

# Reducing crime and violence: Experimental evidence on adult noncognitive investments in Liberia\*

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## Abstract

We show self control and self image are malleable in adults, and that investments in them reduce crime and violence. We recruited criminally-engaged Liberian men and randomized half to eight weeks of group cognitive behavioral therapy, teaching self control skills and a noncriminal self-image. We also randomized \$200 grants. Cash raised incomes and reduced crime in the short-run but effects dissipated within a year. Therapy increased self control and noncriminal values, and acts of crime and violence fell 20–50%. Therapy’s impacts lasted at least a year when followed by cash, likely because cash reinforced behavioral changes via prolonged practice.

*JEL codes:* O12, J22, K42, D03

*Keywords:* noncognitive skills, crime, violence, poverty, cash transfers, field experiment, social identity, rehabilitation, Liberia

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# 1 Introduction

In many countries, poor young men have high rates of violence, crime, and other “antisocial” behaviors. The economic costs are steep. In addition to the direct costs of crime and violence, output suffers from so many unproductive young people. Crime and instability also hinder economic growth by reducing investment, lowering demand in some sectors (e.g. tourism), or allocating resources to security. In fragile states, such men are also targets for mobilization into election intimidation, rioting, and rebellion.<sup>1</sup>

Two of the most common government responses are policing and job creation. Both take the person as they are and try to change their incentives or simply incarcerate them (Becker, 1968; Draca and Machin, 2015). This paper investigates an alternative: rehabilitation, or changing behavior by shaping people’s underlying skills, identity, and values.

A large literature has shown that a broad set of noncognitive skills, especially self control, strongly predict long-run economic performance and criminal activity (e.g. Borghans et al., 2008; Heckman et al., 2006). These skills respond to investment, especially in childhood (Cunha et al., 2010). They are fostered by family, schools, and communities. There is little evidence, however, on the returns to late-stage noncognitive investments, and so it’s unclear whether by adulthood self-investment or interventions can shape noncognitive skills and hence behavior (Heckman and Kautz, 2013; Hill et al., 2011). It’s also unclear what specific skills are both important and malleable.

To investigate, we recruited 999 of the highest-risk men in Liberia’s capital, generally aged 18 to 35. Most were engaged in part-time theft and drug dealing, and regularly had violent confrontations with each other, community members, and police.

We experimentally ran two interventions. One was an 8-week program of group cognitive behavior therapy (CBT) called the STYL program, for Sustainable Transformation of Youth in Liberia. We assigned offers by lottery. Following the therapy, we held a second lottery for an unconditional grant of \$200—about three months wages. The cash was partly a measurement tool, to see if therapy affected economic decisions. The cash was also a treatment, in the sense that it could stimulate legal self-employment.<sup>2</sup> Experimentally, subjects either received therapy, cash, therapy then cash, or neither. To deliver both treatments cost about \$530 per person.

CBT is a therapeutic approach used to treat a wide range of harmful beliefs and

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<sup>1</sup>For example, poor urban young men were recently recruited into election violence in Sierra Leone (Christensen and Utas, 2008) and as mercenaries in Cote d’Ivoire (Blattman and Annan, 2014).

<sup>2</sup>Evidence from East Africa suggests that the poor and unemployed are credit-constrained and have high returns to cash (Haushofer and Shapiro, 2013; Blattman et al., 2014, 2015).

behaviors, including depression, anger, and impulsivity. First, it tries to make people aware of and challenge harmful automatic patterns of thinking or behavior. Second, it tries to disrupt these patterns of thinking and to foster better ones by having people practice new skills and behaviors. The STYL therapy itself was designed and implemented by a Liberian non-profit organization, the Network for Empowerment and Progressive Initiatives (NEPI), which has been running versions of the therapy for a decade. In STYL, groups of 20 men were led by NEPI facilitators, who were themselves reformed combatants or criminals who graduated from a previous NEPI therapy.

Within the broad category of “noncognitive skills”, STYL focused foremost on self control. By this we mean the tendency to be planful, responsible, and resistant to temptation and impulse. Self control skills are often central components of US programs from preschool to rehabilitation therapy.<sup>3</sup> The curriculum focused on helping men foster skills of planning, goal-setting, being more reflective and deliberate in decision-making, and controlling their emotions and impulses.

The therapy also tried to foster a nonviolent, noncriminal self image and set of values. A premise of STYL was that the men self-identified as outcasts and didn’t hold themselves to the standards of mainstream society. The therapy tried to persuade the men that they could change who they were, and how they were perceived. It deliberately walked them through these steps, such as changing their appearance or engaging in normal social interactions. NEPI facilitators also modeled this image change.

The idea that self image and associated preferences are malleable has a central place in criminology (Maruna and Roy, 2007). A psychology and economics literature also supports the idea that self image and associated values influence behavior, and that both can change. This literature treats values as direct utility benefits or penalties from acting in accordance with or against a set of preferences (Bénabou and Tirole, 2004; Almlund et al., 2011). Akerlof and Kranton (2000) argue that these values are tied to a person’s self image, or perceived social category, and that to some extent people can change their social category and with it values that reward and penalize certain behaviors.

There are striking parallels between STYL and socialization into militaries, street culture, gangs and armed groups. Such groups use similar techniques (appearance change, practice, modeling) to shape young men’s self-image and behavior (Vigil, 2003; Wood, 2008; Maruna and Roy, 2007). NEPI designed STYL to reverse this process.

We surveyed the men beforehand, a few weeks after the interventions, and finally

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<sup>3</sup>e.g. Gottfredson and Hirschi, 1990; Borghans et al., 2008. As an example of an intervention, the famous Perry Preschool Program emphasized the ability of young children to plan tasks, execute their plans, and review their work in social groups (Almlund et al., 2011).

a year later. Most men had no fixed address, phone, or even name, and they moved around the country or were in and out of prison. Despite this mobility, we re-interviewed 93%. We rely on self-reported data since (like most poor and fragile states) there are no administrative or arrest records. We did not necessarily trust self-reports, and so we validated behaviors such as drug use and stealing in a subsample.

We approached roughly 1500 high-risk men, and 999 agreed to enter the study. Of those assigned to therapy, nearly all attended at least a day, and two thirds completed it. The higher risk men were the most likely to finish. We estimate simple intent-to-treat effects.

Men who received therapy reduced their antisocial behavior dramatically. Within a few weeks, for instance, drug dealing halved and thefts fell by a third, compared to controls. With therapy alone, these effects diminished after a year. When therapy was followed by cash, however, effects were lasting. For example, a year later, those who received both therapy and cash were 44% less likely to be carrying a weapon, 43% less likely to sell drugs, and reported lower aggression. In the control group, men reported stealing almost once per week on average, and with therapy and cash this fell nearly 40%—equal to 25 crimes per year, per person.

These declines do not seem to be driven by misreporting. On the contrary, validation suggests the control group underreported behaviors such as stealing, and hence the treatment effects slightly underestimate therapy’s impacts.

Therapy also led to improvements in self control skills and anticriminal values of a similar magnitude to the antisocial behavior change. With therapy alone, these noncognitive changes diminished after a year. When therapy was followed by cash, however, the effects were lasting. We cannot validate these self-reported skills and values, but we show that treatment effects are similar whether we examine skills and values covered or ignored in the STYL curriculum.

How was cash used? Regardless of therapy, little of the grant was spent on drugs or “wasteful” things. Most funds were invested in business or saved. Cash led to a short-term increase in petty trading and income. After a year, however, these gains disappeared, partly because most men were robbed regularly, irrespective of treatment.

The fact that therapy’s effects were strongest and most sustained when followed by cash is one of our more unexpected and important findings. Without a sustained effect of cash on earnings, it seems unlikely that cash raised the opportunity cost of antisocial behavior. Drawing on qualitative interviews and psychological theory, we argue that the brief increase in income and legal employment helped to extend and reinforce the changes

in self control skills and self image. Specifically, for a few months longer than the original intervention, the cash allowed men to project a changed self and to avoid homelessness and stealing. In effect, we believe cash helped the men practice behavior change started by the in-class therapy for a longer period of time.

Altogether, these results suggest that noncognitive skills and values are malleable in adulthood (at least high risk men). This is consistent with studies in the United States (US) that show that adolescent CBT programs in schools and correctional institutes reduce antisocial behavior, at least temporarily.<sup>4</sup> For example, three recent randomized control trials among at-risk Chicago adolescents show that CBT can help adolescents reduce automatic behaviors (such as violent retaliations to a slight) by learning to override “fast” decision-making with conscious, “slow” reflection (Heller et al., 2015). There are parallels to STYL’, though STYL targeted a broader array of skills and values.

In addition to testing the interaction of an economic intervention with CBT, this study also addresses several gaps in the literature. While CBT is a well-established approach in the context of child and adolescent antisocial behavior, there is little evidence on late-stage interventions. Most efforts to reduce crime focus on education and employment, with direct noncognitive investments more rare.<sup>5</sup> Moreover, few studies have attempted to measure noncognitive skill and value changes directly, but rather rely on administrative records on school dropout, infractions, or arrests. A final gap is geographic, as there is little non-Western evidence. Understanding how to shift violent behavior in fragile states, where mobilization into armed conflict has fewer barriers, is crucial.

It remains to be seen if STYL is replicable elsewhere, but there are several sources of promise. STYL was adapted from established Western therapies with a strong evidence base. STYL also developed its own facilitators from prior graduates, enhancing scalability. Ideally, future work would not only test generalizability to new contexts, but also address the limitations of this study, including: a reliance on self-reported (albeit validated) data; an absence of direct measures of image change; and no variation in therapeutic length, technique, or focus. The complementarity between economic assistance and therapy also demands more investigation.

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<sup>4</sup>For evidence on children and adolescents, see Heckman and Kautz (2013); Hill et al. (2011). Meta-analyses of adolescent and adult interventions in correctional institutes find that CBT-informed programs that target criminogenic behaviors among the highest-risk men reduce recidivism more than alternate approaches (Andrews et al., 1990; Lipsey, 2009). Heller et al. (2015) highlight some of the weaknesses of this literature, which include small sizes, attrition, and in some instances poor causal identification.

<sup>5</sup>Two large US programs, Job Corps and ChalleNGe, are residential programs for at-risk youth that provide some social and character skills, but mainly focus on remedial training and employment (Schochet et al., 2008; Millenky et al., 2012). The programs that most commonly target noncognitive skills directly are those in correctional institutions (Andrews et al., 1990; Lipsey, 2009).

## 2 Intervention and experiment

Liberia’s capital, Monrovia, is home to a third of the country’s 4.3 million people. There are few formal jobs. Most men aged 18 to 35 have limited employment and earn money through a mix of agriculture, casual labor, or petty business. A few turn to crime, which is becoming more violent and commonplace.

From 1989-96 and 1999-2003 two civil wars wracked Liberia. They killed 10% of the population, displaced a majority, and recruited tens of thousands into combat. Since 2003, however, Liberia has been at peace with the help of a United Nations (UN) peacekeeping force. During our study period, 2009-12, the economy was growing 6% per year (Republic of Liberia, 2012). Nonetheless, in 2009, people aged 18 to 35 would have spent 2 to 15 years of their childhood or adolescence under war and political instability, many robbed of the institutions and stability that normally fostered planfulness, emotional stability, and other noncognitive skills.

Marginalized young men are one of the government’s main concerns, especially poorly reintegrated ex-combatants and other men involved in drugs and crime. Drug and criminal networks were disorganized, but there was worry that they could consolidate. Another worry was political violence. High-risk men had joined riots in the past, and more serious violence was feared. They were targets for mercenary recruitment into the 2010-11 conflict in Côte d’Ivoire. Before the 2011 elections, there were also worries these men would be mobilized into election violence.

### 2.1 Recruitment and target population

The study recruited 999 young men aged 18 to 35 in five mixed-income areas of Monrovia, focusing on the homeless, men involved in drugs and crime, and poorly reintegrated ex-combatants. Column 1 of Table 1 describes the sample at baseline. On average the men were 25, had nearly eight years of schooling, earned about \$68 in the past month working 49 hours per week (mainly in low skill labor and illicit work), and had \$34 informally. 38% were a former member of an armed group.

NEPI recruited study subjects. NEPI had extensive knowledge of these neighborhoods and connections to local leaders, as well as a strong reputation that leaders and high-risk young men could verify (which NEPI often encouraged them to do, to build trust). NEPI solicited recommendations from local leaders, but mainly targeted places or professions with reputations for high-risk young men.<sup>6</sup> All our data and qualitative observation

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<sup>6</sup>Professions included “car loaders” who have reputations for pickpocketing, or wheelbarrow and mo-

Table 1: Baseline summary statistics and test of balance for select covariates

Baseline covariate	Sample	Test of randomization balance			
		Assigned therapy		Assigned cash	
		Coeff.	p-value	Coeff.	p-value
	(1)	(2)	(3)	(4)	(5)
Age	25.40	-0.13	0.69	0.06	0.82
Married or living with a partner	0.16	0.00	0.98	-0.02	0.36
# children under 15 in household	2.21	-0.14	0.49	-0.11	0.45
Years of schooling	7.72	-0.13	0.56	0.03	0.92
Has any disabilities	0.08	0.01	0.39	-0.02	0.25
Ex-combatant	0.38	0.01	0.64	0.03	0.34
Monthly cash earnings (USD)	68.30	2.66	0.29	-7.49	0.22
Currently sleeping on the street	0.24	-0.01	0.42	-0.01	0.38
Savings stock (USD)	33.75	-0.53	0.89	-3.31	0.46
Hours/week in illicit activities	13.55	0.65	0.56	-0.26	0.81
Hours/week in agriculture	0.36	0.41	0.02	-0.06	0.79
Hours/week in low-skill wage labor	19.39	-0.83	0.81	0.10	0.97
Hours/week in in low-skill business	11.53	3.59	0.02	1.83	0.14
Hours/week in high-skill work	1.51	0.18	0.67	0.85	0.00
Sells drugs	0.20	0.01	0.49	0.00	0.97
Uses marijuana daily	0.44	0.03	0.32	0.01	0.57
Uses hard drugs daily	0.15	-0.05	0.03	0.03	0.41
Committed theft in past 2 weeks	0.53	0.02	0.68	0.01	0.72
Aggressive and hostile behaviors index, z-score	0.00	-0.05	0.45	0.00	1.00
Conscientiousness index (0-24)	15.33	-0.03	0.62	-0.14	0.26
Patience index (0-6)	4.12	0.11	0.45	-0.05	0.77
Time inconsistency index (0-6)	3.27	-0.18	0.01	0.02	0.74
Risk aversion index (0-3)	1.57	0.06	0.49	0.00	0.97
Executive function (z-score)	0.00	0.02	0.64	0.00	0.96
Cognitive ability (z-score)	0.00	-0.07	0.18	-0.03	0.74
R-squared		0.12		0.05	
p-value on F-statistic on all 58 covariates		0.64		0.90	

*Notes:* All 58 covariates are reported in Appendix A.1. Column (1) reports the sample mean at baseline. All responses are based on survey questions except for the indices of patience, time inconsistency, and risk aversion, which are based on small-stakes choices made with real sums of money. A small number of missing values are imputed at the median. Columns (2)-(3) and (4)-(5) report the coefficients and p-values from an ordinary least squares regression of an indicator for assignment to treatment on the baseline covariates used in all treatment effects regressions. Block and validator fixed effects are included in the regressions but omitted from this table.

indicates this process identified the highest-risk men.

NEPI approached each target and described the therapy (not the cash), the lottery process, and the surveys. They approached roughly 1500 men, and 999 agreed to speak and enter the sample (we do not have data on those who refused). To avoid recruiting groups of friends and colleagues (i.e. to minimize correlated outcomes and spillovers) NEPI approached just one out of every seven to ten high-risk men they identified.<sup>7</sup>

## 2.2 Interventions

We designed the programs be low cost, roughly \$530 per head for all: \$14 for registration, \$189 for therapy, \$216 for the grant, and \$111 for administration costs.

### Therapy

CBT is a short-term approach that tries to reduce self-destructive beliefs or behaviors and promote positive ones. It does so in two ways. First, the therapist tries to help the patient become more aware of their automatic thoughts: inaccurate or negative thinking about themselves or others. Shifting automatic thoughts allows them to respond to everyday situations in a more effective way. A central principle of CBT, however, is that sustained changes in behavior or symptoms also comes from actively practicing new behaviors, often starting with simple tasks and, through repetition, positive reinforcement, and gradually increasing the difficulty or complexity of the tasks, changing both behavior and thinking. This practice happens in therapy but also as “homework” (Beck, 2011).

CBT has been studied extensively and validated as a treatment for several of the behaviors targeted by STYL: anger, aggression, criminality, and substance abuse (Saini, 2009; Pearson et al., 2002; Wilson et al., 2005; Del Vecchio and O’Leary, 2004).

**Origins and aims** STYL grew from of the experiences of NEPI’s founders, but as it developed, standard Western CBT curricula were integrated into it as it was shaped via

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torbike parking areas with reputations for drug selling and crime. It is also easy to identify gambling and drug shacks, squatter sites, and hangouts for the homeless. The team sometimes also approached men who were poorly dressed, had longer hair or dreadlocks, or bloodshot eyes. Recruiters attempted to exclude people with serious addictions to hard drugs, or mid-ranking criminals (e.g. bosses of street drug dealers), and men with legal jobs.

<sup>7</sup>We estimate our sample represents 0.6% of all adult males in the neighborhoods, and about 12% of all men aged 18-35 and in the bottom decile of income (Appendix A.2). We traced social networks for first two therapy groups. On average, each subject was casually friendly with 6 of the 43 others. 13 of the 44 reported one close associate in the group.



interactions with international organizations and experts resulting in a firm grounding in research-based psychological theories of change.

The program combined group therapy with one-on-one counseling. Twenty men met in groups three times a week, four hours at a time, led by two NEPI facilitators. On alternate days when groups did not meet, facilitators visited men at home or work to provide advising and encouragement. NEPI offered no compensation except lunch, since men who sacrificed four hours of work could not afford to eat.

As noted earlier, NEPI designed the curriculum and approach to encourage two kinds of change. First, they tried to teach skills of self control: to become more conscientious and persevering, manage their anger and emotions, and reduce impulsivity.<sup>8</sup> While often described as personality traits, such traits evolve over the life cycle and are affected by upbringing and investment, so we follow Heckman and Kautz (2013) in considering them skills of character. This concept of self control has parallels to economic time preferences. In general, the literature is unclear whether character skills are related to time preferences.<sup>9</sup> We measure both and treat the relationship as an empirical question.

Second, NEPI tried to persuade men to change their self image, from outcast to normal society member. The premise of STYL was that the security and respect associated with a mainstream identity were familiar, even attractive, to the men. So were the values associated with a mainstream identity—it was no mystery to the men that crime and drugs were considered “bad”. But those norms and values didn’t apply to outcasts like them, to whom a main mainstream identity seemed out of reach or a poor fit.

NEPI facilitators tried to persuade the men that this identity was within reach, and that the men should at least try. Partly through exercising skills of self-control, and partly by practice and exposure to new situations, the STYL curriculum walked men through the process of change. The facilitators were an integral part of this intervention, because they modeled the change in skills and values. All were graduates of a prior STYL-like program run by NEPI, and three-quarters were former “hard core” street youth or combatants.

There are parallels to interventions which show that aspirations—forward-looking goals or targets—influence behavior and respond to investment (Bernard et al., 2014). There are also parallels to switching social identity, described by Akerlof and Kranton (2000). Criminologists sometimes refer to this process as “knifing off” from old social rules and

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<sup>8</sup>Note that psychologists also use “self control” to refer to abilities such as executive function (EF) and delay of gratification (DoG), both of which are thought to lead to less impulsive decision-making and influence long-term success (Mischel et al., 1989). Some evidence suggests that EF and DoG are distinct from our character skills and are less malleable (Duckworth and Schulze, 2009). We measured EF and DoG but they were not the focus of the therapy and we did not hypothesize any change.

<sup>9</sup>The limited evidence suggests correlations are positive but low Becker et al. (2012).

behaviors, and associate these changes with significant turning points in life, such as marriage, a move, or a life-threatening experience (Maruna and Roy, 2007). This literature almost always ties successful knifing off to having a new “script” for the future. The STYL program is effectively that script.

**STYL curriculum and approach.** The sessions employed a variety of techniques, from lectures and group discussions, to various forms of practice, including: role playing in class, homework that requires practicing tasks, exposure to real situations, and in-class processing of experiences of executing these tasks. Like many CBT programs, these tasks began simply and got more difficult over time.<sup>10</sup>

In the first three weeks, facilitators encouraged men to try to maintain some new, simple behaviors. This included getting a haircut and removing facial hair, wearing shoes and pants instead of sandals and shorts, improving personal hygiene and the cleanliness of their living area, and reducing substance abuse. These simple exercises in goal-setting and self control also helped men start to operate within mainstream social norms.

In the middle weeks, facilitators encouraged men to engage with society in planned and unaccustomed ways, akin to exposure therapy.<sup>11</sup> For instance, homework included reintroducing themselves to their family, joining community sports, and visiting banks, supermarkets, shops, and so forth. Men also studied successful people in their community, and reached out to one as a mentor. Men then processed their attempts as a group. Often homework was independent, but facilitators might accompany the more troubled men.

Men also learned to manage emotion: practicing nonaggressive responses to angry confrontations in class, and recognizing signs of angry reactions and learning to distract or calm oneself (walking away, doing other activities, or breathing techniques).

In the last weeks, facilitators taught planning and goal setting. These lessons included training on breaking down large goals into smaller accomplishable sub-goals, and then creating plans to accomplish them via concrete steps. For example, men would list sub-goals of a plan; these were written on a paper in front of the room, for all to see; the group critiqued them; and plans were rewritten. For homework men would attempt planning in their own lives: how to feed their family the next day; starting a garden; making a savings plan; reconciling with estranged family; or starting a business. These assignments began

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<sup>10</sup>Appendix B.2 describes the curriculum in more detail. The full program manual is available at <http://chrisblattman.com/documents/policy/2015.STYL.Program.Manual.pdf>.

<sup>11</sup>Therapy for patients with social phobia practice similar engagement (Ponniah and Hollon, 2008). Besides practice, subjects learn that social feedback is less negative than feared. By re-engaging with society, participants tested their negative beliefs about themselves.

easy and got more difficult. This process of goal identification and planning is central to most forms of CBT, especially for disruptive behavior disorders (Langberg et al., 2013).

### Unconditional cash transfers

A second organization, Global Communities (GC), ran a cash lottery roughly one week after therapy. Winners received \$200 cash. Losers received a consolation prize of \$10.<sup>12</sup> There was minimal framing of the grant. Prior to the lottery, subjects were given about 15 minutes of information on how to keep the money safe (e.g. depositing it with a bank) and examples of what they could use it for (e.g. starting a small business or home improvement). But GC explicitly emphasized to subjects that the grant was unconditional and they were free to do what they wished.

## 2.3 Experimental design

We use a  $2 \times 2$  factorial experiment, in blocks of roughly 50 men. The experiment proceeded in four steps: First, roughly one week after recruitment and baseline surveys, NEPI held public draws to assign half the men to an offer to enter therapy. Therapy commenced one week after the draw. About 1–2 weeks after therapy, GC announced and held a private draw for \$200 grants among the full sample, blocked by assignment to therapy. Finally, a third organization (Innovations for Poverty Action) ran endline surveys 2 and 5 weeks, and then 12 and 13 months, after grants.

The sample were very mistrustful of authority, and we randomized by individual draw rather than computerized assignment to maximize trust, transparency, and staff safety. Men in each block took turns drawing colored chips from an fabric bag.<sup>13</sup>

**Balance** This resulted in 25% assignment to cash, 25% to cash and therapy, but 28% to therapy only, and 22% to neither (Table 2). The excess therapy assignments is in part chance, and is in part driven by two blocks where excess treatment chips were accidentally used. All regressions include block fixed effects to account for this. Treatment is balanced along covariates. Table 1 reports tests of randomization balance for teach treatment for selected covariates (see Appendix A.1 for all). Of 57 covariates, three (5%) have a

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<sup>12</sup>See Appendix B.3 for implementation details.

<sup>13</sup>The order of selection was deliberately unsystematic but not randomized. The number of chips in the bag generally exceeded the number of draws, partly to avoid a correlation between order of the draw and treatment assignment probabilities, and partly to avoid having late-drawing men receive their status by default. For the cash grant, men were also blocked by initial assignment to therapy (i.e. they attended different draws). See Appendix B.1 for full details.

Table 2: Study sample and treatment assignment by block and phase

Phase	Start date (MM/YY)	Block (slum)	Sample	% recruits assigned to:			
				Therapy	Cash	Therapy & cash	Neither
1	12/10	Red Light	100	25.0%	25.0%	25.0%	25.0%
2	06/11	Red Light	219	26.9%	25.1%	24.2%	23.7%
	06/11	Central Monrovia	179	31.8%	19.0%	31.8%	17.3%
3	03/12	Clara Town	175	28.6%	27.4%	22.9%	21.1%
	02/12	Logan Town	86	26.7%	29.1%	19.8%	24.4%
	02/12	New Kru Town	240	26.3%	26.7%	23.8%	23.3%
All			999	27.7%	25.1%	24.9%	22.2%

difference with  $p < .1$  for therapy, and four (7%) have have a difference with  $p < .1$  for cash, and they are jointly not significant.

**Compliance** Both interventions had high compliance, in part due to the persuasive efforts and credibility of the implementers. Of those assigned to the cash grant, 98% received it. Among men assigned to therapy, 5% attended none, another 5% dropped out within the first 2–3 weeks, and two thirds attended most sessions (>80%). Those who dropped out early had less schooling, lower earnings and assets, and were less likely to abuse substances or steal (Appendix A.3). Thus the highest-risk young men seem more likely to attend over poorer, noncriminal men.

**Phased implementation** For logistical reasons we recruited, treated, and studied the men in three phases, as seen in Table 2. A pilot phase recruited 100 men, to ensure that the therapy and cash grant caused no harm, to assess statistical power, and to allow us to refine experimental protocols . The pilot showed no indication of harm, and so we scaled to a further 900 with only minor changes to the interventions and protocols in two phases.

### 3 Conceptual framework

We start by considering the potential effects of therapy and cash in a simple model of occupational choice between legal and criminal work.<sup>14</sup> We develop the formal model in Appendix C and outline the structure and results here. We treat self control skills as a

<sup>14</sup>It is rooted in models of occupational choice with capital infusions and adapted to illicit behavior, as in Blattman and Annan (2014). It is related to the broad class of economic crime models discussed by Draca and Machin (2015).

dimension of ability, within the production function. In principle, improved self control could also affect time preferences, and we allow for that possibility. Finally, we model a change in self image and values as a preference over crime qua occupation.

This simple introduction of preferences for time and actions follows the structure of the Almlund et al. (2011) model of personality in economics. Typically economic models treat such preferences as fixed, or ignore them. Our aim is merely to outline how exogenous change in noncognitive abilities or preferences affect the comparative statics in an otherwise standard model.

**Setup** We suppose men can allocate time between leisure  $l$ , legal work  $L^b$  such as petty business or labor, and illegal occupations  $L^c$  such as crime, mercenary work, or election thuggery. We refer to these as “business” and “crime”.

We assume crime uses labor alone and pays a wage  $w$ , which may be uncertain. This resembles the observed returns to illegal work in Liberia.<sup>15</sup> Crime also carries a punishment  $f$  with probability  $\rho$ , and this risk increases with the time devoted to crime. Punishment could mean prosecution, mob justice, or social sanctions.

Business uses capital, and yields output  $F(\theta, L_t^b, K_t)$  where  $\theta$  is individual ability and  $K_t$  is capital inputs at time  $t$ . Finally, people start with wealth in the form of a riskless asset,  $a_0$ . They save or borrow at interest rate  $r$ . Self control skills are one element of  $\theta$ , and output is increasing in  $\theta$ .

We assume that people value consumption and leisure, but we also allow for the possibility that a person’s self image and personal values penalize crime. We use  $\sigma$  to indicate this preference against illegal labor. Thus people have the utility function  $U(c, l, \sigma L^c)$ . We put the  $\sigma$  in the utility function to distinguish it from punishments  $f$ . This is essentially a consumption value of conforming to one’s self-image or identity (Akerlof and Kranton, 2000; Bénabou and Tirole, 2004).<sup>16</sup>

Finally, we allow people to be present-biased in the sense that they have a general inter-temporal discount factor  $\delta$  but can also be time-inconsistent with an extra factor denoted  $\beta < 1$  that multiplies all future periods relative to the present (the standard form of quasi-hyperbolic time preferences).

In this framework, people choose consumption, labor supply in each sector, and the

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<sup>15</sup>Petty crime requires little capital; drug dealers typically work for a “boss” who owns the supply; and those who leave town to work in illicit mining work as “mining boys” for capital-owning “miners” on short-term renewable contracts that pay a daily wage plus a payment tied to output.

<sup>16</sup>We ignore the possibility, proposed by Bénabou and Tirole (2004), that ability is imperfectly known and correlated with perceived self-image.

amount of wealth to invest in business (versus the safe asset) in order to maximize their utility subject to the constraint that consumption plus wealth are equal to total income from business, crime, and the interest on investment.

**Occupational choice in the absence of interventions** Where financial markets work well and where people are time consistent ( $\beta = 1$ ), people are at their optimal business scale—that is, they have borrowed (if needed) until the marginal return to capital is equal to  $r$ . Of course, the poor are typically credit constrained. In this case poor people are forced to slowly invest in capital over time until they reach the same optimal scale. The young and those who have experienced adverse shocks will be the furthest behind their potential. As a result, crime is more likely to be chosen by men with low business ability  $\theta$ , the poor and credit constrained, those with low disutility of crime, and the time-inconsistent. People may also choose both crime and business. Credit-constrained people with partial capital for business may still spend some time in crime. Also, risk averse people may do both activities when returns are uncertain.

**Impacts of cash** If there are no credit constraints, cash windfalls will not affect occupational choice. But if one is credit constrained, windfalls will be partly invested in business. It will also shift people from crime to business, especially those with high ability. Cash infusions will lead to a smaller increase in business work for time-inconsistent individuals, however, since they will choose to consume more today.

**Impacts of therapy** In principle, the therapy could increase  $\sigma$ , increase  $\theta$ , or  $\beta$ . These channels have some distinguishing predictions. Interventions that increase  $\sigma$  (or the size or probability of punishment) will reduce time devoted to crime, but will have no effect on returns to business. Interventions that increase business ability  $\theta$  will not only induce more time and investment in business, but also reduce crime.

With the presence of risk in both sectors (and assuming risk aversion), interventions in  $\theta$  will have greater effects in terms of pushing individuals away from crime, because an increase in  $\theta$  now also makes business relatively less risky. A rise in  $\sigma$  will also have a bigger effect than without uncertainty, because risk aversion will reinforce the rise in crime aversion and further reduce hours in crime.

When people are credit constrained and also receive cash, the effects of a change in  $\sigma$  or  $\theta$  will be greater with cash than without it. Thus we would expect the two interventions to have larger impacts in combination.

What if an intervention increases time consistency  $\beta$ ? This will increase investment in business and an individual’s earnings, assuming he was credit-constrained. If people become more time-consistent, they will also be more strongly influenced by the consequences of their actions in terms of punishments, and will therefore reduce criminal labor (and increase business labor) as well.

Finally, while we have focused on crime as an occupational choice, there are other antisocial behaviors that are not as labor intensive. This could include interpersonal aggression, or participation in a short-lived riot or act of collective violence. In this case, cash infusions and increases in business may not have a deterrent effect on these antisocial behaviors. Rather, reductions in behaviors that have a low opportunity cost of time might be more consistent with a change in values  $\sigma$  or punishments  $f$ .

**Relevance for non-economic aggression** This framework is mainly useful for thinking about crime. More generally, non-instrumental aggression could generate benefits, either in the moment (the pleasure in expressing anger) or longer term (detering future slights), without incurring an opportunity cost of time. In general, instilling values against aggression will decrease their utility and hence frequency. Improved self control skills could reduce aggression when the benefits are momentary, future costs high, but people are time-inconsistent or subject to temptation. STYL explicitly teaches techniques to regulate emotions in charged, automatic situations.

## 4 Data

We tried to survey each subject five times: (i) at baseline prior to the intervention; (ii and iii) at “short-run” endline surveys 2 and 5 weeks after the grants; and (iv and v) at two “long-run” endline surveys 12 and 13 months after grants.<sup>17</sup>

The short run surveys focused on immediate impacts of the behavior change program as well as expenditures and investments in the previous two weeks. The long run surveys focused on broader measures of behavior and material well-being. We ran pairs of surveys because it allowed us to reduce noise in outcomes with potentially low autocorrelation such as earnings or criminal activity (McKenzie, 2012). To measure time preferences, risk aversion, and baseline cognitive abilities (such as executive function), following each

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<sup>17</sup>The exception is the 100 men in the pilot, which had a single “short run” survey 3 weeks after grants. Actual survey times were, on average, 2.2, 5.7, 55.4 and 61.1 weeks after grants. Surveys were 90-minutes long and delivered verbally by enumerators in Liberian English on handheld computers.

survey the respondents also conducted 45 minutes of incentivized games and tests.<sup>18</sup> The winnings from all survey activities equalled about a half day’s wages.

This sample was exceptionally mobile and difficult to track over time. Roughly 40% changed locations between each round, many changing sleeping places every few weeks or nights. Just 30% had mobile phones. Many were also suspicious or fearful of others and went by several aliases. We made at least four attempts to locate each person, all over the country, including prison (to be interviewed only when released). Averaging across all endline surveys, 92.7% responded. Attrition is relatively unsystematic. Treatment groups had nearly identical response levels, within 0.4% of the control group (see Appendix for response rates by survey wave and treatment group). A joint test of significance of all baseline covariates has a p-value of .092, and the  $R^2$  is just .096.<sup>19</sup>

#### 4.1 Validation of self-reported survey data

A major concern is self-reported data. One worry is social desirability bias, where all subjects underreport unacceptable behaviors. This would understate treatment effects. A more serious concern is misreporting correlated with treatment (experimenter demand). One worries that people who receive an anti-violence message or addiction treatment might be more likely to respond that they are non-violent or drug free to please the experimenter. This would overestimate treatment effects.

In developed countries, administrative data on crime are often preferred, though this typically captures an indirect and attenuated measure of crime, such as arrests, rather than actual levels of crime.<sup>20</sup> There are self-reported behaviors that have a fairly clear gold standard for validation. For school attendance, for instance, one can do spot-checks. It gets difficult where there is no gold standard, as with aggression or thievery.

To test for bias, we developed a new technique to validate a selection of our survey

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<sup>18</sup>The main activities were incentivized inter-temporal choices (patience and present bias); incentivized gambles (risk aversion); and hypothetical large-magnitude inter-temporal choices. At each survey we also used cognitive tests or games to measure cognitive ability. We assessed motor inhibition (i.e. the ability to stop one’s self), cognitive flexibility (the ability to switch rapidly from one task to another), working memory (the ability to hold in mind information for short periods), and spatial problem solving (e.g., completing a puzzle). We did not hypothesize an impact on these cognitive abilities, and use the measures as controls only. We describe games in Appendix D. This was done within a few days of the survey and was handled by local specialists. 99% of survey respondents completed the games.

<sup>19</sup>Of the 298 non-responses (of 3,896), we (i) had no location information (75%); men were mentally incapacitated (1%); died (8%, or 9 men); were in prison (12%); or refused (3%). See Appendix A.3. Covariates associated with higher attrition include better mental health and income.

<sup>20</sup>Arrest data also requires the assumption that the intervention does not affect the likelihood that criminal behavior results in arrest, such as a shift in the type or location of crime.



variables through intensive observation. A companion paper reports the approach and results in detail (Blattman et al., 2014). We summarize here and Appendix E.

Of more than 4,000 endline surveys, we randomly selected 7.3% and validated answers to six survey-based measures with two-week recall periods. Beforehand, we chose four behaviors of varying sensitivity—marijuana use, thievery, gambling, and homelessness. Two others were typical social behaviors that we did not consider sensitive but could be subject to recall bias or other error—paying to watch a movie or sports match in a commercial video club, and paying to charge their mobile phone battery at a kiosk. We chose them to have a neutral set of measures for comparison.

Shortly after the survey, one of a small team of trained local validators would visit the respondent four times over ten days, spending several hours in casual conversation and observation. Validators would shadow the respondents as they were going about their day, rather than sit down for a formal interview. The target topics were raised mainly through indirect questions while chatting and conversing. Validators developed techniques to develop trusting and open relationships: becoming close to street leaders; eating meals with subjects; sharing personal information about themselves (including similar acts they or friends engaged in); and mirroring participants’ appearance and vernacular as appropriate. Validators would also observe the respondent’s behavior from afar, as well as converse with peers and family. Validators developed a routine presence in the study communities.

Without knowing the respondent’s survey responses, the authors and validators coded an indicator of whether or not the respondent had engaged in the behaviors in the two weeks prior to the survey. In general we only coded the behavior if the validator directly observed the behavior or the respondent directly admitted it.

This validation is not free from observational error. But these errors, we argue, are less likely to bias treatment effect estimates than the underreporting, experimenter demand, or social desirability bias in survey data. This is the key assumption underlying the validation technique, and without objective data it cannot be tested (and so must be taken with caution). Nonetheless, under this assumption we can: (i) estimate the direction and magnitude of systematic measurement error in each outcomes, (ii) estimate the correlation with treatment arms, and (iii) adjust or bound survey-based causal estimates.

## 4.2 Qualitative data

We collected longitudinal qualitative data to better understand the context, intervention, and mechanisms. First, a Liberian research assistant acted as a participant-observer during the Phase 1 therapy. Second, we interviewed facilitators for their impressions of

the intervention and participants. Third, three Liberian research assistants conducted semi-scripted interviews, 14 pre-treatment and 130 post-treatment, with 66 men in the sample.<sup>21</sup> Interviews covered job satisfaction, investments, economic challenges, plans, antisocial behaviors, and perceptions of the interventions.<sup>22</sup>

## 5 Impacts on crime and violence

We estimated intent-to-treat (ITT) effect using an OLS regression of each outcome on three treatment indicators: for an offer to enter therapy only, for being offered a grant only, or for being offered both therapy and cash.<sup>23</sup> All estimates control for all baseline covariates and randomization blocks.

Table 3 reports treatment effects on self-reported behaviors. To reduce the number of hypothesis tests and risk of “false positives”, we also test an standardized additive index of all antisocial behaviors (following Kling et al., 2007). The table also reports the mean difference between therapy only and therapy plus cash.

We focus on six classes of antisocial behavior, predefined by survey section. The first is a set of self-reported aggressive and hostile behaviors. This includes nine questions from a standard scale of reactive and proactive (instrumental) aggression, adapted to the context by the authors, such as whether they use yelling and cursing to get people to do things, or whether they tend to lose their temper (Raine et al., 2006). The index also includes ten hostile acts which we deemed relevant in Liberia, such as cheating someone, threatening others, or bullying. An additive index of all 19 questions falls .15 standard deviations with therapy alone and .34 with both.

We also ask about six types of angry disputes and fights in the past two weeks, including angry confrontations and violence involving family members, neighbors, community leaders, or the police. The decline from therapy or both treatments is not statistically significant, though a test of their joint significance has  $p < .1$ . Men offered therapy also reported they were about half as likely to go about armed (usually with a knife, as guns

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<sup>21</sup>19 in control, 16 in therapy, 15 in cash, and 16 in therapy then cash. Sampling was purposeful, based on variation in key baseline measures: economic success, crime, drug use, and present bias.

<sup>22</sup>Notes and recorded interviews were transcribed, reread, edited, and analyzed to explore program outcomes and mechanisms.

<sup>23</sup>Where we have two measures of the same variables (i.e. the 2 and 5 week surveys, or the 12 and 13 month surveys) we treat these as separate observations clustered at the individual level (McKenzie, 2012). To reduce sensitivity to outliers, we top-code all continuous variables (e.g. hours worked and dollar amounts) at the 99th percentile. We test sensitivity to alternative estimation strategies and report the results for four outcomes in Appendix F.2. In general, the results are unchanged with and without baseline covariates, and also to treatment on the treated (TOT) estimation.

Table 3: Program impacts on antisocial behaviors, peer quality, and substance abuse

Outcome (No. of questions in index)	Round	Control mean	ITT regression											
			Therapy only					Both					Both vs. Therapy alone	
			ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	Diff.	Std. Err.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)				
Index of all antisocial behaviors, z-score	2-5w	0.171	-0.197	[.074]***	-0.089	[.073]	-0.255	[.072]***	-0.058	[.064]				
	12-13m	0.034	-0.091	[.081]	0.090	[.082]	-0.223	[.075]***	-0.131	[.066]**				
Aggressive and hostile behaviors (19), z-score	2-5w	0.091	-0.173	[.069]**	0.009	[.071]	-0.205	[.071]***	-0.032	[.063]				
	12-13m	0.188	-0.154	[.102]	-0.045	[.099]	-0.339	[.102]***	-0.185	[.090]**				
Disputes/fights, past 2 weeks (6), z-score	2-5w	0.366	0.089	[.106]	0.054	[.091]	-0.091	[.083]	-0.180	[.092]*				
	12-13m	0.273	-0.046	[.107]	0.084	[.104]	-0.122	[.092]	-0.076	[.072]				
Carries weapon	2-5w	0.157	-0.086	[.032]***	-0.044	[.034]	-0.093	[.032]***	-0.007	[.028]				
	12-13m	0.148	-0.058	[.029]**	0.044	[.032]	-0.065	[.031]**	-0.007	[.027]				
Usually sells drugs	2-5w	0.170	-0.080	[.025]***	-0.040	[.027]	-0.072	[.026]***	0.008	[.022]				
	12-13m	0.135	-0.037	[.027]	0.033	[.028]	-0.058	[.027]**	-0.021	[.022]				
# of thefts/robberies, past 2 weeks	2-5w	2.580	-0.912	[.369]**	-0.842	[.382]**	-1.213	[.384]***	-0.302	[.304]				
	12-13m	1.876	0.000	[.362]	0.280	[.362]	-0.721	[.335]**	-0.721	[.326]**				
Arrested in past two weeks	2-5w	0.139	-0.007	[.025]	0.007	[.025]	-0.009	[.026]	-0.002	[.024]				
	12-13m	0.115	-0.003	[.023]	0.009	[.023]	-0.030	[.022]	-0.027	[.020]				

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 4: Impacts on crime incidence, in the last two weeks and annualized extrapolation

	Cash + therapy ITT, 12–13 month endline				Annualized impact	
	Control			%	Control	Cash +
	mean	Coeff.	Std. Err.	change	mean	therapy
	(1)	(2)	(3)	(4)	(5)	(6)
# crimes, past two weeks	2.56	-0.947	[.406]**	-37%	66.5	-24.6
# times sold drugs, past two weeks	0.68	-0.226	[.172]	-33%	17.7	-5.9
# thefts/robberies, past two weeks	1.88	-0.721	[.335]**	-38%	48.8	-18.7
Selling/switching fake goods	0.28	-0.061	[.064]	-22%	7.2	-1.6
Stealing unwatched items	0.34	-0.085	[.078]	-25%	8.9	-2.2
Overcharging or cheating	0.30	-0.101	[.071]	-34%	7.9	-2.6
Burglary	0.10	-0.075	[.033]**	-78%	2.5	-1.9
Con artistry/scams	0.12	-0.092	[.034]***	-78%	3.1	-2.4
Pickpocketing	0.60	-0.194	[.128]	-32%	15.7	-5.1
Mugging	0.09	-0.084	[.046]*	-97%	2.3	-2.2
Armed robbery	0.03	-0.030	[.023]	-92%	0.8	-0.8
Arrested in past two weeks	0.12	-0.030	[.022]	-26%	3.0	-0.8

*Notes:* Columns (1) to (4) report the same ITT regression as in Table 3, with robust standard errors in brackets, clustered by individual. Columns (5) and (6) simply multiply the two week estimates by 26 weeks to generate an estimated annual impact per person.

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

are rare), whether with therapy or both.

Criminal acts decline most in the therapy plus cash group. Drug selling nearly halves in the short and long run. An index of all thefts and robberies also falls 40% in the long run from 1.9 acts in the past two weeks down to 1.15 acts.

Table 4 disaggregates crimes committed in the past two weeks into the eight acts of theft we surveyed plus drug deals, focusing on the effects of therapy plus cash after one year. Control men committed 2.56 crimes in the previous two weeks, and this fell by almost one crime with therapy plus cash. All types of crime decreased by 20 to 100% with cash and therapy, but the statistically significant (and largest proportional) reductions are in pickpocketing, muggings, and scams (e.g. the sale of non-existent goods, or down-payments for a hidden fortune).

If this decline were persisted for the year, it would translate to 25 fewer crimes per person each year. Given the \$530 cost of the two interventions, this is roughly \$21 per crime, ignoring any other benefits of the program.

We do not see a statistically significant decline in arrests, though after one year the coefficient on therapy plus cash represents a 25% decline, or about three arrests per year.

Table 5: Impact heterogeneity based on initial levels of antisocial behavior

Outcome	Round	Coeff.	Therapy only		Cash only		Assigned to both	
			ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Index of all antisocial behaviors	2–5w	ATE	-0.195	[.073]***	-0.080	[.073]	-0.255	[.071]***
		Interaction	-0.160	[.095]*	-0.067	[.089]	-0.186	[.076]**
	12–13m	ATE	-0.090	[.080]	0.105	[.082]	-0.226	[.074]***
		Interaction	-0.010	[.097]	0.222	[.102]**	-0.201	[.074]***

*Notes:* We report the ITT regression as in Table 3, with interactions between treatments and baseline antisocial behaviors. Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: Comparison of survey and qualitative validation means at endline

Outcome	Survey = validated measure	Survey mean	Validated mean	OLS difference	p-value
	(1)	(2)	(3)	(4)	(5)
<i>Potentially sensitive</i>					
Stealing	79%	0.22	0.20	0.01	0.66
Marijuana	85%	0.48	0.51	0.03	0.24
Gambling	72%	0.18	0.29	-0.02	0.61
Homeless	82%	0.23	0.21	-0.01	0.56
<i>Expenditures</i>					
Video club	62%	0.42	0.61	-0.07	0.06
Phone charging	82%	0.39	0.48	-0.01	0.73
Pot. sensitive (0-4)		1.12	1.21	0.01	0.86
Expenditures (0-2)		0.82	1.09	-0.08	0.09

*Notes:* Column 1 reports the percentage of respondents for whom both measures are the same (N=240). Columns 2 and 3 display the means of the two measures. Columns 4 and 5 report the coefficient and p-value from an OLS regression of the difference between the survey and qualitative measures on a constant and indicators for blocks, baseline covariates, and validator fixed effects.

**Heterogeneity** Table 5 reports ITT regressions where we add an interaction between the treatment indicators and a standardized index for antisocial behavior at baseline. The therapy was impactful for the average participant, but the greatest decline in antisocial behavior was among those with the highest initial levels.

## 5.1 Validating self-reported data

We summarize results of validation in Tables 6 and 7, with detailed results in Blattman et al. (2014). First, we find that, in the endline surveys, men routinely report behaviors we thought might be sensitive. For instance, at endline, 22% reported stealing in the past two weeks, and 48% admitted to marijuana use.

Second, survey responses closely correspond to validation measures. They are identical in roughly 75% of cases, with the correspondence higher in the most potentially sensitive behaviors, stealing and marijuana use (Table 6, Column 1).

Third, when the two measures do differ, the difference is small and not statistically significant for the potentially sensitive behaviors (Table 6, Columns 2 to 5). Meanwhile, the expenditure-related questions (video club and phone charging) that we expected to be neutral in terms of sensitivity actually appear to be underreported in the survey, though the result is only statistically significant at the 10% level.

Fourth, there is little correlation between treatment status and measurement error in the potentially sensitive behaviors, and if anything results suggests the opposite of experimenter demand. We see this in Table 7, which pools all endline surveys and for each treatment calculates: survey-based ITT estimates for the six variables and composite indexes (columns 1–2 and 7–8); an ITT estimate of the systematic measurement error from a regression of the survey-validated measure difference (in Table 6) on treatment indicators (Columns 3–4 and 9–10); and the difference of these two ITT estimates, i.e. an adjusted or “corrected” ITT estimate after accounting for detected bias from measurement error (columns 5–6 and 11–12). For the sensitive outcomes, none of the correlations between treatment and our proxy for measurement error are statistically significant. What’s more, the direction of measurement error suggests that, if anything, the control group underreports unacceptable behaviors, meaning the true treatment effect is larger.

Finally, the control group appears to have underreported expenditures in the survey. This suggests that the weak increases in short-term expenditures we observe from grants (see below) may be overstated, and that the appropriate interpretation is no evidence of an increase short term consumption.

After extensive field work, we believe we see little underreporting in drugs, crime,

Table 7: Estimates of treatment effect bias from measurement error and adjusted treatment effects

Outcome	Assigned to therapy				Assigned to cash							
	Survey-based ITT Coeff. (1)	SE (2)	ITT on survey-validated difference Coeff. (3)	SE (4)	“Corrected” ITT (Columns 1 – 3) Coeff. (5)	SE (6)	Survey-based ITT Coeff. (7)	SE (8)	ITT on survey-validated difference Coeff. (9)	SE (10)	“Corrected” ITT (Columns 7 – 8) Coeff. (11)	SE (12)
<i>Potentially sensitive</i>												
Stealing	-0.056	[.017]***	0.012	[.059]	-0.068	[.088]	-0.050	[.016]***	-0.061	[.056]	0.011	[.091]
Marijuana	-0.065	[.021]***	0.006	[.043]	-0.071	[.071]	-0.026	[.020]	-0.026	[.047]	-0.000	[.079]
Gambling	-0.101	[.017]***	0.036	[.066]	-0.138	[.104]	0.002	[.017]	0.019	[.068]	-0.017	[.109]
Homeless	-0.040	[.018]**	0.010	[.054]	-0.050	[.084]	-0.075	[.017]***	0.099	[.059]*	-0.174	[.088]**
<i>Expenditures</i>												
Video club	-0.011	[.022]	0.066	[.066]	-0.077	[.110]	0.014	[.022]	0.010	[.079]	0.004	[.118]
Phone charging	0.002	[.022]	0.134	[.053]**	-0.133	[.080]*	0.067	[.022]***	0.096	[.050]*	-0.028	[.077]
Pot. sensitive (0-4)	-0.261	[.049]***	0.052	[.128]	-0.312	[.196]	-0.150	[.048]***	0.021	[.125]	-0.171	[.202]
Expenditures (0-2)	-0.009	[.032]	0.193	[.088]**	-0.202	[.142]	0.082	[.031]***	0.102	[.091]	-0.021	[.150]

Notes: The treatment effect estimates (Columns 1 and 7) pool all survey rounds (N=3,764) and regress each outcome on cash and therapy treatment indicators, baseline covariates, and fixed effects for each survey round-randomization block pair. Standard errors are robust and clustered by individual. Estimates of the treatment effect bias (Columns 3 and 9) come from a regression of the difference in the survey and validation measures (from Table 6) on an indicator for random assignment to each or any treatment, controlling for randomization block fixed effects and indicators for each endline round (N=239). Standard errors are robust and clustered by block. The difference between the two ATEs is an estimate of the “true” ATE after correcting for observed measurement error. It is calculated as the linear difference of the estimates and the standard error is calculated via bootstrapping (we performed 1000 draws from the sample, with replacement, and we generated the standard error on  $\hat{\theta} - \theta^\Delta$  using the distribution from these draws).

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 8: Summary of potential channels of impact

Channel	Explanation	Evidence
Opportunity cost	Cash spurs investment and incomes when paired with therapy, raising cost of crime/violence	None
Peer change	Therapy leads men to shed risky peers, with change enabled or reinforced by cash	Short term
Drug abuse	Therapy reduces addiction (direct driver of crime/violence), with change enabled or reinforced by cash	Small, sustained
Self control skills	Therapy increases skills to control anger and criminal temptation, with change enabled or reinforced by cash	Moderate, sustained
Value change	Therapy helps men internalize antiviolenent and anticriminal norms, with change enabled or reinforced by cash	Moderate, sustained
Time preferences	Therapy leads to more forward-looking and risk-averse behavior, with change enabled or reinforced by cash	None

stealing, and homelessness because the men most enmeshed in these activities were the least likely to feel stigma, because of their self-image as outcasts. They seemed to speak freely on the topic and seldom hesitated to admit the behavior. This is not something we would have known or could have demonstrated, however, without the validation. The systematic error in expenditures questions is more puzzling, but we see two possible explanations: a strategic interest in over-reporting poverty in order to appear eligible for future programs; and recall bias in expenditure data.

## 6 Why do crime and violence decrease?

Why did therapy have large, sustained effects on antisocial behaviors, especially with cash? Table 8 summarizes the major potential channels and our evidence, presented in this section. Obviously our research design cannot causally identify the channel at work, and no list is exhaustive, but the patterns of outcomes (plus qualitative data) tend to rule out large changes through some channels (such as a higher opportunity cost, reduced addiction, or changed peers) and favor changes in skills and self image.



Table 9: Self-reported allocation of the grant, by expenditure category

Expenditure category	Treatment group	
	Cash & therapy	Cash only
Consumption and rent	28%	25%
Durable assets	7%	6%
Drugs, alcohol, gambling & sex	4%	4%
Gifts and transfers to others	11%	11%
Business investments and expenses	23%	25%
Savings and debt payments	20%	21%
Own health and education	8%	8%

## 6.1 Opportunity cost

We assessed grant spending in two ways. Using pictures of different types of spending and plastic chips, we asked grant recipients to indicate how they used the grant. We also collected consumption and expenditure data for the previous two weeks (including spending on capital goods and other “investments”). According to both types of self-reported data, little of the grant was spent on alcohol, drugs, parties, and so forth. Little was “wasted”. Table 9 lists average self-reported allocations of the grant by treatment group. We see little effect of the recent therapy on allocation patterns. All differences are statistically not significant.

We report economic outcomes in Table 10. The expenditure survey included a range of business investments in the previous two weeks, at both the 2- and 5-week surveys. Those who received only cash reported \$57 more investment in each 2-week period. Thus the total 5-week investment treatment effect is equal to at least \$114—almost 60% of the grant. The therapy group resembled the control group in terms of investment. These short run investments do not persist, however. In the cash only group, the stock of business assets after a year is only \$20 greater than in the control group, not statistically significant. Therapy has little effect on investment.

Likewise, we see only a short run increase in incomes from cash. We proxied income in three ways: (i) estimated earnings in all activities in the two weeks prior to each survey; (ii) consumption in the two weeks prior to each survey; and (iii) an index of durable assets.<sup>24</sup> We consider these measures individually and an additive standardized index of

<sup>24</sup>First, we asked each respondent their gross and net earnings in the past four weeks across 25 economic activities (legal and illegal). This earnings measure could still be subject to recall and other biases, and may inadequately capture home production. Thus we also use two measure of permanent income. One is an index of durable assets—a z-score constructed by taking the first principal component of 42 measures of land, housing quality, and small and large household assets. We also conduct an abbreviated consumption

Table 10: Program impacts on investment, income, and employment

Outcome	Round	Control mean	ITT regression							Both vs. Cash only		
			Therapy only			Cash only			Both		(Columns 7 – 5)	
			ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	Diff.	Std.Err.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)		
Investment in past 2 weeks (USD)	2–5w	16.812	8.005	[5.468]	57.001	[7.346]***	47.500	[6.878]***	39.495	[6.797]***		
Value of business assets (USD)	12–13m	26.121	3.123	[12.468]	19.328	[14.144]	13.532	[12.032]	10.409	[12.098]		
Index of income measures (z-score)	2–5w	-0.145	0.161	[.087]*	0.318	[.094]***	0.223	[.087]**	0.062	[.088]		
	12–13m	-0.016	0.137	[.093]	-0.054	[.090]	0.027	[.089]	-0.110	[.086]		
Weekly profits, past two weeks (USD)	2–5w	14.342	1.734	[1.407]	4.518	[1.420]***	2.965	[1.370]**	1.231	[1.356]		
	12–13m	17.591	0.495	[1.567]	1.370	[1.538]	0.157	[1.713]	-0.338	[1.574]		
Durable assets, z-score	2–5w	-0.093	0.128	[.089]	0.151	[.089]*	0.230	[.093]**	0.102	[.092]		
	12–13m	0.009	0.141	[.089]	-0.113	[.089]	0.086	[.089]	-0.055	[.085]		
Consumption, past 2 weeks, USD	2–5w	44.146	12.056	[3.576]***	26.570	[3.943]***	22.045	[3.312]***	9.988	[3.620]***		
	12–13m	47.432	-2.290	[3.561]	-2.586	[3.390]	-5.249	[3.376]	-2.960	[2.472]		
Savings (USD)	2–5w	45.957	-1.169	[8.252]	16.679	[9.260]*	18.729	[9.483]**	19.898	[8.932]**		
	12–13m	51.395	11.531	[10.270]	2.199	[9.538]	21.726	[10.574]**	10.195	[10.171]		
Homeless now	2–5w	0.202	0.006	[.027]	-0.091	[.027]***	-0.095	[.027]***	-0.101	[.024]***		
	12–13m	0.147	0.018	[.028]	0.012	[.027]	-0.020	[.028]	-0.037	[.024]		
Hours/week of work, past month	2–5w	36.376	0.437	[2.666]	6.717	[2.684]**	1.862	[2.750]	1.425	[2.539]		
	12–13m	34.163	1.351	[2.362]	0.945	[2.329]	-1.244	[2.311]	-2.595	[2.158]		
Home robbed, past month	2–5w	0.698	-0.028	[.045]	0.002	[.045]	-0.050	[.047]	-0.022	[.043]		
	12–13m	0.711	-0.038	[.043]	-0.055	[.041]	-0.016	[.045]	0.022	[.041]		
Belongings stolen, past month	2–5w	0.784	0.016	[.037]	-0.006	[.038]	-0.042	[.041]	-0.057	[.036]		
	12–13m	0.635	-0.012	[.045]	-0.048	[.046]	0.039	[.047]	0.051	[.041]		

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

all three. Overall we see a short term increase from cash—a .32 standard deviation rise in the income index from cash alone. But after a year there was no significant change in income or hours worked.

Nonetheless, the short run effect of cash on legal work and income had many positive effects. It increased basic consumption (such as food) and reduced homelessness. But these, like the income gains, were not sustained.

From qualitative interviews, insecure property rights were a major barrier to capital accumulation. A large number of men reported the theft of all their assets, or all their wares, on a regular basis, by criminals or (for market wares) the police.<sup>25</sup> At each survey round, about 70% of the men reported a house robbery and belongings stolen in the past month. This implies a robbery every other month, at least. There is little difference by treatment status, suggesting that men were not more likely to be targeted if they received cash. But they would have had more to lose.

## 6.2 Self control and other noncognitive skills

Table 11 reports treatment effects on noncognitive skills. We measured them using existing normed scales, which we adapted to use in Liberia (Appendix D).

First, men who received the therapy reported a long-term decrease in impulsive behaviors, by 0.18 standard deviations in the therapy only group, and .21 with both therapy and cash. Examples of questions assessing impulsivity were “I buy things on impulse” or “I say things without thinking”.<sup>26</sup>

Men who received therapy also reported lower reward motivation, by .16 standard deviations with therapy only, and .23 with both. The scale assessed whether men reported they are motivated by immediate, typically emotional rewards. Examples include “I will often do things for no other reason than that they might be fun” or “When I see an opportunity for something I like I get excited right away.”<sup>27</sup>

In contrast, therapy did not lead to statistically significant long-run effects on conscientiousness and perseverance/grit (continuing in the face of setbacks).<sup>28</sup> Nonetheless, module of short-term food and non-food consumption.

<sup>25</sup>In some cases this was theft by a friend, family member, or stranger. Also common was confiscation of wares by the police. Some forms of market selling contravene official rules, often unenforced, but nonetheless giving police opportunities to confiscate. Some confiscation is legitimate, some not.

<sup>26</sup>These questions were selected from the Barrett Impulsiveness Scale-11 (Spinella, 2007) and are designed to assess each subject’s inability to control their own thoughts and actions.

<sup>27</sup>Reward orientation was assessed with questions selected from the Behavioral Inhibition/Behavioral Activation Scale (BIS/BAS). Previous research has linked disruptions in and extremes of reward motivation to drug and alcohol abuse (Robinson and Berridge, 2000).

<sup>28</sup>Perseverance was measured using a subset the GRIT scale (Duckworth and Quinn, 2009), which

Table 11: Program impacts on character skills

Outcome (# questions), z-score	Round	Control mean	ITT regression						Both vs. Therapy (Columns 7 – 3)	
			Therapy only			Cash only			Both	
			ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Index of self control skills	2–5w 12–13m	-0.046 -0.076	0.087 0.153	[.093] [.082]*	-0.154 -0.025	[.099] [.086]	0.036 0.237	[.091] [.086]***	-0.051 0.084	[.090] [.078]
Impulsiveness (9)	2–5w 12–13m	-0.042 0.115	-0.011 -0.175	[.096] [.087]**	0.185 0.007	[.102]* [.089]	0.107 -0.208	[.091] [.090]**	0.118 -0.033	[.091] [.080]
Conscientiousness (8)	2–5w 12–13m	-0.112 0.042	0.108 -0.068	[.096] [.092]	0.046 -0.032	[.097] [.094]	0.161 0.044	[.096]* [.091]	0.054 0.111	[.095] [.085]
Perseverance/GRIT (7)	2–5w 12–13m	0.016 -0.077	0.028 0.114	[.093] [.090]	-0.133 0.056	[.100] [.090]	0.043 0.102	[.099] [.094]	0.015 -0.011	[.093] [.086]
Reward responsiveness (8)	2–5w 12–13m	0.058 0.038	-0.073 -0.160	[.101] [.091]*	0.109 0.079	[.102] [.089]	0.013 -0.234	[.099] [.092]**	0.086 -0.075	[.094] [.080]
Self control skills (high emphasis)	12–13m	-0.112	0.203	[.085]**	0.035	[.084]	0.164	[.088]*		
Self control skills (low emphasis)	12–13m	-0.029	0.060	[.086]	-0.035	[.089]	0.239	[.090]***		
<i>Economic preferences:</i>										
Patience in game play	2–5w 12–13m	-0.194 -0.073	0.174 0.026	[.075]** [.081]	0.151 0.134	[.075]** [.077]*	0.243 0.097	[.075]*** [.080]	0.069 0.071	[.070] [.070]
Time inconsistency in game play	2–5w 12–13m	0.085 -0.018	-0.042 -0.034	[.079] [.068]	-0.118 -0.016	[.082] [.071]	-0.082 -0.051	[.081] [.070]	-0.040 -0.017	[.070] [.067]
<i>Other noncognitive skills:</i>										
Neuroticism (8)	2–5w 12–13m	0.080 -0.051	0.012 0.044	[.094] [.087]	0.022 0.037	[.097] [.091]	-0.080 -0.146	[.099] [.086]*	-0.092 -0.190	[.096] [.081]**
Locus of control (8)	2–5w 12–13m	0.025 -0.019	0.000 -0.031	[.095] [.088]	0.059 -0.106	[.100] [.086]	-0.093 -0.021	[.097] [.093]	-0.093 0.009	[.098] [.084]
Self esteem (8)	2–5w 12–13m	-0.054 -0.113	0.110 0.078	[.090] [.090]	-0.012 0.058	[.091] [.092]	0.187 0.188	[.092]** [.093]**	0.078 0.110	[.086] [.080]

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

the coefficients all point to an improvement. If we assemble all four measures into a standardized index of all self control-related measures, we can reject the hypothesis that all are unchanged. The index increases by 0.15 standard deviations for therapy only and .24 for both, and we can't reject that the two groups have equal effects.

We must be cautious because scales are self-reported, and treated men could simply be repeating back their lessons. There is some evidence this is not so. We divide the 32 self control questions into two indexes: questions with high (43%) and low (57%) emphasis in the curriculum. Table 11 reports the ITT estimates after a year. The effect of cash and therapy is at least as large for low emphasis items.

**Other personality measures** We also measured three other traits commonly associated with economic performance. Low self-esteem has been linked with many aspects of negative behavior and counterproductive or extreme risk-seeking behavior (Coopersmith, 1967).<sup>29</sup> Men who received both therapy and cash reported an increase in self-esteem, by .19 standard deviations. The effect of therapy only is positive and not statistically significant, but we can't reject that the two impacts are equal.

Meanwhile, therapy does not change locus of control (control they felt over their own lives) or neuroticism (a tendency to experience emotional instability or anxiety). There is weak evidence, however, of a decrease in neuroticism from therapy plus cash after a year. It is not clear if the rise in self-esteem and decline in neuroticism resulted from a self-control skill and self-image change or was independent. Since the therapy did not treat these traits directly, and since we have no theoretical reason to suppose a direct effect, we favor the idea that these result from self control and image change.

### 6.3 Time preferences

We see no evidence of a persistent change in time preferences as a result of therapy. Men who received therapy played the incentivized games .17 standard deviations more patiently in the short run, but this effect disappears in the long run. We do not see a corresponding change in self-reported patience using survey questions, or in the same game without

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captures the ability to press on in the face of difficulty. Like conscientiousness, it is commonly understood to be impervious to change after adolescence and to reflect stable individual traits. We measured conscientiousness with a subset of the questions from the NEO-five factor personality inventory. The conscientiousness dimension of personality is associated with keeping in mind the needs of others, following societal rules, and controlled, careful behavior.

<sup>29</sup>Examples of questions include, "I am able to do things as well as most other people" or "I take a positive attitude toward myself." Generally self-esteem is a measure of how positively or negatively individuals feel about themselves.

monetary incentives (not shown), nor do we see persistent changes in time-inconsistency or risk aversion in game play.

Interestingly, we see a similar and more persistent increase in patience among men who received cash: they play .15 standard deviations more patiently in the short run, and .13 in the long run (significant at the 10% level). The short-term change could simply be a liquidity effect on game play. The persistence is harder to explain since excess liquidity dissipated. Since the effect is weakly significant, and does not appear in other time preference measures, we discount it.<sup>30</sup>

## 6.4 Self image and value changes

We noted a sustained rise in self-esteem, above, which could reflect a more mainstream self-image. We did not measure perceived social category directly and so cannot say for certain. But we did measure values in the sense of self-reported attitudes towards crime and violence in the men's own lives—an indicator of the degree to which they have internalized mainstream social norms. Table 12 reports results.

We asked 11 questions about their attitudes regarding the use of violence to solve community or personal problems, such as mob killings of suspected thieves, community stoning of corrupt leaders, or men who beat unfaithful wives or attack their lovers. We also asked 12 questions about their attitude toward participating in crime, including whether they would feel fine with taking goods from an unwatched open room, stealing \$100 from someone's pocket, or even stealing their electricity illegally. We also asked about 10 hypothetical forms of political violence, including whether they would consider committing violence in the wake of a stolen election, or whether they discuss protesting with friends or making trouble or conflict with the authorities.

An index of all three measures shows that all treatments decreased the acceptability of violent behaviors in the short run. Cash had little impact on self-reported attitudes in the long run, but therapy plus cash led to a .17 standard deviation decline. We cannot reject that the effects of therapy only and therapy plus cash are equal. The overall effect is driven by attitudes to criminality and political violence.

Finally, at the end of the survey enumerators also reported their impressions of the person's appearance: quality of dress, shoes, cleanliness, smell, and so forth. We hypothesized a change in appearance, although expecting any effect to be difficult to detect since

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<sup>30</sup>Speculatively, it could arise from the fact that the grant was a larger sum of money than most men had controlled before, so they were forced into making more explicit plans and tradeoffs about how to spend it over time.

we capture people in their daily work, which is often manual and dirty (hence even “mainstream” individuals might be unclean or dressed poorly). Nonetheless, we hypothesized and improvement. Surprisingly, however, we see a short run effect from therapy but this is not sustained in the long run.

## 6.5 Peer change

In addition to asking about their own behavior, we also ask whether the men’s peers changed or changed in behavior. We ask men who their five closest peers are, by name, and then ask whether they hold any of 20 qualities ranging from positive (they work hard, save, go to school) or negative (the steal, do drugs, get in fights). Table 12 examines treatment effects. This measure of peer quality goes up significantly in the short run but not in the long run. This suggests that the main mechanism of long run change may not be permanently changed peers. However, see below for an alternate explanation from qualitative interviews.

## 6.6 Drug abuse

Finally we examine substance abuse. Looking at Table 12, alcohol and drug use show modest declines, especially in the short run. In the long run, therapy leads regular marijuana use to fall from 50% to 47%, and hard drug use falls from 20% to 16%. Qualitative interviews suggested that few men quit drugs altogether. Many stopped hard drugs, but resumed marijuana use. The program also tried to equip participants with strategies to cut back. Indeed, facilitators discouraged quitting “cold turkey” to reduce risk of withdrawal problems.

## 6.7 Insights from qualitative interviews and observation

Nearly all the subjects we interviewed described feeling ostracized at baseline. In general, the men reported that the therapy pushed them to believe they could be someone better for the first time. The facilitators played an important role here. The participants we interviewed unanimously had admiration and praise for the facilitators, highlighting that their backgrounds demanded respect and credibility among respondents, while their personal stories of change were encouraging.

Beyond modeling the change in self image and social category, men reported the facilitators were also sometimes the first people to treat them with seriousness and respect,

Table 12: Impacts on other self-reported attitudes and behaviors

Outcome (# questions), z-score	Round	Control mean	ITT regression						Both vs. Therapy			
			Therapy only			Cash only			Both		(Columns 7 – 3)	
			ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	Diff.	Std. Err.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)			
Index of violent/criminal attitudes, z-score	2-5w	0.172	-0.228	[.093]**	-0.225	[.094]**	-0.200	[.098]**	0.028	[.084]		
	12-13m	0.045	-0.080	[.080]	0.013	[.079]	-0.176	[.079]**	-0.096	[.065]		
Attitudes toward use of violence (11)	2-5w	0.021	-0.141	[.097]	-0.201	[.098]**	-0.057	[.099]	0.084	[.094]		
	12-13m	0.051	0.017	[.100]	0.080	[.101]	-0.045	[.101]	-0.063	[.090]		
Attitudes toward criminality (12)	2-5w	0.139	-0.177	[.099]*	-0.154	[.103]	-0.242	[.101]**	-0.064	[.089]		
	12-13m	0.044	-0.063	[.094]	-0.041	[.092]	-0.242	[.093]**	-0.179	[.079]**		
Attitudes on political violence (10)	2-5w	0.217	-0.250	[.110]**	-0.204	[.107]*	-0.198	[.117]*	0.052	[.102]		
	12-13m	-0.005	-0.104	[.083]	0.008	[.083]	-0.143	[.084]*	-0.040	[.069]		
Violent/criminal attitudes (high emphasis)	12-13m	0.013	-0.097	[.095]	-0.041	[.092]	-0.170	[.092]*				
	12-13m	0.048	-0.070	[.080]	0.015	[.080]	-0.182	[.079]**				
Index of quality of appearance	2-5w	-0.108	0.103	[.074]	0.116	[.075]	0.180	[.073]**	0.077	[.069]		
	12-13m	0.009	-0.094	[.073]	-0.074	[.072]	-0.091	[.076]	0.003	[.070]		
Positive peer qualities (20), z-score	2-5w	-0.160	0.207	[.084]**	0.014	[.088]	0.234	[.087]**	0.027	[.079]		
	12-13m	0.040	0.011	[.081]	-0.070	[.083]	0.017	[.083]	0.006	[.080]		
Usually uses marijuana	2-5w	0.500	-0.102	[.034]**	-0.002	[.033]	-0.132	[.033]**	-0.030	[.035]		
	12-13m	0.495	-0.029	[.033]	0.014	[.032]	-0.046	[.033]	-0.018	[.032]		
Usually takes hard drugs	2-5w	0.209	-0.029	[.025]	-0.013	[.027]	-0.009	[.028]	0.020	[.023]		
	12-13m	0.200	-0.007	[.028]	0.075	[.030]**	0.005	[.029]	0.013	[.026]		

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



and how this built their confidence to reintroduce themselves to community members, or to expose themselves to banks and shops.

Attempts to behave normally, especially the exposure to new social situations, reinforced skill and identity change. Many of the men failed in their plans, or experienced stigma in their shop or bank visits. In group sessions, men discussed what went wrong and why (poor decisions, or choice of dress). Men with setbacks learned from and were encouraged by the positive experiences of others. And facilitators sometimes observed men's homework attempts and coached them through difficulties.

We also saw striking transformations in the men's appearance. The first day men typically arrived with long or messy hair, facial hair, dirty or ripped clothing, wearing t-shirts with shorts and sandals. Their demeanor was tough, and their appearance signaled their outcast status. Haircuts were offered in the second week, and many men took advantage, symbolizing the change. But others showed up before this having gotten a haircut on their own. Similarly, before the unit on hygiene began, many men began arriving in pants, shoes, and collared shirts. Typically a few men in each group refused the haircut and continued to dress tough. But after seeing the positive experiences of others, they too began to arrive more clean cut, trying out the new image. The quantitative results confirm this short-term change in appearance.

A year later, therapy participants also described applying skills of self-regulation in their lives. To avoid fights, they used new tactics: removing themselves from emotionally-charged situations, allowing space to process their feelings, and ignoring negative automatic thoughts in the favor of more logical, controlled thinking. Related to these strategies were improved social and communication skills. Interviewees described how these communication skills allowed them to engage with community members or in disputes and express themselves without confrontation or violence.

Not only did the community regard them differently, many said, but troubled young men began coming to them for advice and lessons learned from the therapy once they saw the sudden and sustained change—another important source of reinforcement, and perhaps one reason we do not see a change in peer quality in the data.

## 7 Discussion

We show that a cheap, short program of therapy for high-risk urban young men reduced a variety of violent and criminal behaviors by 30 to 50%. The effects persisted for at least a year when followed by a simple cash transfer. These effects are large enough

that, given that we find no evidence of misreporting in the qualitative validation, it seems unlikely they reflect bias from the treatment group underreporting bad behaviors. This is a dramatic behavior change, with potentially huge social benefits. Why was it effective? Is it scalable? And why didn't it reduce poverty?

## 7.1 Lessons from the cash transfer

This supposedly undisciplined, lawless group of men largely invested and saved an unconditional grant. Little was spent on temptation goods. This example joins a body of work showing that people seldom “waste” cash (Evans and Popova, 2014).

In the short run, men used the cash for petty trade, earning high returns to capital. For instance, the impact on earnings (\$8.80 a month) represents a monthly return of 4.4% on the \$200 grant, while the impact on non-durable consumption (\$53 per month) represents a monthly return of 26.5%. While there are reasons these figures might overstate returns, recall that men only invested about \$114 in the month after the grant, implying returns on actual investment are much higher. Without monthly data on how long gains lasted, however, we can't say whether the cash grant passed a cost-benefit test in private monetary returns alone.

There were social spillovers, however. The income gain had little effect on aggression, but those who received the cash reduced stealing incidents by a third. This is consistent with rural ex-combatants in Liberia, who shifted away from (but not entirely out of) illicit activities when a program raised their farm productivity (Blattman and Annan, 2014). This suggests that capital can stimulate employment, and the income gains can help deter economically-motivated crime and violence.

After a year, however, these investments and income gains have disappeared. This contrasts with a growing literature showing that poor young people in Africa invest cash transfers and increase self-employment and incomes.<sup>31</sup> One possibility is that our sample was poorly prepared for business. Existing studies showing high returns to cash typically screen for existing entrepreneurs or high-ability unemployed (e.g. requiring business plans) or provide training and framing.

Our evidence, however, suggests that risk and economic shocks may play a large role in explaining business failure, especially insecurity of property. The men's homes and neighborhoods were highly insecure. Extrapolating from reports of burglary and theft at each endline (Table 10), men in our sample experienced a theft or robbery roughly eight times

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<sup>31</sup>Haushofer and Shapiro (2013); Fafchamps et al. (2014); Blattman et al. (2014, 2015)

in the year after the grant. While treated men were no more likely to experience theft, they had more to lose. These shocks may have eliminated the accumulated investment and savings of the men’s nascent businesses.

A key lesson for the growing practice of cash transfers to the poor, then, is that removing credit constraints via cash may not be sufficient to increase self-employment when property rights are poorly protected and insurance markets are mostly absent.

Nonetheless, the fact that cash was well used is important, since concerns about temptation spending restrain political support for welfare programs. The men received a few months worth of income, and basic consumption—especially basic shelter and food—improved for about that length of time. This is important.

Future research ought to study how to make the economic effects of cash more sustained. Given that insecurity and other shocks seemed to have set men back, it may be that helping people relocate to better quality neighborhoods, helping them enhance personal security, or providing the information and means to gain necessary licenses or protection from security forces might reduce the risk of theft. Alternately, programs can try to provide crude insurance. It is possible that regular cash transfers would stimulate enterprise development more than the one-time transfer we study.<sup>32</sup>

## 7.2 Lessons from behavior change

First, we observed sustained changes in self control skills and values linked to antisocial behaviors. Historically, impulsivity and reward motivation have been considered stable traits. However most therapies for extreme risky behavior, such as substance abuse or criminality, attempt to teach tactics for shifting impulsive behavior. Our evidence suggests that these are malleable characteristics that can be changed by exposure to group therapy, at least with this subject group and context. Conscientiousness and grit receive much more emphasis in the economics literature on noncognitive skills, but these seem to be less affected by the therapy, and perhaps less malleable in adulthood. Overall, these results echo the effects of adolescent CBT programs in Chicago that target similar automatic behaviors (Heller et al., 2015).

Second, we saw ample evidence that shifting behaviors led to changes in self image and reputation, and with it the values and norms to which the men subscribe. Qualitatively

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<sup>32</sup>In Ghana, Karlan et al. (2012) show that a cash transfer only improved farmers’ incomes when it was accompanied by insurance, and in Mexico Bianchi and Bobba (2013) show that expectation of an annual cash transfer effectively provided insurance and was at least as important as the relieving of credit constraints in stimulating self-employment.

the changes in appearance, in community regard, and in interaction were particularly important, at least in the short run. The basis of CBT is that such positive interactions challenged respondents' negative beliefs about themselves, and reinforced their self image as more responsible, mainstream members of society.

STYL's focus on planful skills and image change in addition to automatic behaviors could explain why the changes in antisocial behavior are more sustained in Liberia than the Chicago studies mentioned above. However, the difference in contexts is so great that comparison is difficult. Nonetheless, the attention to noncognitive skill change and self image, the targeting of the highest-risk men, as well as the non-residential nature of the therapy, correspond closely to best practice in criminal rehabilitation in US correctional institutions (Andrews et al., 1990; Lipsey, 2009). Moreover, a randomized trial of another NEPI intervention that did not follow these principles had no effect on attitudes, values, or behaviors, despite having some of the same facilitators and trainers (Blattman and Annan, 2014).<sup>33</sup>

### **Understanding the cash–therapy interaction**

The qualitative evidence and psychological theory both suggest that the cash was akin to an extension of therapy, in that it provided more time for the men to independently practice and reinforce their changed skills, image, and behaviors. The therapy was brief—just eight weeks long. It helped men change their intentions, image and behavior, and provided almost daily commitment and reinforcement. After eight weeks they were left to themselves, and had to contend with the usual economic and peer pressures. The grant, however, provided men with the cash they needed to maintain their new image—to avoid homelessness, to feed themselves, and to continue to dress well. They had no immediate financial need to return to crime.

The men could also do something consistent with their new image and skills: execute plans for a business. This was a source of practice and reinforcement of their newfound skills and identity. It was also a form of performance, to themselves as well as their

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<sup>33</sup>Prior to this study, NEPI was hired by an international non-profit to conduct a residential group therapy program for rural ex-combatants, in tandem with agricultural training. While there was overlap in curriculum with STYL, the residential therapy had a more diverse array of topics (including dealing with trauma and civic education); did not formally include homework or follow-up or exposure to new social interactions; and socialized young men in an artificial environment outside their home. The subjects were considered high-risk but had lower rates of crime, drugs, and violence than their urban STYL counterparts. Given differences in design, facilitators, and subjects, we cannot causally attribute the absence of impacts on antisocial behavior to the therapeutic approach, but the difference is consistent with the theory underlying CBT.

peers, family, and neighbors who could see the men engage in legitimate business. Our qualitative interviews also suggested that the cash allowed people to navigate mild shocks while getting their life on a new track.

In this way, the grant may have parallels to “booster sessions” commonly used in therapy. A small body of experimental research on CBT for aggression or substance abuse indicates that follow-up therapy sessions weeks or months after the intervention improves long term outcomes (e.g. Lochman, 1992).

Caution is warranted, however. While our interpretation of the cash-therapy interaction is supported by the qualitative data and related research in psychology, quantitatively it is more of a residual explanation, since the evidence supports none of the alternatives. We cannot reject the hypothesis, for instance, that the positive reinforcement from winning a cash grant alone was enough to reinforce therapy. In future, more direct evidence is needed. A comparison of extended therapy to shorter therapy plus cash would be one such test.

Nonetheless, high short-run returns to capital and sustained social spillovers suggests that the combination of cash and therapy had promising returns. Since the private returns to the grant were temporary, however, the cost effectiveness rides mostly on the social benefits from roughly one fewer crime per week per person. These social returns are unknown. If these social returns are greater than \$20 or \$25 per crime, however, the STYL program is a promising investment on the crime reduction alone.

### 7.3 Generalizability

There are several reasons this approach has promise beyond Liberia. The therapy, while developed by Liberians, was substantially adapted from US-based CBT programs, suggesting that adaptability to other contexts is feasible. We also kept the intervention low-cost and created a publicly-available manual, curriculum, and training guidelines to ease adaptation and replication. Finally, the theory and results are consistent with comparable US programs and best practice.

The identity of NEPI facilitators seem important. While CBT has been shown to be effective independent of such “therapist effects”, they are believed to be important in program effectiveness (Beck, 2011). Nonetheless, facilitators were graduates of past NEPI programs, meaning facilitators can self-perpetuate. Also, levels of experience and human capital in Liberia are lower than in most countries. Together this suggests that developing qualified and effective facilitators in other places is feasible.

There are obvious limits. For instance, there were no gangs or armed groups vying for

men in our sample. CBT-based approaches may be most effective against disorganized, impulsive crime and violence rather than organized crime. There is also selection onto the street, and a country which has experienced many negative shocks (such as Liberia) might have more high-potential young men who need only a little help to regress to the mean.

Moreover, recall that compliers were less than half the high risk population: a third of the high risk men we identified refused to engage with NEPI, and a third of those that entered therapy did not complete it. Our treatment effects, while large, are local effects, relevant to men who comply with the program when offered. On the other hand, our evidence from dropouts suggests that the most antisocial men stay, and the program is most effective with them.

These limits are speculative without further testing, however, and replication and experimentation seem more than warranted given the results in Liberia, Chicago, and elsewhere. Combining therapeutic approaches with economic assistance, including longer term assistance than a single cash grant, seem especially important to test.

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# Appendix for online publication

## A Baseline sample

### A.1 Full summary statistics and balance tests

Table A.1 expands the balance table in the main paper for the full set of baseline covariates available and used in the treatment effects regressions.

Table A.1: Baseline statistics and balance test

Baseline covariate	Full Sample	Test of randomization balance			
	N=999	Assigned to Therapy		Assigned to Cash	
	Mean	Coeff.	p-value	Coeff.	p-value
	(1)	(2)	(3)	(4)	(5)
Age	25.40	-0.13	0.69	0.06	0.82
Married or living with a partner	0.16	0.00	0.98	-0.02	0.36
# of women supported	0.53	-0.04	0.12	0.01	0.61
# children under 15 in household	2.21	-0.14	0.49	-0.11	0.45
How often sees members of family (1-4)	2.37	-0.06	0.28	0.09	0.14
Muslim	0.10	0.03	0.21	0.00	0.90
Years of schooling	7.72	-0.13	0.56	0.03	0.92
Currently in school	0.06	0.00	0.68	-0.01	0.63
Literacy index (0-2)	1.23	0.00	0.91	-0.02	0.58
Math score (0-5)	2.79	-0.17	0.10	-0.06	0.64
Ability to perform daily activities (0-6)	4.87	0.12	0.19	-0.04	0.66
Has any disabilities	0.08	0.01	0.39	-0.02	0.25
Symptoms of depression (0-18)	7.09	0.08	0.52	-0.10	0.46
Symptoms of distress (0-21)	7.46	0.06	0.59	-0.20	0.18
Relationships with ex-commanders, (0-4)	0.45	-0.03	0.56	0.02	0.60
Ex-combatant	0.38	0.01	0.64	0.03	0.34
War experience (0-14)	5.86	-0.01	0.94	-0.18	0.19
Weekly cash earnings (USD)	68.30	2.66	0.29	-7.49	0.22
Index of 38 durable assets, z-score	0.00	-0.06	0.30	0.07	0.50
Currently sleeping on the street	0.24	-0.01	0.42	-0.01	0.38
Times went hungry in past week	1.26	0.04	0.60	0.09	0.26
Savings stock (USD)	33.75	-0.53	0.89	-3.31	0.46
Able to get a loan of \$50	0.52	0.00	0.78	-0.03	0.30
Able to get a loan of \$300	0.11	0.01	0.75	0.00	0.97
Hours/week in potentially illicit activities	13.55	0.65	0.56	-0.26	0.81
Hours/week in agriculture	0.36	0.41	0.02	-0.06	0.79
Hours/week in low-skill wage labor	19.39	-0.83	0.81	0.10	0.97
Hours/week in in low-skill business	11.53	3.59	0.02	1.83	0.14

Baseline covariate	Full Sample	Test of randomization balance			
	N=999	Assigned to Therapy		Assigned to Cash	
	Mean	Coeff.	p-value	Coeff.	p-value
	(1)	(2)	(3)	(4)	(5)
Hours/week in high-skill work	1.51	0.18	0.67	0.85	0.00
Experience in agriculture (years)	0.78	-0.11	0.33	-0.16	0.01
Experience in low skill work (years)	2.96	0.12	0.53	-0.24	0.27
Experience in high skill work (years)	0.96	0.02	0.75	0.06	0.71
Sells drugs	0.20	0.01	0.49	0.00	0.97
Drinks alcohol	0.75	0.05	0.31	0.03	0.44
Uses marijuana ever	0.59	0.03	0.47	0.01	0.59
Uses marijuana daily	0.44	0.03	0.32	0.01	0.57
Uses hard drugs ever	0.26	-0.01	0.62	0.02	0.54
Uses hard drugs daily	0.15	-0.05	0.03	0.03	0.41
Committed theft in past 2 weeks	0.53	0.02	0.68	0.01	0.72
# nonviolent thefts in past 2 weeks	5.10	-0.20	0.57	-0.11	0.90
# violent thefts in past 2 weeks	0.70	-0.14	0.41	-0.05	0.84
# fights and disputes in past 2 weeks	2.16	-0.19	0.46	0.10	0.83
Aggressive and hostile behaviors index, z-score	0.00	-0.05	0.45	0.00	1.00
Conscientiousness index (0-24)	15.33	-0.03	0.62	-0.14	0.26
Neuroticism index (0-24)	12.08	-0.02	0.84	0.24	0.16
Perseverance/GRIT index (0-21)	13.79	0.06	0.59	-0.05	0.79
Reward responsiveness index (0-24)	14.67	-0.23	0.19	-0.06	0.73
Locus of control index (0-24)	14.45	0.13	0.38	-0.17	0.17
Index of 8 self-reported impulsiveness questions (0-24)	9.35	-0.03	0.90	-0.30	0.07
Self esteem index (0-24)	13.47	-0.08	0.56	0.01	0.94
Behavioral game play:					
Patience index (0-6)	4.12	0.11	0.45	-0.05	0.77
Time inconsistency index (0-6)	3.27	-0.18	0.01	0.02	0.74
Risk aversion index (0-3)	1.57	0.06	0.49	0.00	0.97
Declared time preference (z-score)	0.00	0.01	0.82	-0.01	0.84
Declared risk appetite (z-score)	0.00	-0.03	0.82	-0.08	0.07
Executive function (z-score)	0.00	0.02	0.64	0.00	0.96
Cognitive ability (z-score)	0.00	-0.07	0.18	-0.03	0.74
R-squared			0.12		0.05
p-value on F-statistic on all covariates			0.64		0.90

## A.2 Neighborhoods and recruitment

Table A.2 describes each of the study neighborhoods where we recruited, along with population estimates. We report the estimates of the number of all adult males, as well as our low-end estimates of the number of target males in each neighborhoods—men 18

to 35 in the bottom decile of income.

### **A.3 Correlates of compliance and attrition**

Table lists survey response rates by treatment group and survey wave (short term, pooling 2- and 5-week surveys, and long term, pooling 11- and 13-month surveys). It also reports the p-value from a t-test of the difference between the response rate in each treatment group and the control group. None of the differences are statistically significant, and all are within about a percentage point of the control group response rate. The control group response rate is a tiny bit lower in the long run surveys and a tiny bit higher in the short run ones. But none of these differences control for covariates or even strata fixed effects, as in the next table.

We analyze the correlates of attrition in Columns 1 and 2 of Table A.4. We use a selection of baseline covariates to reduce collinearity and thus aid interpretation. Results with full covariates draw similar conclusions. We define compliance as “attended at least 5 days of therapy”, but attendance data was not collected the first week, and so in principle this is an indicator for attending at least 8 days of therapy (about 2.5 weeks).

## **B Additional intervention details**

After completing the pilot, we decided on a target sample of 1,000. This target was based on maximum program capacity and financial constraints. Based on the pilot, we estimated that the Minimum Detectable Effect for the full 1,000 (for each treatment) would be a 0.12 standard deviation change in a standardized dependent variable for a two-tail hypothesis test with statistical significance of 0.05, statistical power of 0.80, an intra-cluster correlation of 0.25, and the proportion of individual variance explained by covariates as 0.10.

### **B.1 Randomization protocols**

For the therapy and cash randomization, men in each block took turns drawing colored chips from an opaque fabric bag. In general, the bag was shaken and then the subject was instructed to turn away and to place one arm into the bag and to draw out a single chip. The color was confirmed and recorded.

In the cash instance, men were randomized in roughly equal sized blocks of about 50 people. Each man was invited into a private room to draw to ensure privacy and safety.

Table A.2: Recruitment neighborhoods

Phase	Neighborhood	Short description	Estimated males		Recruited		
			All	Target	No.	% all % target	
1	Red Light 1	Peri-urban, along the main road from Monrovia to the northeast of the country, residential but the site of one of the major markets in the city, mixed income neighborhood.	23 422	1 171	100	0.4%	8.5%
2	Red Light 2	Peri-urban, along the main road from Monrovia to the NE of the country, residential but the site of one of the major markets in the city, mixed income neighborhood.	36 434	1 822	219	0.6%	12.0%
	Central Monrovia	The area consists of Mamba Point and West Point, one of the busiest business areas in Monrovia.	32 345	1 617	179	0.6%	11.1%
3	New Kru Town	Peri-urban, the north of Bushrod Island, the transit point to counties of the northwest of Liberia, notorious for petty crime.	28 704	1 435	240	0.8%	16.7%
	Logan Town	Peri-urban, the middle of Bushrod Island, next to Freeport of Monrovia, many garages and small shops and booths.	22 100	1 105	86	0.4%	7.8%
	Clara Town	Peri-urban, the south of Bushrod Island, next to Central Monrovia, lots of car-loaders and wheelbarrowers.	23 921	1 196	175	0.7%	14.6%
	All		166 926	8 346	999	0.6%	12.0%

*Notes:* Total male population estimates come from the authors' calculations based on data from Liberia Institute of Statistics and Geo-Information Services (LISGIS). To get an estimated number of target males we assume half are in the age range of 18-35 and take the bottom 10% decile as our targets. Red Light 1 includes Gorbachop, Woodcamp, Reservoir, Pipeline, Soul Clinic, and Sugar Hill. Red Light 2 includes Turtle Base, Chicken Poultry, Ma Kebebeh Gas Station area, Sugar Hill, Bassa Town, Goba Chop Community, Morris' Farm, Bernard Farm, Pipeline Road, Zayzay Community, Coca Cola Factory Community, Plank Field Community, Banana Bush Community, Soul Clinic Community, and Wood Camp. Central Monrovia includes Mamba Point and West Point areas. New Kru Town also includes part of Calwell. Logan town also includes part of Mamba Point and West Point that are not covered in Phase 2.

Table A.3: Survey response rates by wave and treatment status

	Treatment group				All
	Control	Treatment Only	Cash Only	Treatment + Cash	
Short-Term Response Rate	92.1%	91.0%	89.7%	91.5%	91.0%
<i>p-value vs. control</i>		0.65	0.36	0.83	
Long-Term Response Rate	91.8%	92.9%	94.8%	94.8%	93.6%
<i>p-value vs. control</i>		0.65	0.18	0.18	
All	91.9%	91.9%	92.3%	93.2%	92.4%
<i>p-value vs. control</i>		1.00	0.84	0.48	

This procedure was explained to the entire group, and all chips were placed into the bag in front of everyone. Then the bag was taken into a private room, and participants were called into the room individually. If they wished, they could inspect the bag to confirm that there were still chips of both colors inside. After everyone present had drawn, staff drew the remaining chips for the no-shows.

In the case of therapy, men were randomized each day, according to how many were recruited and surveyed in that neighborhood. This led to blocks ranging in size from 1 to 20, though the vast majority of blocks contained roughly 7 to 15 people. The draw was not as private as the cash draw, and men observed the outcomes of others drawing at the same time. Those who lost in the therapy randomization were offered a free meal along with the opportunity to discuss their situation with someone, and they were transported to a location of their choosing. A small percentage of the men were visibly upset and refused to engage at this point.

## B.2 Therapy

The standard STYL curriculum tended to be longer and broader than the two noncognitive skill and value changes that we study. For the purposes of this study, we worked with NEPI to streamline and focus the traditional STYL curriculum in two ways. First, we further grounded the approach in terms of CBT, emphasizing more practice over lectures. In general these modifications were quite modest, since the program already incorporated these techniques. Second, we asked NEPI to exclude modules not relevant to their theories of change: interpersonal skills; conflict resolution skills; dealing with war trauma and PTSD; career counseling; and community leadership.

To clarify and validate NEPI’s curriculum, a Liberian qualitative researcher acted as a participant observer throughout one of the two Phase 1 pilot classes. Based on NEPI’s

Table A.4: Baseline correlates of survey attrition and treatment compliance for select covariates

Baseline covariate	Dependent variable			
	Unfound		Attended >5d of therapy	
	Coeff.	Std. Err.	Coeff.	Std. Err.
	(1)	(2)	(3)	(4)
Assigned to therapy only	0.004	[0.016]		
Assigned to cash only	-0.004	[0.017]		
Assigned to therapy & cash	0.000	[0.016]		
Age	0.001	[0.001]	0.000	[0.003]
Married or living with partner	-0.017	[0.018]	-0.056	[0.038]
# children under 15 in household	-0.002	[0.002]	0.006	[0.004]*
Years of schooling	0.001	[0.002]	0.019	[0.005]***
Cognitive skills, z-score	0.007	[0.007]	-0.027	[0.016]*
Ability to perform activities of daily life (0-6)	0.001	[0.004]	-0.007	[0.008]
Mental health, z-score	0.017	[0.007]***	-0.014	[0.011]
War experience (0-14)	-0.003	[0.002]	-0.001	[0.004]
Earnings, assets and consumption, z-score	0.011	[0.007]*	-0.016	[0.015]
Savings stock (USD)	0.000	[0.000]	0.000	[0.000]
Hours/week working in potentially illicit activities	0.000	[0.000]	-0.001	[0.001]
Hours/week working (total)	0.000	[0.000]	0.000	[0.000]
Index of all antisocial behaviors, z-score	-0.005	[0.008]	0.034	[0.016]**
Index of personality skills, z-score	0.009	[0.007]	0.029	[0.014]**
Patience index (0-6)	0.000	[0.003]	0.010	[0.007]
Mean of dependent variable	0.073		0.903	
R-squared	0.096		0.298	
P-value for test of joint significance	0.092		0.019	

*Notes:* Columns (1)–(2) pool all endline survey rounds and report the coefficients and standard errors from an OLS regression of an indicator for attrition on the baseline covariates. Columns (3)–(6) report the coefficients and standard errors from an OLS regression of an indicator for compliance on the same covariates, restricting the samples to people assigned to the respective treatment groups only. Block fixed effects are included in all regressions but are omitted from this table. Robust standard errors are clustered at the block level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

training materials, our analysis of the theoretical grounding of the therapy, and this participant observation, we and NEPI developed a full program manual for the intervention, available at <http://chrisblattman.com/documents/policy/2015.STYL.Program.Manual.pdf>. The manual details the history and theory of the interventions, guidelines for recruitment of trainers and participants, training suggestions, the full curriculum, and guidelines for out-of-classroom engagement.

The curriculum has eleven main modules, which we present here with some examples of goals and activities:

1. *Transformation.* A tenet of CBT is that the therapist explicitly sets goals with participants and lays out the therapeutic strategy. This module introduces the concept of transformation, its significance, and the processes involved in transforming oneself.

- The men are introduced to the techniques that will be used (role playing, lectures, storytelling, etc.), homework assignments, home visits, and the reasons for each.
- The module also introduces ground rules for behavior, in terms of being respectful, practicing listening, waiting your turn, etc. The men do not necessarily have these skills, or haven't exercised them in some time, and learning to abide by these behavioral rules is an important part of the therapy.
- Facilitators also begin to teach the songs, slogans, and call-and-response that will be used repeatedly throughout the course. These songs and slogans serve as important reminders of rules of behavior for the men to follow. They also can be used to bring order to a disorderly or inattentive group.
- There are symbolic rituals to indicate a break in their lives. For example, the men write their "street names" and aliases on sheets of paper and they are burned together.

2. *Substance Abuse.* This module defines substance abuse and discusses its ill effects, as well as steps for moving past it. It explicitly encourages participants to reduce their consumption of drugs, alcohol, and tobacco. They are cautioned against cutting drugs entirely, to avoid withdrawal problems.

- Men talk through and list reasons that they use drugs. The idea is to make them consciously aware of the reasons for their own behavior and risk factors



in their lives. They also talk through the ill effects. Men talk through publicly about ways in which drugs have adversely impacted their own lives, sharing experiences.

- Men role play situations where they could be pressured to use drugs and practice strategies for saying no.
- An outside speaker comes to the classroom, often a former graduate of the therapy, to talk about their experiences with drugs and what it did to their lives, as well as what strategies they used to emerge. Men discuss strategies they can use in their own lives. They practice some of these as homework and come back to discuss their experiences with the class.

3. *Body Cleanliness.* The module explores the health, psychological, and social benefits of maintaining body cleanliness. Participants are encouraged to change behaviors that alienate them, and to present a public image (such as hair and dress) that promotes positive social interactions with community members.

- Body uncleanliness is defined and highlighted as a problem mainly by getting men to discuss and volunteer their own opinions and experiences in a group.
- The facilitators bring in a hair cutter, an electric shaver, and a set of nail clippers for men to clean up if they like.

4. *Garbage/Dirt Control.* An extension of the previous module, this module highlights the importance of cleanliness in participants' environments, and the ill effects of living in a dirty environment. It aims to help them maintain clean, healthy, and orderly living spaces.

- Facilitators present the men with pictures of dirty and clean homes, businesses, and streets, and men point out different risks and unclean elements, and discuss the consequences.
- Men identify ways they can improve cleanliness where they live (e.g. get a garbage can) and set and execute these plans as homework, to be followed up with home visits.

5. *Anger Management.* This module discusses the causes and effects of anger, the problems with acting out in ways they may later regret. It also provides participants with tools to manage their anger.

- Men discuss the signs and indications of anger, in themselves and others, through discussion and role playing. Facilitators show pictures of angry faces and situations, and men interpret them. The aim is to make them cognizant of these signs.
  - Men discuss the causes of anger, and learn to link some of their actions to other people's anger.
  - Men discuss and role play the negative consequences of aggression and violence, or share experiences from their own life.
  - Men practice nonaggressive responses to angry confrontations in class, such as learning to distract or calm oneself (walking away, doing other activities, starting discussions and de-escalating, or practicing breathing techniques). Men practice these techniques as homework.
6. *Self-Esteem*. This module emphasizes the need for participants to discover themselves in order to begin the path to recovery. This module links their behavioral changes to respect, pride, and confidence.
- The facilitators try to link poor self-image directly to many of the behaviors they have discouraged in previous modules, both as a cause and consequence.
  - Men discuss ways they can build self esteem, make plans, and execute them as homework.
  - Facilitators work with men to identify worthwhile skills and characteristics they hold that are worthy of others' respect.
  - Men practice shopping for goods in a supermarket or shop as one of the first exposure activities. They work through successes and failures as a group and try again, sometimes with the help of a facilitator.
7. *Planning*. Reviews the steps and components necessary for planning and implementation. The goal of this module is to build participants' capacity to develop short- and long-term plans and understand the processes involved in executing these plans.
- Planning skills are commonly taught in CBT programs as a method to build new skills. At its most basic, this involves helping the men break down larger plans into smaller steps and helping them work through ways to accomplish those steps, positively reinforcing successes and helping them process challenges

and setbacks, often as a group. Men give examples and discuss them together. Another example: Small groups of men are tasked with organizing activities, such as a football match. The larger group listens to the different plans and critiques them.

- As homework assignments, initially men are tasked with simple tasks (create a short term survival plan for feeding yourself or your family), and then more complex tasks (such as a business plan or home garden).
- Men are also tasked with identifying a successful friend or family member and determining what steps led to their success. A motivational speaker (usually a past graduate) is also invited to talk about the steps involved in their success and their learnings and setbacks.

8. *Goal Setting.* The module outlines tools participants can use to develop goals, objectives, and indicators for measuring success in their own lives.

- Participants are taught what short and long term goals are (through discussion and examples) and how to set reasonable short- and long-term goals (such as feeding their family, or starting a garden).
- First participants practice setting goals and making plans, and then the larger group discusses and critiques them. Participants then set their own small, short term goals (e.g. changing a behavior, reconciling with a family member, or saving a certain amount this week) and execute these as homework, processing successes and failures as a group.
- Participants discuss the characteristics of good goals (e.g. achievable, measurable, time-bound) and revise goals and plans. They are given poor goals as a group and practice turning them into better goals. Another motivational speaker is used to discuss the role of goal setting in their own life.

9. *Money Business.* Stresses the importance of engaging in positive spending habits and appropriately managing money. Impulsive spending habits are emphasized. Participants are taught to make plans and prioritize their needs and wants prior to spending their money.

- Men engage in exercises to track their own recent spending to see where their money has gone. They discuss the use and misuse of their own money. As

a group they discuss regrets and bad decisions and work through the negative consequences. These are illustrated dramatically through role-playing and skits, followed by discussion.

- Later discussion, role playing and skits focuses on techniques for resisting peer pressure and temptation. There is also testimony from a motivational speaker, usually a past graduate of the program.

10. *Money Saving.* The module introduces participants to various saving options and encourages them to reflect on the most suitable saving method for their lives. They practice interactions in informal and formal financial institutions.

- Men discuss the reasons for and advantages of saving and it is explicitly linked to positive self image and esteem in the community. There is another motivational speaker.
- Men learn techniques for saving safely at home without formal institutions. They learn to set and execute saving plans, using their goal setting and planning skills.
- Homework assignments involve saving money they would have otherwise used on things they regret (identified in the previous module). Homework also involves trips to the bank and informal lenders. Prior to these assignments they meet and role play in groups, and their strategies are discussed and critiqued by the larger group. There is also a focus on appropriate presentation and image in these outings.

11. *Challenges and Setbacks.* The module explores potential challenges and setbacks they will face and has them practice positive coping mechanisms needed to effectively overcome them. Challenges and setbacks are framed as a test of one's maturity, potential, and abilities, and an opportunity for improvement.

### **B.3 Cash grants**

We contracted the international non-profit Global Communities (GC) to conduct the registration and cash distribution, as well as oversee NEPI's financial management and implementation schedule. We did so for several reasons:

1. To keep the therapy and the research teams distinct from cash distribution;

2. To coordinate registration and implementation of the two activities;
3. To relieve the research team of project and financial management of the interventions; and
4. To make the intervention as close as possible to a real-world, replicable intervention by other non-profit or state organizations.

For safety, GC developed a highly structured system of cash distribution. GC staff held cash in a car that moved around the neighborhood, to avoid theft. A lottery team with the men gave grant winners a voucher, and put them on a motorbike taxi that was then directed to the street corner where the car with the cash awaited. They were told to approach the car (which had an identifying mark such as a red bag on the dash), hand over their voucher, and receive their cash. The car would then move to a new corner, whose location would be relayed by mobile phone, and the process would repeat.

Anyone who was assigned to the cash treatment but was not present on the day of disbursement was still eligible for the grant. GC attempted to locate them for up to three weeks afterward, and generally succeeded.

## C Formal theoretical model

### C.1 Setup

We model an individual’s choice between legitimate business and illicit activities under different conditions—with and without time inconsistency, and with and without financial market imperfections—and assess the predictions for a number of common labor market and crime-reducing interventions: greater punishment, increasing productivity in legitimate business (e.g. through technology or skills improvement), cash or capital transfers, and interventions that shape preferences—either time preferences or personal preferences against illegal behavior.

We use  $L^b$  and  $L^c$  to denote time spent in legitimate activities (such as petty business) and illegitimate activities (such as crime). Legitimate business produces revenue according to production function  $F(\theta, L_t^b, K_t)$ , where  $\theta$  is productivity or individual ability and  $K$  is accumulated capital used in business. A person’s decision to participate in illegal activity is motivated by the potential gains and costs from such activity. Gains include the expected illegitimate payoff per hour spent in illegal activities,  $w$ . Costs include the possibility of apprehension and conviction, which occurs with probability,  $\rho$ , and implies a

penalty,  $fL_{t-1}^c$ . Thus the penalty for criminal behavior is a linear function of hours spent in criminal activities in the previous period<sup>34</sup> The individual's total expected earnings from legitimate and illegitimate activities are  $y_t \equiv F(\theta, L_t^b, K_t) + w_t L_t^c - \rho f L_{t-1}^c$ . In addition to investing in business, the individual can also invest or borrow through a riskless asset with constant returns  $1 + r$ . At each period  $t$ , the individual decides how much to invest for next period  $a_{t+1}$  and reaps interests  $ra_t$  from last period's investments.

Individuals have utility function  $U(c, l, \sigma L^c)$ , where  $c$  denotes consumption and  $l$  denotes time for leisure. We also allow for individuals to have direct disutility from engaging in crime, as measured by  $\sigma L^c$ , where  $\sigma > 0$  implies that illicit work induces some internal penalty such as shame, though in principle it could also reflect social penalties such as a loss of esteem or exclusion from peers and other social networks. We make the standard assumption that  $U'_c \geq 0$ ,  $U'_l \geq 0$ ,  $U'_{\sigma L^c} \leq 0$ ,  $U''_{cc} < 0$ ,  $U''_{ll} < 0$ ,  $\partial^2 U / \partial L_c^2 \leq 0$  and  $F'_\theta \geq 0$ ,  $F'_L \geq 0$ ,  $F'_K \geq 0$ ,  $F''_{\theta\theta} < 0$ ,  $F''_{LL} < 0$ ,  $F''_{KK} < 0$ , and  $F''_{\theta L} \geq 0$ ,  $F''_{\theta K} \geq 0$ ,  $F''_{LK} \geq 0$ .<sup>35</sup> We allow for the individual to have quasi-hyperbolic  $(\beta, \delta)$  preferences.

We first consider the case without any uncertainty. The individual's problem is:

$$\begin{aligned} \max_{c_t > 0, 0 \leq l_t \leq \bar{L}, L_t^b, L_t^c, K_{t+1}, a_{t+1}} \quad & U(c_t, l_t, \sigma L_t^c) + \beta \sum_{i=1}^{\infty} \delta^i U(c_{t+i}, l_{t+i}, \sigma L_{t+i}^c) \\ \text{s.t.} \quad & c_t + a_{t+1} + K_{t+1} = F(\theta, L_t^b, K_t) + w_t L_t^c - \rho f L_{t-1}^c + (1+r)a_t \quad \text{for each } t \\ & a_0 \quad \text{given} \end{aligned}$$

where  $L_t^b + L_t^c + l_t \equiv \bar{L}$ .

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<sup>34</sup>One reason for this modeling choice is because we want to explore the role that quasi-hyperbolic preferences play in the decision to commit crimes when the punishment is in the future not the present.

<sup>35</sup>For ease of analysis, we also assume that the marginal return to capital is infinity for the first unit of capital invested in business, and that as long as there is positive capital input, marginal product of labor for the first unit of labor will be infinity, i.e.  $\lim_{K \downarrow 0} F'_K(\theta, L^b, K) = +\infty$  for all  $L^b$  and  $\lim_{L^b \downarrow 0} F'_K(\theta, L^b, K) = +\infty$  as long as  $K > 0$ . This assumption guarantees that investments and hours in business will always be positive.

## C.2 Occupational choice (and interventions) among time consistent individuals

### Without credit constraints

Without time inconsistency ( $\beta = 1$ ) or credit constraints, the set of optimality conditions are:

$$\frac{U'_l(t)}{U'_c(t)} = F'_{L^b}(t) \quad \text{if } L_t^b > 0 \quad (1)$$

$$\frac{U'_l(t)}{U'_c(t)} - \sigma \frac{U'_{\sigma L^m}(t)}{U'_c(t)} = w_t - \frac{\rho f}{1+r} \quad \text{if } L_t^m > 0 \quad (2)$$

$$1+r = F'_K(t+1) \quad \text{if } K_{t+1} > 0 \quad (3)$$

$$\frac{U'_c(t)}{U'_c(t+1)} = \delta(1+r) \quad (4)$$

$$c_t + a_{t+1} + K_{t+1} = F(\theta, L_t^b, K_t) + w_t L_t^c - \rho f L_{t-1}^c + (1+r)a_t \quad (5)$$

where for ease of notation, we use  $U(t)$  to denote  $U(c_t, l_t, \sigma L_t^c)$  and  $F(t)$  to denote  $F(\theta, L_t^b, K_t)$ . Since we modeled crime punishment as a potential reduction in future wages, the risk neutral individual will view crime as an occupation with a discounted wage  $w_t - \frac{\rho f}{1+r}$ .

To find the marginal conditions for engaging in each sector, we first consider the case where illicit activity is not feasible. This would arise naturally if the probability of apprehension is high enough and punishment is heavy enough that  $w \ll \frac{\rho f}{1+r}$ . In this case the decision to engage in business depends on productivity  $\theta$ , wealth level and the returns on other financial assets  $r$ . We use  $c^{ba}$ ,  $L^{ba}$  and  $K^{ba}$  to denote consumption, labor and capital level in this scenario. Each period  $t$ , the individual chooses  $L_t^{ba}$  to satisfy  $\frac{U'_l(c_t^{ba}, \bar{L} - L_t^{ba}, 0)}{U'_c(c_t^{ba}, \bar{L} - L_t^{ba}, 0)} = F'_{L^b}(\theta, L_t^{ba}, K_t^{ba})$  taking  $K_t^{ba}$  as given, and he chooses capital investment  $K_{t+1}^{ba}$  to satisfy  $F'_K(\theta, L_{t+1}^{ba}, K_t^{ba}) = 1+r$ , taking expected  $L_{t+1}^{ba}$  as given.

Now, taking levels of  $c^{ba}$ ,  $L^{ba}$  and  $K^{ba}$  as given, we then look at individuals' decision to engage in crime. Individuals will engage in illicit activities if and only if:

$$w_t - \frac{\rho f}{1+r} \geq \frac{U'_l(c_t^{ba}, \bar{L} - L_t^{ba}, 0)}{U'_c(c_t^{ba}, \bar{L} - L_t^{ba}, 0)} + \sigma \frac{-U'_{\sigma L^m}(c_t^{ba}, \bar{L} - L_t^{ba}, 0)}{U'_c(c_t^{ba}, \bar{L} - L_t^{ba}, 0)} \quad (6)$$

which says expected returns from crime are higher than the highest possible marginal rate of substitution between leisure and consumption the individual can achieve without engaging in crime. Since  $-U'_{\sigma L^m}/U'_c > 0$ , a rise in  $\sigma$  means more people will drop out of

crime.

If condition (6) is satisfied and if  $K_t > 0$ , the individual then chooses  $L_t^b$  and  $L_t^c$  such that the marginal product of labor in business equals his expected marginal gains from crime, which also equals his marginal rate of substitution between leisure and consumption: i.e. conditions (1) and (2) will be satisfied. Notice  $L_t^c$  may not always be positive. The individual will not engage in crime if any or all three of the following happens:  $w_t$  is very low relative to the probability of apprehension  $\rho$  and punishment  $f$ ; productivity in business  $\theta$  is very high; the degree of aversion to crime  $\sigma$  is very high.

Capital investment and hours in business will satisfy condition (3). Notice that  $w$ ,  $\rho$  and  $f$  will not affect returns to investment in business.

Interventions that increases the disutility of crime or the size or probability of punishment will reduce time devoted to in crime, but will have no effects on returns in business.<sup>36</sup> However, interventions that increase business productivity  $\theta$  will not only induce more investment in business, but also reduce involvement in crime. In other words,  $\frac{\partial L^c}{\partial \sigma} < 0$ ,  $\frac{\partial L^b}{\partial \sigma}$  is ambiguous,  $\frac{\partial L^c}{\partial \theta} < 0$  and  $\frac{\partial L^b}{\partial \theta} > 0$ . Finally, interventions that provide capital or liquid financial assets, such as a cash windfall, will not affect occupational choice at all, since the individual will already be working at his optimal level in both sectors. The windfall will simply be consumed and saved.

### With credit constraints

In this section we consider the model with a simple credit constraint in the form of  $a_t \geq 0$ —individuals are unable to borrow in any period. We focus our attention on individuals whose initial  $a_0$  is low enough that at some point in his life, the credit constraint is binding. Credit constraints will affect optimal conditions (2) and (3). The optimal condition for capital investment (3) becomes

$$F'_K(\theta, L_t^b, K_t) = \max\{1 + r, \frac{1}{\delta}\} \quad \text{if } K_{t+1} > 0$$

and the optimal condition for hours in crime (2) becomes

$$\frac{U'_l(t)}{U'_c(t)} - \sigma \frac{U'_{\sigma L^m}(t)}{U'_c(t)} = w_t - \frac{\rho f}{\max\{1 + r, \frac{1}{\delta}\}} \quad \text{if } L_t^m > 0$$

Notice that  $\max\{1 + r, \frac{1}{\delta}\} \geq 1 + r$  and  $w_t - \frac{\rho f}{\max\{1 + r, \frac{1}{\delta}\}} \geq w_t - \frac{\rho f}{1 + r}$ . For the impatient

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<sup>36</sup>The level of investment in business may change depending on the shape of the utility and production functions, but the returns to investment will not change.



individuals whose  $\frac{1}{\delta} > 1+r$ , their optimal level of capital investment will be lower than the baseline case because of the credit constraint. They also have a higher expected returns from crime than in the baseline case, because the low level of business investment also forces them to put a higher discount rate on potential future punishment from crime.

Critical condition (6) becomes

$$w_t - \frac{\rho f}{\max\{1+r, \frac{1}{\delta}\}} \geq \frac{U'_l(c_t^{ba}, \bar{L} - L_t^{ba}, 0)}{U'_c(c_t^{ba}, \bar{L} - L_t^{ba}, 0)} + \sigma \frac{-U'_{\sigma L^m}(c_t^{ba}, \bar{L} - L_t^{ba}, 0)}{U'_c(c_t^{ba}, \bar{L} - L_t^{ba}, 0)}$$

Credit constraints induce more individuals who would otherwise not engage in crime to commit crime. For the impatient individuals, credit constraints increase their hours in crime and reduce their capital investments and hours in business activities.

Interventions that ease the credit constraint, including cash windfalls, will induce more investment in business and reduce involvement in crime. As in the baseline case,  $\frac{\partial L^c}{\partial \sigma} < 0$ ,  $\frac{\partial L^b}{\partial \sigma}$  is ambiguous,  $\frac{\partial L^c}{\partial \theta} < 0$  and  $\frac{\partial L^b}{\partial \theta} > 0$ ; however, the magnitude the effects of a change in  $\sigma$  or  $\theta$  will be greater than in the baseline case; the magnitudes also increases with the degree of impatience:  $\frac{|\partial L^c / \partial \sigma|}{d\delta} < 0$ ,  $\frac{|\partial L^c / \partial \theta|}{d\delta} < 0$  and  $\frac{|\partial L^b / \partial \theta|}{d\delta} < 0$  (notice that the lower the value of  $\sigma$ , the more impatient the individual).

### C.3 Occupational choice (and the effects of interventions) under time inconsistency

#### Without credit constraints

Time-inconsistent individuals ( $\beta < 1$ ) will be more reckless in the present. Intuitively, the smaller is  $\beta$ , the more individuals want to enjoy higher consumption today at the expense of future consumption, which means they will borrow more, save less, invest less in business and/or involve more in criminal activities. However, as long as there is a perfect financial market, no one will change their business or criminal activities in order to consume more today—they will simply borrow more (or save less) today through the financial market.

In terms of optimal conditions, in the absence of any credit constraint, the only condition that changes is equation (4), which becomes

$$\frac{U'_c(c_t, l_t, \sigma L_t^c)}{U'_c(c_{t+1}^P, l_{t+1}^P, \sigma L_{t+1}^c)} = \left[ \frac{\partial c_{t+1}}{\partial W_{t+1}} \beta \delta + \left(1 - \frac{\partial c_{t+1}}{\partial W_{t+1}}\right) \delta \right] \cdot (1+r)$$

where  $W_t$  denotes total wealth at time  $t$ ,  $c_{t+1}^P$  denotes the individual's predicted future

decision about  $c_{t+1}$  at time  $t$ . For the sophisticates  $c_{t+1}^P = c_{t+1}$  while for the naifs  $c_{t+1}^P > c_{t+1}$ . Compared with the baseline case, the discount factor  $\delta$  is replaced by the effective discount factor  $\frac{\partial c_{t+1}}{\partial W_{t+1}}\beta\delta + (1 - \frac{\partial c_{t+1}}{\partial W_{t+1}})\delta$ , a weighted average of the short-run and long-run discount factors  $\beta\delta$  and  $\delta$  where the weights are the next period marginal propensity to consume out of total wealth.

Notice that neither condition (2) nor condition (3) changes, as long as we have no credit constraints. Compared with the baseline, time inconsistency alone will not affect criminal activities or business investment. It would only change the level of savings or debts.

In this case, interventions that aim to correct time consistency will have no effects on either business investment or criminal activities, but will have an effect on consumption, savings and income.

### With credit constraints

With credit constraints, in addition to equation (4), optimal conditions (2) and (3) will change as well. Let  $\Delta = \frac{\partial c_{t+1}}{\partial W_{t+1}}\beta\delta + (1 - \frac{\partial c_{t+1}}{\partial W_{t+1}})\delta$  be the effective discount factor under  $(\beta, \delta)$  preferences and  $\tau = \frac{U'_c(c_t, l_t, \sigma L_t^c)}{U'_c(c_{t+1}^P, l_{t+1}^P, \sigma L_t^c)} \cdot \frac{1}{\Delta}$ , where  $c_{t+1}^P$  denotes the individual's predicted future decision about  $c_{t+1}$  at time  $t$ . With credit constraints, the Euler equation (4) becomes

$$\tau \geq 1 + r \quad \text{with equality if } a_{t+1} > 0$$

and conditions (2) and (3) become

$$\frac{U'_l(t)}{U'_c(t)} - \sigma \frac{U'_{\sigma L^m}(t)}{U'_c(t)} = w_t - \frac{\rho f}{\tau} \quad \text{if } L_t^m > 0$$

and

$$F'_K(\theta, L_t^b, K_t) = \tau \quad \text{if } K_{t+1} > 0$$

In addition, critical condition (6) will change accordingly, with  $1 + r$  replaced by  $\tau$ .

Compared with the baseline case,  $\tau > 1 + r$  as long as an individual is credit constrained (i.e. has no savings). The level of  $\tau$  will be higher for the sophisticates than for the naifs. However, regardless of their level of sophistication (i.e. the way individuals set their expectations for their future behavior), we know for sure that  $\tau > \frac{1}{\delta}$ , and the smaller  $\beta$  is (i.e. the more time inconsistent), the higher  $\tau$  will be.

Compared to the time-consistent credit constrained case, fewer individuals will invest in business, more individuals will engage in crime, business investment levels will be lower,

and hours in crime will be higher for everyone. The difference increases with the level of inconsistency (i.e. decreases with  $\beta$ ).

Interventions that improve time consistency will shift people away from crime towards business. So will increasing the disutility of crime (though, as in the case without time inconsistency, while  $\frac{\partial L^c}{\partial \sigma} < 0$ ,  $\frac{\partial L^b}{\partial \sigma}$  is ambiguous). Increasing business productivity will have similar effects as before:  $\frac{\partial L^c}{\partial \theta} < 0$  and  $\frac{\partial L^b}{\partial \theta} > 0$ . In all of these cases, however, the magnitudes the effects of a change in  $\sigma$  or  $\theta$  will be greater than under time consistency, and the magnitudes also increase with the both degree of impatience and the degree of time inconsistency:  $\frac{|\partial L^c/\partial \sigma|}{d\beta} < 0$ ,  $\frac{|\partial L^c/\partial \theta|}{d\beta} < 0$ ,  $\frac{|\partial L^b/\partial \theta|}{d\beta} < 0$ ,  $\frac{|\partial L^c/\partial \sigma|}{d\delta} < 0$ ,  $\frac{|\partial L^c/\partial \theta|}{d\delta} < 0$  and  $\frac{|\partial L^b/\partial \theta|}{d\delta} < 0$ . Notice that the lower the value of  $\beta$ , the more time inconsistent the individual is, and similarly, the lower the value of  $\sigma$ , the more impatient the individual is.

## C.4 Introducing uncertainty and risk aversion

Three potential sources of risk are uncertainties in business productivity  $\theta$ , wages from criminal activities  $w$ , and the potential punishment after apprehension  $f$ . We assume that decisions on business investment and hours in both sectors are made before risks are realized, and that  $\theta$ ,  $w$  and  $f$  follow independent stochastic processes.

With uncertainties in both the business and illicit sector, business investment and hours in both sectors depend on the variance of returns in both sectors and the level of initial wealth  $a_0$ . If both sectors are sufficiently risky, then those with high levels of wealth  $a_0$  will turn away from both activities by reducing  $K$ ,  $L^b$  and  $L^c$  and investing instead in other riskless assets.  $K$ ,  $L^b$  and  $L^c$  will all be lower than the cases without risk. Those with low levels of initial wealth will not be able to live off savings alone, so they will have to invest more in either or both sectors, depending on the relative riskiness of the two sectors. As long as both sectors are similarly risky,  $K$ ,  $L^b$  and  $L^c$  will all be higher; otherwise, if one of the sectors is less risky than the other, individuals will invest more time in that sector.  $\frac{L^c}{L^b+L^c}$  will be lower than in the case without uncertainty if returns to crime are more volatile than business returns. One special case would be if individuals face a significantly positive chance of death after committing any crime. This is the equivalent of saying  $f = +\infty$  with strictly positive chances. In this case hours in crime will be reduced to zero as long as the probability of apprehension is positive,  $\rho > 0$ .

With the presence of risk, interventions in  $\theta$  will have greater effects, because an increase in  $\theta$  now also makes business *relatively* less risky. A rise in  $\sigma$  will also have a bigger effect than without uncertainty, because risk aversion will reinforce the rise in aversion and further reduce hours in crime.

## D Measurement

### D.1 Self-reported non-cognitive skills

Because all personality questions were selected from questionnaires used in the United States, they were first translated into Liberian English by the enumerators, and then pre-tested with individuals selected from the same population as the youth in our study. To ensure that questions continued to assess the original underlying constructs two checks were performed. First, within the pre-test data we ensured that groups of questions were correlated or anti-correlated as one would expect given the underlying personality measure (e.g., impulsivity was negatively correlated with conscientiousness). Second, in Phase 2 we performed factor analyses to ensure that within scales, questions were answered similarly. Internal consistency within scales was confirmed in this way.

### D.2 Cognitive abilities

The behavioral protocol consisted of several interactive “activities”, some drawn from psychology and some from economics.<sup>37</sup>

**Spatial comprehension and general problem solving.** We asked subjects to complete a simple 6-piece jigsaw puzzle, where the image was a photograph of a familiar local setting such as a filling station. For individuals familiar with puzzles, this would be a simple test, however, none of the subjects had encountered jigsaw puzzles before, and thus this served as a test of problem solving within the novel testing environment. Subjects received a score (1 or 0) indicating whether the puzzle was correct, and a time to completion. If the subject was not finished when 5 minutes had passed they received a score of 0 (incorrect) and their time to completion was 5 minutes. On average subjects took 2.05 minutes (SD = 1.14 min) to complete the puzzle. Average accuracy on the puzzle was 90%.

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<sup>37</sup>Across all behavioral tests administration was standardized. First, a clinical psychologist and economist trained enumerators in test administration. Next, in collaboration with experienced enumerators and research assistants, a comprehensive protocol was developed and used by all future enumerators. Enumerators were also instructed to answer clarifying questions and were taught the over-arching concept within each game so they could address questions/alleviate concerns without straying from the central concepts of the tests. This tight control over the testing situation allowed us to collect relatively sophisticated measures of cognitive function and behavioral responses to rewards in a constrained and otherwise under-resourced testing environment.

**Planning behaviors.** We used a series of mazes to test planning behavior. Again, mazes were unknown to nearly all respondents. Similarly to the puzzle, subjects were shown an example maze on paper and then given 2, 2, and 3 minutes respectively to complete increasingly difficult mazes. Each had two entry points, one of which almost immediately led to a dead end. The main outcome of the mazes was the subject's ability to pause and plan their approach before completing the maze (i.e. did they plan their approach before choosing a starting point). As outcomes, we measure "time to first touch", or the amount of time spent planning prior to engaging in the maze; and number of mistakes (or "backtracks") in Maze 3, the hardest maze, which required the most planning and by which time participants had learned the concept of the maze. On average subjects took 18 seconds to plan for Maze 3 (SD = 23 seconds).

**Behavioral inhibition and cognitive flexibility** We developed the "arrows game", a modified directional Stroop task, a class of tasks that assess inhibitory control. Here subjects were shown a sequence of large black or white arrows that pointed either up or down and were first told to respond "up" or "down" to each arrow ("arrows baseline"). In the second version they were again shown the arrows but now were told to state the opposite direction; this constitutes producing the less common response while suppressing the more common response and is an assessment of inhibition ("arrows inhibition"). Finally, in a third version subjects were told to switch between two approaches: if the arrow was white they were to state the actual direction, but the opposite direction if the arrow was black. This is commonly called 'switching' and is an assessment of cognitive flexibility, the ability to move rapidly between two goals as the situation demands ("arrows switching"). For each version, the outcome data included total time to completion and the number of correct/incorrect responses out of 32 arrows. On average subjects made .33 errors (SD = 1.5) on arrows baseline, 2.4 errors (SD = 3.5) on arrows inhibition, and 3.9 errors (SD = 3.9) on arrows switching. Arrows took on average 25 seconds (SD = 17.7), 38 seconds (SD = 45.8), and 46 seconds (SD = 28.7) for baseline, inhibition, and switching separately.

**Working memory.** Working memory is the ability to hold something in mind when it is no longer present in the environment and then manipulate it. The digit span task is an assessment of working memory. The digit span tasks involved the enumerator saying a random sequence of digits (1-9) out loud with a short pause between each digit, followed by the respondent repeating them back either in the same (forward-digits) or the reverse (backwards-digits) order. The enumerator began by giving two 2-digit numbers (one at a

time) and recording the responses. If the subject correctly reported either of the numbers back, the enumerator would do the same with 3-digit numbers, and so on up to a maximum of 9 digits. As soon as the subject incorrectly reported both examples at a given level or span the enumerator moved on to the next activity (backwards-digits). The reverse digit span was done the same way, except that the subject was instructed to repeat the digits in the opposite order that the enumerator gave them (e.g., “three, zero, one”) On average subjects were able to remember 5.5 digits forward ( $SD = 1.23$ ) and 3.33 digits backwards ( $SD = 1.03$ ). Each activity existed as two slight variants (e.g. changing the numbers in the gambles). These activities were alternated in the 2 versus 5-week endlines and the 12 versus 13-month endlines, so that participants were never asked identical questions too close together in time.

### D.3 Economic preferences

The behavioral protocol also measure time and risk preferences.

**Intertemporal choices.** The penultimate activities were incentivized inter-temporal choices and hypothetical large-magnitude inter-temporal choices. These consisted of a series of binary choices between money at one point in time versus more money later in time.

Subjects were told that one of the questions across the next few activities would be picked for payout, with their choice implemented, so that they should pay careful attention to their decisions. We had told subjects that if one of the inter-temporal tasks was chosen for payout, and if their individual choice implicated a delayed reward, that we would come back and find them at the appointed time, in their own environment, to pay them.<sup>38</sup>

In this activity, after a clarifying example, subjects were asked four questions: first a choice between money now and more money in two weeks; second between two weeks and four weeks; and finally one more question for each of these pairs of delays, but with the numbers modified depending on their first answer (i.e. if they chose to wait, then they were asked again but with a lower reward in the future). This bifurcating design allowed

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<sup>38</sup>In fact, for logistical reasons, we always chose one of the risk questions for actual payout. Although we did not technically lie at any point, this could be construed as minor deception. None of the respondents brought this up, even after having gone through the process five times. By the endline stage, they knew us fairly well and knew that we were able to track them (and that we had paid them everything we had promised them in the past). We also directly asked them, at the end of the behavioral protocol, whether they believed that we would return to find and pay them, if necessary. In addition we asked whether they expected the program to deliver any future benefits, in case such an expectation might also have influenced their stated choices.

us to glean as much information as possible about their preferences with as few questions as possible, and we pretested the numbers in order to maximize the variance in responses.

The enumerators then told respondents that they were done with the “real money” games but that they would be asked a series of hypothetical inter-temporal choices for larger amounts of money (on the order of US\$10-30, about a week’s wages). This was organized as two lists of 11 binary decisions, with a fixed amount right now versus a varying amount in two weeks (or two weeks versus four weeks for the second list). The delayed amount started as strictly less than the sooner amount, then equal to, and then larger and larger until it was four times as big.<sup>39</sup>

**Risk preferences.** The final activity was similar except that it examined risk preferences: subjects were shown a flashcard with an example of a binary lottery, along with an explanation of how it worked. We used the Liberian term “lucky ticket” to refer to this process. Then they were reminded that real money was (probabilistically speaking) at stake, and they were asked to choose between two binary lotteries, one with higher variance and higher expected value than the other. Depending on their choice, they were asked to make a second choice (again in a bifurcating design). Next, in order to assess loss aversion, everyone was asked to choose between doing nothing and playing a lottery in which they could either lose a small amount or gain a larger amount.

## E Survey data validation details

### E.1 Variables

We selected six survey variables for validation, all with recall periods of two weeks. We attempted to choose a set of outcomes important to the analysis with varying degrees of salience (i.e. memorability) and potential social stigma and experimenter bias. The variables were:

1. *Stealing.* The corresponding survey questions asked, in the last two weeks, if the respondent stole someone’s belongings when they were not paying attention (“corrected someone’s mistake” in the Liberian English vernacular), shoplifted an item (“took something from behind someone that’s not for you”), or deceived or conned

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<sup>39</sup>In part this final activity was a way to quickly collect more data about a key outcome variable, and in particular to do so with substantial (hypothetical) magnitudes at stake. However in part it was a robustness check, since it is notoriously difficult to interpret the results of real-money inter-temporal choices, given that there is almost always some element of trust and risk involved as well.

someone of money (“cheated or scraped from people”).<sup>40</sup> Based on our fieldwork, we hypothesized that stealing would be the most salient and least socially desirable of all six measures.

2. *Gambling.* The corresponding survey question was, “In the last two weeks, how many days did you gamble, including betting like football games and other things?” Beforehand, we hypothesized gambling had a lower level of salience and sensitivity than stealing, but was still stigmatized somewhat.
3. *Marijuana use.* The corresponding survey questions were, “In the last 7 days how many times did you smoke opium?” and, “What about the 7 days before that?” Opium is the vernacular for marijuana in Liberia, and does not imply an actual opiate. Marijuana use is not socially acceptable across Liberian society overall, but is fairly prevalent in our target demographic. We initially hypothesized underreporting could arise not so much from social stigma but from the discouragement of drug use in the therapy treatment.
4. *Homelessness.* The corresponding survey question was, “In the last 2 weeks, have you ever had to sleep outside, or on the street, or in a market stall because you had no other place to sleep or stay?” This is a salient variable where we hypothesized respondents might have under-reported from embarrassment or over-reported in order to appear more needy (and eligible for more programs).
5. *Phone charging.* The corresponding survey question was, in the context of an expenditure portion of the survey, “In the last 2 weeks, how many times did you charge phones?” In the vernacular, this corresponds to taking one’s phone to a kiosk with electricity where one pays a small fee to recharge the battery. This is a common and routine expense for many Liberians, without stigma but possibly not very memorable. 38% of our sample had a mobile phone at the endline, and 38% reported charging a phone in the last two weeks.
6. *Video Club Attendance.* The corresponding survey question was, “In the last 2 weeks, how many times did you go to the video club?” These clubs are private businesses where one can go to watch a movie, television show, or football match for a small fee. This is a popular and socially acceptable pastime, as most Liberians do not

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<sup>40</sup>The survey also measured more serious forms of theft, such as armed robbery, but our qualitative validation focussed on non-violent theft.



have electricity or home entertainment. Salience was unclear but likely greater than phone charging.

The program also intended to change political behavior, particularly participation in election violence, association with ex-military commanders, and participation in riots. These would normally be candidates for qualitative validation. In this particular instance, there were few opportunities for political violence during our study period, especially as the election turned out to be a peaceful affair. Also, our three-phase design meant that opportunities for political violence would have varied by phase. As such, political violence was not an ideal candidate for field testing the method in this instance.

## **E.2 Validator staff**

Eight different people did the validation over the two years of data collection. Typically two were active during each validation round. All but one were men, and all had a high school or some post-secondary education. Two of the men completed roughly half the validations with the remainder doing roughly 10 to 20% each.

We selected validators from the study's best survey enumerators. We had hired and trained half of these to do more standard qualitative data collection also, and this prior qualitative research experience generally improved the quality of their work. To find these validators, we trained roughly two to three times the number of people needed from the pool of research staff, selecting only those with the most natural questioning and rapport-building skills for the validation exercise. Each received at least 10 days of training on the validation methods involving both classroom learning and extensive field training. Like any qualitative study, we believe staff recruitment and training to have been among the most important tasks and also the largest start-up cost of this method.

## **E.3 Approach**

For each respondent, validators tried to determine whether the respondent had engaged in any of the measured behaviors, even once, in the two weeks preceding the respondent's survey date. We found it optimal for validators to visit each respondent four times, on four separate days, with each visit, or "hangout session" lasting approximately three hours. The validator aimed to begin hanging out the day after subjects completed their quantitative surveys and to conduct all four visits in the days following the respondent's endline survey date.

On the first visit validators would obtain verbal consent for hanging out and learning more about participants' lives. We designed the consent script to be informal, and explained that the goal of hanging out with the respondent was to talk about some of the same things they discussed in the survey, but also to get qualitative information about people's lives. In addition to this verbal consent, the more formal consent form delivered with the survey said that qualitative staff may come and visit them again to gather more information.

Validators deliberately avoided the feeling of a formal interview. Validators would typically shadow the respondents as they were going about their business, rather than sit down for a formal interview. Validators sometimes made notes during longer interviews, but only in isolated areas out of sight from the respondent, such as a toilet stall or teashop. If validators were unable to find a secluded area in which to take notes, they sometimes recorded information in their cell phones, pretending to send a text message.

The main approach was to engage in casual conversation on a wide range of topics, including the six target topics/measures. The target topics were raised mainly through indirect questions while informally chatting and conversing. For example, validators typically started conversations with discussions of family. This was both customary among peers in Liberia and a sign of interest in their lives and respect. It was also a stepping stone for discussing the target behaviors—either because the validator can discuss an issue in their family (someone engaging in one of the activities) or how the respondent's family feels about their current lifestyle and circumstances.

In general, validators found it helpful to tell respondents stories or scenarios about another person, or themselves, related to the target measures, then steer the conversation to get information about how respondents have behaved in similar situations, eventually discussing the past two weeks. Validators were careful to present these behaviors and incidents in a non-stigmatized light, for instance by discussing a friend who stole in order to get enough to eat, or how they themselves had periods of homelessness or used drugs and alcohol. Validators found these personal stories (all of which were truthful) and genuineness were essential to building rapport and trust.

Validators might hold these conversations once or twice over the three hours, spending perhaps twenty or thirty minutes in conversation each time, to avoid unnaturally long or awkward conversations. The validator spent the remainder of the three hours in the general vicinity, observing respondents engaging in their daily activities. This could involve taking a rest in the shade or in a tea shop (as is common) or engaging others in conversation. Validators would also try to talk casually with the respondent's friends, relatives,

or neighbors to learn about him (although we considered information from these second-hand sources as insufficient to support a conclusion about the respondents' behaviors, but merely as supporting information).

We found that building a rapport with participants in a short space of time was crucial to success. To develop trusting and open relationships, validators developed techniques, including becoming close to respected local community and street leaders, eating meals with participants, sharing personal information about themselves, befriending respondents' acquaintances, assisting subjects with their daily activities, and mirroring participants' appearances and vernacular, as appropriate. In addition, validators tried to maintain neutrality and openness while discussing potentially sensitive topics. For instance, conveying—through stories or otherwise—that illicit behaviors were not perceived negatively, allowed respondents to feel comfortable sharing their involvement in such activities. Validators did not lie to or deceive respondents, however.

#### **E.4 Coding validated data**

Validators were unaware of the respondents' survey responses, and formed their own opinions based on the information they collected about whether the respondent engaged in the six activities during the time period captured by the quantitative survey.

A core part of the validator training included logical reasoning, supporting their reasoning with evidence, and writing this down in a clear and structured manner. After each visit, validators made written notes about the relevant data collected, including evidence to support their conclusions, on a standardized form. At the conclusion of the four visits, the validator coded six indicators, one for each behavior, where “1” meant that he had relatively direct evidence that the respondent engaged in the behavior during the recall period, and “0” otherwise. This was a subjective judgment, but all submissions and coding decisions were reviewed with the authors case-by-case.

Over the course of the exercise, different measures offered different experiences and lessons. Because of its relative frequency and visibility, we suspect marijuana use was the easiest to directly observe. But validators found other behaviors straightforward to discuss in conversation. In the survey and (especially) the validation, phone battery charging led to the most confusion—in particular, did simply charging one's phone count, or did only paying to charge one's phone count? Paid charging was the focus of the survey question (it appeared in an expenditure survey module), but we were concerned that the validators would use a more expansive definition. We attempted to mitigate such differences through trainings and regular discussions on the coding.

Homelessness also proved somewhat challenging to measure and validate, as we discovered its definition is subjective. Circumstances arose that were somewhat ambiguous, such as having no home of one’s own but regularly sleeping on a friend’s floor or in an acquaintance’s market stall. To account for the potential variability in perceptions of homelessness, validators were instructed to include as much information as possible about respondents’ living situations in their summary reports. The authors then worked with validators to code a somewhat broad definition of homelessness that included any ambiguous circumstances. Prior to analysis, it was not clear whether survey respondents applied the same definition, and hence we err on the side of finding underreporting in the survey.

## E.5 Validation sampling and non-response

In each endline survey round we randomly selected study respondents to be validated, stratified by treatment group.<sup>41</sup> In general, the validation sample was a balanced subsample of the full sample.

Table A.5 describes the samples selected for validation in each survey round over the course of the study. In total, we randomly selected 297 people for validation, and found 240 (81%).<sup>42</sup> We could not find 15 for even the endline survey. We could not validate a further 42 because they were difficult to find even immediately after the survey or (more commonly) because they lived a long distance away. In general, we surveyed respondents who had moved far out of Monrovia, but we were unlikely to validate them because of the time and expense and opportunity cost.

This attrition is an identification concern, but there is little evidence of biased attrition. Just as overall endline survey attrition was low and relatively uncorrelated with baseline characteristics, the excess validation attrition (those who were surveyed but not validated) was not robustly associated with baseline characteristics.

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<sup>41</sup>We blocked respondents by survey window, and within each block we randomly selected validation subjects using a computer-generated uniform random variable. The selection was performed without replacement in a given pair of survey rounds (e.g. the short-term endline surveys in a given phase), but sampling was performed with replacement across survey rounds. Twenty subjects were validated in more than one round.

<sup>42</sup>We decided to select 297 based on a combination of logistical capacity and budget, alongside power calculations based on the earliest rounds of data collected.

Table A.5: Validation sample, totals and attrition

Surveys		Validation			Reason for no validation data				
Phase	Round	Target #	Selected	Validated	Unfound at endline	Unfound for validation	% validated (all)	% validated (treatment)	% validated (control)
1	3-week	100	0						
	5-month	100	24	18	0	6	75%	75%	75%
	7-month	100	24	12	0	12	50%	50%	50%
	12-month	100	10	6	3	1	60%	63%	50%
	13-month	100	10	8	2	0	80%	86%	67%
2	3-week	398	26	24	0	2	92%	94%	89%
	5-week	398	27	17	0	10	63%	68%	40%
	12-month	398	28	25	2	1	89%	86%	100%
	13-month	398	44	38	1	5	86%	85%	91%
3	3-week	501	0						
	5-week	501	0						
	12-month	501	35	31	2	2	89%	89%	88%
	13-month	501	69	61	5	3	88%	88%	88%
All		4096	297	240	15	42	81%	81%	80%

*Notes:* The proportion selected in each round was principally a function of logistical feasibility (e.g. number of available staff), and in some none were selected. As procedures became more familiar and staff more experienced, more could be done over time. The percentage validated in the treatment group includes any treatment (cash, CBT, or both).

## E.6 Limitations of the approach

While our qualitative assessment is that this validation exercise gave enough time to gather detailed, accurate information and fostered trust and frankness, there are nonetheless limitations to this approach.

1. The interviews may be intrusive and might disrupt respondents' daily activities, thereby altering the findings. To mitigate this risk, validators wore clothes that would blend in with their respondent's environment, and typically accompanied and assisted respondents in their activities as appropriate (e.g. helping a scrap metal collector scavenge).
2. The survey and validation questions might have been interpreted differently, making it difficult to compare results. As discussed above, phone charging and homelessness proved somewhat difficult to measure consistently. We used close consultations and reviews of the data, and focus groups with survey and validation staff, to maximize consistency.
3. The validation period came after the survey recall period and validators or respondents could have made errors about the relevant window of time (e.g. homelessness could have been observed the week after the survey, and inferred to the time of the survey incorrectly). This is most likely a source of random measurement error.
4. In principle the participant observation method, by building a rapport, could lead to a different source of measurement error by (for example) increasing social desirability bias. Our strong sense is that the opposite is true, that trust and rapport reduced the bias, but this is a subjective interpretation and not independently verifiable.
5. The validator staff could easily learn the subject's treatment status, simply through conversation, and in principle this could bias the validation data because of expectations.
6. The method is reliant on skills, persistence, luck, and best judgment of the validators and authors.
7. Like any qualitative work, this is not an off-the-shelf tool. To select and refine the variables, recruit and train validators, and monitor quality of the data requires the researcher to have some familiarity with the context and population and at least basic experience in qualitative data collection.

## F Additional treatment effects analysis

F.1 The interaction of cash and therapy treatments

F.2 Robustness of treatment effects

Table D.1: Program impacts on personality traits, non-cognitive skills, and time and risk preferences

Outcome, z-score	Round	Control mean	Assigned to therapy (any)			Assigned to cash (any)			Both	
			ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
Index of traits associated with self control	2 & 5 wk.	-0.046	0.087	[.093]	-0.154	[.099]	0.103	[.136]		
	12 & 13 mo.	-0.076	0.153	[.082]*	-0.025	[.086]	0.109	[.114]		
Impulsiveness (9)	2 & 5 wk.	-0.042	-0.011	[.096]	0.185	[.102]*	-0.067	[.141]		
	12 & 13 mo.	0.115	-0.175	[.087]**	0.007	[.089]	-0.040	[.118]		
Conscientiousness (8)	2 & 5 wk.	-0.112	0.108	[.096]	0.046	[.097]	0.008	[.138]		
	12 & 13 mo.	0.042	-0.068	[.092]	-0.032	[.094]	0.143	[.123]		
Perseverance (7)	2 & 5 wk.	0.016	0.028	[.093]	-0.133	[.100]	0.149	[.141]		
	12 & 13 mo.	-0.077	0.114	[.090]	0.056	[.090]	-0.067	[.124]		
Reward responsiveness (8)	2 & 5 wk.	0.058	-0.073	[.101]	0.109	[.102]	-0.023	[.139]		
	12 & 13 mo.	0.038	-0.160	[.091]*	0.079	[.089]	-0.154	[.119]		
Neuroticism (8)	2 & 5 wk.	0.080	0.012	[.094]	0.022	[.097]	-0.114	[.136]		
	12 & 13 mo.	-0.051	0.044	[.087]	0.037	[.091]	-0.227	[.121]*		
Locus of control (8)	2 & 5 wk.	0.025	0.000	[.095]	0.059	[.100]	-0.153	[.142]		
	12 & 13 mo.	-0.019	-0.031	[.088]	-0.106	[.086]	0.115	[.122]		
Self esteem (8)	2 & 5 wk.	-0.054	0.110	[.090]	-0.012	[.091]	0.090	[.125]		
	12 & 13 mo.	-0.113	0.078	[.090]	0.058	[.092]	0.052	[.121]		
Patience in game play	2 & 5 wk.	-0.194	0.174	[.075]**	0.151	[.075]**	-0.082	[.103]		
	12 & 13 mo.	-0.073	0.026	[.081]	0.134	[.077]*	-0.063	[.104]		
Time inconsistency in game play	2 & 5 wk.	0.085	-0.042	[.079]	-0.118	[.082]	0.078	[.108]		
	12 & 13 mo.	-0.018	-0.034	[.068]	-0.016	[.071]	-0.001	[.096]		
Risk aversion in game play	2 & 5 wk.	0.147	-0.137	[.080]*	-0.110	[.084]	0.106	[.122]		
	12 & 13 mo.	-0.033	-0.061	[.073]	-0.139	[.074]*	0.141	[.101]		

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table D.2: Program impacts on anti-social behaviors

		Basic ITT regression							
		Assigned to therapy (any)		Assigned to cash (any)		Both			
Outcome (No. of questions in indexes in brackets)	Round	Control mean	ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Index of all antisocial behaviors	2 & 5 wk.	0.171	-0.197	[.074]***	-0.089	[.073]	0.030	[.096]	
	12 & 13 mo.	0.034	-0.091	[.081]	0.090	[.082]	-0.221	[.105]**	
Aggressive and hostile behaviors (19), z-score	2 & 5 wk.	0.091	-0.173	[.069]**	0.009	[.071]	-0.041	[.095]	
	12 & 13 mo.	0.188	-0.154	[.102]	-0.045	[.099]	-0.140	[.130]	
Disputes/fights, past 2 weeks (6), z-score	2 & 5 wk.	0.366	0.089	[.106]	0.054	[.091]	-0.234	[.128]*	
	12 & 13 mo.	0.273	-0.046	[.107]	0.084	[.104]	-0.160	[.133]	
Carries weapon	2 & 5 wk.	0.157	-0.086	[.032]***	-0.044	[.034]	0.038	[.044]	
	12 & 13 mo.	0.148	-0.058	[.029]**	0.044	[.032]	-0.051	[.042]	
Usually sells drugs	2 & 5 wk.	0.170	-0.080	[.025]***	-0.040	[.027]	0.048	[.034]	
	12 & 13 mo.	0.135	-0.037	[.027]	0.033	[.028]	-0.054	[.035]	
# of thefts/robberies, past 2 weeks	2 & 5 wk.	2.580	-0.912	[.369]**	-0.842	[.382]**	0.540	[.474]	
	12 & 13 mo.	1.876	0.000	[.362]	0.280	[.362]	-1.001	[.468]**	
Arrested in past two weeks	2 & 5 wk.	0.139	-0.007	[.025]	0.007	[.025]	-0.010	[.033]	
	12 & 13 mo.	0.115	-0.003	[.023]	0.009	[.023]	-0.036	[.031]	

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table D.4: Program impacts on Attitudes and Drug Use

Outcome (No. of questions in indexes in brackets)	Round	Control mean	Basic ITT regression				Coefficient on a cash + therapy	
			Assigned to therapy (any)		Assigned to cash (any)		ITT	Std. Err.
			ITT	Std. Err.	ITT	Std. Err.		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Index of violent/criminal attitudes, z-score	2 & 5 wk.	0.172	-0.228	[.093]**	-0.225	[.094]**	0.254	[.127]**
	12 & 13 mo.	0.045	-0.080	[.080]	0.013	[.079]	-0.109	[.099]
Attitudes toward use of violence (11), z-score	2 & 5 wk.	0.021	-0.141	[.097]	-0.201	[.098]**	0.285	[.138]**
	12 & 13 mo.	0.051	0.017	[.100]	0.080	[.101]	-0.143	[.135]
Attitudes toward criminality (12), z-score	2 & 5 wk.	0.139	-0.177	[.099]*	-0.154	[.103]	0.090	[.133]
	12 & 13 mo.	0.044	-0.063	[.094]	-0.041	[.092]	-0.138	[.117]
Attitudes on political violence (10), z-score	2 & 5 wk.	0.217	-0.250	[.110]**	-0.204	[.107]*	0.256	[.149]*
	12 & 13 mo.	-0.005	-0.104	[.083]	0.008	[.083]	-0.047	[.102]
Positive peer qualities (20), z-score	2 & 5 wk.	-0.160	0.207	[.084]**	0.014	[.088]	0.013	[.118]
	12 & 13 mo.	0.040	0.011	[.081]	-0.070	[.083]	0.076	[.114]
Usually drinks	2 & 5 wk.	0.673	-0.102	[.037]**	-0.018	[.037]	0.095	[.052]*
	12 & 13 mo.	0.763	-0.072	[.039]*	-0.052	[.039]	0.082	[.053]
Usually uses marijuana	2 & 5 wk.	0.500	-0.102	[.034]**	-0.002	[.033]	-0.029	[.049]
	12 & 13 mo.	0.495	-0.029	[.033]	0.014	[.032]	-0.032	[.045]
Usually takes hard drugs	2 & 5 wk.	0.209	-0.029	[.025]	-0.013	[.027]	0.033	[.035]
	12 & 13 mo.	0.200	-0.007	[.028]	0.075	[.030]**	-0.062	[.040]

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table D.6: Program impacts on investment, income, and employment

Basic ITT regression							
Outcome (No. of questions in indexes in brackets)	Round	Assigned to therapy (any)		Assigned to cash (any)		Both	
		ITT	Std. Err.	ITT	Std. Err.	ITT	Std. Err.
	(1)	(3)	(4)	(5)	(6)	(7)	(8)
Business investment in past 2 weeks (USD)	2 & 5 wk.	8.005	[5.468]	57.001	[7.346]***	-17.507	[10000]*
Estimated value of business assets (USD)	12 & 13 mo.	3.123	[12.468]	19.328	[14.144]	-8.919	[18.728]
Index of income measures (z-score)	2 & 5 wk.	0.161	[.087]*	0.318	[.094]***	-0.256	[.123]**
	12 & 13 mo.	0.137	[.093]	-0.054	[.090]	-0.056	[.125]
Weekly average profits (USD)	2 & 5 wk.	1.734	[1.407]	4.518	[1.420]***	-3.287	[2.008]
	12 & 13 mo.	0.495	[1.567]	1.370	[1.538]	-1.708	[2.196]
Durable assets, z-score	2 & 5 wk.	0.128	[.089]	0.151	[.089]*	-0.049	[.127]
	12 & 13 mo.	0.141	[.089]	-0.113	[.089]	0.058	[.123]
Consumption in the past 2 weeks, USD	2 & 5 wk.	12.056	[3.576]***	26.570	[3.943]***	-16.582	[5.330]***
	12 & 13 mo.	-2.290	[3.561]	-2.586	[3.390]	-0.373	[4.321]
Consumption of health and education items in the past 2 weeks, USD	2 & 5 wk.	2.085	[1.477]**	3.500	[1.651]**	-0.709	[2.369]
	12 & 13 mo.	3.104	[.805]	-1.449	[.749]*	1.683	[.963]*
Consumption of food items in the past 3 days, USD	2 & 5 wk.	1.188	[.383]***	0.963	[.403]**	-1.692	[.555]***
	12 & 13 mo.	-0.032	[.493]	-0.145	[.445]	-0.541	[.576]
Consumption of non- food items in the past 2 weeks, USD	2 & 5 wk.	12.877	[1.572]	8.996	[1.688]***	-1.490	[2.346]
	12 & 13 mo.	-0.908	[2.130]	-1.483	[2.069]	1.155	[2.585]
Savings (USD)	2 & 5 wk.	45.957	[8.252]	16.679	[9.260]*	3.219	[12.649]
	12 & 13 mo.	11.531	[10.270]	2.199	[9.538]	7.996	[13.791]
Number of days they slept on the street in the past 2 weeks	2 & 5 wk.	0.122	[.271]	-0.527	[.297]*	-0.492	[.379]
	12 & 13 mo.	0.085	[.284]	-0.095	[.281]	-0.273	[.377]
Sleeping on the streets now	2 & 5 wk.	0.006	[.027]	-0.091	[.027]***	-0.010	[.035]
	12 & 13 mo.	0.018	[.028]	0.012	[.027]	-0.049	[.036]
Hours of work per week in past month	2 & 5 wk.	0.437	[2.666]	6.717	[2.684]**	-5.292	[3.748]
	12 & 13 mo.	1.351	[2.362]	0.945	[2.329]	-3.540	[3.226]
Hours of illicit work per week	2 & 5 wk.	-0.649	[.487]	-0.696	[.463]	0.178	[.604]
	12 & 13 mo.	-0.239	[.431]	0.117	[.418]	-0.335	[.537]
Hours of formal sector work/week	2 & 5 wk.	0.388	[.449]	0.203	[.425]	-0.052	[.624]
	12 & 13 mo.	-0.410	[.466]	-0.484	[.423]	0.320	[.578]
Hours of informal/casual work per week	2 & 5 wk.	0.100	[.157]	0.584	[.162]***	-0.440	[.229]*
	12 & 13 mo.	0.123	[.225]	0.070	[.236]	-0.184	[.327]
Home robbed, past month	2 & 5 wk.	-0.028	[.045]	0.002	[.045]	-0.024	[.062]
	12 & 13 mo.	-0.038	[.043]	-0.055	[.041]	0.077	[.059]
Belongings stolen, past month	2 & 5 wk.	0.016	[.037]	-0.006	[.038]	-0.051	[.052]
	12 & 13 mo.	-0.012	[.045]	-0.048	[.046]	0.099	[.062]

Notes: Robust standard errors in brackets, clustered by individual. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table D.8: Robustness of effects of cash grants

Outcome, z-score	Main Specification													
	Endline Averages, unclustered						Endline Averages, clustered						Conservative Attrition Scenario	
	Therapy Only (1)	Cash Only (2)	Therapy & Cash (3)	Therapy Only (4)	Cash Only (5)	Therapy & Cash (6)	Therapy Only (7)	Cash Only (8)	Therapy & Cash (9)	Therapy Only (10)	Cash Only (11)	Therapy & Cash (12)		
Self control	0.087 [.093]	-0.154 [.099]	0.036 [.091]	0.087 [.101]	-0.154 [.107]	0.036 [.098]	0.087 [.162]	-0.154 [.117]	0.036 [.069]	-0.119 [.093]	-0.360 [.098]***	-0.176 [.090]*		
	0.153 [.082]*	-0.025 [.086]	0.237 [.086]***	0.153 [.089]*	-0.025 [.093]	0.237 [.093]**	0.153 [.106]	-0.025 [.122]	0.237 [.145]	0.010 [.084]	-0.165 [.086]*	0.119 [.087]		
Antisocial behaviors	-0.197 [.074]***	-0.089 [.073]	-0.254 [.072]***	-0.197 [.080]**	-0.091 [.080]	-0.271 [.078]***	-0.197 [.151]	-0.091 [.087]	-0.271 [.109]*	0.002 [.076]	0.109 [.077]	-0.049 [.075]		
	-0.092 [.081]	0.090 [.082]	-0.223 [.075]***	-0.081 [.087]	0.106 [.089]	-0.223 [.081]***	-0.081 [.114]	0.106 [.025]***	-0.223 [.142]	0.031 [.079]	0.191 [.080]**	-0.115 [.074]		
Violent/criminal attitudes	-0.228 [.093]**	-0.225 [.094]**	-0.200 [.098]**	-0.228 [.101]**	-0.225 [.102]**	-0.200 [.106]*	-0.228 [.100]*	-0.225 [.064]**	-0.200 [.095]	0.002 [.091]	0.048 [.093]	0.020 [.095]		
	-0.079 [.080]	0.014 [.079]	-0.176 [.078]**	-0.073 [.085]	0.023 [.085]	-0.173 [.084]**	-0.073 [.155]	0.023 [.080]	-0.173 [.152]	0.058 [.079]	0.134 [.077]*	-0.049 [.077]		
Income	0.161 [.087]*	0.318 [.094]***	0.223 [.087]**	0.161 [.094]*	0.318 [.102]***	0.223 [.094]**	0.161 [.079]	0.318 [.136]*	0.223 [.071]**	-0.050 [.087]	0.049 [.093]	-0.005 [.085]		
	0.137 [.093]	-0.054 [.090]	0.027 [.089]	0.137 [.100]	-0.054 [.097]	0.027 [.096]	0.137 [.109]	-0.054 [.137]	0.027 [.127]	0.008 [.091]	-0.161 [.089]*	-0.082 [.088]		