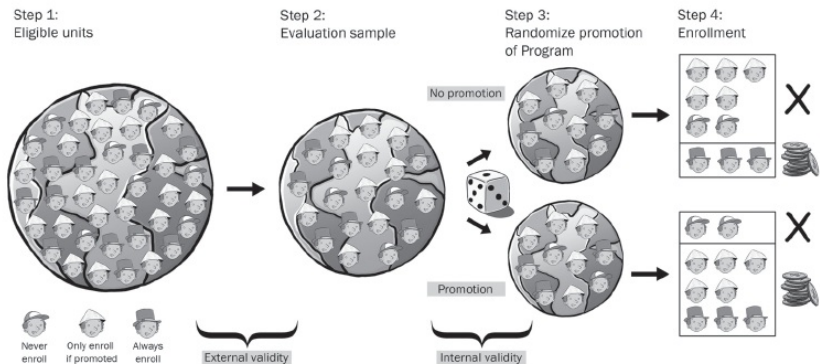
- Perfect counterfactual in an ideal experiment to *HIV+* individuals on treatment is *HIV+* individuals not on treatment
- One possibility - randomize patients into and out of the treatment program.
 - ▶ Use a randomized control trial with perfect compliance.
 - ▶ Perfect compliance unlikely; ethical and feasibility problems

Identification Strategy (Encouragement Design-IV)

- We use a randomized encouragement outreach
 - ▶ a subset of patients is randomly selected to receive additional “encouragement” to get treatment
- Treat Treatment Arms 1 and 2 as instruments to estimate the true **causal effect** of treatment on the outcome
- We estimate causal impact by comparing outcome differences for Groups B and C versus Group A
- Also treat the treatment arm with nutritional support (Group C/Treatment Arm 3) as a way to distinguish how much of the overall effect is through health improvement and how much is change of incentives








Study Design

Figure: Randomized Encouragement



Study Design

Figure: Estimating Causal Impact

	Promoted group	Non-promoted group	Impact
	% enrolled = 80% Average Y for promoted group = 110	% enrolled = 30% Average Y for non-promoted group = 70	$\Delta\%$ enrolled = 50% $\Delta Y = 40$ Impact = $40/50\% = 80$
Never enroll			—
Only enroll if promoted			
Always enroll			—

Encouragement Design-IV Estimation

$$\text{Step 1 : } d_i = k(z_i, \delta_i) \quad (1)$$

$$\text{Step 2 : } y_i = \alpha_i + \beta_i \hat{d}_i \quad (2)$$

- In equation (1), the variables y_i and d_i are respectively the observed outcome and a binary indicator (1 if treatment and 0 if not).
- β_i is the individual specific parameter giving the patient's sexual behavior without treatment as long as z_i satisfies four assumptions outlined in Angrist, Imbens, and Rubin (1996)
- Groups B and C allow us to generate binary dummy variables for z_i in Step 1 above

Baseline Stats

Table: Balancing Across Three Groups At Baseline

	<i>Arm 1 (n=214)</i>	<i>Arm 2 (n=212)</i>	<i>Arm 3 (n=208)</i>
Age	37.45 (9.39)	36.92 (8.70)	37.20 (8.77)
Gender	0.78 (0.20)	0.73 (0.22)	0.77 (0.21)
Marital	0.25 (0.45)	0.25 (0.35)	0.25 (0.43)
Education	10.11 (2.78)	8.34 (2.99)	8.62 (7.21)
Currently in School	0.02 (0.13)	0.01 (0.09)	0.01 (0.12)
Health Status	78.81 (19.19)	79.44 (18.52)	77.68 (18.64)
Job	0.55 (0.14)	0.57 (0.13)	0.58 (0.13)
Minutes to Clinic	48.45 (51.41)	49.58 (53.84)	48.66 (50.73)
Adherence Scale (1-10)	7.75 (0.83)	7.79 (0.67)	7.82 (0.63)

Standard errors in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: This table shows balancing tests for the demographics by assigned treatment arm

Very Preliminary Results For Effect on Sexual Behavior

<i>Dependent Variable:</i>	<i>Sexual Partners (OLS)</i>	<i>Condom Used (Logit)</i>
Treatment	0.79*** (0.02)	-0.21*** (0.11)
Number of Obs.	509	509

Standard errors in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%

People on Treatment are **1.23 times** less likely to use a condom

Summary

- 1 Preliminary Results suggest modest negative behavioral change to free ARV provision!
- 2 Next Steps for Analysis:
 - ▶ Use clinical data to proxy and improve the measure for probability of treatment and
 - ▶ Proxy unsafe sexual behavior with STI prevalence
 - ▶ Distinguish between physical health improvement effect and distortion of incentives more clearly
 - ▶ Behavior change by different strata and robustness checks

Thank you!

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