Shinji Okazaki
Department of Economics, London School of Economics
Sir Arthur Lewis Building, 32 Lincoln's Inn Fields
London WC2A 3PH, United Kingdom
+44 7823 450878
s.okazaki@lse.ac.uk
www.lse.ac.uk/people/shinji-okazaki

September 15, 2026

Dear Professors Breza, Chandrasekhar, and Viviano,

I am applying to the NBER Workshop on Development Economics and Networks for Early-Career Researchers, to be held in Cambridge, Massachusetts, on December 5, 2026. I am a fourth-year MRes/PhD student in Economics at the London School of Economics.

The paper I would present is "Local Intelligence for Targeting High-Risk Populations," joint with Tomohiro Hara (Musashi University), Yuko Shem Okoth (University of Nairobi), and Shunsuke Tsuda (University of Essex). It reports a field experiment in fragile communities in Nairobi, Kenya, that randomizes referral incentives and ethical, verifiable referral conditions to study how to effectively reach individuals at high ex-ante risk of involvement in criminal and violent activities through local information and networks.

This file contains, in order, this letter, my curriculum vitae, a one-page statement of motivation and research interests, and the working paper.

Maitreesh Ghatak (London School of Economics, m.ghatak@lse.ac.uk) can provide a recommendation if I am shortlisted.

Sincerely,

Shinji Okazaki

Shinji Okazaki

Email: s.okazaki@lse.ac.uk | Website: www.lse.ac.uk/people/shinji-okazaki

Education

London School of Economics and Political Science	London, UK
PhD student in Economics	2025–present
London School of Economics and Political Science	London, UK
MRes in Economics, *with Distinction*	2025
University of Tokyo	Tokyo, Japan
MA in Economics	2022
Kyoto University	Kyoto, Japan
BA in Economics	2020
Tel Aviv University	Tel Aviv, Israel
Visiting student	2017–2018

PhD Coursework (LSE MRes/PhD Programme)

Completed	Microeconomics, Macroeconomics, Econometrics, Development Economics I and II, Economics of Industry II, Political Economy I, International Economics I, Labour Economics I

Research Fields

Primary	Development Economics
Secondary	Industrial Organization, Economic Geography, Political Economy

Works in Progress

Culture and Labor Market Integration

Social Institutions and the Effectiveness of Industrial Policy

Local Intelligence for Targeting High-Risk Populations
(with Tomohiro Hara, Yuko Shem Okoth, and Shunsuke Tsuda)

Transport Investment and Conflict: Evidence from Sub-Saharan Africa

Awards & Grants

STEG SRG (Co-PIs: Tomohiro Hara, Shunsuke Tsuda, Soyoka Okamura, and Yuko Shem Okoth)	2025–2026
Grant for Groundbreaking Young Researchers, Suntory Foundation	2025–2026
Nomura Foundation Research Grant (Co-PIs: Tomohiro Hara and Shunsuke Tsuda)	2024–2025
Toyota Foundation Research Grant (Co-PIs: Tomohiro Hara and Shunsuke Tsuda)	2023–2025
Nakajima Foundation Scholarship	2023–present
LSE Economics Departmental PhD Scholarship	2023–present
Grant-in-Aid for JSPS Fellows (DC1), Japan Society for the Promotion of Science (JSPS)	2022–2023
World-leading Innovative Graduate Study of Advanced Economics, Graduate School of Economics, University of Tokyo	2021–2022

Relevant Positions

Visiting Member, CREPE, University of Tokyo	2026–2027
Research Fellowship for Young Scientists (DC1), JSPS	2022–2023
Research Assistant, University of Tokyo, for Prof. Yoshito Takasaki	2023
Research Assistant, University of Tokyo, for Prof. Suk Joon Son	2023
Research Assistant, UTokyo Economic Consulting Inc.	2021
Research Assistant, Kyoto University, for Prof. Hisaki Kono	2019

Teaching Experience

London School of Economics, Graduate Teaching Assistant

EC2A1 – Microeconomics II (undergraduate) for Prof. Daniel Sturm and Prof. Matthew Levy 2025–2026

University of Tokyo, Teaching Assistant

Foundation of Development Economics (undergraduate) for Prof. Yasuyuki Sawada, Graduate School of Economics 2022

Development Economics: Microeconomic Approach (graduate) for Prof. Yoshito Takasaki, Graduate School of Public Policy 2021

External Presentations

2026	8th Annual JADE Conference (Kyoto University)
2025	HSI-Young JADE Joint Conference (Hitotsubashi University)
2024	CREPE Day (University of Tokyo)
2022	Japanese Economic Association 2022 Spring Meeting; SIHS Seminar Series (Sophia University)

Referee Service

Economica

Skills and Languages

Software: R, Stata, Python, Matlab, ArcGIS, LaTeX

Languages: English (fluent), Arabic (intermediate), Japanese (native)

Last updated: September 2026

Statement of Motivation and Research Interests

Shinji Okazaki, London School of Economics

My current research interests lie in social institutions and the informal connections behind them, in how they shape development, and in what they imply for the design of policy. Social networks are the structure through which these institutions operate, and I am bringing them further into my research. I hope to present work to receive valuable feedback, to expand my networks, and to contribute to the discussions at the workshop.

The paper I would present studies effective methods to reach hard-to-reach populations through local information and networks. Our context is targeting individuals at high ex-ante risk of involvement in criminal and violent activities, in fragile communities in Nairobi, Kenya. We conduct a field experiment that surveys 3,324 youths, and a detailed cost-benefit analysis, to derive implications for how to combine incentive design and local networks. The key takeaway is that the targeted population can be effectively reached by screening referrers among randomly sampled individuals based on simple risk proxies elicited in their interviews, with a non-monetary referral incentive to address strategic misreporting. Once referrers are screened, it is efficient to delegate to their networks, homophilous in risk, through multiple referrals without additional incentives.

This study tracks whom a respondent refers, whom that person refers in turn, and the characteristics of all individuals reached along the way. Referrers are asked for multiple referrals under several conditions, which captures links to different individuals in their broader networks. Although we do not observe those never named or reached, our cost-benefit analysis accounts for part of the unobserved networks by allowing for an unobserved referrer effect and its transmission to the next round of referrals. At the workshop, I would like to discuss what more these networks can tell us beyond what our analysis currently captures.

My two sole-authored projects follow my interests in a labor market and in industrial policy. In *Culture and Labor Market Integration*, I theoretically explore the implications of endogenous social institutions in an environment where workers carry records of past employers, and a firm learns to trust the records written in a region only by hiring from it, so that trust builds up along hiring ties into networks. One of my key findings is that the existence of such networks sustains a permanent hiring disadvantage for migrants that arises without any difference in ability or any belief about their origin. In *Social Institutions and the Effectiveness of Industrial Policy*, I investigate why similar industrial policies produce larger effects in some places than in others. I examine whether and how this difference across places comes from the local networks that substitute for formal contract enforcement, and whether those networks should enter the design of such policies.

Across these projects, my broader aim is to contribute to work on the interplay between social networks and formal institutions, and on how policy shifts it (e.g., Breza and Chandrasekhar, ECMA 2019; Banerjee et al., REStud 2024). I look forward to taking part in the discussions, and to carrying them into this research agenda.

Local Intelligence for Targeting High-Risk Populations*

Tomohiro Hara
Musashi University

Shinji Okazaki
London School of Economics

Yuko Shem Okoth
University of Nairobi

Shunsuke Tsuda
University of Essex

September 13, 2026
Please check HERE for the latest version.

Abstract

The intended beneficiaries of policies are often hard to reach. This paper examines effective methods to reach individuals at high ex-ante risk of being involved in criminal and violent activities through local information and networks in fragile communities in Nairobi, Kenya. We randomize targeting conditions—ethical and verifiable referral criteria designed to proxy multidimensional risk—and referral incentives to discourage strategic misreporting. We find that referral networks can systematically connect referrers to individuals at higher risk than the randomly sampled population. Simple targeting conditions predict risk across many dimensions and enable referrers to identify individuals at high risk. Moreover, referrers at higher baseline risk identify higher-risk targets. Referral incentives have limited average effects on targeting outcomes, but the average masks heterogeneity: among referrers at moderately high risk, either a monetary reward or information about positive community externalities on its own shifts referrals toward higher risk. Cost-benefit analysis shows that the target population can be effectively reached by screening referrers among randomly sampled individuals based on simple risk proxies, and by requesting referrals with the cost-free informational incentive. Once referrers are screened, it is efficient to delegate to their networks by requesting multiple referrals under the targeting conditions, without further screening or incentives. This approach achieves about 30% greater welfare through crime reduction than a random-sampling benchmark.

JEL codes: O12, D82, K42
Keywords: Policy targeting, Crimes, Radicalization, Social networks

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1 Introduction

Delivering a program begins with finding the people it is meant for. When the characteristic that defines the target population is recorded or easy to verify, a government can screen a register or use a proxy means test (Alatas et al. 2012; Hanna and Olken 2018), whereas when neighbors can observe it, the choice can be delegated to the community (Alatas et al. 2012; Basurto et al. 2020). For many programs, however, the defining characteristic is neither recorded nor observable to neighbors. Neither approach then ensures that the target population is correctly identified.

Youth violence imposes a severe burden on individuals and societies, with over 500 youths murdered every day, disproportionately in fragile, low-income countries (World Health Organization 2024; United Nations Development Programme 2023). The returns to crime-reduction programs are large among individuals at high risk (Bhatt et al. 2024; Blattman et al. 2023), but reaching these individuals is challenging. High-risk status is multidimensional, spanning involvement in crime and violence, social isolation, substance dependence, and weak attachment to the formal sector, and these characteristics are hard to observe and ethically sensitive to ask about. Conventional census-based screening is infeasible in fragile environments marked by safety concerns, limited trust between communities and external actors, and weak institutional infrastructure, while community-based targeting through group deliberation risks stigmatization. Peer referrals and community information offer a practical alternative, but existing evidence comes from settings where a single observable variable captures the targeting objective—poverty status (Alatas et al. 2012), disease infection (Goldberg et al. 2023), and high-productivity workers or entrepreneurs (Beaman and Magruder 2012; Hussam et al. 2022)—and where the objective raises fewer concerns about strategic misreporting, which can easily be checked against an observable, than in our context, where the objective is multidimensional and often hidden.

We investigate how a planner can screen and effectively reach its target population through referrals, when the policy objective is multidimensional, hard to observe, and ethically sensitive to ask about. In a field experiment in fragile communities in Nairobi, Kenya, we target youths at high *ex-ante* risk of involvement in violent crimes related to gangs or extremist organizations (hereafter "individuals at high risk").[1] The setting is well-suited for studying multidimensional targeting, because there is a clear policy objective of reducing high-risk activities, the target population is hard to reach, and the study area spans ethnic and religious heterogeneity that mirrors many fragile urban contexts. Among 3,324 youths we survey, nearly half have been held

[1] Our research objective is not to identify criminals, complementing the roles local authorities play, but rather to reach populations most likely to become involved in high-risk activities. Additionally, in relation to this objective, our referral approach must eliminate any possibility of discrimination by respondents during their interactions with potential survey participants. This consideration is especially relevant to the targeting conditions, which must be concrete and designed to avoid disclosing the intent of targeting individuals at high risk based on their social networks.

in a police cell, over a third have taken illegal drugs, and around 30% have been invited to join a gang. We partner with a local NGO that has developed initiatives to help marginalized youths disengage from high-risk activities, given the high crime rates and prevalent violent activities in its operating area. In practice, however, the NGO reaches highly motivated individuals at low risk rather than its intended targets. Such individuals are not a priority for the program, with limited marginal returns to crime reduction from skill training.[2]

Our experiment randomizes the referral design along two dimensions: (i) targeting conditions (TCs), questions designed to be ethical and verifiable in the referral process and likely to correlate with the dimensions of risk; and (ii) referral incentives, both monetary and non-monetary, for referrals that meet the condition. The two dimensions correspond to the constraints local policymakers face: practical and ethical limits on what can be asked, and potential incentive misalignment. We construct multidimensional TCs drawing on studies on radicalization toward extremism and criminal behavior (e.g., United Nations Development Programme 2023; Kruglanski et al. 2014). They are designed to identify individuals at high risk from social isolation, hostility received from outgroups, limited exposure to outgroups, experience of political harassment, and educational dropout, together with one place-based condition for high-risk gathering locations. In our survey, respondents nominate individuals or locations under randomized referral incentives, each nomination corresponding to a specific TC.[3]

While each respondent refers under multiple TCs, our primary randomization of referral incentives, designed to discourage strategic misreporting, assigns respondents to one of four incentive arms: conditional monetary compensation, information provision about positive community externalities, combined incentives, or a no-incentive control group. For each TC, we construct a verifying measure capturing how well each individual satisfies the corresponding TC. The monetary reward is conditioned on the referred individual's verifying measure, recorded after their interview rather than reported by the referrer. We extend this process to second-round referrals, in which referred individuals are asked to refer in turn, and add a condition that asks them to refer friends without specifying any TC, letting us analyze strategic nomination behavior across referral chains.

To evaluate the risk profiles of referred individuals, we construct risk factor measures drawing on the same literature, as push factors that reduce attachment to the legitimate sector (labor market conditions, family background, cognitive skills, crime exposure, past criminal activities) and pull factors that lower barriers to the illegitimate sector (implicit anti-government attitudes measured by an implicit association test (IAT), gang proximity, drug and substance

[2]Our companion paper formally evaluates the impact of this program.

[3]An alternative approach in community-based targeting is to convene a focus group that collectively decides whom to refer (e.g., Hussam et al. 2022). In our context of targeting individuals at high risk, however, such collective discussions may require disclosing private information about individuals to their neighbors, raising concerns about stigmatization. We mitigate these ethical concerns by conducting one-on-one interviews and ensuring that all collected information remains confidential and is shared only among the research team.

use, attitudes toward gangs, attitudes toward crime and violence, and weak preference for crime reduction).

Our reduced-form analyses of the experiment yield three findings.

First, referral chains systematically reach individuals with higher push and pull risk than random sampling does, demonstrating that local networks connect referrers to otherwise hidden populations at high risk. However, referrals also bring individuals with lower risk, such that the average risk of referred individuals stays close to that of referrers themselves. This variation across referral chains is partially predicted by the referrer's own risk profile—referrers at higher risk tend to name individuals at higher risk (risk-based homophily), though their networks encompass individuals across a range of risk levels.

Second, referrers can screen on the TCs. Individuals who meet the TCs tend to exhibit higher risk on both push and pull factors, most strongly under political harassment. Referrals under nearly every TC yield individuals who score higher on the corresponding verifying measure. Social isolation, limited exposure, political harassment, and educational dropout do so more reliably than receiving hostility does, consistent with the interpretation that referrers can identify readily observable characteristics but not those involving perception of the experience. However, we do not find a difference across TCs in the aggregate risk of the referred individual.

Third, we find no evidence that referral incentives, on average, correct the referrer's misalignment by bringing individuals at higher risk. Monetary rewards and information about positive community externalities show limited average effects on the risk measures of referred individuals. Offering both appears rather counterproductive by offsetting their separate effects, which is consistent with the payment crowding out the externality message. These null averages, however, mask heterogeneous effects: each incentive on its own improves targeting among referrers at moderately high risk, and the information arm continues to raise pull risk among those at the highest risk, while referrers at lower risk do not respond, consistent with a lack of network connections to individuals at higher risk.

The null averages do not mean that incentive misalignment is absent. Compared with referrals from comparable referrers not asked for friends, friend-based referrals without explicit TCs achieve higher success rates yet reach individuals with weaker implicit anti-government attitudes. Because both draw on the same referral networks, this downward shift suggests that referrers fall back on socially closer acquaintances at lower risk on these dimensions when no TC directs them.

Beyond estimating reduced-form treatment effects, we develop a cost-benefit framework to evaluate targeting approaches over a design space that includes relevant extensions of the experiment. Motivated by the convex empirical relationship between criminal offenses and our risk measures, we specify the NGO's payoff function with increasing returns from reaching individuals with higher risk, measured by an overall risk measure combining the push and pull factors, and define welfare as the sum of these payoffs over the individuals the NGO in-

terviews. Using the estimated referral process and fixing the budget, we solve for the optimal plan, a map from the NGO's observation and belief about each individual to whether to request referrals and, if so, under which TCs and incentive. We then compare a no-referral random-sampling benchmark with referral plans that differ in policy flexibility: (i) whether to select which individuals to ask based on their verifying measures recorded in their interview (referrer screening), (ii) whether to allow multiple referrals from each referrer under different TCs (multiple referrals), (iii) whether to vary the TCs and the incentive assigned across referrers (a referrer-specific design), and (iv) whether to continue chains beyond one round (second-round referral). Our evaluation framework attributes the welfare gain to each margin of flexibility and to their combinations.

Under a fixed budget and calibrated interview and recruitment costs, the optimal plan with all four flexibilities screen referrers, asking fewer than half of the sampled individuals to refer under most of the TCs. We find that this screening is effective with any single verifying measure, while the referrer's own exposure to political harassment is the most informative. The optimal plan pairs the referral request with information about community externalities—a cost-free incentive to which referrers at high risk respond by reaching individuals at higher risk. At the second round, it requests multiple referrals from most of the referred individuals under different TCs, without any incentive. These patterns imply that, once referrers are screened, it is efficient to delegate to their local networks by requesting multiple referrals under different TCs, without relying heavily on further screening or offering any incentives.

This optimal plan delivers about 30% more welfare than random sampling, reaching about 9% more individuals in total, who generate about 21% higher average social payoff. Based on the Shapley values, about 38% of this gain comes from multiple referrals, 24% from referrer screening, 16% from second-round referral, and 11% each from a referrer-specific design and the single referral from everyone. These Shapley values, however, mask complementarity and substitution among the flexibilities. With second-round referral allowed, multiple referrals and referrer screening attain about 35% and 44% of the gain alone but about 98% together, and a referrer-specific design in place of screening still attains about 91%. These results provide evidence that the target population can be effectively reached through referral despite incentive misalignment in fragile settings.

Related literature. This paper is broadly related to the literature on the use of community information to inform policy (e.g., Banerjee et al. 2024; Basurto et al. 2020; Bryan et al. 2015; Galasso and Ravallion 2005; Devereux et al. 2017). Specifically, our approach builds on the literature on community-based targeting (e.g., Agüero et al. 2020; Alatas et al. 2012; Hillebrecht et al. 2023; Premand and Schnitzer 2021) and the literature on efficient targeting approaches and screening devices (Haushofer et al. 2022; Johnson and Lipscomb 2021; Johnson et al. 2023; Follett and Henderson 2023; Yang et al. 2025), particularly those using networks (Beaman et al. 2021a; Alatas et al. 2016). This study addresses two open questions in this literature.

First, while referral can reach appropriate individuals through social networks, the evidence on why it works and how a planner should design the referral process remains scarce (Beaman and Magruder 2012; Bandiera et al. 2009; Bryan et al. 2015). Our evaluation framework extends budget-constrained treatment assignment (Bhattacharya and Dupas 2012; Kitagawa and Tetenov 2018; Athey and Wager 2021) to a process in which the treatment generates the next candidates and the information the planner reads. The experiment and the framework together quantify the marginal value of each element of the referral process. Our results suggest that referral repays its cost even in urban areas, where networks are often considered sparse (Beaman et al. 2021b), provided the process is designed around whom and what to ask.

Second, prior studies offer mixed evidence on strategic misreporting: while some downplay elite capture and suggest that community reports can be accurate (e.g., Basurto et al. 2020; Alatas et al. 2019), Hussam et al. (2022) document self-interested distortions by non-elites, emphasizing incentive compatibility in community-based targeting mechanisms. We provide direct evidence consistent with this concern, identifying friend-favoring by randomizing whether a TC directs referrers or we simply ask them for friends. A related concern is that conditioning a targeting rule on more indicators can worsen it when the agent applying it has private objectives (Niehaus et al. 2013). Our referrers are such agents, and we show that selecting them on verifiable information about themselves and imposing verifiable conditions on their referrals counters the incentive misalignment.

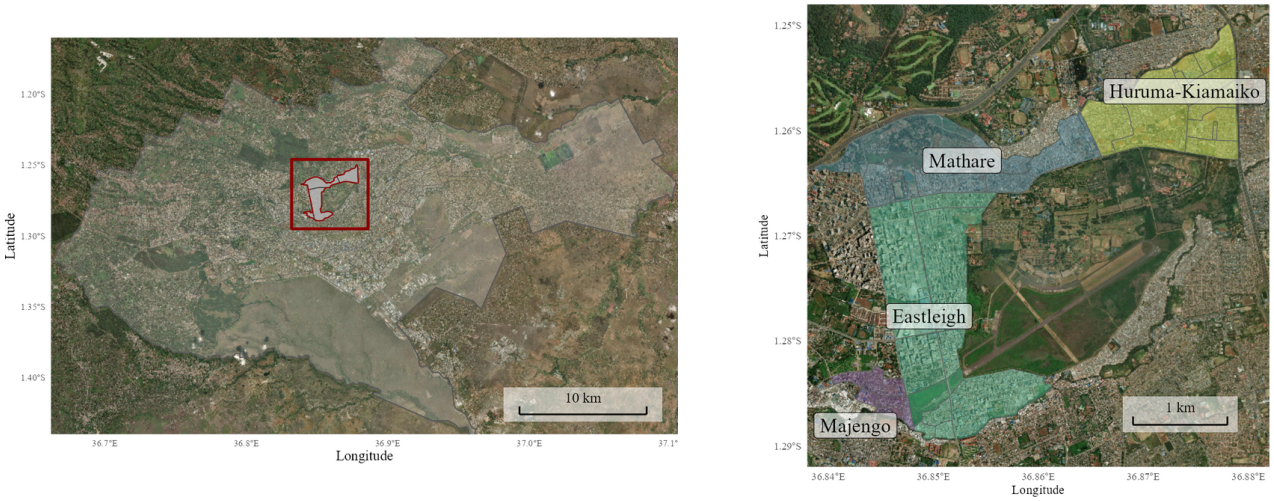
Methodologically, our approach is a variant of chain-referral sampling methods, including snowball sampling (Goodman 1961), which asks respondents to refer others through their social networks. These methods, developed for hard-to-reach populations such as groups at risk of contracting HIV, have since been refined and remain widely used in qualitative studies (Frank and Snijders 1993; Heckathorn 1997; Parker et al. 2019). We connect this literature to economics work that targets populations through referrals (e.g., Hussam et al. 2022; Beaman and Magruder 2012; Goldberg et al. 2023) and make the referral request a design variable.

This paper also adds to the literature on reducing violence and crime (Bhatt et al. 2024; Blattman and Annan 2016; Blattman et al. 2017; Melnikov et al. 2020; Blattman et al. 2024). We draw on interdisciplinary work characterizing high-risk populations (Bélanger 2021; Kruglanski et al. 2014; Higginson et al. 2018; United Nations Development Programme 2023). While theory suggests local networks shape criminal activities, empirical evidence on the information that flows through them remains scarce. We measure how each verifiable condition used in the referral process correlates with underlying risk, identifying which kinds of local knowledge signal these risk profiles and which do not.

Roadmap. The remainder of this paper proceeds as follows. Section 2 describes the setting and Section 3 the conceptual framework behind the design and the evaluation. Section 4 describes the study design. Section 5 explains the data and empirical specifications, and Section 6 reports the results. Section 7 presents the cost-benefit evaluation, and Section 8 concludes.

2 Institutional Background

Our main study area consists of geographically concentrated yet culturally segregated fragile communities in Nairobi (Figure 1), Eastleigh, Majengo, Mathare, and Huruma-Kiamaiko. This area is estimated to have 350,000 people within 6.2 km^2, including slums that lack access to basic public services such as water, electricity, roads, and waste disposal. Our study area is home to populations with diverse ethnic and religious identities. Eastleigh is predominantly Somali and serves as a business hub (Carrier and Lochery 2013), though the crime rate is high and gangs (e.g., Superpower) are known to operate there. In the adjacent community, Majengo, located south of Eastleigh, the majority of residents are non-Somali, Kenyan Muslims. Multiple media reports have linked this community to Al-Shabaab recruitment activities. In contrast, Mathare, the second-largest slum in Nairobi (after Kibera), has a majority population of Kenyan Christians without a Somali identity. Huruma and Kiamaiko are the adjacent communities east of Mathare, where the religious composition is mixed while the majority is Christian.



(a) Study area in Nairobi

(b) Map of Study Communities

Figure 1: Four Study Communities

This segregation, combined with the lack of protective infrastructure, has been linked to the incidence of crime and violence in these communities (Mutahi 2011; Winter et al. 2022). Violence takes the form of confrontation between residents and police officials and of conflict among gangs, and marginalized youths are often involved in both. Our survey confirms the prevalence of crime-related experiences, alongside low income, unemployment, and informal employment, consistent with existing surveys (e.g., wa Teresia 2022).

Given these conditions, the collaborating NGO, Accept International, runs a job training program. With nearly a decade of experience in Somalia, Kenya, and Indonesia, the NGO has established trust with local governments to de-radicalize gang members and ex-combatants

from extremist groups. It has contributed to the de-radicalization and peaceful demobilization of a Somali gang in our study area. Its job training program teaches smartphone repair and entrepreneurial skills, targeting youths at high risk in the study area with the goal of encouraging disengagement from criminal activity and integration into formal labor markets. While our companion paper evaluates the impacts of the training program, this paper focuses on how to identify the intended beneficiaries.

3 Conceptual Framework

This section considers the targeting problem through referrals, by which the NGO draws on local information that is held within a community but not by the NGO itself. We define the information the NGO seeks and the limits on eliciting it, model the referral decision, and draw the implications for the experimental design and the cost-benefit evaluation.

3.1 Setting

Consider an NGO that designs and implements a *targeting approach* to recruit individuals from its target population within a fixed budget. The social payoff $w(x)$ from reaching an individual depends on their true underlying risk, represented by a scalar targeting index $x \in \mathbb{R}$ that is not directly observable. The NGO cannot ask about x directly, because the question exposes the person it names and the answer cannot be checked. Instead, the community members it asks decide whom to name. We assume w is increasing and convex in x, since the NGO prioritizes individuals at higher risk and the harm it averts rises more than proportionally with risk (Figure 5b).[4] We define a vector of *verifying measures* $\widetilde{\boldsymbol{x}} = (\widetilde{x}_1, \ldots, \widetilde{x}_K)' \in \mathbb{R}^K$, where each component $\widetilde{x}_k$ corresponds to a targeting condition (TC) k and captures how well an individual satisfies that condition. These measures are correlated with the true targeting index x; they are observable to community members through everyday interactions and, unlike x itself, verifiable by the NGO through the target survey, so referral incentives can be conditioned on them.[5]

To reach individuals at high risk, the NGO randomly contacts N_0 individuals from its target population. These initial contacts are interviewed and serve as information sources about others in the community, and we call them *first-order respondents*. Those the NGO then asks to refer are *first-order referrers*, and enumerators recruit the individuals they name (*first-order targets*). This process may extend through multiple rounds, in which targets become referrers for subsequent rounds.

[4]This assumption may not hold if there are conflicts between targeting the most deprived individuals and maximizing overall program effectiveness (Haushofer et al. 2022).

[5]The vector of verifying measures is a tag in the sense of Akerlof (1978), an observable characteristic on which a transfer is conditioned and which correlates with the unobservable one the planner cares about, here read on the nominee while the transfer goes to the referrer.

3.2 NGO's Problem

Under a fixed budget B, the NGO chooses its targeting approach to maximize total welfare, the sum of $w(x)$ over the individuals it reaches. We say a targeting approach is more *efficient* if it attains higher welfare at the same budget.[6] It chooses two things: *breadth*, the number of initial contacts N_0, and a *targeting plan*, which specifies what to do at each initial contact and each target. At each of them the plan specifies whether to ask for a referral at all (*referrer screening*) and, if so, which incentive arm to run and which set of TCs to ask under it, the *referral design* at that individual. Because a target may in turn be asked to refer, a single initial contact generates a tree of referrals rather than one chain, and the *depth* of that tree, the number of referral rounds R, is not chosen but follows from where the plan keeps asking.

Breadth, depth, and referrer screening are three margins with different returns. Breadth spreads the budget over initial contacts whose expected risk is the population average, while depth reaches, through referral chains, individuals whom random sampling rarely draws. Engaging referrers selectively raises efficiency at the same budget whenever targeting effectiveness varies with referrer characteristics the NGO can read. The return to each margin depends on the cost of recruitment and on the information content of referral chains.

Referral design shapes the referrer's behavior. Different TCs direct referrers' attention to different characteristics of individuals or locations in their community, and different incentives affect their willingness and effort to identify individuals who meet a TC. Both channels enter the referrer's optimal choice under the chosen design, which sets whether a referral is made and whom they name. We characterize that choice next.

3.3 Referral Decision

A respondent asked to provide local information under a referral design (k, τ), with TC k and incentive τ, decides whether to name anyone and whom. Our model of that decision is similar to those of Beaman and Magruder (2012) and Bandiera et al. (2009).

Under design (k, τ), referrer i chooses an element from the set of local knowledge $J_{ki}(x_i) \cup \{\emptyset\}$, representing names of socially connected individuals or relevant local information about TC k, where the empty set represents abstaining from referral. We assume that the size of this knowledge set is increasing in referrer i's targeting index x_i, reflecting homophily in local networks.[7] For each element $j \in J_{ki}(x_i)$, referrer i knows its verifying measure $\widetilde{x}_{ki}(j)$, which captures how well the associated individual satisfies TC k.

[6] A targeting approach is a screening device in the sense of Yang et al. (2025), whose value is the alignment between whom it reaches and whom the NGO wants, net of the cost of running it, with one difference: the screening is done not by the individuals reached but by community members the NGO chooses to ask.

[7] The local knowledge $J_{ki}(x_i)$ is assumed to be conditional on the cost of social interactions, and hence this assumption does not imply that, for instance, socially isolated individuals necessarily have smaller knowledge sets. Rather, among individuals with similarly high costs of social interaction, those with higher risk profiles are assumed to possess more relevant information about others who meet specific TCs.

The referrer receives a baseline incentive, consisting of a fixed monetary payment independent of referral performance and minimal information about the intervention. Because this payment does not depend on which name the referrer provides, or on whether they provide one, it drops out of the comparison below. Under this baseline, the expected payoff from nominating j, denoted by $\overline{u}_i(j)$, consists of three components: utility from complying with the enumerator's request $b_i(\widetilde{x}_{ki}(j), x_i)$; the expected payoff $f_{ki}(j)\, p_i(\widetilde{x}_{ki}(j))$ from nominating a close friend or relative, where $p_i(\widetilde{x}_{ki}(j))$ is the subjective probability that the nominee takes part; and the cost of providing such information $c_i(\widetilde{x}_{ki}(j), x_i)$. We normalize $\overline{u}_i(\emptyset) = 0$.

A referral incentive τ augments this baseline. It consists of a payment conditional on the nominee meeting the TC, information about the positive externality the referral generates, or both. We denote by $u_i(\widetilde{x}_{ki}(j), \tau)$ the additional utility the referrer derives under incentive τ from providing information whose associated verifying measure is high, normalized so that $u_i(\widetilde{x}_{ki}(j), \tau_0) = 0$ under the no-incentive baseline τ_0. The payment is an extrinsic reward and the externality information raises the value the referrer attaches to an appropriate referral, and the return to offering both need not equal the sum of the returns to each (Bénabou and Tirole 2003, 2006). Given these payoff components, the referrer's problem under referral design (k, τ) can be expressed as:

$$\max_{j \in J_{ki}(x_i) \cup \{\emptyset\}} u_i(\widetilde{x}_{ki}(j), \tau)\, p_i(\widetilde{x}_{ki}(j)) + \underbrace{f_{ki}(j)\, p_i(\widetilde{x}_{ki}(j)) + b_i(\widetilde{x}_{ki}(j), x_i) - c_i(\widetilde{x}_{ki}(j), x_i)}_{=\overline{u}_i(j)}. \tag{1}$$

The solution set $J^*_{k\tau}(x_i)$ collects the maximizers, and a nominated element $j^* \in J^*_{k\tau}(x_i)$ yields the targeting index x_{j^*} of the nominated individual.

From the NGO's perspective, the benefits of the referral approach for targeting efficiency arise through two mechanisms. The first is the direct effect of the referral design. By raising the payoff from nominating individuals with high verifying measures, the referral design corrects the friend-favoring that the baseline would otherwise produce through $f_{ki}(j)$, with TC k determining which individuals count as appropriate. The design can do so only through the verifying measure, since the NGO cannot reward a referral for the nominee's risk itself. A payment also offsets the cost $c_i(\widetilde{x}_{ki}(j), x_i)$ of identifying and reaching a more appropriate individual.

The second mechanism is the indirect use of the referrer's local network, which the NGO does not directly observe. Referrers with higher x_i are connected through their network $J_{ki}(x_i)$ to individuals with higher x, so recruiting through such referrers shifts the recruited pool toward higher x. The NGO can capture this benefit only when the verifying measures are strong proxies for x. Through both mechanisms, recruitment is directed toward individuals with higher x, for whom the social payoff $w(x)$ from reaching them is greater. These two mechanisms organize the design implications that follow.

3.4 Design Implications

The model has three implications for the experimental design and the cost-benefit analysis.

Testing referral designs and incentive compatibility. Since referral pays only when it yields information, the experiment tests multiple TCs and incentive arms to identify which combinations produce informative referrals. Let $\bar{j}$ be the referrer's choice under the baseline and j^* their choice under incentive τ. The incentive changes whom the referrer names only when the payoff it adds for naming someone with a higher verifying measure exceeds the baseline utility given up, $u_i(\widetilde{x}_{ki}(j^*), \tau)\, p_i(\widetilde{x}_{ki}(j^*)) \geq \overline{u}_i(\bar{j}) - \overline{u}_i(j^*)$. The same comparison decides whether the referrer names anyone at all, since abstaining yields zero, and an incentive raises the share of referrers who name someone when it turns the payoff of the best name from negative to positive.

The referral model therefore implies that an incentive improves targeting under three conditions. First, the added payoff must exceed the baseline utility given up, which is more likely when the preference for friends over appropriate targets is weaker and the cost of reaching the more appropriate individual is lower. Second, the verifying measure the referrer knows must correlate positively with the targeting index x. Third, referrer i must hold information that the baseline incentive does not elicit. The added payoff need not be additive across incentives. A payment offered alongside the externality message can reduce what the message adds, and the two together then fail the condition that each satisfies alone (Bénabou and Tirole 2006).

Referrer heterogeneity and selection. When TCs capture meaningful dimensions of risk, the referral model predicts that referrers with higher values of x_i nominate targets with higher targeting indices, because the knowledge set $J_{ki}(x_i)$ is richer for such referrers. This risk-based homophily generates heterogeneity in targeting effectiveness across referrers, which lets the NGO raise efficiency by engaging referrers with higher expected value.

Multi-round referrals. The referral decision is the same problem (1) at every order, but the knowledge set $J_{ki}(x_i)$, the preference for friends $f_{ki}(j)$ and the cost c_i can differ for a referrer who was themselves referred. Our experiment implements two rounds of referrals with separate randomization of incentives for second-order referrers, to test whether TCs and incentives still screen at the second order and to estimate the referral process there, which the evaluation needs to value continuing a referral chain.

4 Study Design

4.1 Overview of Experiment

Guided by the framework, we design and conduct interviews with 995 randomly selected youths aged 18–30 in our study area from January 2025 to June 2026. Given the gendered

patterns of public-space usage in the study communities, we sampled male respondents from streets randomly and recruited female respondents from randomly chosen households, which is intended to give diverse community coverage and access to information about individuals at high risk. Interviews on sensitive topics, such as involvement in commercial sex, are conducted by an enumerator of the same gender as the respondent to facilitate candid responses.[8] For the same reason, referrers nominate individuals of their own gender, and hence a referral chain does not cross genders. We exclude individuals outside the age range, those unable to communicate in Swahili or English, previous participants, and those whose behavior posed a safety risk to enumerators (e.g., visible drug addiction, aggression, or unresponsiveness).

To operationalize the referral designs (k, τ) from our theoretical framework, we implement four referral incentive arms, one place-based targeting condition and five network-based ones, summarized in Figure 2. Each survey includes a *referral phase*, in which respondents (*referrers*) are assigned one referral incentive and multiple TCs and we recruit at most one target per referrer–TC pair, and a subsequent *contact phase*, in which enumerators accompany referrers to visit nominated locations or individuals to recruit *targets*, randomly offering referrers a reward for a target's participation. This process repeats for a second round, in which first-order targets become second-order referrers who nominate second-order targets.

Because the final number of targets depends on referrer behavior, the sample size is not fixed in advance. We address this with two procedures. First, we assign a random combination of TCs to each referrer rather than asking every referrer to respond to all TCs. Second, we implement a time cutoff: the referral module was not administered in interviews conducted after 3:30 p.m. The protocol ensures that the referral and contact process can be completed on the same day, which lets enumerators monitor and prevent strategic communication between referrers and potential targets and hence minimizes the potential for it. This was a particular concern for treatments involving monetary incentives, as detailed in Section 4.2.2. As a result of this time constraint, some respondents did not participate in the referral module. While the full sample is used for descriptive statistics, the referral analysis uses the subset of participants who completed the referral module.[9]

We recruited 995 first-order respondents from the study area, of whom 857 completed the referral module. Over the two rounds, 1,504 first-order targets and 825 second-order targets were successfully referred and interviewed. Figure 2 summarizes the overall data collection procedure.

[8] Our enumerator team was composed of approximately two-thirds male and one-third female staff, and the gender composition of our final sample reflects this ratio.

[9] Potential selection issues arising from this sampling procedure are discussed in Section 6.3 and Appendix A.3.

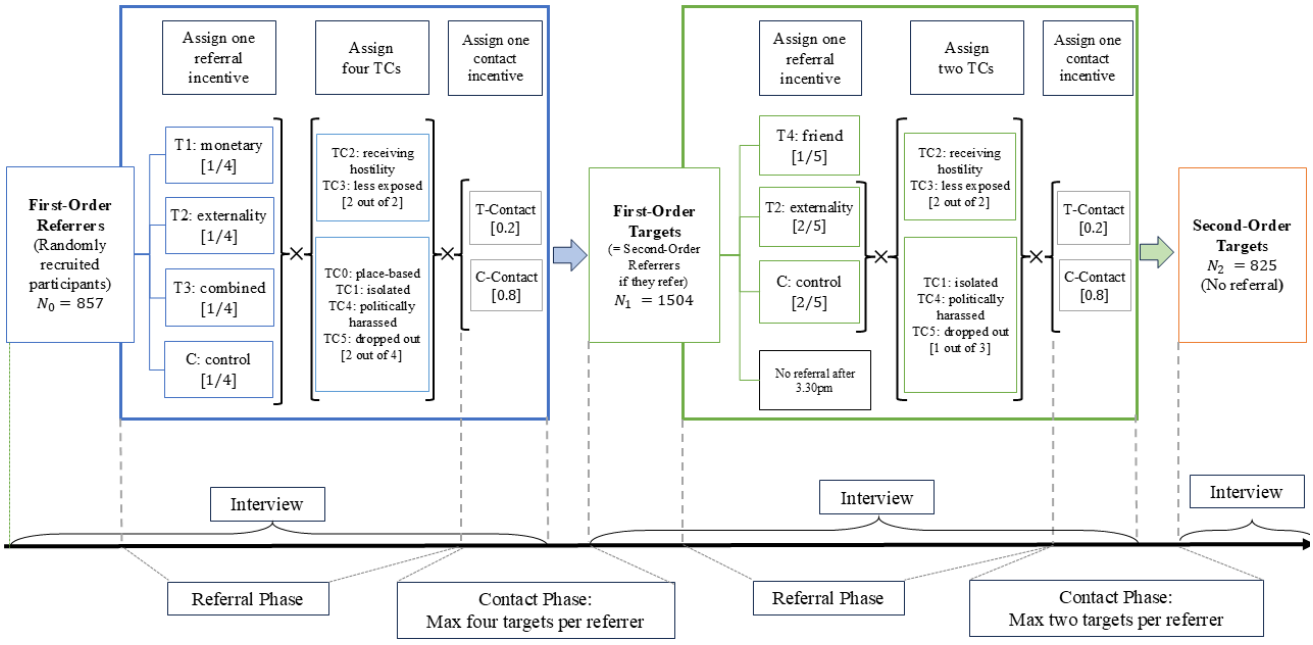


Figure 2: Treatment Structure

Note. N_ρ denotes the number of individuals recruited at each referral stage, for $\rho = 0, 1, 2$. Each referrer is assigned one referral incentive and a random subset of targeting conditions (TCs); at most one target is recruited per referrer–TC pair. The contact incentive (T-Contact) is randomized within each referrer–TC pair with probability 0.2. Randomly selected first-order targets are asked not to refer. Note that because the same individual may be referred by more than one referrer or under more than one TC, the regression tables, which count referrer–target links at a TC level, report a larger N than the individual counts shown here.

4.2 Randomization

Three components of the referral process are randomized: (i) targeting conditions (TCs), (ii) referral incentives, and (iii) contact incentives. We begin by explaining TCs, which are specifically designed for our context to overcome ethical issues, and to which the verifying measures $\tilde{x}$ of Section 3.1 correspond. For referral incentives, we vary the treatments for first- and second-order referrers to study potential heterogeneity across rounds of referral and to maintain statistical power. Finally, the contact incentive is designed to investigate how the referrer's post-nomination effort costs affect targeting outcomes. Details of the experimental implementation, including exact treatment scripts, are provided in Appendix C.

4.2.1 Targeting Conditions

The policy target, the "population at high risk," is an ambiguous concept that is also ethically sensitive to identify directly: asking respondents to refer high-risk individuals risks stigmatization. To overcome this issue, we propose various targeting conditions (TCs) likely to correlate with the dimensions of risk, drawing on insights from previous studies on radicalization (e.g., United Nations Development Programme 2023; Kruglanski et al. 2014). We ask each respondent to identify an individual or a location matching each of the TCs randomly assigned to

them. We consider two types of TCs: *place-based* and *network-based*.

The place-based TC is an indirect approach in which respondents are asked to name a location that attracts targeted individuals, from which we then sample targets. For our objectives, we propose the following condition:

- TC0 [Place-based]: Asking about seemingly high-risk clusters of young men (spots such as specific streets, buildings, intersections, not individuals), who may be vulnerable to recruitment into criminal groups through social networks.

Under the place-based TC, we consider a channel in which criminal groups recruit individuals, or individuals voluntarily join risky activities, through social networks at specific gathering spots. The protocol describes features of a "seemingly high-risk cluster," such as the gathering of unemployed men, involvement in criminal activities, shared drug use, and signs of disorder. Blattman et al. (2017) also use these features to identify individuals at high risk in Liberia; our contribution is to compare the place-based condition systematically against the network-based ones.

Under the network-based TC, by contrast, respondents name individuals they know. Our proposed network-based TCs are as follows:

- TC1 [Isolated]: Asking about individuals who are socially isolated within their community.
- TC2 [Receiving Hostility]: Asking about individuals who have experienced hostile behaviors, such as physical or psychological violence, from other religious or ethnic groups.
- TC3 [Less Exposed]: Asking about individuals who rarely visit other neighborhoods outside their community for any purpose, including consumption and work.
- TC4 [Politically Harassed]: Asking about individuals who have experienced political harassment by police or government officials.
- TC5 [Dropped Out]: Asking about individuals who have dropped out of school.

In TC1, we consider a situation in which criminal groups may recruit isolated individuals by offering them a sense of belonging. In TC2, we first measure the respondent's own experiences of being marginalized from other groups, and then ask the respondent to identify the person whom they predict would report the strongest marginalization on the same question. TC3 captures a related but distinct dimension of intergroup relations: while TC2 identifies individuals who feel attacked or marginalized, TC3 identifies those who lack exposure to others. TC4 aims to identify individuals who have had negative experiences with political events, such as losing family or friends to arrests or riots, being attacked, or experiencing abuse or harassment by police or government officers, which United Nations Development Programme (2023) identifies as one of the most important driving forces.[10] Finally, TC5 is designed to identify individuals

[10]The UNDP report "Journey to Extremism in Africa" states "Many recruits experienced a 'tipping point', most commonly a government action or the killing or arrest of a friend or family member" (p. 22), and "[t]he absence

who left formal education early, and are therefore expected to have limited human capital and a higher likelihood of engaging in high-risk activities.

The assignment protocol differs for first- and second-order referrers. For first-order referrers, all participants were asked to make referrals under TC2 (Receiving Hostility) and TC3 (Less Exposed), conditions chosen for their relevance to intergroup dynamics.[11] In addition, we randomly select two TCs from the remaining set (TC0, TC1, TC4, and TC5) for each referrer. For second-order referrers, we randomly select one TC from {TC2, TC3} and one from {TC1, TC4, TC5}; TC0 was not used in the second round.

Across all TCs, if respondents identify multiple candidates, we ask them to rank candidates by their likelihood of fulfilling the condition and then prioritize individuals according to this ranking.[12] In the place-based TC, respondents identify a location, while in the network-based TCs (TC1–TC5), they identify an individual in their own network. This distinction is important because targets recruited under the place-based TC are strangers to the referrer, so if a respondent identifies an individual instead of a location, there may be a substantive risk of retaliation against the identified person. The network-based TCs that use the referrer's existing social network are designed to carry a much lower risk of such outcomes.

4.2.2 Referral Incentives

Referral incentive for first-order referrers. In the referral phase, we randomly assign referral incentives for referring individuals at high risk, to investigate the strategic provision of information (e.g., Hussam et al. 2022). These incentives may affect the characteristics of targets and the efficiency of identifying them through the first term in the referrer's problem (1). We randomly assign the following treatments to first-order referrers:[13]

- T1 [Monetary Incentive]: Respondents receive monetary compensation if they identify individuals who match the TC.
- T2 [Externality]: Referrers are informed about the positive externalities of building a more peaceful community, thereby benefiting referrers themselves, by reducing the number of vulnerable youths through appropriate referrals: the training program improves economic opportunities for them, criminal groups face greater difficulty recruiting, and crime and violence may eventually decline.
- T3 = T1+T2 [Interaction]: Combination of T1 and T2.
- C [Control]: No monetary compensation and no information about positive externality.

of a 'tipping point' reduces the risk of recruitment significantly" (p. 18) for the population at high risk (United Nations Development Programme 2023).

[11] We put higher weights on TC2 and TC3 because one of the aims of the subsequent policy intervention is to mitigate ethnic and religious cleavages.

[12] An alternative approach is to recruit individuals based on the likelihood of a candidate satisfying all the conditions.

[13] "T" stands for "treatment" and "C" stands for "control."

T1 examines the effect of offering monetary incentives for effectively identifying the targeted population, which enters the referrer's problem through the incentive payoff $u_i(\widetilde{x}_{ki}(j), \tau)$ in (1). Respondents are informed that they will receive a reward if they identify individuals who meet the TC. After the target is identified and interviewed, we determine whether the TC was met by comparing the target's verifying measure to a benchmark. Specifically, the referrer receives the reward if the target's verifying measure exceeds the rolling average of that measure over the previous 50 survey participants from the same community. Section 4.3 describes the construction of the verifying measures.

T2 tests whether informing referrers about the program's positive externalities improves targeting and reduces strategic misreporting, without offering any additional monetary reward. Specifically, when we explain the positive externalities of the job training program—such as reducing risk among the target population, decreasing crime rates, and benefiting local residents—referrers may better grasp the program's potential benefits for themselves and engage more carefully with the targeting task.

T3 examines the interactive effect of monetary and non-monetary referral incentives. The motivation is that either the monetary incentive or the information about the positive externality alone may not elicit sufficient effort in referrals. The conditions for receiving the monetary reward under T3 are identical to those in T1.

We randomly assign the 857 youths to these four treatments with equal probability. Before the referral module begins, we show and explain detailed messages for T1, T2, and T3 to respondents. In addition, short reminder messages are read out every time before each TC referral. Across all treatments (including the control), respondents are told that the survey aims to identify young people in vulnerable situations and that some will be offered a job training program to help them find stable jobs and increase their income.

Referral incentive for second-order referrers. We then ask randomly selected first-order targets to serve as second-order referrers, randomly assigning them to one of three treatments:

- T2 [Externality]: This treatment is the same as the externality treatment defined earlier.
- T4 [Friend]: Respondents are asked to introduce a friend without any TC specified.
- C [Control]: This assignment is the same as the control group defined earlier.

T4 is designed to examine the hypothesis that individuals are more likely to refer those with similar unobservable characteristics when no TC directs them. In problem (1), this is captured through the change in $f_{ki}(j)$. This treatment arm helps us assess the trade-off between reaching more people through simpler questions and the increased variance in risk measures when relying on a limited number of referrers. We evaluate the effect of T2 across different referral stages and compare its effectiveness with T4.

We have 825 second-order targets in our final sample. Randomly selected first-order targets become second-order referrers and are assigned to T2 with a probability of 2/5, to T4 with a

probability of 1/5, and to C with a probability of 2/5.

4.2.3 Contact Incentive

As monetary incentives may affect referral outcomes not only through the nomination but also through the effort of contact (through $c_i(\cdot)$ in equation (1)), we introduce a contact incentive *after* the names are nominated. Under each TC the referrer names several candidates, rates how well each of them matches the TC, and is asked to bring the highest-rated one, so the individual to be recruited is fixed before any contact incentive is revealed. For each TC, we randomly assign whether the referrer can receive additional monetary rewards (T-Contact) or not (C-Contact) based on the participation of targets in the interview. This randomization itself is determined at the beginning of the referral process, so that whether each referrer is assigned a T-Contact for each TC is *known* to the researcher, but *unknown* to the referrer. For the referrer, the results of this randomization are revealed *after* they agree to refer someone.

This randomization helps us address concerns about the selection problem when analyzing the causal effect of the treatment (i.e., T1–T3) on characteristics of targets. Because the ratings fix which individual the referrer is asked to bring before the contact incentive is drawn, T-Contact cannot shift the composition of recruited targets, only the effort spent recruiting them. This setup satisfies the exclusion restrictions necessary for a valid instrumental variable (IV) to instrument whether the referral of targets is successful and thus observed in our dataset or not. We discuss how we use this variation to address the selection issue in the next section. Note that we provide these randomized incentives for both first- and second-order referrers.

4.3 Construction of Risk Factor and Verifying Measures

Risk factor measures. Given that an individual's underlying risk x is an unobserved and ambiguous concept, evaluating the performance of referral methods requires the construction of observable indicators that proxy it, as conceptualized in Section 3. To construct indicators, we specify relevant risk factors by building on the interdisciplinary literature on the ex-ante risk of radicalization and criminal activities (e.g., United Nations Development Programme 2023; Kruglanski et al. 2014; Higginson et al. 2018). We classify risk factors into two categories based on how they relate to the choice between legitimate and illegitimate sectors.

Push factors are variables that reduce returns to or attachment to the legitimate sector. These include (i) labor market outcomes, (ii) family background, (iii) cognitive skills, (iv) crime exposure as a victim, and (v) prior criminal activities. *Pull factors* are variables that increase returns to or lower entry barriers to the illegitimate sector. These include (vi) implicit bias toward insurgency against the government, (vii) gang proximity, (viii) usage of drugs and substances, (ix) attitudes toward gangs, (x) attitudes toward crime and violence, and (xi) weak preference for crime reduction.

For each dimension from (i) to (v) and (vii) to (x), we construct a single measure from multiple survey questions using principal component analysis (PCA), retaining the first principal component.[14] The variables used for the measurements are summarized in Panels A and B of Appendix Table A.1.

The remaining factor, (vi) implicit bias toward insurgency against the government, is constructed through the Implicit Association Test (IAT, Greenwald et al. 1998).[15] We operationalize this test in local language using Qualtrics. The details of the test are documented in Appendix D. The measure for (xi) weak preference for crime reduction is constructed from an incentivized allocation task in which respondents divide 500 KES between a wildlife conservation NGO and a de-radicalization NGO.

Each measure is standardized so that first-order respondents have mean zero and unit standard deviation. When constructing aggregate measures, we orient all component measures so that higher values indicate greater risk. Specifically, we reverse the sign of (i)–(iii), as these are originally coded such that higher values indicate better labor market outcomes, stronger family background, and higher cognitive skills, respectively. We then construct aggregate measures by averaging the standardized measures: an overall risk measure combining all dimensions, a push factor measure averaging (i)–(v), and a pull factor measure averaging (vi)–(xi).[16] These aggregate measures are also standardized at the referrer level.

Verifying measures. While policymakers may want to use these measures for referral approaches, the measures are difficult to observe and too ambiguous for local community members to consider during the referral process. The practical constraint requires us to rely on observable variables $\widetilde{x}$ that can be used ethically as targeting conditions in the referral process, which we use as verifying measures for the evaluation of referral performance.

We construct these measures in a similar manner to the risk factor measures. For each TC, we construct a single measure from multiple survey questions using PCA, retaining the first principal component.[17] Each measure is standardized at the level of first-order referrers, with higher values indicating greater likelihood of satisfying each TC. We also construct an aggregate verifying measure as the mean of the standardized verifying measures across all TCs. Note that we construct measures for all respondents, not only for referred individuals, to

[14]To mitigate concerns that the covariance structure for PCA captures spurious variation introduced by temporary aggregate shocks or logistical factors, we first partial out survey-month fixed effects, day-of-week fixed effects, whether the interview starts in the morning, and whether a follow-up survey ran the same day, then use the residualized variables recentered to their original means.

[15]The IAT is a psychological tool that measures unconscious biases by assessing how quickly individuals associate concepts with positive or negative evaluations. It is widely used to explore attitudes toward different social groups and stereotypes.

[16]We use unweighted means rather than PCA-derived weights because the individual components are not necessarily positively correlated (Appendix Table A.10).

[17]The weights used in the field to pay the monetary reward are derived from the scoring coefficients of the first principal component, calculated using data from the first 100 referrers in our dataset, including our pilot survey conducted since January 2025, and fixed for the entire sampling period.

examine the correlations with the risk factors and to check for distributional differences. The variables used for the verification of TCs are summarized in Panel C of Appendix Table A.1.

5 Data and Empirical Specifications

This section provides an overview of the data and discusses the empirical strategy at both the referrer and target levels. We first focus on analysis involving first-order referrals, and then on the differences for second-order referrals. For details on the Pre-Analysis Plan and where we go beyond it, see Appendix E.

5.1 Descriptive Statistics and Balance

Table 1 presents the summary statistics for the full sample. The demographic and socioeconomic characteristics depict a population of vulnerable youth, consistent with our target group. The average age is around 23 years, with males constituting about 60% of the sample. Education levels average around 10.5 years, but economic opportunities appear scarce, with unemployment around 33% and casual labor around 36%. The prevalence of high-risk activities and exposure to violence is high. For instance, around 28% of respondents report having been victims of beating, and nearly half have been held in a police cell. Exposure to gang activity is also widespread, with around 30% having been invited to join a gang and over 60% knowing someone who has. A detailed breakdown of these characteristics by referral stage is provided in Appendix Table A.2.

Table 2 summarizes the randomization implementation and referral outcomes of the first-order referral process. Panel A shows that nomination rates were high across all incentive arms, with a consistent number of successful referrals. Panel B details the performance of each targeting condition, showing variation in both nomination and successful referral rates. Place-based targeting (TC0) exhibits the highest nomination rate, while network-based TCs such as isolated (TC1) and hostility (TC2) show relatively lower rates. Less exposed (TC3) and dropped out (TC5) have the lowest share of targets successfully surveyed, suggesting that these populations are more difficult to recruit.[18]

To support a causal interpretation of our results, we first verify that randomization created comparable treatment groups. Balance tests are presented in Appendix Tables A.4 and A.5. Randomization inference fails to reject joint equality with the control at the 5% level for every arm. While we observe some significant differences in individual characteristics, particularly for T1 (Monetary Incentive), our preferred empirical specifications include a comprehensive set of control variables to address potential imbalances. These tests support a causal interpretation

[18] Appendix Table A.3 provides a complete breakdown of the randomization implementation across all referral stages.

Table 1: Summary Statistics

	Mean	Std. dev.	Min.	Max.
Panel A: Demographic and economic characteristics				
Age	23.43	4.194	18	38
Male	0.609	0.488	0	1
Muslim	0.380	0.486	0	1
Kikuyu ethnicity	0.288	0.453	0	1
Luo ethnicity	0.177	0.382	0	1
Living in Majengo	0.208	0.406	0	1
Living in Eastleigh	0.263	0.440	0	1
Living in Mathare	0.307	0.461	0	1
Living in Huruma-Kiamaiko	0.211	0.408	0	1
Years of education	10.53	2.897	2	16
Can write in Kiswahili	0.955	0.207	0	1
Reading English: % correct answers	67.64	21.75	0	100
Numeracy test: % correct answers	30.44	18.47	0	100
Formal employment	0.312	0.463	0	1
Casual, part-time, or temporary employment	0.356	0.479	0	1
Unemployed	0.329	0.470	0	1
Monthly income from all economic activities	4984.8	6045.5	0	20000
Panel B: High-risk activities				
Ever been a victim of beating	0.285	0.451	0	1
Ever been a victim of stealing	0.353	0.478	0	1
Ever been a victim of robbery	0.254	0.435	0	1
Ever been a victim of rape (female)	0.0434	0.204	0	1
Ever been a victim of gang-related violence	0.152	0.359	0	1
Ever been a victim of phone snatching	0.373	0.484	0	1
Ever invited to join a gang	0.294	0.456	0	1
Know anyone who joined a gang	0.614	0.487	0	1
Ever stayed in a police cell	0.492	0.500	0	1
Ever stayed in a jail/prison	0.131	0.337	0	1
Ever taken any illegal drug	0.373	0.484	0	1
Ever earned from commercial sex (female)	0.0993	0.299	0	1
Ever paid for commercial sex (male)	0.0573	0.232	0	1
Committed crime: beating	0.231	0.421	0	1
Committed crime: stealing	0.149	0.356	0	1
Committed crime: robbery	0.0756	0.264	0	1
Committed crime: rape (male)	0.00936	0.0963	0	1
Committed crime: fighting with violence	0.0420	0.201	0	1
Committed crime: gang-related	0.0150	0.122	0	1
Committed crime: broker	0.00660	0.0810	0	1
Police harassment: innocent but harassed	0.329	0.470	0	1
Police harassment: mistargeted for others	0.134	0.341	0	1
Police harassment: harassed by identity	0.197	0.398	0	1
Panel C: Referral status				
First-order referrer	0.301	0.459	0	1
First-order target	0.451	0.498	0	1
Second-order target	0.248	0.432	0	1

Notes: $N = 3333$. Illegal drugs include glue, marijuana, cocaine, and heroin. The variable 'Monthly income from all economic activities' is winsorized at the 95th percentile. The information of committed crimes comes from reasons for having stayed in a police cell, reasons for having stayed in a jail/prison, and reasons for having received police harassment (committed a small crime but treated heavily; committed a small crime but was suspected of other crimes as well). The gang-related category of committed crimes includes assisting gang members' activities.

Table 2: Summary of Randomization Implementation for First-Order Referrals

Panel A: Referral incentive:

	C: Control	T1: Monetary	T2: Externality	T3: Interaction
Nominated any name or location among 4 assigned TCs (share)	0.990	0.991	0.996	0.985
Avg. nominations per assigned TC, network-based conditions (TC1–TC5)	1.095	1.109	1.043	1.049
Number of successful referrals	1.932	2.013	1.947	2.052
Avg. location nominations per assigned TC0	1.523	1.545	1.471	1.625
Number of assigned individuals	192	229	243	194

Panel B: Targeting condition:

	TC0: Place-based	TC1: Isolated	TC2: Hostility	TC3: Less exposed	TC4: Politically harassed	TC5: Dropped out
Target nominated (share)	0.952	0.721	0.684	0.731	0.766	0.780
Share of successful referral (i.e. target surveyed)	0.952	0.493	0.437	0.404	0.443	0.411
Number of assigned individuals	415	430	858	858	431	440

Notes: The table reports summary statistics for first-order referral outcomes. Panel A presents the average outcomes by the main referral incentive treatment groups. Panel B shows the nomination and success rates for each targeting condition. See Appendix Table A.3 for a detailed breakdown of the randomization implementation across all referral stages. Nominations under the place-based condition (TC0) are locations rather than individuals and allow at most two nominations per referrer, compared to four slots under network-based conditions, so they are not pooled into the per-TC average.

of the treatment effects presented in subsequent sections.

5.2 Empirics: Referrer-Level Analysis

We evaluate the effect of the randomized incentive on referrers' referral behaviors based on the following econometric specification:

$$y_{ic}^{referrer} = \beta_1 T_i^M + \beta_2 T_i^E + \beta_3 T_i^M \times T_i^E + Z_{ic}'\Theta + FE_c + \epsilon_{ic} \tag{2}$$

where $y_{ic}^{referrer}$ is the outcome of interest for referrer i in community c, including aggregated characteristics of their targets; T_i^M and T_i^E are dummies equal to one if referrer i is assigned the monetary incentive (T1) and the externality information (T2), respectively; and ϵ_{ic} is the error term. The vector Z_{ic} contains age, gender, years of education, ethnic and religious group dummies, interviewer dummies, risk and verifying measures, and community-specific linear time trends. FE_c denotes fixed effects for residence community and survey month. Standard errors are clustered at the level of first-order referrers.

We test the hypothesis $H_0 : \beta_\tau = 0$ for $\tau \in \{1, 2, 3\}$, where $H_1 : \beta_1 = 0$ means that the monetary incentive (T1) itself has no effect on referral behaviors of first-order referrers, while $H_2 : \beta_2 = 0$ means that the information about positive externality (T2) itself has no effect. $H_3 : \beta_3 = 0$ means that combining the monetary incentive with the information (T3) adds nothing beyond their separate effects. We conduct an F-test for the hypothesis $H_0 : \beta_1 = \beta_2 = \beta_3 = 0$, which tests whether the three treatment effects are jointly zero.

5.3 Empirics: Target-Level Analysis

We evaluate the effect of the referral design on target outcomes based on the following econometric specification:

$$y_{jic}^{target} = \beta_1 T_i^M + \beta_2 T_i^E + \beta_3 T_i^M \times T_i^E + \sum_{k=0}^{4} \gamma^k TC_{ji}^k + Z_{ikc}'\Theta + FE_c + \epsilon_{jic} \tag{3}$$

where y_{jic}^{target} is the outcome of interest for first-order target j referred by referrer i in community c, and TC_{ji}^k is a dummy equal to one if target j is referred under TC k. Controls follow equation (2), with two additions: Z_{ikc} includes the referrer's verifying measure for the assigned TC k, and FE_c additionally includes within-referrer TC order fixed effects. For unsuccessful referrals, we treat each nomination as a distinct target when clustering standard errors.[19] We test the same hypotheses on β_1, β_2, and β_3 as in the referrer-level analysis, now for the first-order targets' outcomes.

Regarding TCs, we test $H_0 : \gamma^k = 0$ for each $k \in \{0, \ldots, 4\}$ separately. Our main specifications consider those referred under TC5 (dropped out) without any additional rewards (namely, C: Control) as the reference group, and thus the coefficient γ^k captures the relative difference from TC5. This reference group is considered an attribute-based method with easier verification and more straightforward policy implications in our context (e.g., educational investment or education-based targeting), compared to the rest of the network-based TCs. We also test $H_0 : \gamma^k = 0$ for $k = 1, \ldots, 5$ jointly with TC0 as the reference group, which states that no network-based TC differs from the place-based TC.

Addressing selection issues. When a referral is unsuccessful, the outcome y_{jic}^{target} is unobserved, raising concerns about selection bias. To address this issue, we employ a control-function approach that leverages the randomly assigned post-nomination contact incentive. The first stage of this approach models the probability of a successful referral with this experimental variation, which determines whether the target is observed in our data. In the second stage, we include the inverse Mills ratio from the first-stage estimation in the outcome equation to correct for selection bias.

Our identification strategy relies on an instrumental variable that influences the outcome only through the selection channel. We use the referrer's assignment to the post-nomination contact incentive, as well as its interaction with the within-referrer TC order, for this purpose. The exclusion restriction holds because the nominee is fixed before the contact incentive is revealed (Section 4.2.3). This ensures that the variation from the contact incentive affects the outcome solely through its impact on the probability of a successful referral. To show that this

[19] Setting aside the place-based TC, under which the referrer names a location rather than a person, 0.38% of successfully referred individuals were named by more than one referrer, so we do not adjust sampling weights for well-networked individuals.

instrument is relevant, Section 6.3 presents the first-stage results, examining the effect of the contact incentive on referral success.

In our empirical implementation, we apply the Heckman two-step method, following the approach used in the literature (e.g., Beaman and Magruder 2012). We first estimate a Probit model for referral success and then include the resulting inverse Mills ratio as a control in the second-stage outcome regression.

Under the place-based TC the referrer names a location rather than a person, leaving no nominated individual to contact and no success indicator for the selection equation. Enumerators accompany the referrer to the named location, and a nomination that delivered no target failed because the visit did not take place, not because the location could not be reached. We therefore treat such a nomination as successful when a previously interviewed individual is recorded within 50 metres of the named location, and take the nearest such individual as the target. Every place-based nomination with valid coordinates matched such an individual, at a median distance of 13 metres and a maximum of 48.

Inference accounts for the two-level dependence in the referrer–target link data. Links sharing a first-order referrer and links sharing a target are both correlated, and the same person can appear as a target under multiple TCs or referrers, which we treat as distinct observations. We therefore cluster standard errors two-way by referrer and target. Because each specification tests several treatment arms at once, we report Romano and Wolf (2005) step-down p-values and Anderson (2008) sharpened q-values alongside the unadjusted ones.[20] Because place-based referrals (TC0) succeed essentially mechanically after location-based imputation, selection is degenerate under that TC and the correction term is zero for those links.

5.4 Empirics: Second-Order Referrals

We extend the analysis to second-order referrals using strategies analogous to the first order. For second-order referrer j, referred by first-order referrer i, we estimate

$$y_{jic}^{referrer} = \beta_2 T_j^E + \beta_4 T_j^F + Z'_{jic}\Theta + FE_c + \epsilon_{jic}$$

where T_j^F is a dummy equal to one if referrer j is assigned the friend-based referral (T4), and the remaining variables are defined as before. For second-order target ℓ, referred by second-order

[20]For the selection-corrected specifications, we report cluster-bootstrap standard errors that resample referral trees, merging the few trees sharing a target into a single resampling unit, and re-estimate the selection equation in each replication so that first-stage estimation error is reflected in the reported uncertainty. The same bootstrap draws underlie the Romano and Wolf (2005) step-down adjustment, with test statistics studentized by the two-way clustered standard errors, and the sharpened false discovery rate q-values of Anderson (2008).

referrer j, we estimate

$$y_{\ell jic}^{target} = \beta_2 T_j^E + \beta_4 T_j^F + \sum_{k=1}^{4} \gamma^k TC_{\ell j}^k + Z'_{jic}\Theta + FE_c + \epsilon_{\ell jic} \tag{4}$$

We test $H_0\colon \beta_2 = 0$ and $H_0\colon \beta_4 = 0$ separately; reference groups, TC-level hypotheses, and the selection correction follow the first-order analysis. Because the sampling of second-order targets operates at the level of first-order referrers, standard errors are clustered two-way by first-order referrer and target, and the bootstrap resamples first-order referral trees.

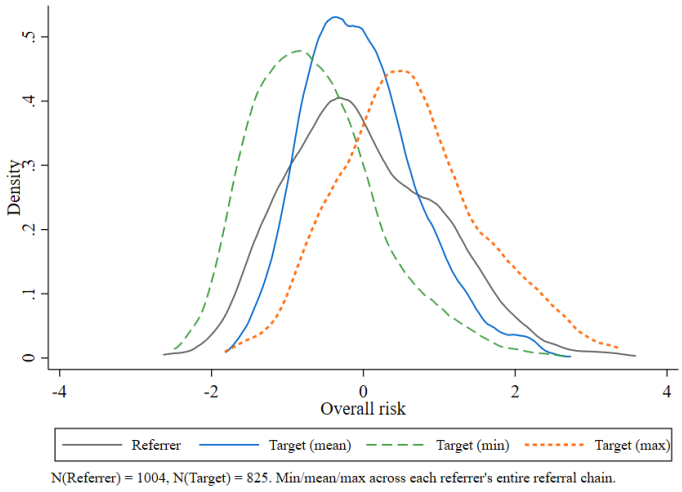
The randomization of referral incentives for second-order referrers ensures internal validity, conditional on the selection correction. Appendix Tables A.6 and A.7 confirm covariate balance across T2, T4, and control. The sample itself is selected, however: second-order referrers are successfully referred first-order targets. Appendix Tables A.8 and A.9 compare first- and second-order referrers; despite some differences in individual characteristics, the joint F-test fails to reject equality on demographic characteristics and rejects it at the 5% level on high-risk activities, and selection into becoming a second-order referrer shows in high-risk activities rather than in demographics.

6 Results

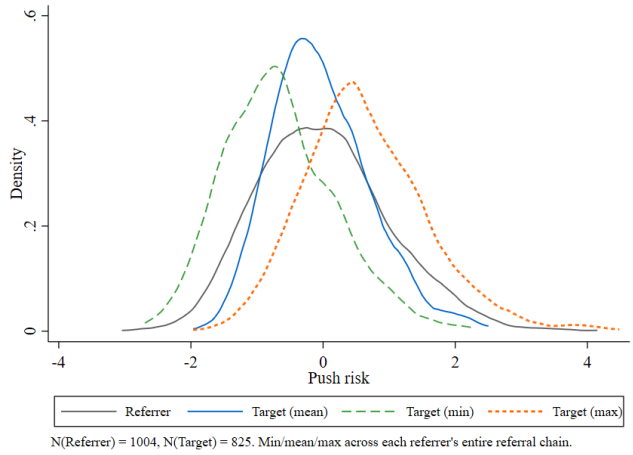
We begin by documenting that referral chains reach individuals with higher risk than those identified through random sampling. We then assess the validity of our TCs by examining their association with underlying risk characteristics and whether referrers can identify community members who meet these conditions. After characterizing how TCs and referral incentives shape the referral process, we examine the risk profiles of recruited targets and analyze heterogeneity in treatment effects across referrer characteristics. We conclude with a discussion of strategic nomination behavior and why regression coefficients alone cannot rank referral designs.

6.1 Reach of Referral-Based Targeting

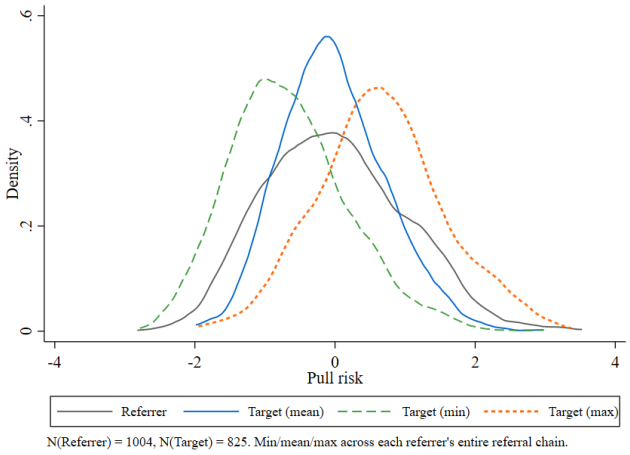
We first verify that referral-based targeting reaches individuals at high risk more often than random sampling does. Figure 3 illustrates this by comparing the distribution of risk among the randomly sampled referrers with the distribution of risk among the individuals they refer. While the average risk of referred individuals is close to that of the referrers themselves, the upper tail of each referral chain consistently reaches individuals with higher profiles for both push and pull risks. At the same time, referrals also include individuals with lower risk, reflecting within-network heterogeneity in exposure to risky environments. Local social networks thus connect referrers to individuals across a wide range of risk profiles, and their upper tail



(a) Overall risk measure



(b) Push risk measure



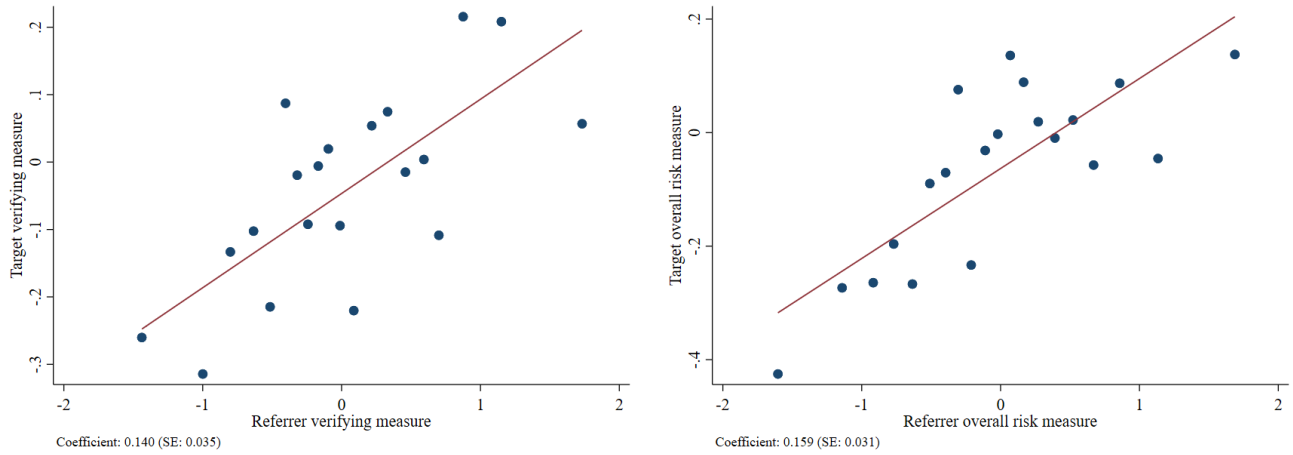
(c) Pull risk measure

Figure 3: Risk Distribution of Referrers and Referred Individuals

Note. Each panel compares the kernel density of risk among first-order referrers with that of all individuals in their referral chains, including both first- and second-order targets. Target (mean), (min), and (max) denote the mean, minimum, and maximum risk across all targets referred by each referrer. The top panel shows the overall risk measure; the bottom panels show push (left) and pull (right) risk measures. Risk measures are standardized at the referrer level.

reaches individuals at high risk more often than random sampling does.

We then examine whether referrer characteristics predict the characteristics of the individuals they refer. Figure 4 plots referrer verifying measures against target verifying measures (left panel) and referrer overall risk against target overall risk (right panel). Both panels show a positive relationship. Referrers with higher verifying measures reach targets with similar profiles (coefficient: 0.140, SE: 0.035), and referrers with higher overall risk identify targets at higher risk (coefficient: 0.159, SE: 0.031). This homophily pattern indicates that referrers are connected to individuals who share their characteristics, and that their position in the risk distribution is informative about the types of individuals they can reach. At the same time, the



(a) Verifying measure

(b) Overall risk

Figure 4: Referrer Characteristics and Target Characteristics

Note. The left panel shows a binscatter of referrer verifying measure against target verifying measure. The right panel shows a binscatter of referrer overall risk against target overall risk. Each point represents a bin mean. The solid line represents the linear best fit, with the regression coefficient and standard error reported below.

coefficients are substantially below one, implying that referrers do not simply replicate their own profiles—their networks encompass individuals across a range of risk levels.

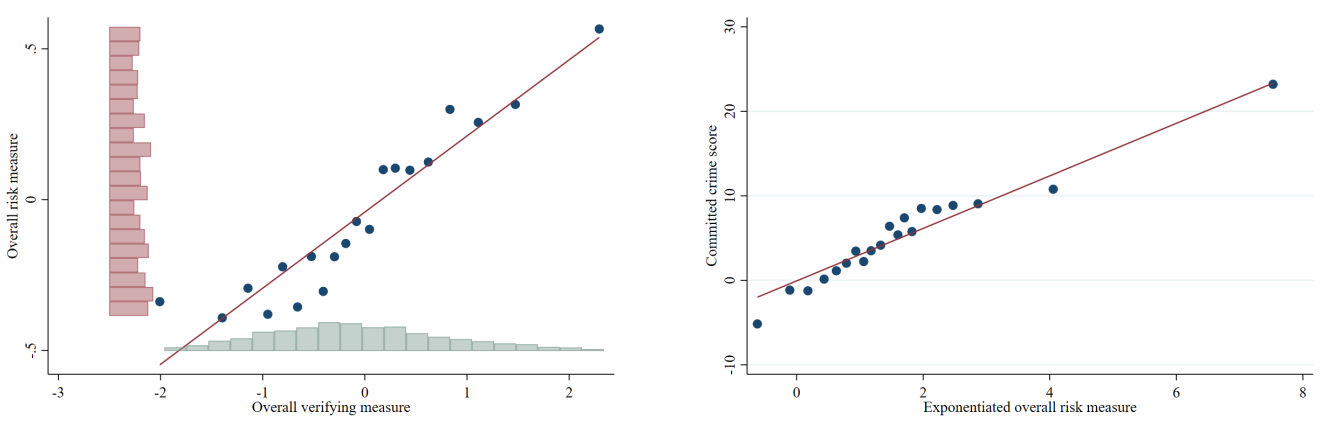
6.2 Validity of Targeting Conditions

For TCs to serve as a screening tool, individuals who satisfy these conditions must exhibit higher underlying risk. We first use the overall risk measure and aggregate verifying measure constructed in Section 4.3. The correlation between the two measures for all referrers and targets is shown in Panel (a) of Figure 5.[21] The positive correlation indicates that individuals with higher verifying measures—those more likely to satisfy the TCs—tend to exhibit higher risk across multiple dimensions.

The overall risk measure we construct captures behaviorally meaningful variation. Panel (b) of Figure 5 plots the relationship between the overall risk measure and a committed crime score, constructed by weighting self-reported criminal offenses in the past 12 months by their maximum statutory penalties under the Kenyan Penal Code. The relationship is approximately exponential, indicating that individuals in the upper tail of the risk distribution engage in substantially more severe criminal activity. Therefore, these results support the premise that our TCs, as a set, capture meaningful variation in underlying risk profiles relevant for targeting.

To examine which TCs and risk dimensions drive this aggregate correlation, we regress each risk indicator on all verifying measures simultaneously, using the sample of first-order

[21] Appendix Figure A.2 plots the same correlation separately for sampled individuals and for referred individuals.



(a) Overall risk against the verifying measure

(b) Committed crime score against overall risk

Figure 5: Verifying Measures, Overall Risk and Criminal Severity

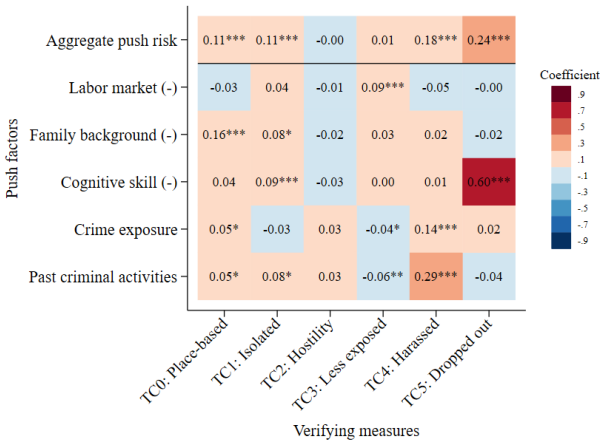
Note. Panel (a): Binscatter of the overall risk measure against the aggregate verifying measure. The aggregate verifying measure is the mean of the standardized verifying measures corresponding to the TCs, while the overall risk factor measure is the mean of the standardized risk factor scores for each topic listed in Section 4.3. Each point represents the mean risk measure for observations within one of 20 equal-sized bins based on the verifying measure. The solid line represents the linear best fit. Panel (b): Binscatter of the committed crime score (expected maximum statutory penal years based on self-reported offenses) against the exponentiated overall risk measure, controlling for demographic characteristics. Sample restricted to first-order referrers.

referrers. The coefficients represent conditional correlations, capturing the unique predictive power of each verifying measure controlling for others. The results are shown in Figure 6.

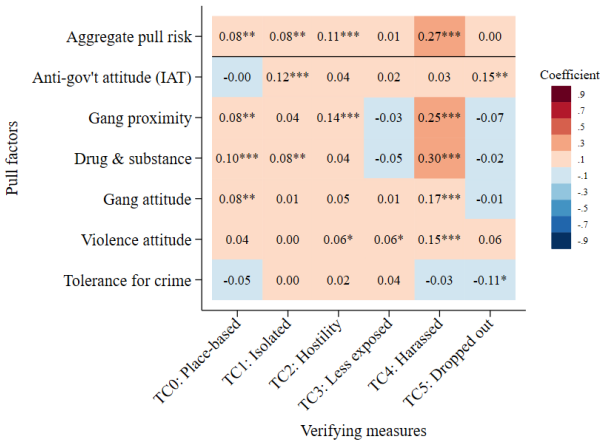
TC4 (politically harassed) serves as the strongest proxy for underlying risk, showing consistent associations with both push and pull factors including crime exposure, past criminal activities, gang proximity, drug use, and attitudes toward gangs and violence. TC5 (dropped out) shows the largest coefficient for aggregate push risk, reflecting primarily its strong association with lower cognitive skills.[22] TC0 (place-based) and TC1 (isolated) each load on a distinct subset of push and pull factors, with TC0 the broadest, TC2 (receiving hostility) loads on pull factors only, and TC3 (less exposed) is negatively associated with crime exposure and past criminal activities but positively with poor labor market outcomes and violence attitudes, so that limited outside exposure identifies a qualitatively different risk profile rather than uniformly lower risk (Appendix A.4 reads the heatmap condition by condition). These patterns suggest that relatively simple, observable conditions can predict complex and multidimensional risk characteristics.

Similar patterns are observed among referred individuals, as shown in Appendix Figure A.3. The effectiveness of each TC for targeting, however, depends on whether referrers can accurately identify individuals meeting these conditions—a question we examine next.

[22]Part of this association is definitional rather than behavioral, since the TC5 verifying measure is built from the same non-basic literacy and numeracy items, with the sign reversed, that enter the cognitive-skills component of the overall risk measure.



(a) Push factors



(b) Pull factors

Figure 6: Correlation between Targeting Conditions and Risk Factors

Note. The figures show heatmaps of regression coefficients from regressing each risk factor on the six verifying measures jointly. Each cell shows the coefficient with significance levels indicated by asterisks ($^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$). The sample is restricted to first-order referrers.

6.3 Selection into the Referred Sample

Before assessing the characteristics of recruited targets, we characterize how TCs and referral incentives shape the referral process. This analysis also tests the instrument for the selection correction used in the target-level analysis.

Table 3 presents pooled regression results for first-order referrer–target links. Columns 1–2 report the first-stage relationship between the post-nomination contact incentive and referral success. Columns 3–6 examine pre-contact outcomes to understand whether incentives and TCs influence nomination and contact behavior.

First stage for selection correction. The post-nomination contact incentive (T-Contact), together with its interaction with within-referrer TC order, provides the identifying variation for our selection correction. The Probit specification in column 2 yields a jointly significant relationship: while the level effect of T-Contact is negative, the positive interaction with TC order indicates that the contact incentive becomes progressively more effective at later TC assignments within a referrer's sequence. This pattern is consistent with referrers learning to use the contact incentive as they gain experience through repeated referral tasks, providing relevant variation for modeling the selection process. On the estimation sample used in the control-function specifications below, the excluded instruments remain jointly significant (Table 5), supporting their relevance for the selection correction applied to target-level outcomes.

TC effects on the referral process. The TC assignments generate substantial variation in referral success rates (column 1). The place-based TC0 achieves higher success relative to TC5 (dropped out), a consequence of the location-based imputation described in Section 5.3 rather

Table 3: Contact Incentives, Referral Success, and Pre-Contact Outcomes

	(1) Referral success (OLS)	(2) Referral success (Probit)	(3) Any nomination (dummy)	(4) Number of nominations	(5) Share introducible	(6) Friendship degree (contacted)
main						
Selection equation variables:						
T-Contact: Post-nomination incentive	-0.016	-0.324*	0.008	0.045	-0.014	0.158
	(0.016)	(0.176)	(0.018)	(0.038)	(0.019)	(0.287)
T-Contact × within-referrer TC order	0.024*	0.185**	-0.003	-0.045**	0.008	0.036
	(0.013)	(0.074)	(0.007)	(0.020)	(0.008)	(0.124)
Referral incentive:						
Monetary incentive	-0.015	-0.020	0.015	-0.025	0.002	0.172
	(0.018)	(0.085)	(0.009)	(0.035)	(0.013)	(0.154)
Externality information	-0.010	-0.037	0.001	-0.025	0.005	-0.006
	(0.017)	(0.082)	(0.009)	(0.037)	(0.014)	(0.153)
Monetary × Externality	0.023	0.073	-0.023*	-0.003	0.008	0.049
	(0.024)	(0.115)	(0.013)	(0.050)	(0.019)	(0.211)
Targeting conditions:						
TC0: Place-based	0.399***	0.000	-0.034***	-0.056		
	(0.023)	(.)	(0.010)	(0.042)		
TC1: Isolated	0.087***	0.355***	-0.045***	-0.236***	0.011	-0.588***
	(0.027)	(0.115)	(0.013)	(0.041)	(0.015)	(0.178)
TC2: Receiving hostility	0.052**	0.224**	-0.034**	-0.195***	0.020	-0.510***
	(0.023)	(0.102)	(0.013)	(0.037)	(0.013)	(0.149)
TC3: Less exposed	0.029	0.140	-0.035***	-0.236***	0.025*	-0.372**
	(0.023)	(0.094)	(0.012)	(0.037)	(0.013)	(0.148)
TC4: Politically harassed	0.029	0.116	-0.016	-0.045	-0.000	-0.656***
	(0.027)	(0.108)	(0.014)	(0.041)	(0.015)	(0.167)
Referrer characteristics:						
Verifying measure (referring TC)	0.001	-0.005	0.002	0.009	0.001	0.060
	(0.007)	(0.033)	(0.003)	(0.012)	(0.004)	(0.052)
Overall risk measure	-0.010	-0.048	0.006	0.018	-0.002	0.112*
	(0.007)	(0.034)	(0.004)	(0.014)	(0.005)	(0.064)
N	3434	2074	3432	3432	2198	2051
Reference group mean	0.482	0.482	0.739	1.146	0.840	6.677
Adjusted R^2 / Pseudo R^2	0.479		0.837	0.550	0.583	0.386
Joint test: contact vars (statistic)	1.73	6.99	0.11	2.78	0.45	1.77
Joint test: contact vars (p-value)	0.179	0.030	0.899	0.062	0.638	0.171
Test type	F	χ^2	F	F	F	F
Joint test: treatments (p)	0.804	0.917	0.085	0.557	0.716	0.312
Combined arm (T1 + T2 + T3)	-0.002	0.015	-0.007	-0.052	0.015	0.215
Standard error	0.018	0.088	0.008	0.037	0.014	0.156
p-value	0.892	0.863	0.402	0.155	0.290	0.167
Controls	✓	✓	✓	✓	✓	✓

Notes: Sample: first-order referrer–target links (all TCs for columns 1–4, TC1–TC5 for columns 5–6). The reference group for targeting conditions is TC5 (dropout). Columns 1–2 report the first-stage relationship between post-nomination contact incentives and referral success. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of first-order referrers. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

than of referrer behavior, which also places TC0 below TC5 on the nomination margin (column 3). More informatively, the network-based TCs separate into two groups. TC1 (isolated) and TC2 (receiving hostility) achieve moderately higher success rates, while TC3 (less exposed) and TC4 (politically harassed) are indistinguishable from TC5. Conversion differs from screening. Hostility converts second best here and is the weakest case for the corresponding verifying measure in Section 6.4, whereas political harassment converts at the baseline rate and screens among the strongest.

The pre-contact outcomes (columns 3–6) show the nomination behavior behind these success differences. All network-based TCs elicit lower friendship degrees with contacted targets compared to TC5 (column 6), indicating that these conditions prompt referrers to reach beyond their closest social ties. Appendix A.5 discusses the number of nominations and their accessibility under each TC.

Referral incentives. Referral incentives do not significantly affect referral success (column 1), but they do shape the nomination margin. The interaction of the monetary and externality incentives lowers the probability of nominating any target at the 10% level (column 3), and the joint test on treatments is marginally significant, which suggests that referral incentives matter for the nomination decision. The two incentives marginally offset each other, and referrers offered both nominate at about the control rate (combined-arm row, column 3). However, conditional on nominating, neither the share introducible nor friendship degree varies across incentive arms. These results suggest that the two incentives act as substitutes on the nomination margin—whether referrers name anyone—rather than on the composition of nominees.[23] Columns 5–6 also support the control-function approach used in the target-level analysis: the contact incentive affects whether a target is observed but not the type of individual nominated, consistent with the exclusion restriction needed for the selection correction.[24]

Implications for identification. We do not find significant effects of the referral incentives on referral success (column 1), which suggests that the incentives are unlikely to affect target quality through selection. Targets interviewed under different arms are therefore named by referrers who succeed at the same rate, which makes the arm effects at the target level into effects on whom a referrer names. TCs, in contrast, influence the contact-phase outcomes (column 1), which could affect the interpretation through selection that differs across TCs. We address this concern with the control function of Section 5.3 and with indicators for TC assignments in every specification. The instruments used in the selection correction, the first two rows, are jointly significant in column 2 and on the estimation sample of the target-level regressions. As expected from the design, the contact incentive has no effect on the type of individual nominated (columns 5–6). We therefore interpret the corrected coefficients as average causal effects

[23] We return to this substitution in Section 6.5.

[24] TC-specific regressions in Appendix Table A.14 show heterogeneous patterns, with the monetary incentive increasing referral success under TC4. Further details on nomination behavior are reported in Appendix Table A.15.

Table 4: Assigned Targeting Condition and Verifying Measure

Dep. var.: verifying measure (continuous)

	TC0: Place-based	TC1: Isolated		TC2: Receiving hostility		TC3: Less exposed		TC4: Politically harassed		TC5: Dropout	
	(1) OLS	(2) OLS	(3) CF	(4) OLS	(5) CF	(6) OLS	(7) CF	(8) OLS	(9) CF	(10) OLS	(11) CF
Assigned to corresponding TC	0.437***	0.131**	0.132**	0.093	0.133	0.146**	0.231*	0.271***	0.330***	0.266***	0.403***
	(0.079)	(0.053)	(0.062)	(0.065)	(0.084)	(0.064)	(0.123)	(0.083)	(0.101)	(0.088)	(0.124)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Non-assigned TC mean	-0.071	-0.053	-0.053	-0.024	-0.024	-0.065	-0.065	-0.112	-0.112	-0.021	-0.021
Adjusted R^2	0.239	0.125	0.125	0.086	0.086	0.119	0.119	0.139	0.139	0.049	0.049
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The table reports the effect of being assigned to the corresponding targeting condition on the target's verifying measure score. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Reference group: links assigned to other targeting conditions. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

of the referral design on target characteristics among referrers with similar probabilities of a successful referral.

6.4 Do TCs Identify Targets with Higher Verifying Measures?

The preceding analysis established that TCs correlate with risk at the individual level. We now test whether referrers can use this correlation in practice—that is, whether referrals under a given TC yield targets with higher corresponding verifying measures. Table 4 reports the effect of being assigned to each TC on the target's corresponding verifying measure, using the target-level framework with equation (3).

Referrals under nearly every TC yield targets with significantly higher corresponding verifying measures. TC0 (place-based), TC4 (politically harassed), and TC5 (dropped out) show effects significant at the 1% level, and TC1 (isolated) and TC3 (less exposed) are significant in both the OLS and control-function specifications. TC2 (receiving hostility) is the weakest case: the point estimate is positive throughout but does not reach significance in either specification. Examining second-order referrals, TCs are unlikely to identify targets with higher corresponding verifying measures on average, as neither the OLS nor the control-function estimates reach significance in Appendix Table A.12.[25]

The full set of TC and referral incentive coefficients on all verifying measures is reported in Appendix Table A.11.[26] Referral incentive effects show mixed patterns: the externality information (T2) increases TC1 verifying measures, suggesting that information about community benefits encourages referrers to identify isolated individuals, while the monetary incentive (T1) reduces TC5 verifying measures, indicating that monetary rewards may lead referrers to nominate individuals who are less likely to have dropped out. For the remaining TCs, incentive

[25]The excluded instrument is jointly insignificant in the second-order first stage, so the control-function estimates there are weakly identified. The OLS estimates do not use it and show no significant pattern either.

[26]Appendix A.8 reports the same regressions for each component of every TC's verifying measure.

treatments do not significantly affect target verifying measures.

6.5 Effects of Referral Design on Target Characteristics

TCs and referrer homophily. Table 5 reports the effects of the TC assignments on the overall, push and pull risk measures of first-order targets. Once we control for referrer characteristics, no TC assignment produces a statistically significant difference in aggregate risk relative to TC5 (dropped out), and the joint tests do not reject equivalence across TCs. Without controls, the joint test rejects equality between the place-based and network-based TCs for the overall and pull factor measures, which suggests that referrer characteristics account for the gap rather than a targeting effect of the condition itself.

Examining individual risk dimensions, as reported in Appendix Tables A.17 and A.18, leaves this conclusion intact while locating the few robust differences: TC0 (place-based), TC1 (isolated), and TC3 (less exposed) yield targets with higher cognitive skills, TC2 (receiving hostility) yields targets with greater exposure to crime, and TC0 additionally identifies targets with less implicit bias against the government in the selection-corrected estimate. These differences do not translate into a shift in the aggregate risk composition of recruited targets. Within the aggregate measures, the TC2 effect on crime exposure rests on the targets' own experience of violent crime, and TC2 targets also hold more permissive attitudes toward gang activities, carried by their comfort interacting with a friend who has joined a gang. The TC4 (politically harassed) effect on attitudes toward crime and violence, imprecise at the aggregate level, concentrates in acceptance of joining violent demonstrations and of attacking police in revenge for harassment (Appendix A.6).

The referrer's own risk profile, in contrast, consistently predicts target risk: referrers with higher overall risk measures identify targets with higher risk across all three aggregate measures, with the coefficients statistically significant at the 1% level. This homophily pattern holds in more than half of the individual risk dimensions and suggests that the referrer's position in the risk distribution is informative for targeting quality. It also persists at the second order, where the referrer's overall risk measure predicts the target's push and pull scores as strongly as at the first (Appendix Tables A.19 and A.20).

Effects of referral incentives on risk composition. Tables 6 and 7 report the effects of the referral incentives on the individual push and pull factor components.[27] Referral incentive coefficients are generally small and statistically insignificant across most risk dimensions. The monetary and externality incentives interact negatively on drug and substance involvement and, more marginally, on past criminal activity, but neither difference carries over to the arm that received both, whose effects on these dimensions are smaller and imprecisely estimated (combined-arm rows of Tables 6 and 7). The two incentives therefore act as substitutes rather

[27] Appendix Tables A.21–A.25 and A.33–A.38 report each risk component and each verifying measure separately.

Table 5: First-Order Referral and Aggregate Risk Measures

	Overall risk factor score			Push risk factor score			Pull risk factor score		
	(1) OLS	(2) OLS	(3) CF	(4) OLS	(5) OLS	(6) CF	(7) OLS	(8) OLS	(9) CF
Targeting conditions:									
TC0: Place-Based	-0.022	0.004	-0.098	-0.033	-0.020	-0.205	-0.007	0.020	0.009
	(0.092)	(0.093)	(0.164)	(0.084)	(0.084)	(0.161)	(0.096)	(0.097)	(0.171)
	[0.970]	[1.000]	[0.900]	[0.970]	[1.000]	[0.540]	[0.970]	[1.000]	[1.000]
	{0.613}	{1.000}	{0.905}	{0.589}	{1.000}	{0.601}	{0.760}	{1.000}	{1.000}
TC1: Isolated	-0.098	-0.037	-0.063	-0.151	-0.098	-0.145	-0.030	0.019	0.016
	(0.093)	(0.087)	(0.090)	(0.101)	(0.098)	(0.105)	(0.084)	(0.080)	(0.085)
	[0.465]	[0.965]	[0.890]	[0.235]	[0.635]	[0.415]	[0.970]	[1.000]	[1.000]
	{0.180}	{1.000}	{0.883}	{0.104}	{1.000}	{0.539}	{0.589}	{1.000}	{1.000}
TC2: Receiving hostility	0.040	0.056	0.039	0.017	0.013	-0.018	0.046	0.071	0.069
	(0.077)	(0.072)	(0.075)	(0.077)	(0.075)	(0.083)	(0.080)	(0.075)	(0.078)
	[0.935]	[0.860]	[0.980]	[0.970]	[1.000]	[1.000]	[0.875]	[0.805]	[0.845]
	{0.491}	{1.000}	{0.905}	{0.613}	{1.000}	{1.000}	{0.491}	{1.000}	{0.750}
TC3: Less exposed	-0.167	-0.106	-0.114	-0.128	-0.068	-0.082	-0.145	-0.103	-0.104
	(0.083)	(0.081)	(0.081)	(0.081)	(0.080)	(0.081)	(0.086)	(0.086)	(0.085)
	[0.060]	[0.410]	[0.415]	[0.235]	[0.825]	[0.730]	[0.130]	[0.515]	[0.540]
	{0.076}	{1.000}	{0.539}	{0.104}	{1.000}	{0.690}	{0.082}	{1.000}	{0.539}
TC4: Politically harassed	0.191	0.061	0.052	0.121	0.009	-0.007	0.185	0.081	0.080
	(0.100)	(0.094)	(0.095)	(0.102)	(0.097)	(0.096)	(0.092)	(0.088)	(0.090)
	[0.060]	[0.865]	[0.980]	[0.340]	[1.000]	[1.000]	[0.060]	[0.805]	[0.845]
	{0.076}	{1.000}	{0.905}	{0.143}	{1.000}	{1.000}	{0.001}	{1.000}	{0.750}
Referrer characteristics:									
Verifying measure (referring TC)		0.008	0.009		-0.012	-0.011		0.020	0.020
		(0.026)	(0.026)		(0.029)	(0.029)		(0.025)	(0.025)
		[0.770]	[0.785]		[0.770]	[0.785]		[0.490]	[0.495]
		{0.477}	{0.455}		{0.477}	{0.455}		{0.220}	{0.220}
Overall risk factor score		0.159	0.163		0.106	0.113		0.151	0.151
		(0.034)	(0.036)		(0.035)	(0.038)		(0.033)	(0.034)
		[0.000]	[0.000]		[0.000]	[0.000]		[0.000]	[0.000]
		{0.001}	{0.001}		{0.001}	{0.001}		{0.001}	{0.001}
N	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.089	-0.089	-0.089	-0.114	-0.114	-0.114	-0.044	-0.044	-0.044
Adjusted R^2	0.037	0.169	0.168	0.039	0.134	0.135	0.030	0.122	0.121
Mills: coefficient	.	.	-0.153	.	.	-0.277	.	.	-0.017
Mills: p-value	.	.	0.425	.	.	0.135	.	.	0.935
Referral incentive indicators (T1–T3)	✓	✓	✓	✓	✓	✓	✓	✓	✓
Joint test (p-value):									
All Ts = 0	0.237	0.112	0.098	0.876	0.590	0.563	0.115	0.068	0.067
TC0 = All TCs (TC1–TC5)	0.004	0.348	0.330	0.055	0.763	0.563	0.013	0.286	0.300
Controls		✓	✓		✓	✓		✓	✓

Notes: Regression results about the aggregate risk factors of the first-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). See Appendix Tables A.17 and A.18 for TC effects on dimension-specific risk factors. Columns without a check mark in the Controls row are estimated without control variables. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Standard errors in parentheses are computed by a cluster bootstrap (200 replications) that accounts for dependence at both the referrer and the target level and re-estimates the selection equation in each replication. Romano-Wolf step-down adjusted p-values in brackets; each family pools one coefficient group (referral incentives; targeting conditions; referrer characteristics) across all columns of the table. Anderson (2008) sharpened FDR q-values in braces.

than complements, and the one dimension on which the combined arm differs from control is attitudes toward gang activities, on which its targets are less permissive and so lower risk.

Combined with the similar pattern on the nomination margin (Section 6.3), this substitution is consistent with the payment crowding out the referrer's own motive to name an appropriate target, though this experiment does not identify the exact mechanism (e.g., intrinsic motivation or image concerns; Bénabou and Tirole 2006).

At the second order, in contrast, the externality arm lowers targets' push risk, crime exposure and past criminal activities (Appendix Table A.19). Second-order referrers are themselves recruited targets and differ in risk from first-order referrers, and if the arm's effect depended on the referrer's risk, that difference alone would move the effect between the orders. Among referrers above the median of their own risk, however, the information about community externality lowers, though imprecise, the target risk, in contrast to the positive effect at the first order (Appendix Figure A.5).[28] The reversal is arguably because the experience of being referred makes the costs of reaching their nominated target salient. Under the message that a referral helps reduce crime in the community, reaching a friend at higher risk works against that friend, and therefore the message adds to that cost for such friends. Consistent with this explanation, we find that the referrer tends to name someone with a less severe criminal record instead, and this is offset by the post-nomination contact incentive, at a lower success rate (Appendix Table A.30).[29]

6.6 Heterogeneity in Treatment Effects

The limited average effects of both TCs and referral incentives raise the question of whether these null results mask systematic heterogeneity across referrer characteristics. We examine treatment effect variation along referrer risk profiles, using OLS interaction analysis and causal forest methods.

Figure 7 displays treatment effects on aggregate push and pull risk outcomes, estimated separately within quartiles of the referrer's overall risk measure. The monetary incentive (T1) and externality information (T2) individually reach targets with higher push and pull risk among referrers in the third quartile, while these effects are attenuated or reversed in other quartiles. The interaction of the two incentives offsets these gains in the third quartile and is indistinguishable from zero elsewhere. These patterns suggest that referral effectiveness is constrained by different margins across the risk distribution.

Referrers at lower risk show no response to incentives, consistent with the interpretation that they lack network connections to individuals at higher risk. Referrers at moderately high risk

[28] For the verifying measure a Wald test rejects equal coefficients on the arm across the two orders (Appendix Table B.43).

[29] To further test whether being referred matters, we compare second-order referrers who were named by an acquaintance with those recruited at a location under TC0. The information treatment lowers the target's push risk and past criminal activity among second-order referrers named by an acquaintance, and among those recruited at a location the estimates are imprecise and indistinguishable from zero. That reduction is larger, though imprecise, when the first-order referrer who named them was a closer friend. The reduction does not differ by whether the second-order referrer has stayed in a police cell or by their own gang proximity (Appendix Table A.30).

Table 6: First-Order Referral and Push Factors: Referral Incentives

	Push risk factor score		Labor market (index)		Family background (index)		Cognitive skill (index)		Crime exposure (index)		Past criminal activities (index)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF
Referral incentive:												
T1: Monetary incentive	0.076	0.080	-0.132	-0.134	-0.086	-0.093	0.134	0.127	0.055	0.051	0.039	0.038
	(0.079)	(0.078)	(0.078)	(0.080)	(0.078)	(0.080)	(0.088)	(0.087)	(0.073)	(0.076)	(0.074)	(0.075)
	[0.790]	[0.815]	[0.355]	[0.330]	[0.785]	[0.680]	[0.420]	[0.485]	[0.850]	[0.880]	[0.920]	[0.925]
	{0.329}	{0.369}	{0.329}	{0.291}	{0.329}	{0.357}	{0.329}	{0.316}	{0.414}	{0.420}	{0.429}	{0.435}
T2: Externality info	0.102	0.103	-0.122	-0.123	-0.059	-0.060	0.049	0.048	0.070	0.069	0.040	0.040
	(0.084)	(0.086)	(0.086)	(0.087)	(0.080)	(0.082)	(0.087)	(0.088)	(0.069)	(0.069)	(0.076)	(0.076)
	[0.560]	[0.605]	[0.420]	[0.460]	[0.850]	[0.880]	[0.920]	[0.925]	[0.785]	[0.815]	[0.920]	[0.925]
	{0.329}	{0.357}	{0.329}	{0.316}	{0.414}	{0.420}	{0.422}	{0.435}	{0.329}	{0.369}	{0.429}	{0.435}
T1 × T2: Interaction	-0.129	-0.139	0.110	0.116	0.027	0.041	-0.126	-0.111	-0.100	-0.090	-0.192	-0.190
	(0.112)	(0.114)	(0.111)	(0.111)	(0.110)	(0.115)	(0.115)	(0.116)	(0.103)	(0.103)	(0.106)	(0.106)
	[0.655]	[0.605]	[0.790]	[0.815]	[0.920]	[0.925]	[0.785]	[0.825]	[0.785]	[0.825]	[0.155]	[0.195]
	{0.329}	{0.357}	{0.329}	{0.369}	{0.436}	{0.435}	{0.329}	{0.369}	{0.329}	{0.370}	{0.329}	{0.291}
Referrer characteristics:												
Verifying measure (referring TC)	-0.012	-0.011	0.004	0.003	0.012	0.012	0.007	0.007	-0.034	-0.034	0.030	0.030
	(0.029)	(0.029)	(0.031)	(0.031)	(0.030)	(0.031)	(0.026)	(0.027)	(0.023)	(0.023)	(0.022)	(0.022)
	[0.955]	[0.960]	[0.955]	[0.960]	[0.955]	[0.960]	[0.955]	[0.960]	[0.275]	[0.225]	[0.375]	[0.410]
	{0.320}	{0.337}	{0.416}	{0.429}	{0.320}	{0.337}	{0.379}	{0.389}	{0.064}	{0.039}	{0.081}	{0.064}
Overall risk factor score	0.106	0.113	0.044	0.040	-0.051	-0.061	-0.096	-0.106	0.072	0.065	0.076	0.074
	(0.035)	(0.038)	(0.035)	(0.038)	(0.034)	(0.035)	(0.037)	(0.039)	(0.034)	(0.034)	(0.030)	(0.029)
	[0.000]	[0.000]	[0.385]	[0.515]	[0.275]	[0.130]	[0.000]	[0.000]	[0.015]	[0.130]	[0.010]	[0.010]
	{0.001}	{0.001}	{0.104}	{0.137}	{0.060}	{0.035}	{0.001}	{0.001}	{0.035}	{0.038}	{0.001}	{0.001}
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.114	-0.114	0.080	0.080	0.118	0.118	-0.135	-0.135	-0.155	-0.155	-0.049	-0.049
Adjusted R^2	0.134	0.135	0.053	0.052	0.065	0.066	0.091	0.093	0.344	0.344	0.163	0.162
Mills: coefficient	.	-0.277	.	0.170	.	0.418	.	0.432	.	0.307	.	0.062
Mills: p-value	.	0.135	.	0.450	.	0.045	.	0.055	.	0.140	.	0.725
Joint test (p-value):												
All Ts = 0	0.590	0.563	0.260	0.259	0.522	0.538	0.420	0.477	0.717	0.753	0.057	0.064
Combined arm (T1 + T2 + T3)	0.049	0.044	-0.144	-0.141	-0.118	-0.111	0.058	0.065	0.025	0.030	-0.113	-0.112
Standard error	0.082	0.084	0.086	0.089	0.078	0.081	0.093	0.093	0.065	0.064	0.068	0.068
p-value	0.580	0.630	0.085	0.095	0.130	0.185	0.510	0.500	0.710	0.650	0.110	0.100
Targeting condition indicators	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the first-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). Coefficients for TCs are reported in Appendix Table A.17. See Appendix Table A.19 for the results of the second-round referrals. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Standard errors in parentheses are computed by a cluster bootstrap (200 replications) that accounts for dependence at both the referrer and the target level and re-estimates the selection equation in each replication. Romano-Wolf step-down adjusted p-values in brackets; each family pools one coefficient group (referral incentives; targeting conditions; referrer characteristics) across all columns of the table. Anderson (2008) sharpened FDR q-values in braces. The combined-arm rows report the total effect of assigning both referral incentives, the sum of the two main effects and their interaction, with its bootstrap standard error and an unadjusted symmetric percentile bootstrap p-value.

appear to possess such connections, and individual incentives can shift their referral behavior, though combined incentives do not yield further gains. Referrers in the top quartile reach targets at the highest risk without any incentive (control means in Figure 7), and the externality information alone raises their targets' pull risk further, though marginally significant, while push risk does not move. The heterogeneous responses are driven primarily by the drug use and past criminal activity dimensions, as shown in Appendix Figures A.6 and A.7.

TC effects by referrer risk quartile (Appendix Figure A.4) show that referrers in higher risk quartiles tend to identify targets with higher risk profiles under certain TC assignments, but these differential effects are imprecisely estimated for most treatment–TC combinations.

Table 7: First-Order Referral and Pull Factors: Referral Incentives

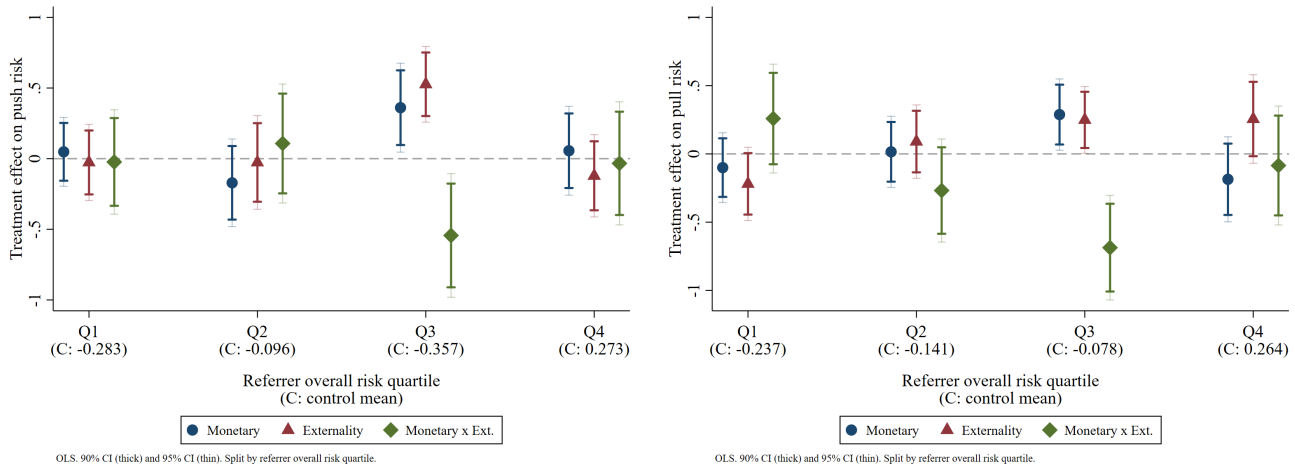
	Pull risk factor score		Implicit bias against government (index)		Gang proximity (index)		Drug & substance (index)		Attitude towards gang activities (index)		Attitude towards crime & violence (index)		Weak preference for reducing crime	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Referral incentive:														
T1: Monetary incentive	0.032	0.033	0.009	0.020	0.088	0.086	0.136	0.135	-0.044	-0.046	-0.026	-0.029	-0.058	-0.060
	(0.075)	(0.076)	(0.078)	(0.080)	(0.083)	(0.084)	(0.072)	(0.074)	(0.087)	(0.090)	(0.087)	(0.089)	(0.091)	(0.093)
	[1.000]	[1.000]	[1.000]	[1.000]	[0.835]	[0.860]	[0.245]	[0.255]	[1.000]	[0.995]	[1.000]	[1.000]	[0.980]	[0.955]
	{0.749}	{0.774}	{0.911}	{1.000}	{0.325}	{0.381}	{0.145}	{0.163}	{0.749}	{0.774}	{0.911}	{0.981}	{0.710}	{0.575}
T2: Externality info	0.092	0.092	-0.015	-0.013	-0.007	-0.007	0.040	0.040	0.007	0.007	0.106	0.106	0.166	0.166
	(0.079)	(0.079)	(0.080)	(0.080)	(0.087)	(0.087)	(0.072)	(0.072)	(0.085)	(0.087)	(0.084)	(0.086)	(0.090)	(0.092)
	[0.640]	[0.640]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[0.995]	[1.000]	[1.000]	[0.570]	[0.615]	[0.195]	[0.215]
	{0.299}	{0.283}	{0.911}	{1.000}	{0.911}	{1.000}	{0.710}	{0.634}	{0.911}	{1.000}	{0.259}	{0.283}	{0.118}	{0.146}
T1 × T2: Interaction	-0.228	-0.228	-0.054	-0.079	-0.112	-0.107	-0.231	-0.229	-0.167	-0.162	-0.200	-0.194	0.029	0.034
	(0.113)	(0.113)	(0.106)	(0.108)	(0.124)	(0.125)	(0.106)	(0.108)	(0.126)	(0.130)	(0.123)	(0.126)	(0.128)	(0.130)
	[0.090]	[0.110]	[1.000]	[0.945]	[0.895]	[0.895]	[0.030]	[0.035]	[0.570]	[0.615]	[0.265]	[0.280]	[1.000]	[1.000]
	{0.118}	{0.118}	{0.749}	{0.567}	{0.433}	{0.468}	{0.118}	{0.118}	{0.230}	{0.272}	{0.145}	{0.169}	{0.911}	{1.000}
Referrer characteristics:														
Verifying measure (referring TC)	0.020	0.020	-0.015	-0.014	0.045	0.045	0.024	0.024	0.013	0.012	0.024	0.024	-0.025	-0.025
	(0.025)	(0.025)	(0.030)	(0.030)	(0.030)	(0.031)	(0.026)	(0.026)	(0.030)	(0.030)	(0.029)	(0.029)	(0.032)	(0.032)
	[0.860]	[0.840]	[0.860]	[0.840]	[0.305]	[0.245]	[0.810]	[0.820]	[0.860]	[0.840]	[0.860]	[0.840]	[0.860]	[0.840]
	{0.208}	{0.218}	{0.379}	{0.419}	{0.082}	{0.069}	{0.208}	{0.218}	{0.414}	{0.419}	{0.208}	{0.218}	{0.213}	{0.221}
Overall risk factor score	0.151	0.151	0.037	0.054	0.109	0.105	0.161	0.159	0.031	0.027	0.099	0.095	0.051	0.048
	(0.033)	(0.034)	(0.031)	(0.032)	(0.039)	(0.039)	(0.031)	(0.031)	(0.037)	(0.038)	(0.037)	(0.038)	(0.033)	(0.034)
	[0.000]	[0.000]	[0.500]	[0.185]	[0.000]	[0.000]	[0.000]	[0.000]	[0.860]	[0.840]	[0.000]	[0.000]	[0.305]	[0.320]
	{0.001}	{0.001}	{0.109}	{0.042}	{0.001}	{0.001}	{0.001}	{0.001}	{0.208}	{0.221}	{0.001}	{0.001}	{0.076}	{0.069}
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.044	-0.044	0.045	0.045	-0.013	-0.013	-0.078	-0.078	-0.008	-0.008	-0.042	-0.042	-0.047	-0.047
Adjusted R^2	0.122	0.121	0.013	0.019	0.075	0.074	0.162	0.162	0.036	0.036	0.076	0.076	0.063	0.063
Mills: coefficient	.	-0.017	.	-0.724	.	0.153	.	0.058	.	0.157	.	0.171	.	0.130
Mills: p-value	.	0.935	.	0.005	.	0.560	.	0.770	.	0.555	.	0.445	.	0.530
Joint test (p-value):														
All Ts = 0	0.068	0.067	0.765	0.567	0.452	0.480	0.038	0.044	0.040	0.045	0.029	0.031	0.011	0.010
Combined arm (T1 + T2 + T3)	-0.103	-0.103	-0.060	-0.072	-0.031	-0.028	-0.055	-0.054	-0.204	-0.202	-0.120	-0.117	0.137	0.139
Standard error	0.067	0.069	0.076	0.077	0.080	0.082	0.065	0.065	0.081	0.082	0.078	0.079	0.086	0.088
p-value	0.100	0.115	0.415	0.330	0.705	0.755	0.425	0.420	0.015	0.015	0.125	0.130	0.095	0.085
Targeting condition indicators	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the first-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). Coefficients for TCs are reported in Appendix Table A.18. See Appendix Table A.20 for the results of the second-round referrals. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Standard errors in parentheses are computed by a cluster bootstrap (200 replications) that accounts for dependence at both the referrer and the target level and re-estimates the selection equation in each replication. Romano-Wolf step-down adjusted p-values in brackets; each family pools one coefficient group (referral incentives; targeting conditions; referrer characteristics) across all columns of the table. Anderson (2008) sharpened FDR q-values in braces. The combined-arm rows report the total effect of assigning both referral incentives, the sum of the two main effects and their interaction, with its bootstrap standard error and an unadjusted symmetric percentile bootstrap p-value.

Causal forest analysis (Athey et al. 2019) on referrer risk scores and demographic characteristics (sex, age, education, ethnicity, and religion) finds no systematic heterogeneity for first-order targets and, for second-order targets, only under TC2 (Appendix Tables A.31 and A.32). These results indicate that the scope for improving targeting lies not in varying TCs and incentives with referrer demographics, but in assigning them conditional on referrer risk profiles.

6.7 Discussions

Strategic reporting. The preceding analysis suggests that referrers possess relevant local knowledge but may not fully use it without appropriate design. Friend-based referrals (T4), available for second-order referrers and independent of TCs, provide direct evidence of this tendency: despite achieving higher success rates, these referrals bring targets with lower anti-government bias and, in the selection-corrected estimates, less crime exposure and less experience of re-



(a) Push risk

(b) Pull risk

Figure 7: Treatment Effects by Referrer Risk Quartile (First-Order Targets)

Note. Points indicate OLS point estimates; thick lines show 90% confidence intervals; thin lines show 95% confidence intervals. The reference group is the control (C). The third series is the interaction of the two incentives, not the arm that received both. Control group means are reported on the x-axis.

ceiving hostility, as reported in Appendix Tables A.20, A.19, and A.35. When explicit TCs are specified, referrers identify individuals with higher risk in specific dimensions, most clearly greater exposure to crime under TC2 (receiving hostility), with weaker differences in the same direction under TC4 (politically harassed). These patterns indicate that referrers default to closer acquaintances at lower risk on these dimensions (Appendix Table A.15). Our results suggest that this strategic misalignment can be partially corrected by designing TCs and referral incentives, taking into consideration referrer heterogeneity and the substitution between the monetary and non-monetary incentives.

Implications for optimal targeting approaches. The reduced-form results establish that different TCs capture distinct risk dimensions, but they do not resolve which combinations of TCs, incentives, and referrer types maximize targeting effectiveness per unit cost. The referral process involves multiple margins—nomination, contact, and the risk composition of recruited targets—that respond differently to design parameters, making it difficult to rank targeting approaches from regression coefficients alone. Moreover, the heterogeneous responses across referrer risk profiles suggest that uniform assignment of treatments is unlikely to be optimal. The reach comparison that opened this section also ignores cost, since every interview a referral chain absorbs is one that random sampling would have spent on another individual. Section 7 prices these margins and the return to a second round jointly, under the additional structure of Section 3.2.

7 Cost-Benefit Evaluation

While the experiment separately estimates the effects of each element in the referral process, evaluating the effective approach requires three decisions the experiment did not make: whether to ask a given individual to refer at all, which TCs and which incentives to use, and whether to ask targets to make further referrals. We solve the NGO's problem of Section 3.2 on the estimated referral process and quantify the welfare gain from those decisions and the extent to which each element of the process contributes to it.

7.1 Evaluation Framework

In Section 3.2, the NGO's problem chooses a best targeting approach—a pair of the number of initial contacts N_0 and a targeting plan that specifies what to do at each initial contact and each target—to maximize total welfare, the sum of the social payoff $w(x)$ over the individuals it reaches, under budget B.

We first formalize this problem by providing additional characterization. Each individual has a type $\theta = (x, \widetilde{\boldsymbol{x}}, q, a)$, comprising the targeting index x, the verifying measures $\widetilde{\boldsymbol{x}}$, one measure $\widetilde{x}_k$ per TC k, observed characteristics q that the referral process conditions on, and unobserved referrer quality a, a referrer-specific term that shifts the risk of all the targets. In this framework, the NGO is assumed to observe $\widetilde{\boldsymbol{x}}$ and q after the referrer's interview, while x and a are not observed.

Let $\bar{R}$ be the last order at which referral is requested. For $r \in \{1, \dots, \bar{R}\}$, we say an individual who refers at the r-th round of referral is an r-th order referrer, the people they refer are r-th order targets, and a target asked to refer becomes an $(r+1)$-th order referrer. The social payoff $w(x)$ from reaching an individual is increasing and convex in x, which we specify in Section 7.2.

Targeting plan. At referral order $r \in \{1, \dots, \bar{R}\}$, we denote a set of referral incentives by $\mathcal{T}_r$, a set of TCs available under incentive τ by $\mathcal{K}_r(\tau)$, and the largest number of TCs one referrer may be asked by $\bar{n}_r$. We define a *design space* $\mathcal{A}_r$ at an r-th order referrer as

$$\mathcal{A}_r = \left\{ (\tau, \boldsymbol{z}) \ : \ \tau \in \mathcal{T}_r,\ \boldsymbol{z} \in \{0,1\}^{|\mathcal{K}_r(\tau)|},\ \textstyle\sum_{k \in \mathcal{K}_r(\tau)} z_k \leq \bar{n}_r \right\}, \tag{5}$$

where $\boldsymbol{z} = (z_k)_{k \in \mathcal{K}_r(\tau)}$ is the vector of utilized TCs, with $z_k = 1$ if TC k is used.[30] It includes $\boldsymbol{z} = \boldsymbol{0}$ which asks for no referral, and a referral chain ends at the first individual at whom $\boldsymbol{z} = \boldsymbol{0}$ is specified.

[30] As in the experiment, we focus on the case in which at most one target is recruited per referrer–TC pair. Since the highest-rated nominee under each TC was contacted in the field but not a second one, the success probability and the risk measure of a second nominee are not estimated. Appendix B.1.1 places an upper bound on the omitted margin, taking the referrer's own rating of each nominee as a measure of fit and the referrer's answer on whether the nominee can be introduced as the measure of success. We find that, under the assumptions stated there, a second nominee could add no more than one more TC (Table B.41).

The plan is specified on what the NGO observes when it asks for referrals. We model the NGO as forming a belief about the unobserved components (x, a) of the type from those observations, and we assume that the belief is specified by its mean μ_r and covariance Σ_r.[31] We define the NGO's knowledge at an r-th order referrer as $b_r = (\widetilde{\boldsymbol{x}}, q, \mu_r, \Sigma_r)$, and the set of all possible values of b_r as $\mathcal{B}_r$.

We define a targeting plan as a sequence $\pi = (\pi_1, \ldots, \pi_{\bar{R}})$ of mappings $\pi_r : \mathcal{B}_r \to \mathcal{A}_r$, and denote by Π the set of all possible targeting plans. The NGO chooses a targeting approach $(N_0, \pi) \in \mathbb{R}_+ \times \Pi$, and this definition includes the random sampling, which corresponds to a plan that refers from nobody.

Referral process. Let $d_{k\tau,r} \in \{0, 1\}$ indicate whether the referral requested under (τ, k) from an r-th order referrer succeeds. The referral process is the estimated map from the referrer's type θ and the request (τ, k) to $d_{k\tau,r}$ (the extensive margin) and, given $d_{k\tau,r} = 1$, to the type of the target (the intensive margin). For referrer i and target j, we write

$$d_{k\tau,r} = \mathbf{1}\big\{g(\theta_i; k, \tau) + u_{ij} \geq 0\big\}, \quad x_j = s(\theta_i; k, \tau) + \varepsilon^x_{ij}, \quad \widetilde{x}_{k,j} = \tilde{s}_k(\theta_i; k, \tau) + \varepsilon^{\widetilde{x}}_{ij}, \tag{6}$$

where $(u_{ij}, \varepsilon^x_{ij}, \varepsilon^{\widetilde{x}}_{ij})$ are errors with mean zero conditional on (θ_i, k, τ) and independent across referrer–target pairs, i.e., $(u_{ij}, \varepsilon^x_{ij}, \varepsilon^{\widetilde{x}}_{ij}) \perp\!\!\!\perp (u_{i'j'}, \varepsilon^x_{i'j'}, \varepsilon^{\widetilde{x}}_{i'j'})$ for $(i, j) \neq (i', j')$.[32] Within a pair, the three errors may be correlated. The target's observed characteristics q_j are drawn from a distribution $G_q(\cdot \mid \theta_i; k, \tau)$, independently of $(u_{ij}, \varepsilon^x_{ij}, \varepsilon^{\widetilde{x}}_{ij})$ and across pairs. Because (6) lets the request enter through (k, τ) alone, the outcome of a TC does not depend on the other TCs asked of the same referrer.

We assume that referrer quality a is independent of $(x, \widetilde{\boldsymbol{x}}, q)$, with mean zero and variance σ^2_a, and that it passes down the chain along network-based links as $a_j = \varrho\, a_i + \zeta_j$ with $\varrho \in [0, 1]$ and ζ_j a mean-zero innovation. Because w is convex, even a mean-zero a raises expected welfare, and a positive ϱ raises it further by passing a referrer's quality into the tree their target starts.

NGO's problem. The NGO's problem considers the expected payoff and cost of each referral chain. Fixing a targeting plan $\pi \in \Pi$, define $\overline{w}(b_r) = \mathbb{E}[w(x) \mid b_r]$ for the payoff the NGO expects from the interview of a referrer who generates knowledge b_r, and the expected social payoff from the targets in the referrer's chain as $\Omega^\pi_r(b_r)$, which is defined recursively. Similarly, let c^{init} be the cost of interviewing a first-order referrer, and $C^\pi_r(b_r)$ be the expected cost of requesting referrals, contacting the nominations and interviewing the targets.[33] With budget B,

[31] Appendix B.1.2 states how b_r is updated along a chain.

[32] We impose these assumptions by residualizing every variable on the control variables of Section 5. The exercise therefore keeps the mechanisms of Section 6 and shuts down any other mechanism through which the control variables affect welfare, directly or through their covariance with the type.

[33] Appendix B.1.3 states the exact definitions of Ω^π_r and C^π_r.

we can write the NGO's problem as

$$\max_{N_0 \geq 0,\ \pi \in \Pi} \ N_0 \int \Big(\overline{w}(b_1) + \Omega_1^{\pi}(b_1) \Big)\, dH(b_1) \qquad (7)$$
$$\text{s.t.} \ \ N_0 \int \Big(c^{\text{init}} + C_1^{\pi}(b_1) \Big)\, dH(b_1) \ \leq \ B,$$

where $H(\cdot)$ is the distribution of b_1 across first-order respondents. Both expected values depend on a referral success $d_{k\tau,r}$, and on the NGO's knowledge b_{r+1} delivered by the target. Ω_r^{π} and C_r^{π} can be calculated backward from order $\bar{R}$ with $\Omega_{\bar{R}+1}^{\pi}(b_{\bar{R}+1}) = C_{\bar{R}+1}^{\pi}(b_{\bar{R}+1}) = 0$.

Characteristics of the solution. Because welfare and spending both rise with N_0, the budget constraint of (7) holds with equality.[34] Let ν be the multiplier on the constraint, which can be interpreted as the shadow price that converts the cost into welfare. Then, the NGO's problem implies that requesting a referral pays under (τ, k) if the welfare it delivers exceeds its cost at the price ν. As shown in Appendix B.1.3, fixing ν, we can introduce $V_{r+1}(b_{r+1}; \nu) := \overline{w}(b_{r+1}) + \max_{\pi \in \Pi} \left\{ \Omega_{r+1}^{\pi}(b_{r+1}) - \nu\, C_{r+1}^{\pi}(b_{r+1}) \right\}$ as the welfare from recruiting the target with b_{r+1}—their own expected payoff plus the maximized net value from asking referrals.

We can numerically solve the problem as follows. At each order r, given the incentive τ, the net value of the referral request under TC $k \in \mathcal{K}_r(\tau)$ at a referrer with knowledge b_r can be written as

$$\psi_{k\tau,r}(b_r) = \Pr(d_{k\tau,r} = 1 \mid b_r) \Big(\mathbb{E}\big[V_{r+1}(b_{r+1}; \nu) \,\big|\, b_r,\, d_{k\tau,r} = 1 \big] - \nu \left(c_k^{\text{tgt}} + c_{\tau}^{\text{inc}} \right) \Big) \ - \ \nu\, c_k^{\text{try}}, \qquad (8)$$

where c_k^{tgt} is the cost of interviewing the target, and c_k^{try} is the cost of trying to contact the nominations TC k produces, paid whether or not one ends in an interview, and c_{τ}^{inc} is the cost of the monetary incentive for a TC whose referral is verified. A request under TC k pays when the expected value of its target, net of the interview and incentive costs, exceeds the contact cost. The optimal plan sets $z_k = 1$ for the TCs with the largest positive $\psi_{k\tau,r}(b_r)$, at most $\bar{n}_r$ of them.

With this set of TCs, it selects the referral incentive $\tau \in \mathcal{T}_r$ whose utilized TCs deliver the largest sum of $\psi_{k\tau,r}$, net of the cost $\nu\, c_{\text{ref}}$ of the request. Because $\boldsymbol{z} = \mathbf{0}$ belongs to every $\mathcal{A}_r$, the same comparison decides whether a first-order respondent is asked to refer at all. The plan requests a referral only where this largest net value is positive, and otherwise the respondent contributes only their own payoff $\overline{w}(b_1)$. Finally, because N_0 adjusts to exhaust the budget, we can find ν satisfying $\int \left(V_1(b_1; \nu) - \nu\, c^{\text{init}} \right) dH(b_1) = 0$, which sets ν equal to the welfare per unit of budget of the optimal plan.[35]

[34] Therefore, (7) is equivalent to $\max_{\pi \in \Pi} B \int \left(\overline{w}(b) + \Omega_1^{\pi}(b) \right) dH(b) / \int \left(c^{\text{init}} + C_1^{\pi}(b) \right) dH(b)$, and hence the optimal plan does not depend on B.

[35] The left-hand side falls in ν, because a lower price lets more requests pay, and Appendix B.1.4 locates its unique root by bisection.

Welfare decompositions. We report two decompositions. For a subset of plans $\Pi' \subseteq \Pi$, let $W(\Pi')$ be the welfare per unit of budget that (7) attains with π restricted to Π'. Write a^0 for the design that asks for no referral, $\boldsymbol{z} = \mathbf{0}$, and $\pi_r(\mathcal{B}_r)$ for the set of designs the plan uses at order r. The first decomposition imposes four restrictions on π, each at every order r.

(S) No referrer screening: At each order the plan asks every referrer or none, $a^0 \notin \pi_r(\mathcal{B}_r)$ or $\pi_r(\mathcal{B}_r) = \{a^0\}$.

(U) Uniform design: One design per order, $|\pi_r(\mathcal{B}_r) \setminus \{a^0\}| \leq 1$, which may differ across orders.

(N) Single referral: One TC per request, $\sum_k z_k \leq 1$ for every $(\tau, \boldsymbol{z}) \in \pi_r(\mathcal{B}_r)$.

(R) No second-round referral: $\pi_r(\mathcal{B}_r) = \{a^0\}$ for $r \geq 2$, or equivalently, $\bar{R} = 1$.

A welfare level carries as superscript the restrictions imposed, in the order S, U, N, R: W imposes none, W^{SUNR} all four, and W^{rs} is random sampling, which asks nobody at any order.[36] Adding a restriction removes plans and never raises the level, and W^{rs} lies below every level. The contribution of a restriction is the difference between the levels without and with it, which depends on the other restrictions in place, and its Shapley value averages that difference over the orders in which the four can be lifted; the four Shapley values sum to $W - W^{\text{SUNR}}$.

The mechanism decomposition holds ν at its value under the full referral process, sets the coefficients of one element of the referral process to zero at a time, and re-solves the plan: (i) the TCs and verifying measures, (ii) risk-based homophily, (iii) the incentives, (iv) referrer quality a, and (v) its transmission ϱ.[37] The loss from each switch is the marginal contribution of that element in the presence of the others, and the five do not sum to the gain because the elements interact.

7.2 Specification and Estimation

Empirical counterparts. The targeting index x is the overall risk measure of Section 4.3, constructed from the full interview after the survey, and the verifying measures are the six of that section, which the enumerator computes during the interview. We let gender be the only observed characteristic q the plan may use. Referrers nominate within their own gender (Section 4), which fixes $q_j = q_i$ along every chain, and gender is the only characteristic beyond the verifying measures used in the plan. Men's overall risk measure averages about 0.7 standard deviations above women's (Appendix Figure A.1), which makes gender informative about the targets a referrer's chain can reach.

Specification of the referral process. We approximate $g(\cdot)$, $s(\cdot)$ and $\tilde{s}_k(\cdot)$ in (6) by linear indices in a cubic of x_i, in $\widetilde{x}_{k,i}$ and its interaction with the TC, in q_i, and in TC and incentive indicators and the incentives' interactions with the cubic, with the extensive margin a probit

[36] Appendix B.1.5 writes the four restrictions as sets of plans in the notation of (5).

[37] Appendix B.1.6 defines the loss and lists the coefficients each switch sets to zero.

in its index (Appendix B.2.1). Referrer quality a_i enters the index of the target's overall risk measure alone, as an additive term common to referrer i's targets, and σ_a^2 and ϱ are estimated from the residual cross-products of targets who share a referrer and of referrer–target pairs along a chain (Appendix B.2.1).[38]

We re-estimate the extensive and intensive margins of Section 5 on the pooled first- and second-order referral data, with the selection correction based on the contact incentive of Section 4.2.3 and the parametric restrictions of Appendix B.2.1. Appendix Figure B.9 plots the estimated intensive margin by TC and incentive, and Appendix B.2.2 checks the pooled specification against the second-order referrers recruited under the place-based TC.

Design space. Referral is requested at the first two orders, $\bar{R} = 2$, the depth at which the experiment estimates the referral process, and the restriction (R) solves every level at $\bar{R} = 1$, at which only first-order respondents refer. We solve on an *extended design space*, the designs the experiment fielded plus those that differ from them only in the number of TCs one referrer is asked (Appendix B.1.1).

Calibration. The social payoff is $w(x) = \delta\hat{\beta}\, e^x$, where $\hat{\beta}$ converts exponentiated risk to expected statutory penal years (Figure 5b and Appendix B.2.3) and $\delta = 0.1$ is the share of that harm the program removes by reaching a person. Comparisons among approaches do not depend on the scale $\delta\hat{\beta}$. The three referral costs and the interview cost come from the enumerator time the survey records and the payments it made (Appendix B.2.4). We report welfare per 1,000,000 KES of program spending.

Inference. We numerically solve the optimal plan and compute its welfare per unit of budget (Appendix B.1.4). We quantify the sampling uncertainty of the estimated referral process with a cluster bootstrap that resamples the first-order clusters, re-estimates the process, and re-solves the plan on the observed referrer population. We report the full-sample estimate with the 5th to 95th percentile range of the replications (Appendix B.2.5). Because the plan is chosen and valued on the same estimated referral process, we also implement a split-sample check, splitting the first-order clusters into random halves repeatedly. On each half, as a training sample, we re-estimate the referral process and solve the plan on the full referrer population. That plan is then simulated from every sampled individual with its own beliefs and choices, while referral outcomes follow the process estimated on the other half as a hold-out sample, to calculate its out-of-sample welfare (Appendix B.2.6).

[38]The data show no referrer-level variation elsewhere. A probit with a referrer random intercept returns a variance of zero and the likelihood of the probit without it, and the same-referrer residual moment that identifies σ_a^2 in the risk equation is negative for the verifying measure. Appendix B.2.1 also states the joint distribution of the errors, the imputation of the five verifying measures a request does not elicit, and that a target recruited at a location under TC0 carries none of the referrer's quality.

7.3 Results

The optimal plan. Figure 8 describes the optimal plan. Panel (a) compares the distribution of the risk measure among sampled individuals, weighted by the expected number of targets reached through their chains, with the unweighted distribution. The weighted distribution lies to the right of the unweighted one, showing that the targets come from sampled individuals at higher measured risk than the sample as a whole.[39]

Panel (b) takes the risk the plan predicts for a sampled individual (the posterior mean of that individual's x) on the horizontal axis and plots the expected number of TCs under which the plan asks that individual and the expected number of successful referrals. At the first round, the plan chooses to ask for referrals from about 48% of the sampled individuals, mostly those with higher predicted risk, and both the number of TCs it asks under and the number of referrals it expects rise with predicted risk.

Panel (c) shows, for each TC and each round, the share of referrers at that round who are asked under the TC. At the first round the plan asks under TC0 (place-based), TC2 (receiving hostility), and TC4 (politically harassed) at over 95% of first-order referrers and the other three TCs at between about 78% and 87%.[40] At the second round, where the place-based TC0 is not available, the plan asks under about four TCs, and under TC2 and TC4 at every referrer.

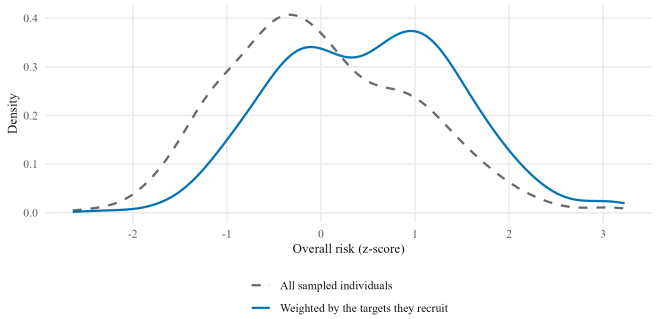
Panel (d) shows the same shares for the incentive treatments. At the first round the plan uses the externality message (T2) at nearly every referrer and a monetary incentive (T1 or T3) at fewer than 1% of them. The externality message is also the modal first-round incentive—the one assigned to the largest share of referrers among the repeated draws—in about 83% of the split-sample plans. The choice is consistent with Section 6.6, where the message or a monetary incentive on its own raises the targets' risk measure among referrers at moderately high risk, and the message costs the NGO nothing. At the second round the plan uses the control condition at every referrer, also the modal incentive in about 83% of the split-sample plans.

Welfare gain and mechanisms. The optimal plan attains about 31% more welfare per unit of budget than random sampling.[41] The plan samples about 20% as many individuals in total as random sampling and reaches everyone else it counts through referral. It reaches about 9% more individuals per unit of budget than random sampling, with the average payoff being

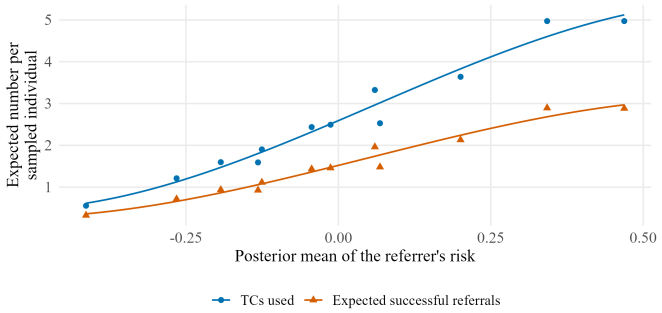
[39] Appendix Figure B.14 reports three consequences of the plan's choices. The risk measure of the plan's first-order targets lies to the right of the sampled population, whereas that of the experiment's targets lies to its left. A referrer yields about three targets when chains stop after one round and about ten when they continue. The rounds after a referrer's own add more targets than the referrer's own round, and both counts rise with the referrer's risk measure.

[40] While summing across TCs treats each TC's outcome as independent of the others asked of the same person, the same individual is named under two TCs only in 1.6% of cases (Appendix B.1.4). Across split-sample plans the set of TCs varies at the first round, with median use of each TC between about 65% and 90%, while all but a few of these plans ask under multiple TCs at once.

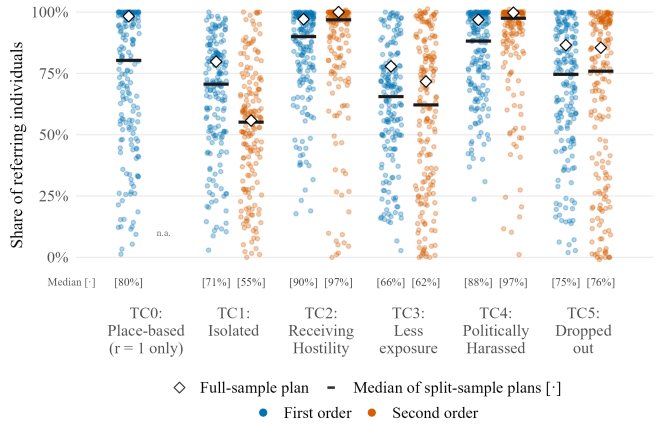
[41] The gains are summarized in Appendix Table B.51.



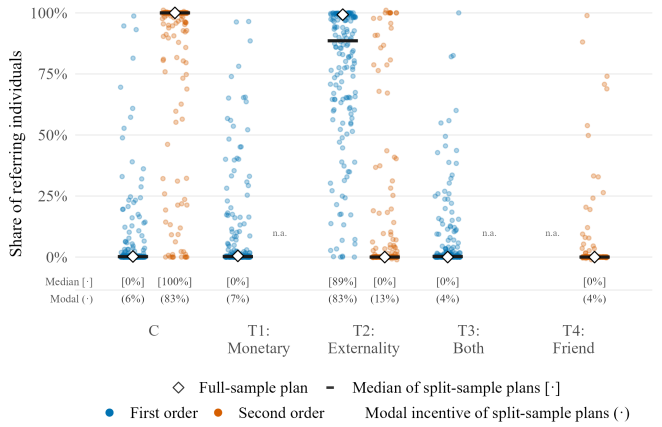
(a) Referrer screening by measured risk



(b) Number of TCs used and successful referrals



(c) TCs the plan uses



(d) Incentives the plan uses

Figure 8: Characteristics of the Optimal Targeting Plan

Note. The optimal plan chooses at each individual and each round whether to ask for referrals, under which TCs, and with which incentive. Panel (a) compares the density of measured risk among sampled individuals weighted by the expected number of targets reached through their chain with the unweighted density. Panel (b) plots the number of TCs and the expected number of successful referrals against the posterior mean of the sampled individual's risk, as expectations over everyone sampled. Panels (c) and (d) give the share of referrers who are assigned each TC and each incentive, by round. The second-round shares weight each state the chain reaches by the expected number of individuals it delivers there. The diamond is the full-sample plan, and each dot is a split-sample plan, the plan solved on the referral process estimated on one half of the first-order clusters (Appendix B.2.6). The bar and the bracketed value give the median across split-sample plans, and the value in parentheses in panel (d) gives the share of split-sample plans in which the incentive is the plan's modal incentive at that round, the one assigned to the largest share of referrers.

about 21% higher. Both ratios exceed one in every replication. Asking targets to make further referrals is worth about 7% of the plan's welfare, and that gain is positive in every replication (Appendix B.2.5). In the experiment, targets have a lower average payoff than the sampled population, as Appendix B.2.5 records, whereas the plan's higher average payoff comes from its choice of whom to ask and what to ask.

Figure 9 splits the optimal plan's gain over random sampling into the amounts from relaxing each restriction alone and from relaxing two together, and marks the Shapley value of each restriction. With every restriction imposed, every sampled individual asked for a single referral under one design with $\bar{R} \leq 1$, referral captures about 11% of the gain, and about 15%

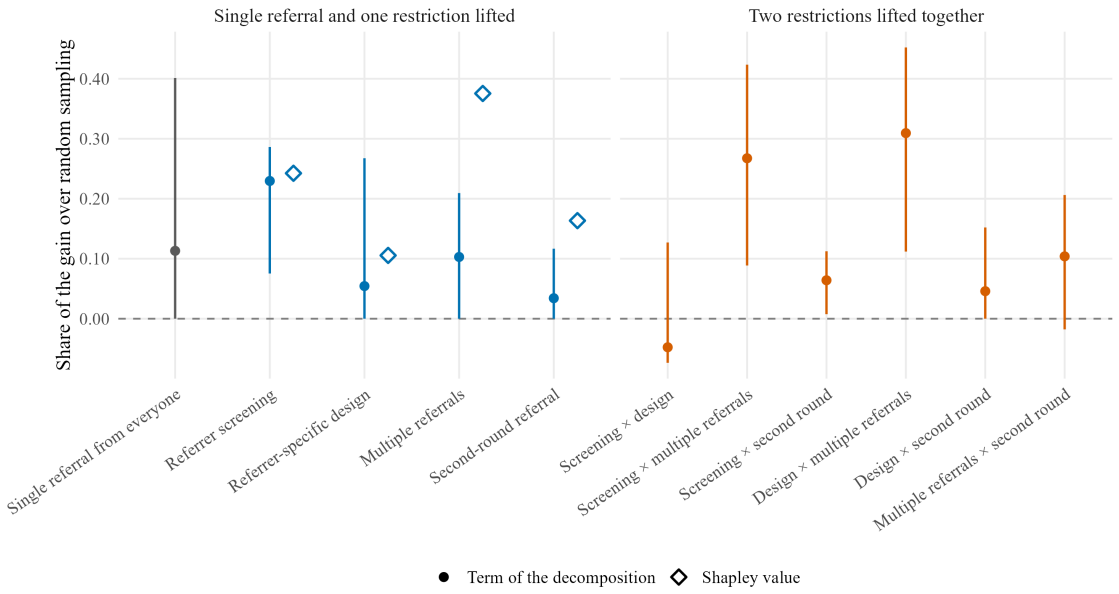


Figure 9: Decomposition of the Gain over Random Sampling

Note. Each term of the decomposition as a share of the unrestricted plan's gain over random sampling: on the left, a single referral from everyone with every restriction imposed, in grey, and the effect of relaxing one restriction from that base, with each restriction's Shapley value as a hollow diamond; on the right, the complementarity of two restrictions relaxed together. Segments run from the 5th to the 95th percentile of the replication distribution, each term taken within a replication. The remainder, the three- and four-way terms, is reported in Appendix Table B.56.

at $\bar{R} = 2$. Allowing referrer screening alone, still under one design and a single referral, raises the share to about 44%. The rest of the gain requires multiple referrals, together with further flexibility either in screening referrers or in tailoring the request based on the referrer's observable interview records. If we allow multiple referrals, referrer screening under one design attains about 98% of the gain and a referrer-specific design about 91%, whereas multiple referrals alone attain about 35%. Referrer screening and a referrer-specific design together under a single referral attain only about 46%.[42] Once the plan screens referrers, a referrer-specific design adds little, which suggests that the two substitute for each other. Allowing second-round referral adds about 3% of the gain on its own and 5% to 10% more with each of the other three restrictions relaxed.[43] Averaged over the order in which the restrictions are lifted, the Shapley values attribute about 38% of the gain to multiple referrals, 24% to referrer screening, 16% to second-round referral, and 11% to a referrer-specific design, the remaining 11% being the single referral from everyone (Appendix Table B.56).

We conduct an additional simulation of referral chains over five rounds, beyond the two

[42] Appendix Table B.51 reports the level under each combination of restrictions.

[43] The second round's contribution does not require the TC effects on the target's verifying measure, which the estimation pools across rounds and which the second-order estimates in Section 6.4 cannot distinguish from zero. With those effects switched off, the second round still adds about 95% of what it adds with them (Appendix Table B.57). The shares in the text are of the gain over random sampling; the 7% above is a share of the plan's welfare.

rounds at which the referral process is estimated, to ask whether a chain sustains the risk measure of its targets as it lengthens. Appendix Figure B.10 shows that the plan holds the expected risk measure of its targets at one level at every round, whatever the sampled individual a chain starts from, whereas under the uniform design it falls toward the sampled mean. It holds that level by continuing to ask under multiple TCs, and asking every target for a friend under no TC instead lowers it by about half.

We also quantify which element of the referral process the gain depends on from the welfare loss by switching off one element at a time, reported in Appendix Figure B.12 and Table B.57. At $\bar{R} = 2$ the incentive arms account for the largest of the five losses, about 9% of the plan's welfare, with risk-based homophily about 5% and the TCs and verifying measures about 4%. Allowing the second round raises homophily's loss to about 2.5 times its size with chains stopped after one round and lowers the incentives' loss. Because the optimal plan uses the control condition at the second round, this result implies that a design that relies on the TCs alone—without additional incentives—attains about 19% more welfare than random sampling.

To see which of the six verifying measures referrer screening needs, we restrict the measures the plan conditions on at the sampled individual to a subset of the six measures (Appendix Table B.50). Any one of the six measures attains over 90% of the gain over random sampling; the TC4 measure alone attains all but about 2% of the gain, and the other five without the TC4 measure lose about 5%. The plan asks about 77% of the men and almost none of the women, and barring women from referring leaves the gain unchanged while barring men removes about 98% of it (Appendix Table B.52). With the risk measure and unobserved referrer quality themselves used at the sampled individual, neither of which an interview can deliver, the gain would rise by about 60%. The six measures therefore recover about 63% of the gain from full knowledge of the sampled individual.

Robustness and sensitivity checks. We check whether our findings about the gain are robust against the calibration and against the estimated referral process. Re-solving the plan under a range of costs of interviewing a target, we find that the gain is convex in that cost and never turns negative, because the plan can choose not to ask for a referral even with an increased referral cost (Appendix B.2.4). The reported gain is not an artifact of fitting the plan to the estimated referral process: a plan solved on one half of the first-order clusters keeps about 64% of its gain when valued on the other half, and its out-of-sample gain is positive in every split (Appendix B.2.6). The curvature of the calibrated payoff function and the limits on the number of TCs per referrer and on referral rounds change the size of the gain, as Appendices B.2.3, B.3.3, and B.3.5 report. Across these checks, the overall gain over random sampling stays above 10% of the random-sampling level unless the cost of interviewing a target rises to 1.5 times its calibrated value or more.

7.4 Discussion

Our results suggest that, per 1,000,000 KES of program spending, the optimal plan averts about 124 more expected penal years than random sampling, under the assumption that the program removes a tenth of the statutory penal years implied by the risk measure of each individual reached. In our welfare specification, this figure scales with that share, while results from the comparison among approaches remain the same. The impact of the program itself is evaluated in a companion paper.

Two features of the environment lie outside the evaluation. First, the social payoff captures individual returns from the program but not spillover beyond the individuals reached, and thus an evaluation framework that incorporates such spillovers is left for future research. Second, the model draws each target from a distribution rather than from a finite population, and therefore abstracts from the chance that two referrers name the same individual. At the density of the communities we study, about 3% of successfully referred individuals were reached through more than one referrer (Appendix B.1.4). As the plan asks and samples more, it draws from a smaller pool of individuals it has not already reached. That pool shrinks faster in a smaller or less dense community, where the plan would have to allow for the chance of reaching the same individual twice.

8 Concluding Remarks

This paper investigates how to use local intelligence for effective targeting when neither registers nor neighbors can readily identify the target population. We target individuals at high risk in fragile urban communities in Nairobi, Kenya, and obtain the following findings from a randomized referral experiment and a cost-benefit evaluation. First, referral chains reach individuals at high risk more often than random sampling does, which shows the informational value of local networks for policy targeting in our context. Second, our simple TCs predict higher risk across multiple dimensions and let referrers identify individuals at higher risk. Third, referral incentives have limited average effects on the targets' risk measures, while information about community externalities can improve the targeting outcomes if the referrer's own baseline risk measure is moderately high. Lastly, referral generates high returns as a plan—a mapping of what a planner knows into a referral design—rather than as a fixed module, since asking everyone under one TC and one design captures only a small gain over random sampling. Most of the remaining gain comes from policy flexibility in allowing multiple referrals, together with either referrer screening or a referrer-specific design.

These findings carry a general lesson for an organization whose objective is multidimensional and hard to observe. Referral pays even where networks are weak and where the organization and its referrers have misaligned incentives, provided the TCs capture the relevant

characteristics of the target population and the incentive is concentrated at the first request. Policy flexibility matters beyond incorporating referrals, since fielding one design on everyone forgoes most of the gain, which comes from the decision the organization makes at each sampled individual. Referrer screening can be implemented within the survey instrument, since it uses measures recorded before a referral is requested and the parameters can be pre-specified.

Future research can incorporate program implementation results to address the tension between targeting individuals at the highest risk and maximizing program effectiveness, as such individuals need not yield the greatest program impacts or community spillover effects (Haushofer et al. 2022). Experimental variation from the training program can be used to analyze the substitution between crime and legitimate economic activities, while considering crime displacement patterns across different areas, to construct refined social objectives and draw further implications for optimal targeting strategies. Such work would further inform the allocation of scarce resources and the design of implementable policies that help individuals disengage from criminal and violent activities in fragile settings.

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A Data and Additional Results on the Experiment

A.1 Construction of Risk Factors

Table A.1: Summary of Risk Factors and Verifying Measures

Topic	Description
Panel A. Push factors	
Labor market outcomes	Monthly income, total duration of employment in main job, unemployment status, and engagement in casual labor.
Family background	Whether both parents are alive, number of household members, and number of siblings.
Cognitive skills	Share of correct answers in non-basic numeracy questions, ability to read and write Kiswahili, and share of correct answers in reading non-basic English words.
Crime exposure	Own experience of violent and property crime victimization, acquaintances' experience of violent and property crime victimization, and estimated weekly robberies in the community.
Prior criminal activities	Whether stayed in a police cell or jail, duration of stay in police cell, duration of stay in jail or prison, and refusal to answer police or prison-related questions.
Panel B. Pull factors	
Implicit bias against government (IAT)	A measure of implicit bias toward insurgency against the government, constructed using the Implicit Association Test developed by Greenwald et al. (1998).
Gang proximity	Whether ever invited to join a gang, whether know anyone invited to or already joined a gang, awareness of gang benefits and push factors, and self-reported willingness to join a gang.
Drug and substance use	Whether ever taken legal substances or illegal drugs, frequency of use in the past seven days, and enumerator observations of substance and drug use.
Attitudes toward gang activities	Extent of agreement with statements on gang existence due to weak institutions, reduced harassment without gangs, joining gangs for better income, gangs providing community benefits, comfort interacting with gang-affiliated friends, and willingness to purchase stolen goods from gangs.
Attitudes toward crime and violence	Extent of agreement with statements on taking money from gamble winnings, joining violent demonstrations, attacking police as revenge, violence against robbers from other communities, forcing religious conversion, and justification of fighting as jihad.
Weak preference for crime reduction	Share of allocation to a wildlife conservation NGO rather than a deradicalization NGO in an incentivized allocation task.
Panel C. Verifying measures for targeting conditions	
TC0: Place-based	Enumerator observations of young men using drugs, drinking alcohol, or being jobless at meeting points, and frequency of encountering high-risk activities at recruiting spots.
TC1: Isolated	Self-reported degree of isolation, feeling isolated or having difficulty making friends, number of friends to share personal concerns with, phone ownership, number of close contacts on phone, and number of message threads and phone calls made in the past seven days.
TC2: Receiving hostility	Self-reported degree of hostility received from other ethnic groups and from other religious groups.
TC3: Less exposed	Frequency of going outside own community for consumption and work purposes, and frequency of interaction with other ethnic and religious groups.
TC4: Politically harassed	Self-reported degree of harassment by police or government officials, whether received any harassment, number of forms of harassment, and number of types of harassment experienced.
TC5: Dropped out	Years of education remaining until 16 years, share of incorrect answers in reading non-basic English words, and share of incorrect answers in non-basic numeracy questions.

Notes. These measures serve two roles: (i) as outcomes of interest when associated with targets, and (ii) as control variables when associated with referrers.

A.2 Summary Statistics

Table A.2: Summary Statistics by Referral Stage

	First-Order Referrer ($N = 1004$)				First-Order Target ($N = 1504$)				Second-Order Target ($N = 825$)			
	Mean	Std. dev.	Min.	Max.	Mean	Std. dev.	Min.	Max.	Mean	Std. dev.	Min.	Max.
Panel A: Demographic and Economic Characteristics												
Age	23.54	4.237	18	38	23.38	4.177	18	35	23.41	4.177	18	38
Male	0.612	0.488	0	1	0.573	0.495	0	1	0.672	0.470	0	1
Muslim	0.368	0.482	0	1	0.378	0.485	0	1	0.401	0.490	0	1
Kikuyu ethnicity	0.296	0.457	0	1	0.275	0.446	0	1	0.304	0.460	0	1
Luo ethnicity	0.176	0.381	0	1	0.175	0.380	0	1	0.183	0.387	0	1
Living in Majengo	0.230	0.421	0	1	0.199	0.399	0	1	0.198	0.398	0	1
Living in Eastleigh	0.263	0.440	0	1	0.253	0.435	0	1	0.279	0.449	0	1
Living in Mathare	0.279	0.449	0	1	0.314	0.464	0	1	0.328	0.470	0	1
Living in Huruma-Kiamaiko	0.211	0.408	0	1	0.223	0.416	0	1	0.190	0.393	0	1
Years of education	10.45	3.022	4	16	10.54	2.827	2	16	10.61	2.868	4	16
Can write in Kiswahili	0.955	0.207	0	1	0.954	0.209	0	1	0.958	0.202	0	1
Reading English: % correct answers	68.09	21.84	0	100	67.13	21.73	0	100	68.02	21.69	0	100
Numeracy test: % correct answers	30.02	18.13	0	100	30.45	18.50	0	88.89	30.96	18.85	0	100
Formal employment	0.299	0.458	0	1	0.314	0.464	0	1	0.324	0.468	0	1
Casual, part-time, or temporary employment	0.384	0.487	0	1	0.337	0.473	0	1	0.355	0.479	0	1
Unemployed	0.309	0.462	0	1	0.347	0.476	0	1	0.319	0.466	0	1
Monthly income from all economic activities	5134.3	6052.5	0	20000	4801.3	6020.0	0	20000	5137.5	6081.3	0	20000
Panel B: High-Risk Activities												
Ever been a victim of beating	0.282	0.450	0	1	0.289	0.454	0	1	0.281	0.450	0	1
Ever been a victim of stealing	0.369	0.483	0	1	0.354	0.478	0	1	0.332	0.471	0	1
Ever been a victim of robbery	0.256	0.437	0	1	0.260	0.439	0	1	0.240	0.427	0	1
Ever been a victim of rape (female)	0.0524	0.223	0	1	0.0392	0.194	0	1	0.0407	0.198	0	1
Ever been a victim of gang-related violence	0.168	0.374	0	1	0.135	0.342	0	1	0.161	0.368	0	1
Ever been a victim of phone snatching	0.382	0.486	0	1	0.369	0.483	0	1	0.370	0.483	0	1
Ever invited to join a gang	0.271	0.445	0	1	0.297	0.457	0	1	0.318	0.466	0	1
Know anyone who joined a gang	0.601	0.490	0	1	0.638	0.481	0	1	0.587	0.493	0	1
Ever stayed in a police cell	0.477	0.500	0	1	0.488	0.500	0	1	0.518	0.500	0	1
Ever stayed in a jail/prison	0.125	0.331	0	1	0.121	0.326	0	1	0.154	0.361	0	1
Ever taken any illegal drug	0.347	0.476	0	1	0.369	0.483	0	1	0.413	0.493	0	1
Ever earned from commercial sex (female)	0.0969	0.296	0	1	0.107	0.309	0	1	0.0855	0.280	0	1
Ever paid for commercial sex (male)	0.0608	0.239	0	1	0.0532	0.224	0	1	0.0606	0.239	0	1
Committed crime: beating	0.216	0.412	0	1	0.231	0.421	0	1	0.248	0.432	0	1
Committed crime: stealing	0.152	0.360	0	1	0.147	0.354	0	1	0.149	0.356	0	1
Committed crime: robbery	0.0608	0.239	0	1	0.0758	0.265	0	1	0.0933	0.291	0	1
Committed crime: rape (male)	0.00651	0.0805	0	1	0.0104	0.102	0	1	0.0108	0.104	0	1
Committed crime: fighting with violence	0.0339	0.181	0	1	0.0445	0.206	0	1	0.0473	0.212	0	1
Committed crime: gang-related	0.0120	0.109	0	1	0.0166	0.128	0	1	0.0158	0.125	0	1
Committed crime: broker	0.00299	0.0546	0	1	0.00665	0.0813	0	1	0.0109	0.104	0	1
Police harassment: innocent but harassed	0.341	0.474	0	1	0.303	0.460	0	1	0.361	0.481	0	1
Police harassment: mistargeted for others	0.126	0.333	0	1	0.128	0.334	0	1	0.155	0.362	0	1
Police harassment: harassed by identity	0.188	0.391	0	1	0.187	0.390	0	1	0.227	0.419	0	1

Notes: All variables in Panel B are dummies. Illegal drugs include glue, marijuana, cocaine, and heroin. The information of committed crimes comes from reasons for having stayed in a police cell, reasons for having stayed in a jail/prison, and reasons for having received police harassment (committed a small crime but treated heavily; committed a small crime but was suspected of other crimes as well). The gang-related category of committed crimes includes assisting gang members' activities.

Figure A.1 plots the overall risk measure of the randomly sampled respondents by gender, and the mean among men lies about 0.7 standard deviations above the mean among women.

A.3 Balance Table

Three margins separate a sampled respondent from an interviewed target, and they are not addressed in the same way. On margin (i), the referral module was not administered after the afternoon cutoff, and Tables A.8 and A.9 compare the respondents who completed it with those who did not. The respondents who completed it are more often male, Muslim and resident in Mathare, and more often victims of theft, robbery and gang violence, and the joint tests reject equality on both sets of characteristics; they do not differ in age, education, literacy or ethnicity. Because the TCs and the incentive arms were randomized among the respondents

Table A.3: Summary of Randomization in Referral Process

	First-Order Referrer ($N = 1004$)					First-Order Target ($N = 1504$)				
	Mean	Std. dev.	Min.	Max.	N	Mean	Std. dev.	Min.	Max.	N
Treatment assignment of referral incentive:										
C: Control	0.191	0.393	0	1	1004	0.276	0.447	0	1	1504
T1: Monetary incentive	0.228	0.420	0	1	1004					
T2: Externality	0.242	0.429	0	1	1004	0.293	0.455	0	1	1504
T3 = T1+ T2: Interaction	0.193	0.395	0	1	1004					
T4: Friend						0.121	0.326	0	1	1504
No referral was requested	0.145	0.353	0	1	1004	0.310	0.463	0	1	1504
Referral under treatment, conditional on assignment:										
C: Control – Avg. # of nominations under TC1–TC5	1.095	0.617	0	3.250	192	1.033	0.665	0	3	415
C: Control – Avg. share of introductions given nomination	0.849	0.210	0.111	1	190	0.822	0.285	0	1	370
C: Control – # of nominations under TC0	1.523	0.606	0	2	88					
C: Control – Any successful referral	0.964	0.188	0	1	192	0.646	0.479	0	1	415
C: Control – Share of successful referral	0.482	0.235	0	1	192	0.416	0.360	0	1	415
T1: Monetary incentive – Avg. # of nominations under TC1–TC5	1.109	0.506	0	3	229					
T1: Monetary incentive – Avg. share of introductions given nomination	0.837	0.233	0	1	227					
T1: Monetary incentive – # of nominations under TC0	1.545	0.568	0	2	112					
T1: Monetary incentive – Any successful referral	0.987	0.114	0	1	229					
T1: Monetary incentive – Share of successful referral	0.503	0.229	0	1	229					
T2: Externality – Avg. # of nominations under TC1–TC5	1.043	0.539	0	3.333	243	1.023	0.673	0	4	440
T2: Externality – Avg. share of introductions given nomination	0.858	0.220	0	1	242	0.842	0.274	0	1	389
T2: Externality – # of nominations under TC0	1.471	0.622	0	2	119					
T2: Externality – Any successful referral	0.963	0.189	0	1	243	0.612	0.488	0	1	441
T2: Externality – Share of successful referral	0.486	0.217	0	1	243	0.414	0.380	0	1	441
T3 = T1+ T2: Interaction – Avg. # of nominations under TC1–TC5	1.049	0.503	0	2.667	194					
T3 = T1+ T2: Interaction – Avg. share of introductions given nominati	0.875	0.202	0	1	191					
T3 = T1+ T2: Interaction – # of nominations under TC0	1.625	0.548	0	2	96					
T3 = T1+ T2: Interaction – Any successful referral	0.974	0.159	0	1	194					
T3 = T1+ T2: Interaction – Share of successful referral	0.513	0.223	0	1	194					
T4: Friend - # of targets named by respondent						2.352	1.329	0	4	182
T4: Friend - Share of introductions given nomination						0.757	0.329	0	1	174
T4: Friend – any successful referral (= share)						0.626	0.485	0	1	182
Assignment of TCs:										
TC0: Place-Based	0.484	0.500	0	1	858	0	0	0	0	1038
TC1: Isolated	0.501	0.500	0	1	858	0.300	0.458	0	1	1038
TC2: Receiving hostility	1	0	1	1	858	0.420	0.494	0	1	1038
TC3: Less exposed	1	0	1	1	858	0.418	0.493	0	1	1038
TC4: Politically harassed	0.502	0.500	0	1	858	0.269	0.444	0	1	1038
TC5: Dropped out	0.513	0.500	0	1	858	0.255	0.436	0	1	1038
Referral under TC, conditional on assignment:										
TC0: Place-Based - Number of spots named by respondent	1.537	0.588	0	2	415					
TC0: Place-Based – successful referral	0.952	0.214	0	1	415					
TC1: Isolated - # of targets named by respondent	1.021	0.846	0	4	430	0.961	0.782	0	4	311
TC1: Isolated - Share of introductions given nomination	0.869	0.257	0	1	310	0.859	0.297	0	1	222
TC1: Isolated – successful referral	0.493	0.501	0	1	430	0.441	0.497	0	1	311
TC2: Hostility - # of targets named by respondent	0.986	0.856	0	4	858	0.787	0.787	0	4	436
TC2: Hostility - Share of introductions given nomination	0.846	0.292	0	1	587	0.802	0.343	0	1	256
TC2: Receiving hostility – successful referral	0.437	0.496	0	1	858	0.339	0.474	0	1	436
TC3: Less exposed - # of targets named by respondent	1.001	0.821	0	4	858	1.051	0.814	0	4	434
TC3: Less exposed - Share of introductions given nomination	0.886	0.261	0	1	627	0.839	0.317	0	1	331
TC3: Less exposed – successful referral	0.404	0.491	0	1	858	0.422	0.494	0	1	434
TC4: Politically harassed - # of targets named by respondent	1.234	0.937	0	4	431	1.244	0.966	0	4	279
TC4: Politically harassed - Share of introductions given nomination	0.831	0.300	0	1	330	0.799	0.338	0	1	214
TC4: Politically harassed – successful referral	0.443	0.497	0	1	431	0.459	0.499	0	1	279
TC5: Dropped out - # of targets named by respondent	1.267	0.940	0	4	438	1.246	0.949	0	4	264
TC5: Dropped out - Share of introductions given nomination	0.814	0.320	0	1	343	0.838	0.314	0	1	209
TC5: Dropped out – successful referral	0.411	0.493	0	1	440	0.449	0.498	0	1	265

Notes: This table summarizes the implementation of the randomization protocol and resulting referral behaviors for first-order referrers and first-order targets. For each treatment arm and targeting condition (TC), the table reports assignment rates and key outcomes. Statistics under the headings are calculated using the subset of individuals assigned to that specific treatment or TC. The number of observations varies across rows due to the nature of the referral process.

Table A.4: Balance Table – Demographic and Economic Variables among First-Order Referrers

	C: Control	T1: Monetary Incentive		T2: Externality		T1+ T2: Interaction	
	Mean/sd	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value
Age	23.932	23.227	0.099*	23.572	0.384	23.464	0.280
	(4.372)	(4.337)		(4.174)		(4.135)	
Male	0.667	0.633	0.474	0.617	0.286	0.603	0.196
	(0.473)	(0.483)		(0.487)		(0.491)	
Muslim	0.469	0.306	0.001***	0.399	0.147	0.356	0.024**
	(0.500)	(0.462)		(0.491)		(0.480)	
Kikuyu ethnicity	0.307	0.284	0.601	0.276	0.474	0.284	0.610
	(0.463)	(0.452)		(0.448)		(0.452)	
Luo ethnicity	0.146	0.223	0.041**	0.181	0.322	0.170	0.514
	(0.354)	(0.417)		(0.386)		(0.377)	
Living in Majengo	0.255	0.192	0.124	0.243	0.767	0.196	0.164
	(0.437)	(0.395)		(0.430)		(0.398)	
Living in Eastleigh	0.281	0.197	0.044**	0.272	0.824	0.294	0.786
	(0.451)	(0.398)		(0.446)		(0.457)	
Living in Mathare	0.245	0.341	0.031**	0.288	0.310	0.314	0.128
	(0.431)	(0.475)		(0.454)		(0.465)	
Living in Huruma-Kiamaiko	0.214	0.258	0.288	0.189	0.534	0.186	0.493
	(0.411)	(0.438)		(0.393)		(0.390)	
Years of education	10.370	10.472	0.736	10.675	0.296	10.438	0.828
	(3.103)	(3.054)		(2.906)		(3.060)	
Can write in Kiswahili	0.953	0.974	0.267	0.967	0.466	0.933	0.394
	(0.212)	(0.160)		(0.179)		(0.251)	
Reading English: % correct answers	66.493	70.087	0.078*	69.753	0.109	65.378	0.628
	(21.639)	(19.663)		(20.234)		(23.565)	
Numeracy test: % correct answers	31.060	29.583	0.400	28.770	0.184	29.021	0.263
	(17.546)	(18.326)		(18.118)		(18.187)	
Formal employment	0.328	0.293	0.434	0.280	0.279	0.294	0.468
	(0.471)	(0.456)		(0.450)		(0.457)	
Casual, part-time, or temporary employment	0.401	0.341	0.203	0.399	0.969	0.407	0.902
	(0.491)	(0.475)		(0.491)		(0.493)	
Unemployed	0.271	0.367	0.035**	0.321	0.255	0.294	0.617
	(0.446)	(0.483)		(0.468)		(0.457)	
Monthly income from all economic activities	5329.729	4793.013	0.355	4674.136	0.238	5499.227	0.789
	(5844.040)	(6025.899)		(5622.954)		(6600.794)	
N	192	229		243		194	
F-test of joint significance (*p*-value, RI)			0.082		0.688		0.527
F-test, number of observations			421		435		386

Notes: Sample of the first-order referrers. The *p*-value for the joint *F*-test was derived using randomization inference (RI) with 1,000 permutations, excluding highly collinear variables (living in Eastleigh, formal employment). Standard deviations in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.5: Balance Table – High-Risk Activities among First-Order Referrers

	C: Control	T1: Monetary Incentive		T2: Externality		T1+ T2: Interaction	
	Mean/sd	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value
Ever been a victim of beating	0.307	0.236	0.102	0.284	0.598	0.330	0.635
	(0.463)	(0.425)		(0.452)		(0.471)	
Ever been a victim of stealing	0.370	0.406	0.447	0.379	0.851	0.402	0.516
	(0.484)	(0.492)		(0.486)		(0.492)	
Ever been a victim of robbery	0.245	0.223	0.595	0.296	0.229	0.304	0.192
	(0.431)	(0.417)		(0.458)		(0.461)	
Ever been a victim of rape (female)	0.047	0.048	0.983	0.065	0.634	0.065	0.643
	(0.213)	(0.214)		(0.247)		(0.248)	
Ever been a victim of gang-related violence	0.214	0.166	0.218	0.148	0.081*	0.191	0.578
	(0.411)	(0.373)		(0.356)		(0.394)	
Ever been a victim of phone snatching	0.344	0.415	0.134	0.424	0.088*	0.320	0.615
	(0.476)	(0.494)		(0.495)		(0.468)	
Ever invited to join a gang	0.313	0.249	0.150	0.267	0.307	0.294	0.691
	(0.465)	(0.433)		(0.444)		(0.457)	
Know anyone who joined a gang	0.625	0.585	0.406	0.621	0.939	0.619	0.896
	(0.485)	(0.494)		(0.486)		(0.487)	
Ever stayed in a police cell	0.510	0.445	0.185	0.502	0.863	0.510	0.998
	(0.501)	(0.498)		(0.501)		(0.501)	
Ever stayed in a jail/prison	0.135	0.135	0.999	0.107	0.371	0.155	0.593
	(0.343)	(0.343)		(0.310)		(0.362)	
Ever taken any illegal drug	0.349	0.345	0.932	0.321	0.541	0.397	0.331
	(0.478)	(0.476)		(0.468)		(0.491)	
Ever earned from commercial sex (female)	0.063	0.107	0.330	0.097	0.431	0.130	0.173
	(0.244)	(0.311)		(0.297)		(0.338)	
Ever paid for commercial sex (male)	0.083	0.031	0.023**	0.066	0.494	0.057	0.307
	(0.277)	(0.173)		(0.249)		(0.232)	
Committed crime: beating	0.214	0.192	0.588	0.210	0.926	0.242	0.502
	(0.411)	(0.395)		(0.408)		(0.430)	
Committed crime: stealing	0.161	0.157	0.906	0.148	0.705	0.180	0.622
	(0.369)	(0.365)		(0.356)		(0.386)	
Committed crime: robbery	0.052	0.057	0.833	0.070	0.437	0.041	0.615
	(0.223)	(0.232)		(0.256)		(0.199)	
Committed crime: rape (male)	0.000	0.007	0.319	0.007	0.319	0.000	.
	(0.000)	(0.083)		(0.082)		(0.000)	
Committed crime: fighting with violence	0.026	0.017	0.553	0.033	0.672	0.031	0.774
	(0.160)	(0.131)		(0.179)		(0.174)	
Committed crime: gang-related	0.016	0.004	0.260	0.008	0.490	0.015	0.990
	(0.124)	(0.066)		(0.091)		(0.124)	
Committed crime: broker	0.005	0.000	0.319	0.000	0.319	0.005	0.994
	(0.072)	(0.000)		(0.000)		(0.072)	
Police harassment: innocent but harassed	0.375	0.358	0.721	0.379	0.939	0.284	0.056*
	(0.485)	(0.480)		(0.486)		(0.452)	
Police harassment: mistargeted for others	0.109	0.114	0.893	0.115	0.848	0.139	0.376
	(0.313)	(0.318)		(0.320)		(0.347)	
Police harassment: harassed by identity	0.193	0.192	0.988	0.202	0.816	0.180	0.757
	(0.395)	(0.395)		(0.402)		(0.386)	
Risk factor score							
Labor market (score)	0.071	-0.069	0.155	-0.044	0.221	0.011	0.553
	(0.963)	(1.041)		(0.985)		(0.999)	
Family background (score)	0.004	0.075	0.464	-0.049	0.586	0.072	0.516
	(1.019)	(0.972)		(0.959)		(1.048)	
Cognitive skill (score)	-0.052	0.075	0.172	0.081	0.152	-0.072	0.851
	(0.980)	(0.910)		(0.929)		(1.099)	
Crime exposure (score)	-0.005	-0.008	0.977	0.062	0.489	-0.013	0.938
	(1.000)	(1.002)		(1.031)		(1.002)	
Past criminal activities (score)	0.026	-0.025	0.602	-0.021	0.619	0.078	0.620
	(0.974)	(1.018)		(0.970)		(1.061)	
Anti-gov't attitude, IAT (score)	0.033	-0.146	0.076*	0.036	0.974	0.030	0.979
	(1.069)	(0.980)		(0.863)		(1.032)	
Gang proximity (score)	0.035	-0.042	0.428	0.048	0.891	0.053	0.855
	(0.996)	(0.974)		(0.999)		(0.999)	
Drug & substance (score)	0.022	-0.112	0.154	0.001	0.829	0.098	0.470
	(1.026)	(0.871)		(0.951)		(1.064)	
Attitude towards gang activities (score)	0.031	-0.059	0.347	0.028	0.975	-0.030	0.555
	(0.984)	(0.966)		(0.984)		(1.022)	
Attitude towards crime & violence (score)	0.131	-0.064	0.037**	-0.087	0.020**	0.017	0.267
	(0.954)	(0.951)		(0.991)		(1.058)	
Tolerance for crime (score)	-0.011	-0.025	0.881	0.008	0.850	0.017	0.786
	(1.016)	(0.945)		(1.005)		(0.972)	
Verifying measure							
TC0: Place-based (score)	-0.043	-0.052	0.932	-0.028	0.883	0.062	0.335
	(1.128)	(0.888)		(0.976)		(1.021)	
TC1: Isolated (score)	-0.041	0.136	0.033**	0.050	0.285	0.039	0.420
	(1.009)	(0.590)		(0.671)		(0.929)	
TC2: Receiving hostility (score)	0.068	-0.035	0.297	-0.030	0.319	-0.036	0.324
	(1.074)	(0.921)		(0.922)		(0.975)	
TC3: Less exposed (score)	-0.060	-0.047	0.895	0.006	0.485	0.011	0.467
	(0.941)	(1.093)		(1.017)		(0.979)	
TC4: Politically harassed (score)	0.005	-0.031	0.701	0.023	0.843	-0.017	0.827
	(0.964)	(0.967)		(0.964)		(0.965)	
TC5: Dropped out (score)	0.034	-0.056	0.343	-0.075	0.241	0.012	0.841
	(1.003)	(0.926)		(0.907)		(1.116)	
N	192	229		243		194	
F-test of joint significance (*p*-value, RI)			0.338		0.572		0.863
F-test, number of observations			421		435		386

Notes: Sample of the first-order referrers. All variables are dummies. Illegal drugs include glue, marijuana, cocaine, and heroin. The information of committed crimes comes from reasons for having stayed in a police cell, reasons for having stayed in a jail/prison, and reasons for having received police harassment (committed a small crime but treated heavily; committed a small crime but was suspected of other crimes as well). The gang-related category of committed crimes includes assisting gang members' activities. The *p*-value for the joint *F*-test was derived using randomization inference (RI) with 1,000 permutations, excluding highly collinear variables (commitment of gang-related crimes, rape, broker). Standard deviations in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.6: Balance Table – Demographic and Economic Variables among Second-Order Referrers

	C: Control	T2: Externality		T4: Friend	
	Mean/sd	Mean/sd	Diff. from C. p-value	Mean/sd	Diff. from C. p-value
Age	23.386	23.288	0.730	23.588	0.571
	(4.182)	(4.065)		(3.940)	
Male	0.590	0.560	0.371	0.621	0.483
	(0.492)	(0.497)		(0.487)	
Muslim	0.419	0.408	0.742	0.407	0.772
	(0.494)	(0.492)		(0.493)	
Kikuyu ethnicity	0.255	0.290	0.253	0.264	0.832
	(0.437)	(0.454)		(0.442)	
Luo ethnicity	0.171	0.168	0.898	0.170	0.982
	(0.377)	(0.374)		(0.377)	
Living in Majengo	0.214	0.202	0.649	0.247	0.387
	(0.411)	(0.402)		(0.433)	
Living in Eastleigh	0.277	0.247	0.320	0.269	0.843
	(0.448)	(0.432)		(0.445)	
Living in Mathare	0.292	0.338	0.145	0.324	0.431
	(0.455)	(0.474)		(0.469)	
Living in Huruma-Kiamaiko	0.205	0.209	0.891	0.159	0.178
	(0.404)	(0.407)		(0.367)	
Years of education	10.631	10.433	0.296	10.352	0.314
	(2.800)	(2.741)		(3.251)	
Can write in Kiswahili	0.957	0.957	0.983	0.962	0.779
	(0.204)	(0.203)		(0.193)	
Reading English: % correct answers	67.831	67.234	0.686	66.117	0.379
	(21.312)	(21.969)		(22.154)	
Numeracy test: % correct answers	30.720	30.093	0.620	29.531	0.484
	(19.245)	(17.651)		(19.049)	
Formal employment	0.287	0.308	0.489	0.352	0.122
	(0.453)	(0.462)		(0.479)	
Casual, part-time, or temporary employment	0.357	0.342	0.663	0.335	0.612
	(0.480)	(0.475)		(0.473)	
Unemployed	0.357	0.349	0.821	0.313	0.299
	(0.480)	(0.477)		(0.465)	
Monthly income from all economic activities	4556.147	4626.041	0.863	5544.780	0.083*
	(5855.721)	(5945.538)		(6624.431)	
N	415	441		182	
F-test of joint significance (p-value, RI)			0.973		0.848
F-test, number of observations			856		597

Notes: Sample of the second-order referrers. The p-value for the joint F-test was derived using randomization inference (RI) with 1,000 permutations, excluding highly collinear variables (living in Eastleigh, formal employment). Standard deviations in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.7: Balance Table – High-Risk Activities among Second-Order Referrers

	C: Control	T2: Externality		T4: Friend	
	Mean/sd	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value
Ever been a victim of beating	0.301	0.281	0.520	0.269	0.424
	(0.459)	(0.450)		(0.445)	
Ever been a victim of stealing	0.313	0.367	0.095*	0.385	0.096*
	(0.464)	(0.483)		(0.488)	
Ever been a victim of robbery	0.294	0.254	0.190	0.286	0.838
	(0.456)	(0.436)		(0.453)	
Ever been a victim of rape (female)	0.030	0.031	0.941	0.014	0.440
	(0.170)	(0.174)		(0.120)	
Ever been a victim of gang-related violence	0.149	0.132	0.453	0.154	0.890
	(0.357)	(0.338)		(0.362)	
Ever been a victim of phone snatching	0.373	0.388	0.668	0.330	0.300
	(0.484)	(0.488)		(0.471)	
Ever invited to join a gang	0.299	0.297	0.956	0.308	0.828
	(0.458)	(0.457)		(0.463)	
Know anyone who joined a gang	0.627	0.635	0.799	0.610	0.702
	(0.484)	(0.482)		(0.489)	
Ever stayed in a police cell	0.455	0.515	0.083*	0.516	0.171
	(0.499)	(0.500)		(0.501)	
Ever stayed in a jail/prison	0.106	0.127	0.339	0.132	0.379
	(0.308)	(0.333)		(0.339)	
Ever taken any illegal drug	0.345	0.367	0.487	0.357	0.768
	(0.476)	(0.483)		(0.480)	
Ever earned from commercial sex (female)	0.101	0.093	0.803	0.145	0.364
	(0.302)	(0.291)		(0.355)	
Ever paid for commercial sex (male)	0.053	0.045	0.605	0.082	0.206
	(0.224)	(0.208)		(0.276)	
Committed crime: beating	0.207	0.224	0.540	0.258	0.182
	(0.406)	(0.418)		(0.439)	
Committed crime: stealing	0.135	0.172	0.129	0.115	0.502
	(0.342)	(0.378)		(0.320)	
Committed crime: robbery	0.067	0.086	0.304	0.099	0.217
	(0.251)	(0.281)		(0.299)	
Committed crime: rape (male)	0.012	0.008	0.648	0.009	0.764
	(0.110)	(0.090)		(0.094)	
Committed crime: fighting with violence	0.041	0.048	0.636	0.044	0.869
	(0.198)	(0.213)		(0.206)	
Committed crime: gang-related	0.024	0.016	0.392	0.016	0.530
	(0.154)	(0.125)		(0.128)	
Committed crime: broker	0.010	0.002	0.166	0.011	0.882
	(0.098)	(0.048)		(0.105)	
Police harassment: innocent but harassed	0.308	0.340	0.322	0.275	0.402
	(0.462)	(0.474)		(0.448)	
Police harassment: mistargeted for others	0.135	0.104	0.169	0.176	0.215
	(0.342)	(0.306)		(0.382)	
Police harassment: harassed by identity	0.188	0.195	0.793	0.203	0.666
	(0.391)	(0.397)		(0.404)	
Risk factor score					
Labor market (score)	-0.085	-0.041	0.544	0.045	0.167
	(1.061)	(1.040)		(1.061)	
Family background (score)	0.061	0.108	0.525	-0.046	0.271
	(1.077)	(1.082)		(1.099)	
Cognitive skill (score)	-0.020	-0.072	0.455	-0.056	0.682
	(0.999)	(1.032)		(0.989)	
Crime exposure (score)	-0.060	-0.140	0.243	-0.066	0.952
	(1.019)	(0.970)		(0.988)	
Past criminal activities (score)	-0.163	-0.067	0.119	-0.019	0.095*
	(0.864)	(0.938)		(1.001)	
Anti-gov't attitude, IAT (score)	0.070	0.001	0.297	-0.091	0.052*
	(1.008)	(0.943)		(0.897)	
Gang proximity (score)	0.031	0.029	0.968	0.040	0.926
	(1.055)	(1.024)		(1.089)	
Drug & substance (score)	-0.038	-0.059	0.755	-0.102	0.440
	(1.009)	(0.977)		(0.888)	
Attitude towards gang activities (score)	-0.074	-0.062	0.860	0.013	0.352
	(1.014)	(1.048)		(1.060)	
Attitude towards crime & violence (score)	-0.036	-0.042	0.925	0.025	0.501
	(1.024)	(1.010)		(1.010)	
Tolerance for crime (score)	0.087	-0.003	0.217	-0.189	0.004***
	(1.127)	(1.003)		(1.055)	
Verifying measure					
TC0: Place-based (score)	0.023	0.095	0.355	-0.058	0.386
	(1.181)	(1.084)		(0.989)	
TC1: Isolated (score)	-0.039	-0.036	0.958	-0.076	0.616
	(0.868)	(0.862)		(0.809)	
TC2: Receiving hostility (score)	0.060	-0.057	0.119	-0.149	0.014**
	(1.115)	(1.073)		(0.875)	
TC3: Less exposed (score)	-0.015	-0.033	0.794	-0.134	0.228
	(1.034)	(1.035)		(1.144)	
TC4: Politically harassed (score)	-0.079	-0.048	0.637	-0.037	0.640
	(1.003)	(0.957)		(1.033)	
TC5: Dropped out (score)	-0.038	0.051	0.183	0.024	0.519
	(0.944)	(1.005)		(1.129)	
N	415	441		182	
F-test of joint significance (*p*-value, RI)			0.792		0.192
F-test, number of observations			856		597

Notes: Sample of the second-order referrers. All variables are dummies. Illegal drugs include glue, marijuana, cocaine, and heroin. The information of committed crimes comes from reasons for having stayed in a police cell, reasons for having stayed in a jail/prison, and reasons for having received police harassment (committed a small crime but treated heavily; committed a small crime but was suspected of other crimes as well). The gang-related category of committed crimes includes assisting gang members' activities. The *p*-value for the joint *F*-test was derived using randomization inference (RI) with 1,000 permutations, excluding highly collinear variables (commitment of gang-related crimes, rape, broker). Standard deviations in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard deviations in parenthesis. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.8: Balance Table – Demographic and Economic Variables by Referral Assignment and Stage

	FOR, referred	FOR, not referred		SOR, referred		SOR, not referred	
	Mean/sd	Mean/sd	Diff. from FOR, referred *p*-value	Mean/sd	Diff. from FOR, referred *p*-value	Mean/sd	Diff. from SOR, referred *p*-value
Age	23.536	23.540	0.993	23.380	0.417	23.377	0.992
	(4.254)	(4.145)		(4.088)		(4.374)	
Male	0.629	0.507	0.007***	0.583	0.039**	0.552	0.258
	(0.483)	(0.502)		(0.493)		(0.498)	
Muslim	0.380	0.295	0.040**	0.412	0.151	0.300	0.000***
	(0.486)	(0.457)		(0.492)		(0.459)	
Kikuyu ethnicity	0.287	0.349	0.142	0.272	0.468	0.281	0.706
	(0.452)	(0.478)		(0.445)		(0.450)	
Luo ethnicity	0.182	0.144	0.236	0.170	0.486	0.187	0.426
	(0.386)	(0.352)		(0.375)		(0.390)	
Living in Majengo	0.221	0.281	0.139	0.215	0.729	0.163	0.016**
	(0.415)	(0.451)		(0.411)		(0.370)	
Living in Eastleigh	0.259	0.288	0.475	0.263	0.833	0.232	0.191
	(0.438)	(0.454)		(0.440)		(0.422)	
Living in Mathare	0.298	0.164	0.000***	0.317	0.383	0.309	0.759
	(0.458)	(0.372)		(0.466)		(0.463)	
Living in Huruma-Kiamaiko	0.212	0.205	0.855	0.198	0.464	0.277	0.001***
	(0.409)	(0.405)		(0.399)		(0.448)	
Years of education	10.499	10.164	0.217	10.498	0.996	10.627	0.409
	(3.022)	(3.015)		(2.860)		(2.755)	
Can write in Kiswahili	0.958	0.938	0.352	0.958	0.963	0.946	0.356
	(0.201)	(0.241)		(0.202)		(0.226)	
Reading English: % correct answers	68.124	67.922	0.927	67.277	0.393	66.810	0.700
	(21.260)	(25.074)		(21.729)		(21.751)	
Numeracy test: % correct answers	29.556	32.718	0.056*	30.245	0.414	30.893	0.529
	(18.053)	(18.393)		(18.536)		(18.416)	
Formal employment	0.297	0.308	0.790	0.307	0.633	0.328	0.421
	(0.457)	(0.463)		(0.462)		(0.470)	
Casual, part-time, or temporary employment	0.386	0.377	0.835	0.347	0.080*	0.315	0.230
	(0.487)	(0.486)		(0.476)		(0.465)	
Unemployed	0.316	0.267	0.225	0.346	0.167	0.350	0.883
	(0.465)	(0.444)		(0.476)		(0.477)	
Monthly income from all economic activities	5039.129	5693.534	0.243	4759.186	0.314	4895.172	0.684
	(6011.103)	(6282.202)		(6039.860)		(5981.032)	
N	858	146		1038		466	
F-test of joint significance (*p*-value, RI)			0.002		0.510		0.005
F-test, number of observations			1004		1896		1504

Notes: The *p*-value for the joint *F*-test was derived using randomization inference (RI) with 1,000 permutations, excluding highly collinear variables (living in Eastleigh, formal employment). Standard deviations in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A.9: Balance Table – High-Risk Activities by Referral Assignment and Stage

	FOR, referred	FOR, not referred		SOR, referred		SOR, not referred	
	Mean/sd	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value	Mean/sd	Diff. from C. *p*-value
Ever been a victim of beating	0.287	0.253	0.398	0.289	0.680	0.294	0.843
	(0.452)	(0.436)		(0.454)		(0.456)	
Ever been a victim of stealing	0.389	0.247	0.000***	0.356	0.076*	0.365	0.743
	(0.488)	(0.433)		(0.479)		(0.482)	
Ever been a victim of robbery	0.267	0.192	0.038**	0.275	0.540	0.225	0.028**
	(0.443)	(0.395)		(0.447)		(0.418)	
Ever been a victim of rape (female)	0.057	0.031	0.322	0.036	0.305	0.063	0.142
	(0.231)	(0.175)		(0.186)		(0.244)	
Ever been a victim of gang-related violence	0.177	0.116	0.042**	0.153	0.239	0.118	0.050**
	(0.382)	(0.322)		(0.360)		(0.323)	
Ever been a victim of phone snatching	0.380	0.397	0.694	0.377	0.833	0.363	0.582
	(0.486)	(0.491)		(0.485)		(0.481)	
Ever invited to join a gang	0.279	0.226	0.168	0.296	0.283	0.292	0.864
	(0.449)	(0.420)		(0.457)		(0.455)	
Know anyone who joined a gang	0.612	0.534	0.084*	0.626	0.346	0.663	0.142
	(0.488)	(0.501)		(0.484)		(0.473)	
Ever stayed in a police cell	0.491	0.397	0.035**	0.496	0.460	0.481	0.575
	(0.500)	(0.491)		(0.500)		(0.500)	
Ever stayed in a jail/prison	0.132	0.089	0.107	0.119	0.195	0.124	0.776
	(0.338)	(0.286)		(0.324)		(0.330)	
Ever taken any illegal drug	0.351	0.322	0.493	0.350	0.471	0.397	0.067*
	(0.478)	(0.469)		(0.477)		(0.490)	
Ever earned from commercial sex (female)	0.101	0.078	0.553	0.098	0.491	0.112	0.601
	(0.301)	(0.270)		(0.298)		(0.316)	
Ever paid for commercial sex (male)	0.058	0.075	0.465	0.060	0.125	0.049	0.349
	(0.234)	(0.265)		(0.238)		(0.217)	
Committed crime: beating	0.213	0.233	0.605	0.220	0.832	0.247	0.238
	(0.410)	(0.424)		(0.414)		(0.432)	
Committed crime: stealing	0.161	0.103	0.040**	0.149	0.366	0.146	0.855
	(0.368)	(0.305)		(0.357)		(0.353)	
Committed crime: robbery	0.056	0.089	0.186	0.075	0.042**	0.064	0.409
	(0.230)	(0.286)		(0.264)		(0.246)	
Committed crime: rape (male)	0.004	0.027	0.227	0.008	0.397	0.012	0.611
	(0.061)	(0.163)		(0.089)		(0.108)	
Committed crime: fighting with violence	0.027	0.075	0.033**	0.040	0.068*	0.045	0.646
	(0.162)	(0.265)		(0.196)		(0.208)	
Committed crime: gang-related	0.010	0.021	0.414	0.017	0.195	0.011	0.286
	(0.102)	(0.142)		(0.129)		(0.103)	
Committed crime: broker	0.002	0.007	0.522	0.005	0.314	0.006	0.810
	(0.048)	(0.083)		(0.074)		(0.080)	
Police harassment: innocent but harassed	0.351	0.281	0.087*	0.334	0.696	0.273	0.011**
	(0.478)	(0.451)		(0.472)		(0.446)	
Police harassment: mistargeted for others	0.119	0.171	0.116	0.124	0.954	0.124	0.990
	(0.324)	(0.378)		(0.330)		(0.330)	
Police harassment: harassed by identity	0.192	0.164	0.407	0.195	0.708	0.172	0.254
	(0.394)	(0.372)		(0.396)		(0.378)	
Risk factor score							
Labor market (score)	-0.012	0.073	0.344	-0.029	0.957	-0.055	0.643
	(0.998)	(1.010)		(1.030)		(1.086)	
Family background (score)	0.023	-0.138	0.077*	0.036	0.505	0.107	0.198
	(0.996)	(1.014)		(1.056)		(1.030)	
Cognitive skill (score)	0.015	-0.090	0.288	-0.028	0.520	-0.063	0.515
	(0.977)	(1.124)		(0.994)		(1.028)	
Crime exposure (score)	0.011	-0.067	0.362	-0.057	0.396	-0.170	0.024**
	(1.009)	(0.947)		(1.001)		(0.919)	
Past criminal activities (score)	0.011	-0.065	0.388	-0.068	0.107	-0.057	0.828
	(1.004)	(0.977)		(0.937)		(0.985)	
Anti-gov't attitude, IAT (score)	-0.014	0.084	0.277	0.019	0.126	-0.021	0.427
	(0.983)	(1.018)		(0.961)		(0.949)	
Gang proximity (score)	0.022	-0.130	0.103	0.035	0.548	-0.001	0.511
	(0.990)	(1.048)		(1.032)		(1.037)	
Drug & substance (score)	-0.003	0.015	0.859	-0.038	0.676	-0.109	0.184
	(0.976)	(1.136)		(0.977)		(1.021)	
Attitude towards gang activities (score)	-0.008	0.045	0.579	-0.029	0.765	-0.091	0.279
	(0.987)	(1.076)		(1.021)		(1.079)	
Attitude towards crime & violence (score)	-0.008	0.049	0.544	-0.017	0.858	-0.157	0.009***
	(0.990)	(1.059)		(1.004)		(1.012)	
Tolerance for crime (score)	-0.003	0.017	0.833	0.000	0.914	-0.020	0.716
	(0.983)	(1.074)		(1.049)		(1.059)	
Verifying measure							
TC0: Place-based (score)	-0.017	0.102	0.186	0.018	0.756	-0.056	0.177
	(0.999)	(1.001)		(1.090)		(1.005)	
TC1: Isolated (score)	0.050	-0.294	0.020**	-0.028	0.006***	-0.020	0.873
	(0.803)	(1.733)		(0.850)		(0.982)	
TC2: Receiving hostility (score)	-0.011	0.063	0.472	-0.015	0.697	0.023	0.501
	(0.969)	(1.169)		(1.041)		(1.068)	
TC3: Less exposed (score)	-0.022	0.129	0.071*	-0.037	0.768	0.053	0.121
	(1.012)	(0.919)		(1.034)		(1.114)	
TC4: Politically harassed (score)	-0.004	0.026	0.771	-0.037	0.822	-0.087	0.333
	(0.964)	(1.195)		(0.981)		(0.988)	
TC5: Dropped out (score)	-0.026	0.152	0.064*	-0.000	0.661	-0.002	0.980
	(0.983)	(1.083)		(0.989)		(0.989)	
N	858	146		1473		466	
F-test of joint significance (*p*-value, RI)			0.014		0.049		0.000
F-test, number of observations			1004		1896		1939

Notes: All variables are dummies. Illegal drugs include glue, marijuana, cocaine, and heroin. The information of committed crimes comes from reasons for having stayed in a police cell, reasons for having stayed in a jail/prison, and reasons for having received police harassment (committed a small crime but treated heavily; committed a small crime but was suspected of other crimes as well). The gang-related category of committed crimes includes assisting gang members' activities. The *p*-value for the joint *F*-test was derived using randomization inference (RI) with 1,000 permutations, excluding highly collinear variables (commitment of gang-related crimes, rape, broker). Standard deviations in parentheses. Significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

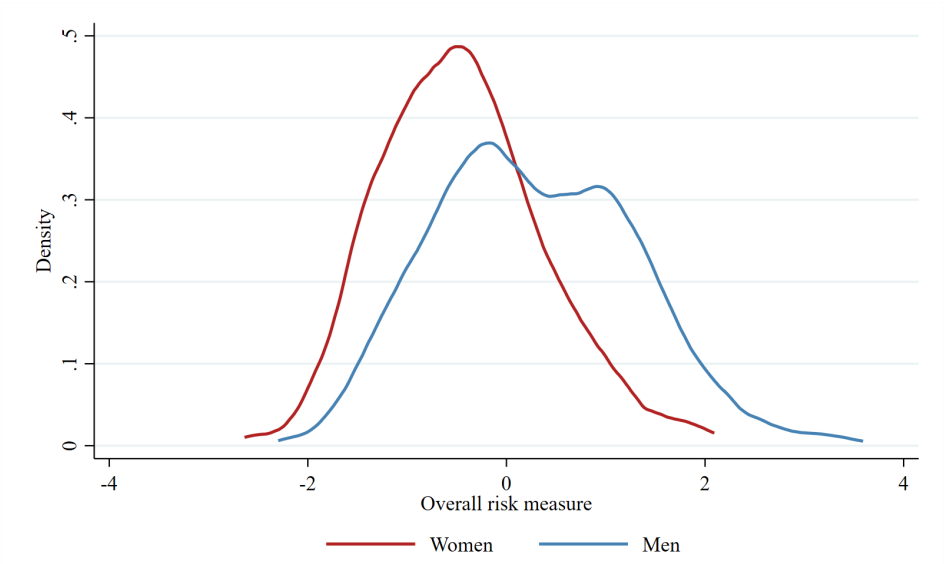


Figure A.1: Overall Risk Measure by Gender

Note. Kernel densities of the overall risk measure among the randomly sampled respondents, 614 men and 382 women.

who completed the module, this selection shapes the population the estimates describe and not the comparison between arms. Margin (ii), whether a referrer names anyone at all, is not a selection problem but part of what we estimate, since the success probability is measured over nominations and interviews together and a referrer who names no one enters with a probability of zero. The population these estimates describe is therefore the one referrers can reach through what they know. Margin (iii), whether a nominated individual is then interviewed, is the one the contact-phase randomization addresses. Because referral is homophilous, respondents who are less represented in the estimation sample are linked to targets who are also less represented, and the estimates describe what a referral-based approach reaches through the respondents it can interview.

A.4 Effectiveness of Targeting Conditions

Reading Figure 6 condition by condition, TC0 (place-based) shows broad associations across family background, crime exposure, and past criminal activities among push factors and gang proximity, drug use, and attitudes toward gangs among pull factors, indicating that a simple location-based condition captures multidimensional risk profiles. TC1 (isolated) is associated with family background, cognitive skills, past criminal activities, anti-government attitudes, and drug use, though not with gang-related dimensions. TC2 (receiving hostility) shows significant associations with gang proximity and violence attitudes and with none of the push factors. Among TCs, TC3 (less exposed) shows the weakest conditional correlation with aggregate measures. While it is negatively associated with crime exposure and past criminal activities, it is significantly associated with poor labor market outcomes and violence attitudes.

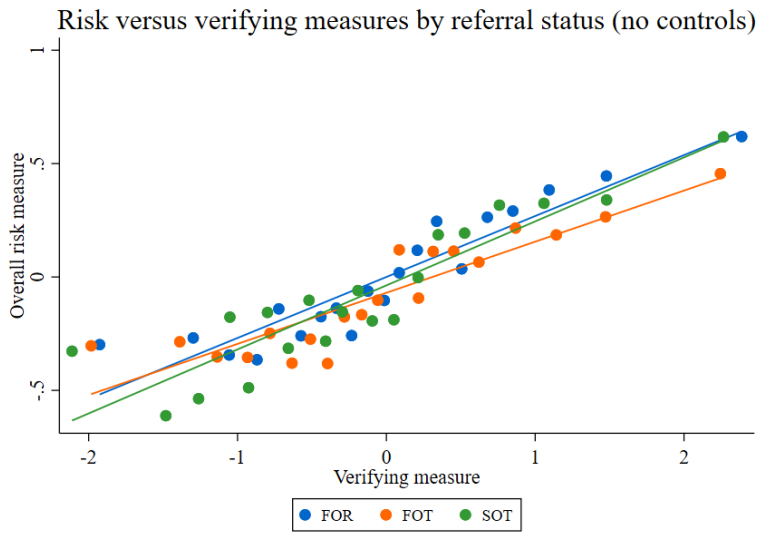


Figure A.2: Correlation between Overall Risk and Verifying Measure

Note. The figure shows a binscatter plot of the relationship between the overall verifying measure and overall risk measure by referral status. The aggregate verifying measure is the mean of the standardized verifying measures corresponding to the TCs, while the overall risk factor measure is the mean of the standardized risk factor scores for each topic listed in Section 4.3 except for the IAT score. For each referral status, each point represents the mean risk measure for observations within one of 20 equal-sized bins based on the verifying measure and the solid line represents the linear best fit.

Table A.10: Correlations of Risk Factor and Verifying Measures

Panel A: Risk factor scores

	Labor market	Family background	Cognitive skill	Crime exposure	Past criminal activities	Anti-gov't attitude (IAT)	Gang proximity	Drug & substance	Attitude toward gangs	Attitude toward violence	Tolerance for crime
Labor market condition z-score	1										
Family background z-score	-0.105	1									
Cognitive skill z-score	0.0447	-0.000317	1								
Crime exposure z-score (push factor)	0.111	-0.103	0.0296	1							
Past criminal activities z-score	0.117	-0.160	-0.0740	0.252	1						
The IAT score	-0.0205	-0.0128	-0.123	0.0505	0.0775	1					
Proximity to gang activities	0.105	-0.0956	0.00403	0.289	0.373	0.0479	1				
Drug & substance z-score	0.139	-0.131	-0.0159	0.390	0.563	0.0844	0.410	1			
Attitude towards gang activities	0.0254	-0.0661	0.0438	0.221	0.217	0.00811	0.317	0.390	1		
Attitude towards crime and violence	0.109	-0.0555	-0.00908	0.261	0.234	0.100	0.263	0.383	0.437	1	
Weak pref. for crime reduction score	0.0159	-0.0663	0.00689	-0.0276	-0.0457	0.0460	-0.0319	-0.0564	-0.0909	-0.0793	1

Panel B: Verifying measures

	TC0: Place-based	TC1: Isolated	TC2: Hostility	TC3: Less exposed	TC4: Politically harassed	TC5: Dropped out
Score for TC location for analysis	1					
Score for TC isolate for analysis	0.0634	1				
Score for TC hostility for analysis	0.0548	0.128	1			
Score for TC exposure for analysis	0.124	0.0343	-0.0571	1		
Score for TC harassment for analysis	-0.121	0.0113	0.226	-0.188	1	
Score for TC dropout for analysis	0.0450	-0.0780	0.0128	0.0243	0.0223	1

Notes: This table reports Pearson correlation coefficients for the sample of first-order referrers. Panel A shows the correlations among the standardized risk factor scores. Panel B shows the correlations among the six standardized verifying measure scores corresponding to TCs.

Table A.11: First-Order Referral and Verifying Measures

Dep. var.: TC-specific verifying measure (z-score)

	TC0 Place-based score	TC1 Isolation score		TC2 Hostility score		TC3 Exposure score		TC4 Harassment score		TC5 Dropout score	
	(1) OLS	(2) OLS	(3) CF	(4) OLS	(5) CF	(6) OLS	(7) CF	(8) OLS	(9) CF	(10) OLS	(11) CF
Referral incentive:											
T1: Monetary incentive	0.071	0.127	0.125	-0.074	-0.075	0.066	0.074	0.103	0.102	-0.264	-0.258
	(0.075)	(0.077)	(0.078)	(0.082)	(0.082)	(0.090)	(0.094)	(0.074)	(0.076)	(0.085)	(0.085)
	[0.740]	[0.190]	[0.310]	[0.775]	[0.785]	[0.825]	[0.785]	[0.540]	[0.570]	[0.005]	[0.005]
	{0.237}	{0.122}	{0.137}	{0.257}	{0.275}	{0.334}	{0.275}	{0.150}	{0.167}	{0.001}	{0.001}
T2: Externality info	-0.023	0.191	0.191	-0.084	-0.084	0.039	0.040	-0.015	-0.015	-0.136	-0.135
	(0.072)	(0.079)	(0.081)	(0.079)	(0.080)	(0.083)	(0.085)	(0.074)	(0.075)	(0.099)	(0.102)
	[0.955]	[0.005]	[0.005]	[0.740]	[0.740]	[0.955]	[0.925]	[0.960]	[0.940]	[0.540]	[0.570]
	{0.487}	{0.001}	{0.001}	{0.220}	{0.220}	{0.410}	{0.400}	{0.501}	{0.487}	{0.157}	{0.167}
T1 × T2: Interaction	-0.008	-0.202	-0.197	0.145	0.146	-0.054	-0.072	-0.184	-0.180	0.211	0.196
	(0.112)	(0.109)	(0.111)	(0.120)	(0.119)	(0.120)	(0.125)	(0.112)	(0.114)	(0.120)	(0.123)
	[0.960]	[0.085]	[0.105]	[0.595]	[0.590]	[0.955]	[0.875]	[0.190]	[0.235]	[0.190]	[0.310]
	{0.567}	{0.107}	{0.127}	{0.200}	{0.191}	{0.410}	{0.370}	{0.107}	{0.127}	{0.107}	{0.127}
Targeting conditions:											
TC0: Place-Based	0.461	0.062	0.162	-0.027	-0.012	-0.116	-0.449	0.041	0.123	-0.364	-0.640
	(0.089)	(0.090)	(0.156)	(0.103)	(0.186)	(0.117)	(0.218)	(0.087)	(0.153)	(0.103)	(0.167)
	[0.080]	[0.990]	[0.955]	[1.000]	[1.000]	[0.915]	[0.375]	[1.000]	[0.985]	[0.080]	[0.005]
	{0.001}	{0.601}	{0.373}	{0.867}	{0.819}	{0.376}	{0.038}	{0.777}	{0.460}	{0.001}	{0.001}
TC1: Isolated	0.022	0.195	0.221	0.043	0.047	0.004	-0.082	0.079	0.100	-0.301	-0.371
	(0.096)	(0.078)	(0.091)	(0.117)	(0.124)	(0.109)	(0.120)	(0.102)	(0.108)	(0.113)	(0.121)
	[1.000]	[0.110]	[0.375]	[1.000]	[1.000]	[1.000]	[0.985]	[0.985]	[0.955]	[0.080]	[0.005]
	{0.867}	{0.028}	{0.038}	{0.867}	{0.819}	{1.000}	{0.467}	{0.472}	{0.399}	{0.001}	{0.001}
TC2: Receiving hostility	0.127	0.109	0.126	0.069	0.072	0.043	-0.014	0.047	0.061	-0.225	-0.272
	(0.072)	(0.084)	(0.092)	(0.105)	(0.109)	(0.097)	(0.107)	(0.078)	(0.079)	(0.101)	(0.108)
	[0.295]	[0.825]	[0.700]	[0.990]	[0.985]	[1.000]	[1.000]	[1.000]	[0.985]	[0.080]	[0.005]
	{0.028}	{0.236}	{0.183}	{0.601}	{0.484}	{0.777}	{0.819}	{0.636}	{0.431}	{0.001}	{0.001}
TC3: Less exposed	-0.002	0.067	0.075	-0.023	-0.022	0.124	0.098	0.015	0.021	-0.252	-0.273
	(0.088)	(0.078)	(0.081)	(0.102)	(0.104)	(0.094)	(0.099)	(0.093)	(0.094)	(0.103)	(0.104)
	[1.000]	[0.985]	[0.960]	[1.000]	[1.000]	[0.725]	[0.910]	[1.000]	[1.000]	[0.080]	[0.000]
	{1.000}	{0.472}	{0.399}	{0.990}	{0.819}	{0.202}	{0.318}	{1.000}	{0.819}	{0.001}	{0.001}
TC4: Politically harassed	-0.079	0.031	0.040	-0.121	-0.120	-0.029	-0.058	0.307	0.314	-0.228	-0.252
	(0.096)	(0.099)	(0.100)	(0.108)	(0.110)	(0.117)	(0.122)	(0.111)	(0.111)	(0.118)	(0.120)
	[0.985]	[1.000]	[0.995]	[0.880]	[0.910]	[1.000]	[0.995]	[0.080]	[0.005]	[0.110]	[0.080]
	{0.472}	{0.867}	{0.751}	{0.310}	{0.318}	{0.867}	{0.630}	{0.001}	{0.001}	{0.028}	{0.031}
Referrer characteristics:											
Verifying measure (referring TC)	0.004	0.006	0.006	0.053	0.053	-0.005	-0.004	-0.020	-0.020	0.018	0.018
	(0.025)	(0.023)	(0.023)	(0.030)	(0.030)	(0.028)	(0.028)	(0.026)	(0.026)	(0.025)	(0.025)
	[1.000]	[1.000]	[1.000]	[0.215]	[0.190]	[1.000]	[1.000]	[0.975]	[0.985]	[0.975]	[0.985]
	{1.000}	{1.000}	{1.000}	{0.059}	{0.090}	{1.000}	{1.000}	{0.819}	{0.794}	{0.819}	{0.794}
Overall risk factor score	0.022	0.045	0.042	-0.003	-0.003	-0.010	0.002	0.028	0.025	0.101	0.111
	(0.035)	(0.027)	(0.028)	(0.034)	(0.034)	(0.037)	(0.039)	(0.032)	(0.032)	(0.036)	(0.037)
	[0.975]	[0.230]	[0.370]	[1.000]	[1.000]	[1.000]	[1.000]	[0.875]	[0.985]	[0.000]	[0.000]
	{1.000}	{0.154}	{0.225}	{1.000}	{1.000}	{1.000}	{1.000}	{0.819}	{0.794}	{0.001}	{0.001}
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.095	-0.162	-0.162	-0.001	-0.001	-0.057	-0.057	-0.038	-0.038	0.155	0.155
Adjusted R^2	0.240	0.124	0.124	0.085	0.084	0.118	0.120	0.137	0.136	0.048	0.050
Mills: coefficient	.	.	0.150	.	0.022	.	-0.500	.	0.124	.	-0.413
Mills: *p*-value	.	.	1.000	.	1.000	.	1.000	.	1.000	.	1.000
Joint test (*p*-value):											
Equivalence with other TCs	0.000	0.179	0.179	0.449	0.449	0.189	0.189	0.043	0.043	0.019	0.019
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

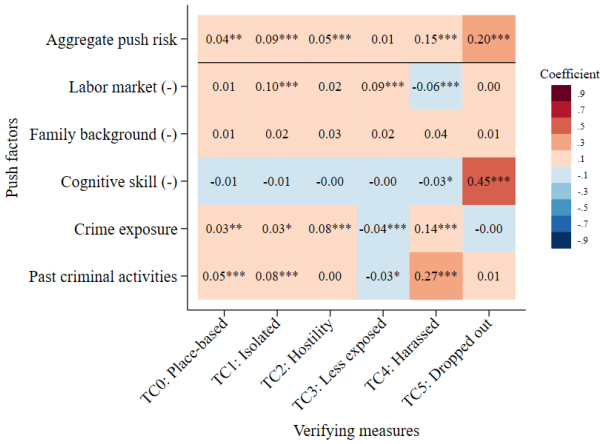
Notes: Regression results about the risk factors of the first-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). See Appendix Table A.12 for the results of the second-round referrals. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Standard errors in parentheses are computed by a cluster bootstrap (200 replications) that accounts for dependence at both the referrer and the target level and re-estimates the selection equation in each replication. Romano-Wolf step-down adjusted *p*-values in brackets; each family pools one coefficient group (referral incentives; targeting conditions; referrer characteristics) across all columns of the table. Anderson (2008) sharpened FDR *q*-values in braces.

Table A.12: Second-Order Referral and Verifying Measures

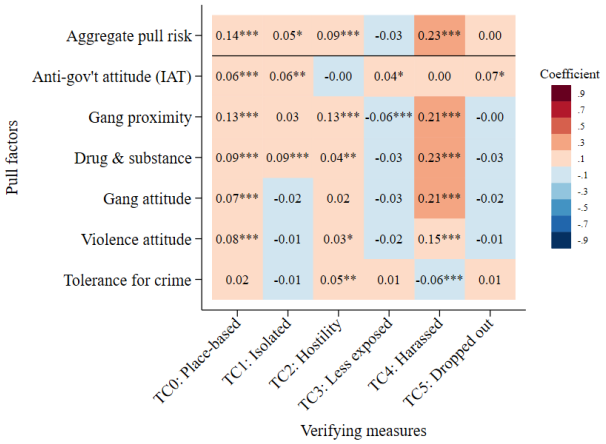
Dep. var.: TC-specific verifying measure (z-score)

	TC0 Place-based score	TC1 Isolation score		TC2 Hostility score		TC3 Exposure score		TC4 Harassment score		TC5 Dropout score	
	(1) OLS	(2) OLS	(3) CF	(4) OLS	(5) CF	(6) OLS	(7) CF	(8) OLS	(9) CF	(10) OLS	(11) CF
Referral incentive:											
T2: Externality	0.032	-0.138*	-0.146*	-0.119	-0.140	-0.023	-0.019	-0.114	-0.118	-0.043	-0.068
	(0.086)	(0.073)	(0.084)	(0.082)	(0.092)	(0.079)	(0.090)	(0.078)	(0.087)	(0.080)	(0.092)
T4: Friend	-0.040	0.031	0.036	-0.146	-0.618**	0.036	0.019	0.015	-0.312	0.088	-0.302
	(0.137)	(0.125)	(0.251)	(0.157)	(0.268)	(0.144)	(0.233)	(0.147)	(0.286)	(0.153)	(0.291)
Targeting conditions:											
TC1: Isolated	-0.087	0.002	-0.002	-0.096	-0.176	-0.170	-0.175	-0.010	-0.065	0.069	-0.002
	(0.136)	(0.107)	(0.134)	(0.132)	(0.154)	(0.135)	(0.136)	(0.123)	(0.136)	(0.136)	(0.161)
TC2: Receiving hostility	-0.062	-0.017	-0.051	-0.018	0.247	-0.166	-0.162	-0.086	0.113	-0.036	0.159
	(0.139)	(0.105)	(0.137)	(0.136)	(0.192)	(0.136)	(0.170)	(0.132)	(0.236)	(0.130)	(0.209)
TC3: Less exposed	-0.289**	0.094	0.088	-0.127	-0.129	0.116	0.114	0.109	0.111	-0.012	-0.019
	(0.133)	(0.103)	(0.100)	(0.120)	(0.144)	(0.123)	(0.121)	(0.122)	(0.139)	(0.129)	(0.160)
TC4: Politically harassed	-0.159	0.041	0.030	-0.164	-0.237	0.015	0.010	0.145	0.099	0.069	-0.001
	(0.149)	(0.110)	(0.141)	(0.136)	(0.176)	(0.131)	(0.137)	(0.139)	(0.160)	(0.129)	(0.169)
Referrer characteristics:											
Verifying measure (referring TC)	0.022	-0.029	-0.025	-0.056	-0.124**	0.070*	0.069	-0.006	-0.054	-0.047	-0.101*
	(0.039)	(0.029)	(0.042)	(0.050)	(0.059)	(0.042)	(0.056)	(0.039)	(0.056)	(0.039)	(0.055)
Overall risk factor score	-0.084*	-0.030	-0.035	-0.022	0.022	0.065	0.066	0.040	0.073	0.007	0.039
	(0.044)	(0.039)	(0.046)	(0.042)	(0.056)	(0.044)	(0.052)	(0.045)	(0.062)	(0.046)	(0.053)
N	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	-0.218	-0.038	-0.038	-0.061	-0.061	0.013	0.013	0.046	0.046	0.065	0.065
Adjusted R^2	0.148	0.138	0.134	0.080	0.084	0.154	0.155	0.144	0.145	0.035	0.037
Mills: coefficient			0.073		-1.431		-0.053		-1.032		-1.135
Mills: p-value			0.895		0.038		0.925		0.213		0.122
Joint test (p-value):											
Equivalence with other TCs	0.229	0.769	0.789	0.635	0.243	0.043	0.057	0.399	0.769	0.914	0.924
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the second-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community and survey month fixed effects are absorbed, with a dummy for second-or-later contact order. The reference group for targeting conditions is TC5 (dropout). The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).



(a) Push factors



(b) Pull factors

Figure A.3: Correlation between Targeting Conditions and Risk Factors among Referred Individuals

Note. The figures show heatmaps of regression coefficients from regressing each risk factor on the six verifying measures jointly. Each cell shows the coefficient with significance levels indicated by asterisks ($^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$). The sample is restricted to referred individuals.

Table A.13: Targeting Methods and Successful Referral (Second-Order Referrers)

Dependent variable: Whether target is observed or not (dummy)										
	TC1: Isolated		TC2: Hostility		TC3: Less exposed		TC4: Politically harassed		TC5: Dropped out	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
T2: Externality	-0.122*	-0.128*	0.004	0.009	-0.003	0.061	0.069	0.091	0.044	0.114
	(0.063)	(0.072)	(0.046)	(0.051)	(0.049)	(0.057)	(0.058)	(0.065)	(0.076)	(0.084)
× T-Contact		0.028		-0.034		-0.313**		-0.114		-0.369**
		(0.163)		(0.120)		(0.127)		(0.142)		(0.177)
TC1: Isolated	0.000	0.000	-0.074	-0.073	0.034	0.024	0.000	0.000	0.000	0.000
	(.)	(.)	(0.057)	(0.058)	(0.063)	(0.063)	(.)	(.)	(.)	(.)
TC2: Receiving hostility	-0.378	-0.375	0.000	0.000	-0.460***	-0.443***	0.463***	0.464***	-0.119	-0.034
	(0.305)	(0.306)	(.)	(.)	(0.147)	(0.148)	(0.148)	(0.146)	(0.265)	(0.277)
TC3: Less exposed	-0.300	-0.296	-0.135	-0.137	0.000	0.000	0.530***	0.533***	-0.193	-0.097
	(0.309)	(0.310)	(0.143)	(0.144)	(.)	(.)	(0.156)	(0.155)	(0.268)	(0.281)
TC4: Politically harassed	0.000	0.000	-0.011	-0.010	0.039	0.036	0.000	0.000	0.000	0.000
	(.)	(.)	(0.061)	(0.061)	(0.058)	(0.058)	(.)	(.)	(.)	(.)
T-Contact: Contact incentive	0.008	-0.008	-0.127**	-0.111	-0.061	0.120	0.014	0.067	0.101	0.286**
	(0.083)	(0.121)	(0.061)	(0.084)	(0.062)	(0.098)	(0.072)	(0.086)	(0.087)	(0.126)
Overall risk measure	-0.019	-0.019	0.004	0.004	-0.031	-0.037	-0.040	-0.042	0.033	0.017
	(0.036)	(0.036)	(0.028)	(0.028)	(0.030)	(0.029)	(0.039)	(0.039)	(0.041)	(0.042)
N	303	303	426	426	428	428	271	271	262	262
Dependent variable mean (control)	0.493	0.493	0.330	0.330	0.433	0.433	0.433	0.433	0.423	0.423
Adjusted R^2	0.050	0.046	0.123	0.121	0.077	0.090	0.259	0.257	0.081	0.097
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results for second-order referrers, excluding T4 (friend-based referrals). The reference group for targeting conditions is TC5 (dropout). The reference group for referral incentives is control (no additional incentive). Standard errors are clustered at the level of first-order referrers. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.14: Targeting Methods and Successful Referral

Dependent variable: Whether target is observed or not (dummy)	TC0: Place-Based	TC1: Isolated		TC2: Hostility		TC3: Less exposed		TC4: Politically harassed		TC5: Dropped out	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
T1: Monetary incentive	0.044	0.008	-0.004	-0.058	-0.074	-0.078	-0.059	0.172**	0.208**	0.035	0.015
	(0.032)	(0.080)	(0.090)	(0.054)	(0.060)	(0.050)	(0.054)	(0.078)	(0.088)	(0.076)	(0.086)
× T-Contact: Contact incentive			0.088		0.077		-0.117		-0.208		0.072
			(0.189)		(0.141)		(0.142)		(0.185)		(0.178)
T2: Externality	0.037	-0.019	-0.067	-0.023	-0.032	-0.029	-0.011	0.068	0.061	-0.008	0.002
	(0.035)	(0.078)	(0.086)	(0.052)	(0.058)	(0.049)	(0.055)	(0.081)	(0.091)	(0.076)	(0.080)
× T-Contact: Contact incentive			0.244		0.041		-0.095		0.026		-0.089
			(0.217)		(0.135)		(0.126)		(0.204)		(0.224)
T3 = T1+ T2: Interaction	0.016	-0.092	-0.175*	-0.005	-0.043	-0.008	-0.002	0.170**	0.116	-0.038	-0.030
	(0.036)	(0.084)	(0.093)	(0.055)	(0.062)	(0.053)	(0.059)	(0.083)	(0.092)	(0.079)	(0.091)
× T-Contact: Contact incentive			0.390*		0.177		-0.046		0.250		-0.028
			(0.199)		(0.130)		(0.135)		(0.207)		(0.178)
T-Contact: Contact incentive		0.058	-0.119	-0.058	-0.134	0.015	0.085	-0.011	-0.013	0.100	0.100
		(0.073)	(0.157)	(0.047)	(0.097)	(0.045)	(0.103)	(0.071)	(0.136)	(0.065)	(0.138)
Overall risk measure	0.015	-0.004	0.001	-0.018	-0.018	0.001	0.002	-0.014	-0.018	0.008	0.008
	(0.013)	(0.033)	(0.033)	(0.022)	(0.023)	(0.022)	(0.022)	(0.033)	(0.032)	(0.034)	(0.035)
N	368	377	377	763	763	763	763	381	381	399	399
Dependent variable mean (control)	0.925	0.457	0.457	0.451	0.451	0.399	0.399	0.341	0.341	0.414	0.414
Adjusted R^2	0.060	0.066	0.071	0.036	0.034	0.089	0.087	0.005	0.013	0.076	0.070
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Standard errors are clustered at the level of first-order referrers. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

A.5 Referral Decisions

In the pre-contact outcomes of Table A.15, TC1 (isolated), TC2 (receiving hostility), and TC3 (less exposed) all yield fewer nominations (column 2), and TC3 additionally shows a marginally higher share of introducible individuals among those nominated (column 4), suggesting that referrers respond to these TCs by selecting fewer but more accessible contacts. In contrast, TC4 generates a comparable number of nominations to TC5 but with the lowest friendship degree, pointing to a different nomination strategy in which referrers cast a wider net among weaker ties.

Table A.15: First-Order Referral Incentives and Pre-Contact Outcomes

	(1) Any nomination (dummy)	(2) Number of nominations	(3) Can introduce any (dummy)	(4) Share introducible	(5) Avg. friendship degree	(6) Friendship degree (contacted)
Referral incentive:						
Monetary incentive	0.015*	-0.024	0.000	0.002	0.200	0.177
	(0.009)	(0.035)	(.)	(0.013)	(0.150)	(0.154)
Externality information	0.001	-0.026	0.000	0.005	0.077	-0.004
	(0.009)	(0.037)	(.)	(0.014)	(0.148)	(0.153)
Monetary × Externality	-0.023*	-0.003	0.000	0.008	-0.030	0.049
	(0.013)	(0.050)	(.)	(0.019)	(0.207)	(0.211)
Targeting conditions:						
TC0: Place-based	-0.034***	-0.046				
	(0.010)	(0.042)				
TC1: Isolated	-0.045***	-0.235***	0.000	0.011	-0.496***	-0.596***
	(0.013)	(0.041)	(.)	(0.015)	(0.169)	(0.177)
TC2: Receiving hostility	-0.034**	-0.194***	0.000	0.021	-0.439***	-0.516***
	(0.013)	(0.037)	(.)	(0.013)	(0.140)	(0.149)
TC3: Less exposed	-0.035***	-0.236***	0.000	0.026*	-0.394***	-0.372**
	(0.012)	(0.037)	(.)	(0.013)	(0.137)	(0.147)
TC4: Politically harassed	-0.016	-0.046	0.000	-0.000	-0.497***	-0.656***
	(0.014)	(0.041)	(.)	(0.015)	(0.161)	(0.166)
Referrer characteristics:						
Verifying measure (referring TC)	0.002	0.009	0.000	0.001	0.066	0.059
	(0.003)	(0.012)	(.)	(0.004)	(0.046)	(0.052)
Overall risk measure	0.006	0.018	0.000	-0.002	0.141**	0.108*
	(0.004)	(0.014)	(.)	(0.005)	(0.062)	(0.064)
N	3432	3432	2198	2198	2175	2051
Reference group mean	0.739	1.146	0.940	0.840	6.435	6.677
Adjusted R^2	0.837	0.549	1.000	0.583	0.341	0.386
Joint test: treatments (p)	0.083	0.548	.	0.707	0.343	0.286
Controls	✓	✓	✓	✓	✓	✓

Notes: Sample: first-order referrer–target links (all TCs for columns 1–2, TC1–TC5 for columns 3–6). The reference group for targeting conditions is TC5 (dropout). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of first-order referrers. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.16: Second-Order Referral Incentives and Pre-Contact Outcomes

	(1) Any nomination (dummy)	(2) Number of nominations	(3) Can introduce any (dummy)	(4) Share introducible	(5) Avg. friendship degree	(6) Friendship degree (contacted)
Referral incentive:						
T2: Externality	0.013	0.030	0.006	0.010	-0.094	-0.081
	(0.022)	(0.044)	(0.018)	(0.020)	(0.140)	(0.149)
T4: Friend referral	0.180***	1.088***	0.000	0.000	0.000	0.000
	(0.032)	(0.108)	(.)	(.)	(.)	(.)
Targeting conditions:						
TC1: Isolated	-0.067*	-0.258***	0.014	0.021	-0.003	-0.057
	(0.035)	(0.070)	(0.027)	(0.030)	(0.228)	(0.244)
TC2: Receiving hostility	-0.209***	-0.479***	-0.040	-0.034	-0.429**	-0.352
	(0.033)	(0.068)	(0.028)	(0.029)	(0.215)	(0.236)
TC3: Less exposed	-0.020	-0.164***	0.004	0.010	-0.274	-0.120
	(0.030)	(0.063)	(0.024)	(0.026)	(0.186)	(0.209)
TC4: Politically harassed	-0.029	-0.005	-0.010	-0.028	0.102	0.094
	(0.033)	(0.074)	(0.028)	(0.032)	(0.222)	(0.239)
Referrer characteristics:						
Verifying measure (referring TC)	0.025**	0.055**	0.003	0.000	0.058	0.018
	(0.011)	(0.021)	(0.007)	(0.008)	(0.069)	(0.074)
Overall risk measure	0.010	0.018	-0.003	-0.013	0.045	0.048
	(0.012)	(0.027)	(0.011)	(0.012)	(0.079)	(0.082)
N	1907	1907	1234	1234	1218	1104
Reference group mean	0.712	1.033	0.910	0.824	7.071	7.209
Adjusted R^2	0.133	0.264	0.060	0.053	0.269	0.313
Joint test: treatments (p)	0.000	0.000	0.746	0.622	0.501	0.588
Controls	✓	✓	✓	✓	✓	✓

Notes: Sample: second-order referrer–target links (all TCs for columns 1–2, TC1–TC5 excluding T4 for columns 3–6). The reference group for targeting conditions is TC5 (dropout). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community and survey month fixed effects are absorbed. Standard errors are clustered at the level of first-order referrers. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.17: First-Order Referral and Push Factors: Targeting Conditions

	Push risk factor score		Labor market (index)		Family background (index)		Cognitive skill (index)		Crime exposure (index)		Past criminal activities (index)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF
Targeting conditions:												
TC0: Place-Based	-0.020	-0.205	-0.145	-0.031	0.049	0.328	0.280	0.568	0.088	0.292	0.049	0.090
	(0.084)	(0.161)	(0.101)	(0.189)	(0.118)	(0.208)	(0.098)	(0.188)	(0.085)	(0.167)	(0.093)	(0.174)
	[1.000]	[0.815]	[0.610]	[1.000]	[1.000]	[0.550]	[0.020]	[0.000]	[0.905]	[0.410]	[1.000]	[1.000]
	{0.611}	{0.195}	{0.207}	{0.445}	{0.611}	{0.150}	{0.001}	{0.001}	{0.388}	{0.150}	{0.596}	{0.429}
TC1: Isolated	-0.098	-0.145	-0.074	-0.045	0.102	0.173	0.263	0.336	0.092	0.145	-0.033	-0.022
	(0.098)	(0.105)	(0.108)	(0.117)	(0.118)	(0.129)	(0.107)	(0.120)	(0.083)	(0.093)	(0.094)	(0.102)
	[0.905]	[0.595]	[0.980]	[1.000]	[0.945]	[0.595]	[0.020]	[0.295]	[0.890]	[0.550]	[1.000]	[1.000]
	{0.388}	{0.150}	{0.550}	{0.445}	{0.410}	{0.150}	{0.001}	{0.001}	{0.374}	{0.150}	{0.611}	{0.445}
TC2: Receiving hostility	0.013	-0.018	-0.191	-0.171	0.158	0.205	0.113	0.162	0.146	0.181	-0.034	-0.027
	(0.075)	(0.083)	(0.100)	(0.105)	(0.106)	(0.112)	(0.090)	(0.096)	(0.069)	(0.075)	(0.081)	(0.086)
	[1.000]	[1.000]	[0.195]	[0.405]	[0.555]	[0.295]	[0.820]	[0.410]	[0.135]	[0.060]	[1.000]	[1.000]
	{0.611}	{0.445}	{0.055}	{0.091}	{0.117}	{0.001}	{0.319}	{0.137}	{0.037}	{0.001}	{0.611}	{0.445}
TC3: Less exposed	-0.068	-0.082	-0.099	-0.090	0.035	0.056	0.187	0.209	0.067	0.082	-0.104	-0.101
	(0.080)	(0.081)	(0.104)	(0.107)	(0.110)	(0.112)	(0.102)	(0.106)	(0.076)	(0.079)	(0.085)	(0.087)
	[0.980]	[0.915]	[0.905]	[0.915]	[1.000]	[1.000]	[0.195]	[0.295]	[0.980]	[0.915]	[0.785]	[0.815]
	{0.410}	{0.210}	{0.410}	{0.239}	{0.611}	{0.429}	{0.037}	{0.027}	{0.410}	{0.212}	{0.299}	{0.177}
TC4: Politically harassed	0.009	-0.007	0.027	0.037	0.031	0.055	0.113	0.138	0.099	0.116	0.093	0.096
	(0.097)	(0.096)	(0.115)	(0.116)	(0.121)	(0.126)	(0.110)	(0.113)	(0.090)	(0.094)	(0.101)	(0.102)
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[0.905]	[0.815]	[0.890]	[0.710]	[0.925]	[0.915]
	{0.611}	{0.518}	{0.611}	{0.445}	{0.611}	{0.445}	{0.388}	{0.195}	{0.319}	{0.161}	{0.410}	{0.212}
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.114	-0.114	0.080	0.080	0.118	0.118	-0.135	-0.135	-0.155	-0.155	-0.049	-0.049
Adjusted R^2	0.134	0.135	0.053	0.052	0.065	0.066	0.091	0.093	0.344	0.344	0.163	0.162
Mills: coefficient	.	-0.277	.	0.170	.	0.418	.	0.432	.	0.307	.	0.062
Mills: p-value	.	0.135	.	0.450	.	0.045	.	0.055	.	0.140	.	0.725
TC0 = All TCs (TC1–TC5)	0.763	0.563	0.202	0.298	0.631	0.366	0.037	0.016	0.515	0.274	0.192	0.260
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the first-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). Referral incentive and referrer characteristic coefficients are reported in Table 6. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Standard errors in parentheses are computed by a cluster bootstrap (200 replications) that accounts for dependence at both the referrer and the target level and re-estimates the selection equation in each replication. Romano-Wolf step-down adjusted p-values in brackets; each family pools one coefficient group (referral incentives; targeting conditions; referrer characteristics) across all columns of the table. Anderson (2008) sharpened FDR q-values in braces.

A.6 Target Risk Measures

For TC2 (receiving hostility), the higher crime exposure reported in Section 6 is spread across components, with the targets' own experience of violent crime the only one individually distinguishable from zero. TC2 also yields targets with more permissive attitudes toward gang activities, where comfort interacting with a friend who has joined a gang is both the largest component and the only individually significant one. For TC4 (politically harassed), the point estimates on attitudes toward crime and violence concentrate in acceptance of joining violent demonstrations when community members already participate and of attacking police in revenge for harassment, though the aggregate measure itself is imprecisely estimated.

Table A.18: First-Order Referral and Pull Factors: Targeting Conditions

	Pull risk factor score		Implicit bias against government (index)		Gang proximity (index)		Drug & substance (index)		Attitude towards gang activities (index)		Attitude towards crime & violence (index)		Weak preference for reducing crime	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Targeting conditions:														
TC0: Place-Based	0.020	0.009	0.015	-0.468	-0.043	0.059	0.064	0.103	0.057	0.162	-0.029	0.085	0.002	0.089
	(0.097)	(0.171)	(0.086)	(0.162)	(0.113)	(0.218)	(0.095)	(0.172)	(0.116)	(0.206)	(0.093)	(0.190)	(0.116)	(0.210)
	[1.000]	[1.000]	[1.000]	[0.035]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[0.995]	[1.000]	[1.000]	[1.000]	[1.000]
	{1.000}	{1.000}	{1.000}	{0.163}	{1.000}	{1.000}	{0.875}	{0.740}	{1.000}	{0.611}	{1.000}	{0.740}	{1.000}	{0.835}
TC1: Isolated	0.019	0.016	0.008	-0.115	-0.045	-0.019	0.063	0.073	0.169	0.195	0.028	0.057	-0.162	-0.140
	(0.080)	(0.085)	(0.095)	(0.105)	(0.108)	(0.124)	(0.095)	(0.101)	(0.101)	(0.111)	(0.087)	(0.096)	(0.122)	(0.131)
	[1.000]	[1.000]	[1.000]	[0.965]	[1.000]	[1.000]	[1.000]	[0.995]	[0.515]	[0.450]	[1.000]	[1.000]	[0.645]	[0.965]
	{1.000}	{1.000}	{1.000}	{0.436}	{1.000}	{1.000}	{0.875}	{0.611}	{0.251}	{0.163}	{1.000}	{0.641}	{0.392}	{0.442}
TC2: Receiving hostility	0.071	0.069	0.043	-0.039	0.121	0.138	0.051	0.058	0.172	0.190	0.039	0.058	-0.199	-0.184
	(0.075)	(0.078)	(0.078)	(0.088)	(0.096)	(0.104)	(0.079)	(0.082)	(0.090)	(0.094)	(0.092)	(0.097)	(0.109)	(0.113)
	[1.000]	[0.990]	[1.000]	[1.000]	[0.865]	[0.915]	[1.000]	[0.995]	[0.240]	[0.220]	[1.000]	[1.000]	[0.515]	[0.470]
	{0.667}	{0.611}	{1.000}	{0.774}	{0.396}	{0.360}	{0.875}	{0.611}	{0.213}	{0.163}	{1.000}	{0.641}	{0.213}	{0.163}
TC3: Less exposed	-0.103	-0.104	-0.074	-0.111	-0.082	-0.075	-0.029	-0.026	0.012	0.020	0.005	0.014	-0.164	-0.158
	(0.086)	(0.085)	(0.087)	(0.092)	(0.105)	(0.107)	(0.084)	(0.086)	(0.096)	(0.097)	(0.089)	(0.089)	(0.110)	(0.111)
	[0.865]	[0.915]	[1.000]	[0.915]	[1.000]	[0.995]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[0.515]	[0.695]
	{0.392}	{0.325}	{0.667}	{0.417}	{0.740}	{0.611}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{1.000}	{0.330}	{0.239}
TC4: Politically harassed	0.081	0.080	-0.025	-0.066	-0.012	-0.003	0.133	0.137	0.121	0.130	0.165	0.175	-0.123	-0.116
	(0.088)	(0.090)	(0.098)	(0.106)	(0.116)	(0.121)	(0.097)	(0.097)	(0.111)	(0.114)	(0.099)	(0.102)	(0.120)	(0.121)
	[1.000]	[0.990]	[1.000]	[0.995]	[1.000]	[1.000]	[0.645]	[0.740]	[0.935]	[0.915]	[0.515]	[0.490]	[0.960]	[0.985]
	{0.674}	{0.611}	{1.000}	{0.641}	{1.000}	{1.000}	{0.392}	{0.239}	{0.489}	{0.436}	{0.213}	{0.163}	{0.522}	{0.488}
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.044	-0.044	0.045	0.045	-0.013	-0.013	-0.078	-0.078	-0.008	-0.008	-0.042	-0.042	-0.047	-0.047
Adjusted R^2	0.122	0.121	0.013	0.019	0.075	0.074	0.162	0.162	0.036	0.036	0.076	0.076	0.063	0.063
Mills: coefficient	.	-0.017	.	-0.724	.	0.153	.	0.058	.	0.157	.	0.171	.	0.130
Mills: p-value	.	0.935	.	0.005	.	0.560	.	0.770	.	0.555	.	0.445	.	0.530
TC0 = All TCs (TC1–TC5)	0.286	0.300	0.818	0.115	0.260	0.238	0.510	0.502	0.265	0.231	0.479	0.601	0.163	0.252
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the first-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). Referral incentive and referrer characteristic coefficients are reported in Table 7. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Standard errors in parentheses are computed by a cluster bootstrap (200 replications) that accounts for dependence at both the referrer and the target level and re-estimates the selection equation in each replication. Romano-Wolf step-down adjusted p-values in brackets; each family pools one coefficient group (referral incentives; targeting conditions; referrer characteristics) across all columns of the table. Anderson (2008) sharpened FDR q-values in braces.

Table A.19: Second-Order Referral and Push Factors

	Push risk factor score		Labor market (index)		Family background (index)		Cognitive skill (index)		Crime exposure (index)		Past criminal activities (index)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF
Referral incentive:												
T2: Externality	-0.155*	-0.176**	0.081	0.108	-0.098	-0.124	0.044	0.071	-0.124*	-0.154**	-0.214**	-0.205***
	(0.086)	(0.088)	(0.086)	(0.102)	(0.084)	(0.088)	(0.083)	(0.092)	(0.069)	(0.073)	(0.091)	(0.077)
T4: Friend	-0.067	-0.450	-0.065	0.341	0.185	-0.275	-0.018	0.150	0.085	-0.615**	-0.141	-0.228
	(0.141)	(0.279)	(0.152)	(0.318)	(0.159)	(0.298)	(0.140)	(0.268)	(0.120)	(0.243)	(0.148)	(0.273)
Targeting conditions:												
TC1: Isolated	-0.005	-0.074	-0.002	0.072	0.121	0.040	-0.045	-0.012	0.077	-0.047	-0.015	-0.026
	(0.124)	(0.136)	(0.128)	(0.146)	(0.137)	(0.141)	(0.130)	(0.150)	(0.104)	(0.142)	(0.132)	(0.146)
TC2: Receiving hostility	-0.053	0.143	0.120	-0.076	-0.019	0.220	0.051	-0.007	0.129	0.500***	-0.103	-0.027
	(0.121)	(0.223)	(0.130)	(0.195)	(0.134)	(0.243)	(0.118)	(0.175)	(0.108)	(0.161)	(0.126)	(0.221)
TC3: Less exposed	0.097	0.092	0.042	0.050	0.010	0.004	-0.075	-0.067	0.029	0.021	0.177	0.182
	(0.125)	(0.140)	(0.123)	(0.131)	(0.121)	(0.124)	(0.127)	(0.144)	(0.107)	(0.124)	(0.135)	(0.146)
TC4: Politically harassed	-0.020	-0.086	-0.112	-0.038	0.314**	0.236	-0.052	-0.014	0.023	-0.095	0.080	0.076
	(0.139)	(0.148)	(0.142)	(0.163)	(0.137)	(0.162)	(0.130)	(0.160)	(0.112)	(0.135)	(0.144)	(0.150)
Referrer characteristics:												
Verifying measure (referring TC)	-0.037	-0.091	-0.041	0.014	0.037	-0.028	0.020	0.041	-0.016	-0.115**	-0.057	-0.072
	(0.054)	(0.064)	(0.041)	(0.060)	(0.047)	(0.059)	(0.051)	(0.067)	(0.044)	(0.054)	(0.039)	(0.053)
Overall risk factor score	0.107**	0.139**	-0.061	-0.093*	-0.080*	-0.040	-0.024	-0.033	0.062	0.123**	0.024	0.037
	(0.045)	(0.058)	(0.047)	(0.056)	(0.047)	(0.072)	(0.047)	(0.061)	(0.041)	(0.051)	(0.046)	(0.051)
N	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.003	0.003	0.019	0.019	0.121	0.121	-0.065	-0.065	-0.024	-0.024	0.107	0.107
Adjusted R^2	0.135	0.138	0.090	0.090	0.092	0.096	0.056	0.049	0.361	0.370	0.120	0.117
Mills: coefficient		-1.128		1.171		-1.359		0.426		-2.094		-0.322
Mills: p-value		0.137		0.123		0.092		0.561		0.000		0.656
Joint test (p-value)												
All Ts = 0	0.197	0.092	0.480	0.387	0.154	0.278	0.838	0.702	0.084	0.011	0.059	0.027
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the second-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community and survey month fixed effects are absorbed, with a dummy for second-or-later contact order. The reference group for targeting conditions is TC5 (dropout). The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.20: Second-Order Referral and Pull Factors

	Pull risk factor score		Implicit bias against government (index)		Gang proximity (index)		Drug & substance (index)		Attitude towards gang activities (index)		Attitude towards crime & violence (index)		Weak preference for reducing crime	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Referral incentive:														
T2: Externality	-0.110	-0.125	-0.003	-0.015	-0.186**	-0.203**	-0.071	-0.078	-0.018	-0.024	0.003	-0.001	-0.082	-0.082
	(0.073)	(0.079)	(0.083)	(0.093)	(0.081)	(0.083)	(0.079)	(0.079)	(0.080)	(0.090)	(0.078)	(0.088)	(0.081)	(0.095)
T4: Friend	-0.065	-0.437	-0.374**	-0.548*	0.130	-0.323	-0.018	-0.111	-0.095	-0.226	0.116	-0.162	0.032	-0.040
	(0.143)	(0.294)	(0.148)	(0.310)	(0.155)	(0.310)	(0.138)	(0.270)	(0.144)	(0.290)	(0.146)	(0.272)	(0.146)	(0.275)
Targeting conditions:														
TC1: Isolated	-0.052	-0.114	-0.369***	-0.407**	0.167	0.094	0.105	0.093	-0.062	-0.080	0.025	-0.017	-0.034	-0.052
	(0.121)	(0.154)	(0.123)	(0.163)	(0.136)	(0.142)	(0.121)	(0.130)	(0.131)	(0.174)	(0.128)	(0.151)	(0.129)	(0.146)
TC2: Receiving hostility	-0.016	0.198	-0.363***	-0.304	0.189	0.462**	0.073	0.140	0.073	0.162	0.106	0.291	-0.129	-0.113
	(0.124)	(0.206)	(0.126)	(0.220)	(0.138)	(0.210)	(0.124)	(0.185)	(0.136)	(0.201)	(0.127)	(0.188)	(0.126)	(0.171)
TC3: Less exposed	-0.012	-0.013	-0.285**	-0.294**	0.156	0.158	0.088	0.091	0.070	0.073	0.081	0.086	-0.149	-0.155
	(0.115)	(0.137)	(0.119)	(0.129)	(0.128)	(0.142)	(0.120)	(0.128)	(0.131)	(0.146)	(0.117)	(0.135)	(0.118)	(0.121)
TC4: Politically harassed	-0.017	-0.073	-0.298**	-0.340**	0.303**	0.240	0.092	0.085	0.049	0.035	-0.081	-0.114	-0.120	-0.142
	(0.129)	(0.158)	(0.142)	(0.172)	(0.139)	(0.179)	(0.130)	(0.144)	(0.130)	(0.171)	(0.131)	(0.151)	(0.127)	(0.143)
Referrer characteristics:														
Verifying measure (referring TC)	-0.010	-0.064	0.075*	0.054	-0.007	-0.075	-0.012	-0.027	0.008	-0.013	-0.044	-0.087	-0.050	-0.058
	(0.040)	(0.051)	(0.039)	(0.059)	(0.042)	(0.054)	(0.038)	(0.045)	(0.045)	(0.053)	(0.044)	(0.055)	(0.049)	(0.057)
Overall risk factor score	0.164***	0.199***	0.023	0.033	0.068	0.113*	0.108**	0.119**	0.152***	0.167***	0.073*	0.104*	0.105**	0.107*
	(0.042)	(0.058)	(0.042)	(0.055)	(0.048)	(0.066)	(0.042)	(0.050)	(0.044)	(0.053)	(0.044)	(0.061)	(0.046)	(0.056)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.002	0.002	0.081	0.081	0.026	0.026	0.044	0.044	-0.122	-0.122	-0.041	-0.041	0.018	0.018
Adjusted R^2	0.151	0.154	0.040	0.036	0.090	0.092	0.159	0.159	0.081	0.081	0.077	0.075	0.068	0.068
Mills: coefficient		-1.138		-0.470		-1.403		-0.297		-0.417		-0.896		-0.192
Mills: p-value		0.120		0.546		0.049		0.670		0.532		0.218		0.788
Joint test (p-value)														
All Ts = 0	0.317	0.130	0.033	0.173	0.021	0.041	0.657	0.609	0.803	0.725	0.722	0.838	0.484	0.690
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the second-order targets. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community and survey month fixed effects are absorbed, with a dummy for second-or-later contact order. The reference group for targeting conditions is TC5 (dropout). The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.21: Referral and Labor Market Outcome

	Labor market (index)		Monthly income		Total duration of working in main job		Unemployment (dummy)		Engage in casual labor or unemployed (dummy)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF
Panel A: First-order targets										
Referral incentive:										
T1: Monetary incentive	-0.132*	-0.134	-691.653	-717.267	-0.308*	-0.306*	0.016	0.017	0.046	0.047
	(0.077)	(0.083)	(452.831)	(495.710)	(0.162)	(0.161)	(0.033)	(0.034)	(0.035)	(0.034)
T2: Externality info	-0.124	-0.123	-598.330	-593.464	-0.227	-0.225	0.039	0.038	0.023	0.023
	(0.079)	(0.084)	(436.136)	(482.057)	(0.165)	(0.164)	(0.034)	(0.033)	(0.036)	(0.037)
T1 × T2: Interaction	0.117	0.116	588.381	611.311	0.345	0.335	-0.009	-0.007	-0.039	-0.040
	(0.112)	(0.110)	(640.063)	(656.665)	(0.221)	(0.224)	(0.048)	(0.045)	(0.051)	(0.049)
Targeting conditions:										
TC0: Place-Based	-0.165	-0.031	-77.738	915.003	-0.092	0.025	0.054	0.017	0.132***	0.110
	(0.101)	(0.185)	(593.235)	(1269.072)	(0.220)	(0.335)	(0.044)	(0.075)	(0.050)	(0.089)
TC1: Isolated	-0.077	-0.045	101.603	345.903	0.039	0.061	0.042	0.033	0.063	0.058
	(0.103)	(0.121)	(599.713)	(738.490)	(0.216)	(0.249)	(0.043)	(0.049)	(0.051)	(0.057)
TC2: Receiving hostility	-0.197**	-0.171*	-84.360	95.800	-0.253	-0.231	0.090**	0.083**	0.091**	0.087*
	(0.094)	(0.103)	(553.161)	(651.261)	(0.195)	(0.189)	(0.040)	(0.042)	(0.045)	(0.050)
TC3: Less exposed	-0.102	-0.090	-42.117	42.821	0.053	0.062	0.058	0.055	0.063	0.061
	(0.092)	(0.096)	(550.559)	(590.129)	(0.197)	(0.194)	(0.039)	(0.039)	(0.045)	(0.047)
TC4: Politically harassed	0.023	0.037	1063.304	1156.425*	0.083	0.096	0.025	0.021	0.042	0.040
	(0.110)	(0.118)	(662.283)	(688.681)	(0.232)	(0.248)	(0.044)	(0.046)	(0.050)	(0.056)
Referrer characteristics:										
Verifying measure (referring TC)	0.003	0.003	49.103	50.547	0.024	0.025	-0.004	-0.005	0.012	0.012
	(0.030)	(0.030)	(161.998)	(170.918)	(0.055)	(0.054)	(0.013)	(0.013)	(0.013)	(0.014)
Overall risk factor score	0.042	0.040	124.235	97.608	-0.053	-0.053	-0.021	-0.020	-0.027*	-0.026
	(0.035)	(0.036)	(212.761)	(226.663)	(0.064)	(0.065)	(0.015)	(0.015)	(0.015)	(0.019)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	0.080	0.080	5949.248	5949.248	1.304	1.304	0.270	0.270	0.606	0.606
Adjusted R^2	0.052	0.052	0.100	0.101	0.041	0.041	0.044	0.044	0.028	0.029
Mills: coefficient		0.170		1388.671		0.114		-0.042		-0.032
Mills: *p*-value		0.453		0.358		0.785		0.664		0.758
Joint test (*p*-value):										
All Ts = 0	0.271	0.339	0.379	0.471	0.288	0.275	0.538	0.581	0.615	0.605
TC0 = All TCs (TC1–TC5)	0.166	0.264	0.449	0.421	0.375	0.281	0.303	0.326	0.140	0.602
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets										
Referral incentive:										
T2: Externality	0.081	0.108	117.166	217.333	0.208	0.245	-0.020	-0.032	-0.037	-0.042
	(0.086)	(0.102)	(491.063)	(478.995)	(0.158)	(0.186)	(0.036)	(0.048)	(0.039)	(0.042)
T4: Friend	-0.065	0.341	-59.285	1273.459	0.006	0.842	0.070	-0.085	-0.019	-0.091
	(0.152)	(0.318)	(832.862)	(1570.346)	(0.303)	(0.680)	(0.067)	(0.138)	(0.069)	(0.146)
Targeting conditions:										
TC1: Isolated	-0.002	0.072	899.061	1112.475	-0.360	-0.207	0.019	-0.010	-0.009	-0.024
	(0.128)	(0.146)	(708.896)	(919.865)	(0.260)	(0.326)	(0.056)	(0.063)	(0.061)	(0.069)
TC2: Receiving hostility	0.120	-0.076	518.098	-242.138	0.055	-0.365	-0.030	0.038	-0.070	-0.039
	(0.130)	(0.195)	(714.709)	(1102.362)	(0.294)	(0.399)	(0.055)	(0.088)	(0.061)	(0.085)
TC3: Less exposed	0.042	0.050	554.998	554.826	-0.246	-0.231	0.008	0.003	-0.066	-0.069
	(0.123)	(0.131)	(677.720)	(799.728)	(0.258)	(0.296)	(0.055)	(0.053)	(0.054)	(0.068)
TC4: Politically harassed	-0.112	-0.038	527.712	721.491	-0.287	-0.138	0.075	0.044	0.043	0.028
	(0.142)	(0.163)	(799.916)	(901.564)	(0.284)	(0.335)	(0.061)	(0.072)	(0.061)	(0.076)
Referrer characteristics:										
Verifying measure (referring TC)	-0.041	0.014	-388.362*	-190.046	-0.003	0.112	0.019	-0.002	-0.006	-0.016
	(0.041)	(0.060)	(225.420)	(288.957)	(0.078)	(0.115)	(0.019)	(0.027)	(0.019)	(0.028)
Overall risk factor score	-0.061	-0.093*	-65.404	-190.069	-0.078	-0.147	0.029	0.040*	0.024	0.029
	(0.047)	(0.056)	(294.649)	(339.550)	(0.082)	(0.105)	(0.019)	(0.024)	(0.022)	(0.023)
N	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.019	0.019	5978.257	5978.257	1.016	1.016	0.273	0.273	0.641	0.641
Adjusted R^2	0.090	0.090	0.131	0.132	-0.003	0.000	0.099	0.096	0.043	0.043
Mills: coefficient		1.171		3981.703		2.467		-0.435		-0.203
Mills: *p*-value		0.123		0.297		0.111		0.215		0.551
Joint test (*p*-value)										
All Ts = 0	0.480	0.387	0.960	0.677	0.392	0.288	0.388	0.685	0.637	0.571
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .0000642, .126, -1.07, and -.682, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.22: Referral and Family Background

	Family background (index)		Number of people living together		Number of siblings		Both mother & father alive (dummy)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF
Panel A: First-order targets								
Referral incentive:								
T1: Monetary incentive	-0.087	-0.093	-0.034	-0.039	-0.227	-0.238	-0.015	-0.016
	(0.076)	(0.078)	(0.149)	(0.153)	(0.155)	(0.157)	(0.038)	(0.031)
T2: Externality info	-0.060	-0.060	0.029	0.028	-0.184	-0.181	-0.022	-0.022
	(0.077)	(0.070)	(0.143)	(0.145)	(0.159)	(0.143)	(0.038)	(0.032)
T1 × T2: Interaction	0.033	0.041	0.062	0.074	0.062	0.069	-0.006	-0.003
	(0.107)	(0.126)	(0.208)	(0.246)	(0.213)	(0.210)	(0.053)	(0.054)
Targeting conditions:								
TC0: Place-Based	0.033	0.328	0.063	0.188	0.018	0.590	0.010	0.127
	(0.117)	(0.215)	(0.208)	(0.388)	(0.225)	(0.408)	(0.052)	(0.083)
TC1: Isolated	0.101	0.173	0.055	0.089	0.242	0.380	0.019	0.047
	(0.114)	(0.124)	(0.199)	(0.214)	(0.231)	(0.247)	(0.051)	(0.057)
TC2: Receiving hostility	0.153	0.205*	0.255	0.276	0.146	0.249	0.038	0.058
	(0.107)	(0.111)	(0.188)	(0.197)	(0.204)	(0.205)	(0.048)	(0.050)
TC3: Less exposed	0.033	0.056	0.106	0.116	0.117	0.164	-0.043	-0.034
	(0.103)	(0.108)	(0.183)	(0.183)	(0.194)	(0.193)	(0.048)	(0.047)
TC4: Politically harassed	0.028	0.055	-0.041	-0.032	0.134	0.189	0.005	0.016
	(0.114)	(0.115)	(0.198)	(0.176)	(0.232)	(0.201)	(0.054)	(0.058)
Referrer characteristics:								
Verifying measure (referring TC)	0.012	0.012	0.003	0.002	0.006	0.008	0.011	0.011
	(0.030)	(0.032)	(0.053)	(0.054)	(0.060)	(0.055)	(0.014)	(0.015)
Overall risk factor score	-0.052	-0.061*	-0.022	-0.028	-0.163***	-0.177**	0.001	-0.003
	(0.033)	(0.036)	(0.066)	(0.059)	(0.060)	(0.074)	(0.015)	(0.016)
N	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	0.118	0.118	3.511	3.511	4.062	4.062	0.619	0.619
Adjusted R^2	0.064	0.066	0.143	0.144	0.041	0.042	0.015	0.016
Mills: coefficient		0.418		0.209		0.777		0.167
Mills: *p*-value		0.148		0.682		0.149		0.119
Joint test (*p*-value):								
All Ts = 0	0.546	0.519	0.934	0.916	0.191	0.157	0.731	0.716
TC0 = All TCs (TC1–TC5)	0.638	0.435	0.561	0.506	0.894	0.706	0.549	0.271
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets								
Referral incentive:								
T2: Externality	-0.098	-0.124	-0.108	-0.131	-0.243	-0.274	0.007	-0.006
	(0.084)	(0.088)	(0.154)	(0.154)	(0.163)	(0.210)	(0.042)	(0.041)
T4: Friend	0.185	-0.275	0.361	0.241	0.249	-0.763	-0.002	-0.173
	(0.159)	(0.298)	(0.273)	(0.503)	(0.304)	(0.558)	(0.075)	(0.159)
Targeting conditions:								
TC1: Isolated	0.121	0.040	0.310	0.289	0.137	-0.050	-0.023	-0.049
	(0.137)	(0.141)	(0.237)	(0.247)	(0.282)	(0.328)	(0.064)	(0.068)
TC2: Receiving hostility	-0.019	0.220	0.075	0.124	-0.048	0.464	-0.038	0.063
	(0.134)	(0.243)	(0.246)	(0.395)	(0.261)	(0.470)	(0.066)	(0.098)
TC3: Less exposed	0.010	0.004	-0.066	-0.070	0.156	0.138	-0.016	-0.015
	(0.121)	(0.124)	(0.223)	(0.209)	(0.247)	(0.286)	(0.059)	(0.065)
TC4: Politically harassed	0.314**	0.236	0.723***	0.699**	0.163	-0.020	0.043	0.019
	(0.137)	(0.162)	(0.263)	(0.296)	(0.276)	(0.308)	(0.067)	(0.075)
Referrer characteristics:								
Verifying measure (referring TC)	0.037	-0.028	0.038	0.022	0.055	-0.084	0.011	-0.015
	(0.047)	(0.059)	(0.082)	(0.103)	(0.081)	(0.118)	(0.021)	(0.028)
Overall risk factor score	-0.080*	-0.040	-0.042	-0.034	-0.140	-0.056	-0.034	-0.017
	(0.047)	(0.072)	(0.086)	(0.107)	(0.093)	(0.129)	(0.022)	(0.031)
N	811	811	811	811	811	811	811	811
Reference group mean	0.121	0.121	3.443	3.443	4.068	4.068	0.648	0.648
Adjusted R^2	0.092	0.096	0.171	0.171	0.045	0.050	0.013	0.012
Mills: coefficient		-1.359		-0.308		-3.018		-0.516
Mills: *p*-value		0.092		0.824		0.036		0.169
Joint test (*p*-value)								
All Ts = 0	0.154	0.278	0.238	0.576	0.134	0.196	0.985	0.547
Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .323, .281, and .797, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.23: Referral and Cognitive Skills

	Cognitive skill (index)		Correct answers in non-basic numeracy questions (share)		Can read & write Kiswahili (dummy)		Correct answers in reading non-basic English words (share)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF
Panel A: First-order targets								
Referral incentive:								
T1: Monetary incentive	0.131	0.127	0.002	0.002	0.040**	0.040**	0.016	0.014
	(0.087)	(0.079)	(0.015)	(0.015)	(0.019)	(0.019)	(0.021)	(0.019)
T2: Externality info	0.051	0.048	-0.014	-0.014	0.035*	0.034*	-0.002	-0.002
	(0.085)	(0.077)	(0.015)	(0.013)	(0.020)	(0.018)	(0.021)	(0.020)
T1 × T2: Interaction	-0.128	-0.111	0.015	0.015	-0.064**	-0.062**	-0.004	0.002
	(0.118)	(0.112)	(0.021)	(0.020)	(0.027)	(0.026)	(0.029)	(0.027)
Targeting conditions:								
TC0: Place-Based	0.285***	0.568***	0.042**	0.041	0.038	0.062	0.052**	0.158***
	(0.100)	(0.156)	(0.020)	(0.033)	(0.024)	(0.038)	(0.026)	(0.050)
TC1: Isolated	0.264**	0.336***	0.023	0.023	0.031	0.037	0.067**	0.094***
	(0.104)	(0.110)	(0.019)	(0.023)	(0.023)	(0.025)	(0.027)	(0.030)
TC2: Receiving hostility	0.117	0.162*	0.026	0.026	0.007	0.010	0.023	0.041
	(0.093)	(0.094)	(0.017)	(0.019)	(0.023)	(0.024)	(0.023)	(0.025)
TC3: Less exposed	0.190*	0.209**	0.026	0.026	0.020	0.020	0.043*	0.050**
	(0.098)	(0.098)	(0.017)	(0.018)	(0.023)	(0.022)	(0.025)	(0.025)
TC4: Politically harassed	0.114	0.138	0.021	0.021	0.011	0.012	0.022	0.031
	(0.105)	(0.099)	(0.020)	(0.023)	(0.024)	(0.022)	(0.028)	(0.026)
Referrer characteristics:								
Verifying measure (referring TC)	0.008	0.007	0.002	0.002	0.001	0.001	0.000	0.000
	(0.026)	(0.026)	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.006)
Overall risk factor score	-0.094***	-0.106***	-0.008	-0.008	-0.013*	-0.014*	-0.022***	-0.026***
	(0.034)	(0.031)	(0.006)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)
N	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.135	-0.135	0.119	0.119	0.918	0.918	0.453	0.453
Adjusted R^2	0.091	0.093	0.017	0.018	0.063	0.062	0.089	0.093
Mills: coefficient		0.432		-0.002		0.038		0.160
Mills: *p*-value		0.047		0.964		0.505		0.011
Joint test (*p*-value):								
All Ts = 0	0.450	0.400	0.571	0.481	0.116	0.117	0.759	0.753
TC0 = All TCs (TC1–TC5)	0.048	0.005	0.464	0.739	0.501	0.392	0.152	0.012
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets								
Referral incentive:								
T2: Externality	0.044	0.071	-0.009	-0.010	0.004	0.010	0.024	0.031
	(0.083)	(0.092)	(0.016)	(0.017)	(0.019)	(0.024)	(0.022)	(0.023)
T4: Friend	-0.018	0.150	-0.026	-0.052	-0.002	0.029	0.018	0.086
	(0.140)	(0.268)	(0.029)	(0.049)	(0.028)	(0.066)	(0.042)	(0.074)
Targeting conditions:								
TC1: Isolated	-0.045	-0.012	-0.011	-0.014	-0.022	-0.016	0.013	0.025
	(0.130)	(0.150)	(0.024)	(0.025)	(0.029)	(0.035)	(0.035)	(0.039)
TC2: Receiving hostility	0.051	-0.007	0.008	0.027	0.002	-0.008	0.013	-0.019
	(0.118)	(0.175)	(0.025)	(0.033)	(0.022)	(0.043)	(0.035)	(0.052)
TC3: Less exposed	-0.075	-0.067	-0.011	-0.010	-0.025	-0.024	0.003	0.004
	(0.127)	(0.144)	(0.023)	(0.020)	(0.028)	(0.029)	(0.035)	(0.040)
TC4: Politically harassed	-0.052	-0.014	0.012	0.009	-0.041	-0.035	0.010	0.022
	(0.130)	(0.160)	(0.025)	(0.027)	(0.028)	(0.037)	(0.035)	(0.042)
Referrer characteristics:								
Verifying measure (referring TC)	0.020	0.041	-0.014	-0.018*	0.015	0.019	0.005	0.014
	(0.051)	(0.067)	(0.009)	(0.011)	(0.013)	(0.015)	(0.012)	(0.016)
Overall risk factor score	-0.024	-0.033	-0.006	-0.003	0.003	0.001	-0.009	-0.014
	(0.047)	(0.061)	(0.009)	(0.010)	(0.011)	(0.015)	(0.013)	(0.014)
N	811	811	811	811	811	811	811	811
Reference group mean	-0.065	-0.065	0.136	0.136	0.942	0.942	0.443	0.443
Adjusted R^2	0.056	0.049	0.061	0.060	0.063	0.057	0.047	0.045
Mills: coefficient		0.426		-0.084		0.076		0.191
Mills: *p*-value		0.561		0.467		0.654		0.329
Joint test (*p*-value)								
All Ts = 0	0.838	0.702	0.639	0.544	0.967	0.874	0.555	0.320
Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of 1.98, 2.35, and 2.16, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.24: Referral and Crime Exposure

	Crime exposure (index)		Own violent crime victimization		Own property crime victimization		Acquaintance violent crime victimization		Acquaintance property crime victimization		Estimated weekly robberies in community	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF
Panel A: First-order targets												
Referral incentive:												
T1: Monetary incentive	0.054	0.051	0.008	0.010	0.016	0.021	13.019	11.948	9.427	8.950	0.896	0.909
	(0.069)	(0.078)	(0.158)	(0.149)	(0.091)	(0.098)	(16.787)	(18.175)	(6.768)	(7.556)	(0.707)	(0.709)
T2: Externality info	0.068	0.069	0.044	0.037	-0.046	-0.043	18.242	18.649	10.252	10.348	0.958	0.956
	(0.066)	(0.064)	(0.159)	(0.148)	(0.088)	(0.090)	(16.404)	(15.116)	(6.739)	(6.987)	(0.692)	(0.692)
T1 × T2: Interaction	-0.094	-0.090	0.060	0.081	0.025	0.007	-32.200	-31.986	-12.725	-12.317	-0.957	-0.973
	(0.092)	(0.101)	(0.225)	(0.216)	(0.127)	(0.131)	(22.563)	(23.517)	(9.411)	(10.819)	(1.003)	(0.940)
Targeting conditions:												
TC0: Place-Based	0.070	0.292*	0.057	0.330	0.178	-0.045	-2.828	44.102	9.760	30.785	-1.060	-2.207
	(0.085)	(0.176)	(0.204)	(0.383)	(0.125)	(0.238)	(19.944)	(40.295)	(8.754)	(19.100)	(1.046)	(1.925)
TC1: Isolated	0.091	0.145	-0.104	-0.034	0.096	0.037	16.532	27.748	10.951	16.082	-1.297	-1.572
	(0.082)	(0.097)	(0.188)	(0.228)	(0.119)	(0.148)	(19.350)	(22.057)	(8.969)	(10.327)	(1.040)	(1.072)
TC2: Receiving hostility	0.141*	0.181**	0.290	0.329*	0.052	0.016	10.380	19.099	10.532	14.332*	-2.309**	-2.510***
	(0.073)	(0.077)	(0.179)	(0.198)	(0.108)	(0.135)	(17.558)	(18.734)	(7.742)	(8.272)	(0.942)	(0.949)
TC3: Less exposed	0.065	0.082	-0.276	-0.265	0.059	0.044	4.023	8.122	12.220	13.977	-2.424***	-2.510***
	(0.075)	(0.083)	(0.184)	(0.181)	(0.110)	(0.124)	(18.536)	(21.756)	(7.761)	(8.553)	(0.925)	(0.912)
TC4: Politically harassed	0.095	0.116	0.103	0.124	-0.026	-0.043	10.091	14.708	7.153	9.138	-2.179**	-2.288**
	(0.089)	(0.086)	(0.209)	(0.198)	(0.116)	(0.126)	(21.687)	(22.536)	(9.284)	(9.263)	(1.018)	(1.034)
Referrer characteristics:												
Verifying measure (referring TC)	-0.035	-0.034	-0.011	-0.014	0.029	0.030	-9.067*	-8.904	-3.715	-3.683	0.075	0.074
	(0.022)	(0.027)	(0.054)	(0.061)	(0.032)	(0.031)	(5.024)	(5.543)	(2.533)	(2.748)	(0.231)	(0.261)
Overall risk factor score	0.071**	0.065*	0.134*	0.120*	0.059	0.069	20.350***	19.341**	3.661	3.107	0.339	0.371
	(0.030)	(0.033)	(0.069)	(0.070)	(0.039)	(0.042)	(7.357)	(8.112)	(3.072)	(3.192)	(0.275)	(0.286)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.155	-0.155	1.091	1.091	0.956	0.956	135.908	135.908	45.433	45.433	7.265	7.265
Adjusted R^2	0.344	0.344	0.077	0.076	0.089	0.090	0.361	0.361	0.342	0.342	0.190	0.190
Mills: coefficient		0.307		0.431		-0.354		62.542		29.105		-1.560
Mills: *p*-value		0.124		0.318		0.223		0.182		0.192		0.481
Joint test (*p*-value):												
All Ts = 0	0.748	0.756	0.898	0.853	0.912	0.894	0.518	0.469	0.430	0.494	0.475	0.476
TC0 = All TCs (TC1–TC5)	0.528	0.233	0.016	0.003	0.574	0.959	0.898	0.746	0.700	0.520	0.063	0.079
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets												
Referral incentive:												
T2: Externality	-0.124*	-0.154**	-0.052	-0.128	-0.038	-0.011	-15.734	-19.279	-19.272***	-23.176***	0.083	-0.035
	(0.069)	(0.073)	(0.155)	(0.156)	(0.092)	(0.086)	(16.699)	(18.450)	(7.249)	(8.958)	(0.762)	(0.838)
T4: Friend	0.085	-0.615**	0.244	-1.187**	-0.142	0.182	13.505	-117.537**	7.397	-65.508**	-0.181	-2.642
	(0.120)	(0.243)	(0.294)	(0.559)	(0.167)	(0.258)	(28.618)	(56.396)	(13.556)	(26.447)	(1.389)	(2.619)
Targeting conditions:												
TC1: Isolated	0.077	-0.047	0.083	-0.176	0.107	0.164	4.631	-18.707	5.405	-7.232	-1.830	-2.270
	(0.104)	(0.142)	(0.244)	(0.308)	(0.152)	(0.183)	(24.450)	(32.017)	(11.105)	(15.672)	(1.235)	(1.521)
TC2: Receiving hostility	0.129	0.500***	-0.058	0.662*	-0.010	-0.173	30.831	101.494***	21.605*	60.623***	1.044	2.315
	(0.108)	(0.161)	(0.246)	(0.386)	(0.154)	(0.206)	(25.577)	(37.121)	(12.009)	(18.368)	(1.284)	(1.746)
TC3: Less exposed	0.029	0.021	-0.134	-0.158	-0.011	-0.006	12.233	10.912	5.102	4.417	-0.097	-0.132
	(0.107)	(0.124)	(0.213)	(0.293)	(0.146)	(0.148)	(25.682)	(28.751)	(11.553)	(13.434)	(1.076)	(1.347)
TC4: Politically harassed	0.023	-0.095	-0.051	-0.304	-0.049	0.007	10.891	-10.986	1.085	-10.868	-0.406	-0.831
	(0.112)	(0.135)	(0.248)	(0.330)	(0.159)	(0.168)	(27.437)	(30.804)	(12.424)	(14.708)	(1.264)	(1.557)
Referrer characteristics:												
Verifying measure (referring TC)	-0.016	-0.115**	-0.064	-0.262**	0.000	0.046	-1.732	-20.156*	0.111	-10.271**	0.325	-0.019
	(0.044)	(0.054)	(0.095)	(0.108)	(0.053)	(0.060)	(9.401)	(12.101)	(4.119)	(5.203)	(0.326)	(0.506)
Overall risk factor score	0.062	0.123**	0.146*	0.264**	-0.056	-0.083	14.908	26.574**	5.508	11.921**	0.422	0.631
	(0.041)	(0.051)	(0.085)	(0.103)	(0.049)	(0.055)	(9.857)	(11.861)	(4.651)	(5.987)	(0.451)	(0.440)
N	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	-0.024	-0.024	1.106	1.106	0.830	0.830	160.931	160.931	71.994	71.994	9.035	9.035
Adjusted R^2	0.361	0.370	0.079	0.085	0.062	0.063	0.361	0.367	0.337	0.344	0.238	0.240
Mills: coefficient		-2.094		-4.203		0.936		-397.234		-217.168		-7.292
Mills: *p*-value		0.000		0.001		0.158		0.003		0.001		0.238
Joint test (*p*-value)												
All Ts = 0	0.084	0.011	0.606	0.102	0.685	0.769	0.469	0.095	0.010	0.007	0.982	0.601
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .13, .056, .00194, .00432, and -.0151, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.25: Referral and Past Criminal Activities

	Past criminal activities (index)		Stayed in police cell (dummy)		Stayed in jail or prison (dummy)		Refused to answer to police/prison related Qs (dummy)		Duration of stay in police cell (days)		Duration of stay in jail or prison (days)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF
Panel A: First-order targets												
Referral incentive:												
T1: Monetary incentive	0.040	0.038	0.039	0.039	0.014	0.014	-0.001	-0.001	-0.023	-0.018	0.781	0.637
	(0.069)	(0.070)	(0.037)	(0.036)	(0.025)	(0.027)	(0.002)	(0.002)	(0.144)	(0.138)	(3.106)	(3.193)
T2: Externality info	0.041	0.040	0.017	0.015	0.020	0.021	0.001	0.001	0.035	0.031	0.810	0.754
	(0.071)	(0.068)	(0.035)	(0.033)	(0.025)	(0.027)	(0.002)	(0.002)	(0.143)	(0.127)	(3.088)	(3.208)
T1 × T2: Interaction	-0.197**	-0.190**	-0.090*	-0.085*	-0.070**	-0.071*	0.003	0.003	-0.116	-0.107	-7.619*	-7.186
	(0.097)	(0.089)	(0.052)	(0.047)	(0.034)	(0.037)	(0.003)	(0.003)	(0.201)	(0.173)	(4.397)	(4.402)
Targeting conditions:												
TC0: Place-Based	0.061	0.090	0.043	0.110	0.022	-0.005	-0.002	-0.006	0.072	-0.163	0.398	7.484
	(0.094)	(0.179)	(0.050)	(0.102)	(0.034)	(0.059)	(0.005)	(0.007)	(0.200)	(0.346)	(4.137)	(8.730)
TC1: Isolated	-0.031	-0.022	-0.020	-0.003	-0.004	-0.010	-0.005	-0.006	-0.066	-0.119	-1.183	0.643
	(0.092)	(0.108)	(0.049)	(0.060)	(0.033)	(0.040)	(0.005)	(0.005)	(0.190)	(0.193)	(4.159)	(5.607)
TC2: Receiving hostility	-0.031	-0.027	0.008	0.018	-0.010	-0.014	-0.004	-0.005	-0.046	-0.092	-2.720	-1.548
	(0.085)	(0.095)	(0.045)	(0.049)	(0.030)	(0.034)	(0.004)	(0.004)	(0.180)	(0.186)	(3.922)	(4.867)
TC3: Less exposed	-0.102	-0.101	-0.083*	-0.080	-0.016	-0.017	-0.002	-0.002	-0.171	-0.193	-1.974	-1.470
	(0.084)	(0.095)	(0.044)	(0.049)	(0.030)	(0.032)	(0.007)	(0.006)	(0.181)	(0.203)	(3.634)	(4.046)
TC4: Politically harassed	0.095	0.096	0.052	0.057	0.025	0.023	-0.005	-0.006	0.162	0.136	1.898	2.486
	(0.099)	(0.114)	(0.050)	(0.053)	(0.036)	(0.040)	(0.005)	(0.005)	(0.207)	(0.211)	(4.532)	(5.369)
Referrer characteristics:												
Verifying measure (referring TC)	0.031	0.030	0.011	0.010	0.009	0.009	-0.000	-0.000	0.039	0.037	1.376	1.347
	(0.023)	(0.024)	(0.013)	(0.013)	(0.008)	(0.008)	(0.001)	(0.001)	(0.050)	(0.057)	(0.973)	(0.957)
Overall risk factor score	0.077***	0.074**	0.039**	0.036**	0.020*	0.021*	0.001	0.001	0.122**	0.124*	2.203*	1.917
	(0.029)	(0.032)	(0.015)	(0.016)	(0.011)	(0.012)	(0.001)	(0.001)	(0.059)	(0.066)	(1.329)	(1.438)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.049	-0.049	0.486	0.486	0.117	0.117	0.007	0.007	1.169	1.169	10.094	10.094
Adjusted R^2	0.162	0.162	0.165	0.166	0.114	0.114	0.046	0.046	0.096	0.095	0.093	0.094
Mills: coefficient		0.062		0.106		-0.037		-0.005		-0.279		10.833
Mills: *p*-value		0.748		0.393		0.600		0.302		0.505		0.225
Joint test (*p*-value):												
All Ts = 0	0.046	0.047	0.264	0.217	0.074	0.102	0.269	0.381	0.772	0.787	0.042	0.086
TC0 = All TCs (TC1–TC5)	0.133	0.323	0.008	0.037	0.582	0.883	0.020	0.543	0.446	0.681	0.722	0.589
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets												
Referral incentive:												
T2: Externality	-0.214**	-0.205***	-0.081**	-0.070*	-0.042	-0.042	0.000	0.000	-0.396**	-0.380**	-9.063**	-9.068**
	(0.091)	(0.077)	(0.038)	(0.040)	(0.031)	(0.030)	(0.000)	(0.000)	(0.185)	(0.155)	(4.206)	(4.003)
T4: Friend	-0.141	-0.228	-0.025	0.085	-0.029	-0.068	-0.001	-0.003*	-0.362	-0.549	-6.006	-17.293
	(0.148)	(0.273)	(0.069)	(0.126)	(0.051)	(0.094)	(0.001)	(0.002)	(0.328)	(0.585)	(6.660)	(12.696)
Targeting conditions:												
TC1: Isolated	-0.015	-0.026	-0.020	-0.001	0.008	0.002	-0.001	-0.001	-0.199	-0.220	2.295	0.517
	(0.132)	(0.146)	(0.058)	(0.065)	(0.045)	(0.050)	(0.001)	(0.001)	(0.295)	(0.340)	(6.011)	(6.264)
TC2: Receiving hostility	-0.103	-0.027	0.015	-0.039	-0.011	0.016	-0.001*	-0.000	-0.480*	-0.310	-3.926	3.390
	(0.126)	(0.221)	(0.059)	(0.094)	(0.045)	(0.067)	(0.001)	(0.001)	(0.273)	(0.470)	(5.554)	(9.396)
TC3: Less exposed	0.177	0.182	0.034	0.036	0.070	0.071	-0.001	-0.001	-0.004	0.009	11.851*	12.005
	(0.135)	(0.146)	(0.056)	(0.057)	(0.047)	(0.050)	(0.001)	(0.001)	(0.281)	(0.295)	(6.175)	(7.310)
TC4: Politically harassed	0.080	0.076	0.058	0.077	0.027	0.022	-0.001*	-0.001*	-0.232	-0.238	7.510	6.086
	(0.144)	(0.150)	(0.064)	(0.066)	(0.050)	(0.053)	(0.001)	(0.001)	(0.299)	(0.332)	(6.684)	(6.991)
Referrer characteristics:												
Verifying measure (referring TC)	-0.057	-0.072	-0.006	0.009	-0.020	-0.026	0.000	-0.000	-0.086	-0.120	-2.760	-4.477*
	(0.039)	(0.053)	(0.018)	(0.024)	(0.015)	(0.020)	(0.000)	(0.000)	(0.085)	(0.110)	(1.863)	(2.407)
Overall risk factor score	0.024	0.037	0.025	0.017	-0.005	0.000	-0.000	-0.000	0.106	0.135	-0.188	1.027
	(0.046)	(0.051)	(0.021)	(0.027)	(0.016)	(0.018)	(0.000)	(0.000)	(0.097)	(0.117)	(2.139)	(2.084)
N	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.107	0.107	0.527	0.527	0.157	0.157	0.011	0.011	1.456	1.456	17.153	17.153
Adjusted R^2	0.120	0.117	0.201	0.200	0.053	0.053	0.669	0.671	0.083	0.080	0.044	0.043
Mills: coefficient		-0.322		0.313		-0.130		-0.006		-0.699		-36.396
Mills: *p*-value		0.656		0.313		0.578		0.072		0.659		0.258
Joint test (*p*-value)												
All Ts = 0	0.059	0.027	0.099	0.079	0.378	0.370	0.467	0.123	0.083	0.044	0.094	0.069
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .565, 1.03, -.423, .149, and .00725, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.26: Referral and Gang Proximity

	Gang proximity (index)		Ever invited to join gang (dummy)		Know anyone invited to gang (dummy)		Know anyone who joined gang (dummy)		Committed gang-related crime (dummy)		Gang awareness: active benefits (count)		Gang awareness: push factors (count)		Willingness to join gang (0-10)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF	(15) OLS	(16) CF
Panel A: First-order targets																
Referral incentive:																
T1: Monetary incentive	0.083	0.086	-0.004	-0.002	0.054	0.055	0.027	0.028	-0.019*	-0.018*	0.055	0.068	-0.007	-0.006	0.392**	0.401**
	(0.078)	(0.081)	(0.033)	(0.033)	(0.038)	(0.040)	(0.037)	(0.037)	(0.010)	(0.010)	(0.091)	(0.084)	(0.037)	(0.039)	(0.186)	(0.193)
T2: Externality info	-0.008	-0.007	-0.023	-0.023	-0.021	-0.020	0.019	0.020	-0.008	-0.008	0.139	0.137	0.032	0.033	0.364**	0.367*
	(0.079)	(0.094)	(0.033)	(0.038)	(0.038)	(0.043)	(0.037)	(0.043)	(0.011)	(0.010)	(0.091)	(0.093)	(0.036)	(0.041)	(0.182)	(0.205)
T1 × T2: Interaction	-0.099	-0.107	0.009	0.008	-0.048	-0.050	-0.049	-0.052	0.021	0.021*	-0.201	-0.217*	0.019	0.013	-0.632**	-0.658**
	(0.113)	(0.126)	(0.047)	(0.054)	(0.055)	(0.058)	(0.052)	(0.058)	(0.015)	(0.012)	(0.132)	(0.126)	(0.052)	(0.053)	(0.267)	(0.283)
Targeting conditions:																
TC0: Place-Based	-0.080	0.059	-0.079*	-0.039	-0.033	0.038	0.027	0.070	-0.001	-0.005	0.006	-0.330	0.072	0.010	-0.076	-0.135
	(0.107)	(0.198)	(0.047)	(0.080)	(0.051)	(0.108)	(0.050)	(0.089)	(0.012)	(0.018)	(0.119)	(0.232)	(0.047)	(0.097)	(0.250)	(0.472)
TC1: Isolated	-0.048	-0.019	-0.048	-0.040	-0.037	-0.022	0.043	0.052	0.024	0.023	-0.003	-0.090	0.057	0.040	-0.293	-0.318
	(0.103)	(0.117)	(0.046)	(0.048)	(0.050)	(0.061)	(0.048)	(0.051)	(0.015)	(0.015)	(0.111)	(0.136)	(0.049)	(0.055)	(0.236)	(0.291)
TC2: Receiving hostility	0.114	0.138	-0.005	0.002	0.047	0.060	0.063	0.072*	0.010	0.009	-0.032	-0.093	0.087*	0.077*	0.310	0.303
	(0.098)	(0.104)	(0.044)	(0.047)	(0.046)	(0.051)	(0.045)	(0.043)	(0.012)	(0.012)	(0.109)	(0.108)	(0.045)	(0.045)	(0.235)	(0.233)
TC3: Less exposed	-0.083	-0.075	-0.081*	-0.080**	-0.016	-0.011	0.009	0.012	-0.006	-0.007	-0.077	-0.107	0.085*	0.081*	-0.139	-0.145
	(0.097)	(0.099)	(0.042)	(0.041)	(0.046)	(0.051)	(0.046)	(0.047)	(0.010)	(0.011)	(0.104)	(0.106)	(0.044)	(0.046)	(0.221)	(0.243)
TC4: Politically harassed	-0.018	-0.003	-0.016	-0.011	-0.019	-0.011	0.031	0.036	0.002	0.001	-0.035	-0.065	0.087	0.082	-0.288	-0.288
	(0.109)	(0.130)	(0.050)	(0.050)	(0.050)	(0.059)	(0.051)	(0.059)	(0.011)	(0.012)	(0.115)	(0.127)	(0.054)	(0.051)	(0.255)	(0.250)
Referrer characteristics:																
Verifying measure (referring TC)	0.044	0.045	0.013	0.013	0.020	0.020	0.011	0.011	0.001	0.001	-0.011	-0.011	-0.019	-0.019	0.104	0.106
	(0.027)	(0.029)	(0.013)	(0.014)	(0.013)	(0.013)	(0.013)	(0.012)	(0.003)	(0.004)	(0.033)	(0.036)	(0.013)	(0.014)	(0.068)	(0.068)
Overall risk factor score	0.107***	0.105***	0.038***	0.037***	0.048***	0.047***	0.028*	0.028	-0.002	-0.002	0.005	0.016	-0.011	-0.008	0.155**	0.163**
	(0.035)	(0.035)	(0.015)	(0.014)	(0.016)	(0.017)	(0.016)	(0.018)	(0.005)	(0.005)	(0.042)	(0.046)	(0.016)	(0.017)	(0.078)	(0.080)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.013	-0.013	0.300	0.300	0.522	0.522	0.559	0.559	0.021	0.021	2.135	2.135	0.756	0.756	1.192	1.192
Adjusted R^2	0.077	0.074	0.117	0.116	0.045	0.043	0.035	0.034	0.016	0.015	0.362	0.363	0.101	0.102	0.035	0.035
Mills: coefficient		0.153		0.045		0.085		0.045		-0.006		-0.501		-0.102		-0.171
Mills: *p*-value		0.531		0.610		0.493		0.705		0.828		0.072		0.388		0.773
Joint test (*p*-value):																
All Ts = 0	0.523	0.478	0.875	0.873	0.168	0.170	0.820	0.819	0.245	0.244	0.345	0.361	0.466	0.625	0.108	0.131
TC0 = All TCs (TC1–TC5)	0.248	0.212	0.139	0.130	0.431	0.396	0.707	0.543	0.283	0.293	0.970	0.798	0.425	0.347	0.072	0.027
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets																
Referral incentive:																
T2: Externality	-0.186**	-0.203**	-0.051	-0.055	-0.080**	-0.080**	-0.095**	-0.107***	-0.006	-0.004	-0.157	-0.153	0.015	0.004	0.126	0.063
	(0.081)	(0.083)	(0.036)	(0.036)	(0.038)	(0.036)	(0.037)	(0.041)	(0.011)	(0.012)	(0.095)	(0.111)	(0.041)	(0.042)	(0.195)	(0.233)
T4: Friend	0.130	-0.323	0.005	-0.140	0.096	0.016	0.026	-0.227	0.012	-0.008	-0.166	-0.434	-0.056	-0.202	0.166	-0.626
	(0.155)	(0.310)	(0.065)	(0.123)	(0.077)	(0.144)	(0.072)	(0.144)	(0.019)	(0.034)	(0.171)	(0.342)	(0.072)	(0.156)	(0.327)	(0.754)
Targeting conditions:																
TC1: Isolated	0.167	0.094	0.060	0.036	0.060	0.048	0.044	0.004	0.011	0.007	-0.253*	-0.294	0.003	-0.022	0.262	0.136
	(0.136)	(0.142)	(0.057)	(0.056)	(0.066)	(0.072)	(0.065)	(0.071)	(0.014)	(0.018)	(0.150)	(0.189)	(0.066)	(0.082)	(0.311)	(0.315)
TC2: Receiving hostility	0.189	0.462**	0.106*	0.192**	0.035	0.087	0.023	0.176*	0.014	0.025	-0.270*	-0.086	0.041	0.114	0.654**	1.108**
	(0.138)	(0.210)	(0.060)	(0.081)	(0.067)	(0.096)	(0.063)	(0.096)	(0.018)	(0.026)	(0.150)	(0.227)	(0.064)	(0.095)	(0.323)	(0.488)
TC3: Less exposed	0.156	0.158	0.066	0.066	0.013	0.014	0.049	0.051	0.023	0.023	-0.238	-0.233	0.007	0.004	0.616**	0.616**
	(0.128)	(0.142)	(0.053)	(0.061)	(0.064)	(0.067)	(0.061)	(0.068)	(0.017)	(0.020)	(0.149)	(0.169)	(0.062)	(0.069)	(0.281)	(0.312)
TC4: Politically harassed	0.303**	0.240	0.126**	0.105	0.108	0.098	0.106	0.072	-0.009	-0.013	-0.218	-0.248	-0.073	-0.099	0.124	0.010
	(0.139)	(0.179)	(0.058)	(0.071)	(0.068)	(0.087)	(0.065)	(0.083)	(0.013)	(0.016)	(0.149)	(0.191)	(0.066)	(0.071)	(0.314)	(0.385)
Referrer characteristics:																
Verifying measure (referring TC)	-0.007	-0.075	0.019	-0.002	-0.018	-0.030	-0.001	-0.039*	-0.005	-0.008	0.043	0.001	-0.060***	-0.081***	-0.066	-0.184
	(0.042)	(0.054)	(0.017)	(0.024)	(0.020)	(0.026)	(0.020)	(0.024)	(0.010)	(0.012)	(0.053)	(0.064)	(0.019)	(0.027)	(0.097)	(0.150)
Overall risk factor score	0.068	0.113*	0.038*	0.052**	0.025	0.033	0.005	0.030	0.001	0.003	0.043	0.074	-0.018	-0.006	0.171	0.245
	(0.048)	(0.066)	(0.021)	(0.025)	(0.022)	(0.030)	(0.022)	(0.028)	(0.004)	(0.006)	(0.048)	(0.059)	(0.023)	(0.028)	(0.112)	(0.179)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.026	0.026	0.321	0.321	0.529	0.529	0.571	0.571	0.007	0.007	2.266	2.266	0.794	0.794	1.408	1.408
Adjusted R^2	0.090	0.092	0.113	0.115	0.065	0.065	0.037	0.038	-0.010	-0.013	0.407	0.405	0.112	0.113	0.074	0.074
Mills: coefficient		-1.403		-0.450		-0.257		-0.779		-0.064		-0.885		-0.421		-2.363
Mills: *p*-value		0.049		0.122		0.412		0.019		0.449		0.252		0.232		0.237
Joint test (*p*-value)																
All Ts = 0	0.021	0.041	0.336	0.241	0.020	0.070	0.019	0.016	0.572	0.940	0.209	0.201	0.604	0.417	0.761	0.610
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .855, .9, .84, .309, -.0243, .00638, and .0551, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.27: Referral and Drug and Substances

	Drug & substance (index)		Ever taken substances (mean)		Ever taken drugs (mean)		Frequency of substances use (mean)		Frequency of drug use (mean)		Enumerator's observation: substances use (mean)		Enumerator's observation: drug use (mean)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Panel A: First-order targets														
Referral incentive:														
T1: Monetary incentive	0.140**	0.135*	0.013	0.012	0.014	0.013	0.124*	0.121	0.207	0.196	0.044	0.044	0.030**	0.029**
	(0.070)	(0.070)	(0.020)	(0.020)	(0.010)	(0.011)	(0.074)	(0.077)	(0.130)	(0.138)	(0.028)	(0.029)	(0.013)	(0.015)
T2: Externality info	0.038	0.040	-0.003	-0.002	0.005	0.005	0.090	0.090	0.048	0.049	0.011	0.012	0.003	0.003
	(0.069)	(0.077)	(0.020)	(0.025)	(0.010)	(0.010)	(0.074)	(0.085)	(0.117)	(0.137)	(0.029)	(0.032)	(0.013)	(0.014)
T1 × T2: Interaction	-0.230**	-0.229**	-0.021	-0.022	-0.031**	-0.031**	-0.155	-0.150	-0.360**	-0.347*	-0.059	-0.062	-0.051***	-0.050**
	(0.096)	(0.100)	(0.028)	(0.031)	(0.014)	(0.014)	(0.104)	(0.109)	(0.169)	(0.199)	(0.041)	(0.042)	(0.019)	(0.020)
Targeting conditions:														
TC0: Place-Based	0.065	0.103	0.035	0.006	-0.008	0.016	0.192*	0.101	-0.036	0.278	0.075*	0.015	-0.024	0.012
	(0.100)	(0.181)	(0.027)	(0.052)	(0.013)	(0.022)	(0.113)	(0.180)	(0.171)	(0.284)	(0.040)	(0.077)	(0.018)	(0.032)
TC1: Isolated	0.063	0.073	0.021	0.014	0.002	0.008	0.032	0.014	-0.002	0.077	0.052	0.038	0.005	0.014
	(0.093)	(0.099)	(0.027)	(0.030)	(0.013)	(0.012)	(0.102)	(0.105)	(0.176)	(0.181)	(0.037)	(0.039)	(0.018)	(0.018)
TC2: Receiving hostility	0.049	0.058	0.030	0.026	-0.002	0.003	0.056	0.041	0.048	0.104	0.036	0.027	-0.009	-0.003
	(0.085)	(0.090)	(0.025)	(0.026)	(0.011)	(0.012)	(0.091)	(0.097)	(0.147)	(0.149)	(0.035)	(0.034)	(0.016)	(0.018)
TC3: Less exposed	-0.033	-0.026	-0.004	-0.005	-0.000	0.002	-0.010	-0.014	-0.136	-0.108	0.012	0.009	-0.016	-0.013
	(0.085)	(0.085)	(0.024)	(0.023)	(0.012)	(0.012)	(0.095)	(0.094)	(0.150)	(0.170)	(0.033)	(0.033)	(0.016)	(0.016)
TC4: Politically harassed	0.133	0.137	0.047*	0.044	0.023	0.025	0.005	-0.005	0.116	0.144	0.041	0.036	0.018	0.022
	(0.095)	(0.105)	(0.028)	(0.030)	(0.014)	(0.016)	(0.105)	(0.112)	(0.178)	(0.193)	(0.037)	(0.039)	(0.018)	(0.020)
Referrer characteristics:														
Verifying measure (referring TC)	0.023	0.024	0.003	0.003	0.005	0.005	-0.014	-0.014	0.066	0.066	0.002	0.002	0.006	0.006
	(0.026)	(0.028)	(0.007)	(0.008)	(0.003)	(0.003)	(0.033)	(0.034)	(0.047)	(0.054)	(0.010)	(0.011)	(0.004)	(0.004)
Overall risk factor score	0.160***	0.159***	0.034***	0.035***	0.016***	0.016***	0.090***	0.092***	0.227***	0.217***	0.049***	0.052***	0.030***	0.029***
	(0.031)	(0.033)	(0.008)	(0.009)	(0.004)	(0.005)	(0.033)	(0.033)	(0.057)	(0.059)	(0.012)	(0.013)	(0.006)	(0.006)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.078	-0.078	0.219	0.219	0.091	0.091	0.386	0.386	0.726	0.726	0.280	0.280	0.123	0.123
Adjusted R^2	0.162	0.162	0.085	0.084	0.147	0.148	0.079	0.078	0.191	0.192	0.077	0.076	0.158	0.158
Mills: coefficient		0.058		-0.041		0.034		-0.099		0.460		-0.087		0.048
Mills: *p*-value		0.780		0.502		0.195		0.656		0.150		0.344		0.225
Joint test (*p*-value):														
All Ts = 0	0.037	0.038	0.666	0.683	0.059	0.089	0.385	0.462	0.092	0.134	0.305	0.219	0.004	0.003
TC0 = All TCs (TC1–TC5)	0.400	0.722	0.199	0.498	0.321	0.655	0.423	0.991	0.531	0.639	0.344	0.896	0.104	0.414
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets														
Referral incentive:														
T2: Externality	-0.071	-0.078	-0.028	-0.027	-0.010	-0.011	-0.051	-0.057	-0.145	-0.152	-0.033	-0.031	0.010	0.007
	(0.079)	(0.079)	(0.022)	(0.023)	(0.011)	(0.012)	(0.093)	(0.089)	(0.136)	(0.142)	(0.031)	(0.032)	(0.015)	(0.015)
T4: Friend	-0.018	-0.111	0.044	0.043	-0.027	-0.030	0.118	-0.034	-0.249	-0.267	0.025	0.015	-0.020	-0.061
	(0.138)	(0.270)	(0.038)	(0.065)	(0.019)	(0.039)	(0.156)	(0.317)	(0.268)	(0.502)	(0.054)	(0.110)	(0.028)	(0.053)
Targeting conditions:														
TC1: Isolated	0.105	0.093	0.038	0.037	-0.011	-0.010	0.191	0.166	-0.079	-0.072	0.063	0.061	0.021	0.015
	(0.121)	(0.130)	(0.031)	(0.034)	(0.016)	(0.017)	(0.131)	(0.146)	(0.212)	(0.225)	(0.050)	(0.054)	(0.024)	(0.025)
TC2: Receiving hostility	0.073	0.140	0.041	0.043	0.000	0.006	0.109	0.198	-0.132	-0.087	0.030	0.036	0.013	0.040
	(0.124)	(0.185)	(0.034)	(0.052)	(0.018)	(0.029)	(0.135)	(0.229)	(0.218)	(0.266)	(0.049)	(0.080)	(0.024)	(0.033)
TC3: Less exposed	0.088	0.091	0.059*	0.060*	-0.015	-0.014	0.312**	0.312**	-0.118	-0.109	0.072	0.072	-0.022	-0.022
	(0.120)	(0.128)	(0.033)	(0.032)	(0.016)	(0.017)	(0.135)	(0.155)	(0.234)	(0.243)	(0.048)	(0.050)	(0.022)	(0.024)
TC4: Politically harassed	0.092	0.085	0.036	0.036	0.003	0.004	0.091	0.069	0.204	0.217	0.046	0.044	-0.008	-0.013
	(0.130)	(0.144)	(0.035)	(0.036)	(0.018)	(0.021)	(0.144)	(0.167)	(0.263)	(0.282)	(0.051)	(0.054)	(0.025)	(0.028)
Referrer characteristics:														
Verifying measure (referring TC)	-0.012	-0.027	-0.016	-0.016	0.004	0.003	-0.016	-0.039	-0.030	-0.038	-0.018	-0.019	0.010	0.004
	(0.038)	(0.045)	(0.011)	(0.012)	(0.005)	(0.007)	(0.043)	(0.051)	(0.067)	(0.096)	(0.016)	(0.021)	(0.008)	(0.010)
Overall risk factor score	0.108**	0.119**	0.021*	0.021	0.011**	0.012*	0.077	0.091	0.184**	0.191**	0.031*	0.032	0.018**	0.022**
	(0.042)	(0.050)	(0.011)	(0.014)	(0.005)	(0.007)	(0.051)	(0.060)	(0.085)	(0.098)	(0.016)	(0.021)	(0.008)	(0.009)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.044	0.044	0.233	0.233	0.111	0.111	0.520	0.520	0.934	0.934	0.304	0.304	0.137	0.137
Adjusted R^2	0.159	0.159	0.100	0.101	0.117	0.114	0.099	0.100	0.168	0.168	0.072	0.073	0.112	0.110
Mills: coefficient		-0.297		-0.007		-0.014		-0.469		-0.089		-0.036		-0.128
Mills: *p*-value		0.670		0.970		0.897		0.579		0.937		0.900		0.329
Joint test (*p*-value)														
All Ts = 0	0.657	0.609	0.121	0.264	0.313	0.538	0.571	0.804	0.436	0.545	0.441	0.562	0.510	0.380
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .835, 1.54, .192, .114, .578, and 1.17, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.28: Referral and Attitudes towards Gang Activities

	Attitude towards gang activities (index)		Existence of gangs due to weak state institutions		Less police harassment if gangs didn't exist		Join a gang for better life/income through unspecified means		Gangs help your community flourish by providing scarce goods		Comfortable interacting with friend after he joins a gang		Willing to buy a stolen iPhone at a cheaper price from gang	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Panel A: First-order targets														
Referral incentive:														
T1: Monetary incentive	-0.047	-0.046	0.048	0.046	-0.037	-0.042	-0.050	-0.044	0.017	0.023	-0.160	-0.167	0.015	0.014
	(0.084)	(0.089)	(0.101)	(0.100)	(0.103)	(0.103)	(0.079)	(0.082)	(0.114)	(0.109)	(0.101)	(0.108)	(0.106)	(0.108)
T2: Externality info	0.007	0.007	-0.025	-0.026	-0.070	-0.073	0.027	0.029	0.155	0.157	-0.085	-0.085	-0.034	-0.036
	(0.082)	(0.079)	(0.103)	(0.091)	(0.105)	(0.105)	(0.076)	(0.090)	(0.107)	(0.103)	(0.104)	(0.094)	(0.099)	(0.095)
T1 × T2: Interaction	-0.160	-0.162	-0.152	-0.144	-0.011	0.007	0.000	-0.014	-0.407***	-0.424***	0.068	0.080	-0.204	-0.197
	(0.117)	(0.127)	(0.149)	(0.141)	(0.154)	(0.139)	(0.112)	(0.133)	(0.154)	(0.150)	(0.143)	(0.153)	(0.148)	(0.151)
Targeting conditions:														
TC0: Place-Based	0.037	0.162	-0.023	0.050	-0.017	0.120	-0.102	-0.135	0.053	-0.077	0.167	0.524**	0.035	0.200
	(0.106)	(0.191)	(0.133)	(0.221)	(0.138)	(0.250)	(0.106)	(0.172)	(0.135)	(0.278)	(0.132)	(0.231)	(0.144)	(0.289)
TC1: Isolated	0.167	0.195*	-0.026	-0.006	-0.379***	-0.339**	-0.027	-0.040	0.260*	0.223	0.188	0.277**	0.217	0.258
	(0.102)	(0.112)	(0.130)	(0.127)	(0.139)	(0.139)	(0.102)	(0.107)	(0.139)	(0.159)	(0.132)	(0.126)	(0.141)	(0.178)
TC2: Receiving hostility	0.168*	0.190**	0.005	0.017	-0.233*	-0.213	0.050	0.046	0.167	0.146	0.230*	0.292**	0.155	0.182
	(0.093)	(0.092)	(0.122)	(0.117)	(0.129)	(0.130)	(0.092)	(0.098)	(0.130)	(0.133)	(0.121)	(0.122)	(0.124)	(0.143)
TC3: Less exposed	0.012	0.020	-0.075	-0.071	-0.123	-0.113	-0.022	-0.025	0.056	0.046	0.055	0.083	0.004	0.014
	(0.092)	(0.088)	(0.120)	(0.131)	(0.127)	(0.109)	(0.093)	(0.095)	(0.124)	(0.124)	(0.118)	(0.114)	(0.125)	(0.128)
TC4: Politically harassed	0.118	0.130	-0.180	-0.175	-0.033	-0.024	0.007	0.007	0.192	0.183	0.231	0.264**	0.104	0.118
	(0.109)	(0.105)	(0.139)	(0.139)	(0.143)	(0.132)	(0.104)	(0.114)	(0.143)	(0.146)	(0.142)	(0.124)	(0.144)	(0.148)
Referrer characteristics:														
Verifying measure (referring TC)	0.012	0.012	0.052	0.051	-0.035	-0.036	0.055*	0.056*	-0.033	-0.032	0.020	0.020	-0.040	-0.040
	(0.031)	(0.029)	(0.038)	(0.039)	(0.039)	(0.038)	(0.030)	(0.030)	(0.040)	(0.038)	(0.035)	(0.036)	(0.037)	(0.035)
Overall risk factor score	0.030	0.027	-0.010	-0.014	0.065	0.057	0.001	0.005	-0.024	-0.017	0.041	0.030	0.086*	0.080*
	(0.035)	(0.037)	(0.043)	(0.045)	(0.044)	(0.046)	(0.033)	(0.032)	(0.045)	(0.050)	(0.046)	(0.049)	(0.047)	(0.046)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.008	-0.008	2.392	2.392	2.945	2.945	1.404	1.404	2.301	2.301	2.277	2.277	2.086	2.086
Adjusted R^2	0.036	0.036	0.121	0.122	0.031	0.031	0.035	0.033	0.039	0.039	0.031	0.034	0.027	0.028
Mills: coefficient		0.157		0.126		0.246		-0.095		-0.232		0.512		0.240
Mills: *p*-value		0.536		0.621		0.459		0.687		0.522		0.063		0.524
Joint test (*p*-value):														
All Ts = 0	0.048	0.027	0.393	0.251	0.732	0.846	0.757	0.708	0.002	0.004	0.301	0.250	0.115	0.097
TC0 = All TCs (TC1–TC5)	0.243	0.227	0.748	0.659	0.048	0.042	0.767	0.808	0.434	0.393	0.285	0.049	0.428	0.516
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets														
Referral incentive:														
T2: Externality	-0.018	-0.024	0.049	0.075	0.006	0.024	-0.002	0.003	0.034	0.014	0.025	-0.005	-0.145	-0.138
	(0.080)	(0.090)	(0.113)	(0.119)	(0.114)	(0.118)	(0.086)	(0.099)	(0.105)	(0.126)	(0.105)	(0.101)	(0.103)	(0.110)
T4: Friend	-0.095	-0.226	-0.037	-0.043	0.027	0.268	-0.098	-0.219	0.162	-0.030	0.076	-0.263	-0.425**	-0.238
	(0.144)	(0.290)	(0.203)	(0.402)	(0.194)	(0.387)	(0.133)	(0.289)	(0.209)	(0.426)	(0.180)	(0.353)	(0.191)	(0.344)
Targeting conditions:														
TC1: Isolated	-0.062	-0.080	0.153	0.151	-0.293*	-0.249	0.146	0.121	-0.166	-0.194	0.063	0.017	-0.383**	-0.348*
	(0.131)	(0.174)	(0.181)	(0.224)	(0.169)	(0.199)	(0.138)	(0.167)	(0.173)	(0.230)	(0.162)	(0.203)	(0.162)	(0.206)
TC2: Receiving hostility	0.073	0.162	0.131	0.155	-0.066	-0.178	0.098	0.155	0.011	0.129	0.146	0.367	-0.084	-0.176
	(0.136)	(0.201)	(0.183)	(0.250)	(0.182)	(0.238)	(0.136)	(0.200)	(0.184)	(0.264)	(0.169)	(0.237)	(0.169)	(0.290)
TC3: Less exposed	0.070	0.073	-0.007	-0.003	-0.244	-0.238	0.056	0.052	0.101	0.104	0.317**	0.324*	-0.226	-0.222
	(0.131)	(0.146)	(0.168)	(0.187)	(0.163)	(0.184)	(0.127)	(0.137)	(0.178)	(0.215)	(0.159)	(0.173)	(0.155)	(0.165)
TC4: Politically harassed	0.049	0.035	0.027	0.030	0.132	0.177	0.102	0.077	0.021	-0.002	0.252	0.215	-0.236	-0.201
	(0.130)	(0.171)	(0.184)	(0.220)	(0.183)	(0.197)	(0.132)	(0.149)	(0.185)	(0.219)	(0.173)	(0.201)	(0.166)	(0.201)
Referrer characteristics:														
Verifying measure (referring TC)	0.008	-0.013	0.069	0.068	-0.010	0.023	-0.031	-0.046	-0.013	-0.043	0.011	-0.043	0.022	0.047
	(0.045)	(0.053)	(0.061)	(0.083)	(0.064)	(0.085)	(0.045)	(0.052)	(0.061)	(0.086)	(0.050)	(0.059)	(0.060)	(0.077)
Overall risk factor score	0.152***	0.167***	0.051	0.056	-0.068	-0.086	0.098**	0.108*	0.162***	0.181**	0.128**	0.164***	0.130**	0.115
	(0.044)	(0.053)	(0.061)	(0.074)	(0.058)	(0.066)	(0.043)	(0.063)	(0.061)	(0.074)	(0.057)	(0.060)	(0.058)	(0.071)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	-0.122	-0.122	2.312	2.312	2.849	2.849	1.334	1.334	2.113	2.113	2.184	2.184	2.063	2.063
Adjusted R^2	0.081	0.081	0.069	0.065	0.072	0.073	0.062	0.062	0.028	0.028	0.054	0.050	0.098	0.100
Mills: coefficient		-0.417		-0.092		0.685		-0.368		-0.575		-1.042		0.553
Mills: *p*-value		0.532		0.923		0.481		0.603		0.552		0.207		0.524
Joint test (*p*-value)														
All Ts = 0	0.803	0.725	0.870	0.789	0.990	0.787	0.744	0.730	0.735	0.988	0.906	0.756	0.062	0.392
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .162, .00303, .306, .241, .298, and .284, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

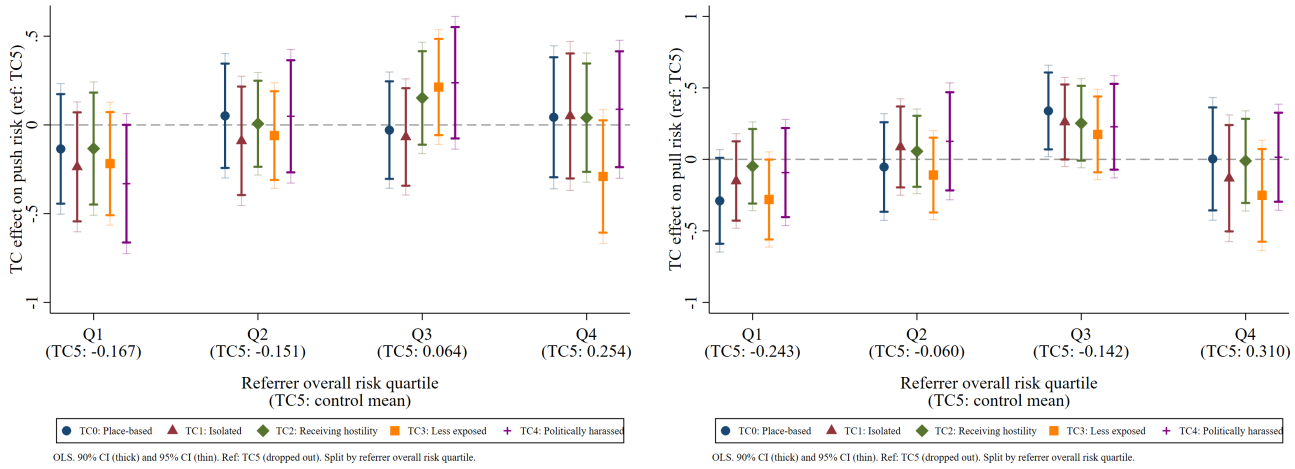
Table A.29: Referral and Attitudes towards Crime and Violence

	Attitude towards crime & violence (index)		Taking 10000KES from gamble winnings due to financial hardship		Joining violent demos if community members already joined		Attacking police and state forces as revenge for harassment		Violence by neighbors against robber from another community		Forcing religious conversion to strengthen community cohesion		Fighting is justified as jihad when revenge	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Panel A: First-order targets														
Referral incentive:														
T1: Monetary incentive	-0.031	-0.029	0.092	0.104	-0.190*	-0.193	0.003	0.005	-0.042	-0.049	0.021	0.023	0.023	0.025
	(0.076)	(0.093)	(0.104)	(0.120)	(0.104)	(0.122)	(0.105)	(0.112)	(0.103)	(0.111)	(0.054)	(0.063)	(0.097)	(0.098)
T2: Externality info	0.108	0.106	0.090	0.088	0.023	0.019	0.178*	0.176	0.025	0.027	0.094*	0.095*	-0.026	-0.031
	(0.076)	(0.083)	(0.104)	(0.099)	(0.104)	(0.105)	(0.106)	(0.107)	(0.102)	(0.107)	(0.056)	(0.057)	(0.100)	(0.099)
T1 × T2: Interaction	-0.198*	-0.194*	-0.398***	-0.411***	0.034	0.052	-0.188	-0.187	-0.006	-0.003	-0.112	-0.117	-0.163	-0.149
	(0.108)	(0.116)	(0.148)	(0.157)	(0.144)	(0.154)	(0.151)	(0.149)	(0.145)	(0.153)	(0.075)	(0.090)	(0.136)	(0.132)
Targeting conditions:														
TC0: Place-Based	-0.038	0.085	0.013	-0.137	0.049	0.487*	-0.006	0.048	-0.109	0.173	-0.133	-0.269**	0.101	-0.028
	(0.100)	(0.172)	(0.137)	(0.264)	(0.145)	(0.274)	(0.139)	(0.238)	(0.137)	(0.225)	(0.081)	(0.123)	(0.131)	(0.206)
TC1: Isolated	0.028	0.057	-0.081	-0.123	0.085	0.193	0.309**	0.321**	-0.092	-0.024	-0.127*	-0.161**	-0.011	-0.036
	(0.098)	(0.108)	(0.139)	(0.152)	(0.143)	(0.167)	(0.141)	(0.155)	(0.140)	(0.154)	(0.075)	(0.075)	(0.133)	(0.133)
TC2: Receiving hostility	0.039	0.058	0.010	-0.020	0.038	0.110	0.127	0.134	-0.104	-0.052	-0.020	-0.043	0.199	0.171
	(0.091)	(0.098)	(0.130)	(0.131)	(0.127)	(0.145)	(0.128)	(0.140)	(0.124)	(0.127)	(0.075)	(0.073)	(0.125)	(0.127)
TC3: Less exposed	0.008	0.014	-0.146	-0.165	0.100	0.128	0.199	0.200	-0.130	-0.106	-0.074	-0.084	0.152	0.138
	(0.091)	(0.092)	(0.125)	(0.113)	(0.131)	(0.132)	(0.127)	(0.146)	(0.122)	(0.124)	(0.072)	(0.075)	(0.124)	(0.127)
TC4: Politically harassed	0.165	0.175*	-0.096	-0.108	0.239	0.277*	0.200	0.204	0.112	0.139	0.039	0.027	0.209	0.192
	(0.105)	(0.106)	(0.143)	(0.147)	(0.152)	(0.144)	(0.146)	(0.152)	(0.138)	(0.144)	(0.089)	(0.089)	(0.140)	(0.143)
Referrer characteristics:														
Verifying measure (referring TC)	0.024	0.024	0.058*	0.058	0.035	0.033	-0.008	-0.009	0.034	0.034	-0.025	-0.025	-0.003	-0.005
	(0.028)	(0.026)	(0.035)	(0.036)	(0.040)	(0.038)	(0.038)	(0.034)	(0.040)	(0.038)	(0.019)	(0.020)	(0.035)	(0.037)
Overall risk factor score	0.100***	0.095***	0.123***	0.128***	0.055	0.039	0.047	0.044	0.090**	0.084**	0.036	0.041	0.043	0.041
	(0.034)	(0.032)	(0.045)	(0.042)	(0.043)	(0.048)	(0.046)	(0.042)	(0.044)	(0.040)	(0.025)	(0.026)	(0.041)	(0.042)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.042	-0.042	2.708	2.708	2.474	2.474	2.368	2.368	2.868	2.868	1.103	1.103	2.033	2.033
Adjusted R^2	0.077	0.076	0.069	0.068	0.109	0.110	0.070	0.070	0.031	0.032	0.051	0.053	0.042	0.040
Mills: coefficient		0.171		-0.244		0.634		0.075		0.380		-0.196		-0.118
Mills: *p*-value		0.399		0.452		0.084		0.783		0.172		0.178		0.648
Joint test (*p*-value):														
All Ts = 0	0.026	0.012	0.011	0.010	0.098	0.165	0.227	0.147	0.913	0.880	0.314	0.338	0.181	0.244
TC0 = All TCs (TC1–TC5)	0.448	0.561	0.686	0.757	0.649	0.277	0.164	0.307	0.370	0.311	0.110	0.123	0.363	0.326
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets														
Referral incentive:														
T2: Externality	0.003	-0.001	-0.020	-0.025	-0.093	-0.029	-0.013	-0.046	0.010	-0.026	0.091	0.094	0.084	0.067
	(0.078)	(0.088)	(0.107)	(0.117)	(0.107)	(0.143)	(0.110)	(0.129)	(0.103)	(0.149)	(0.059)	(0.071)	(0.103)	(0.110)
T4: Friend	0.116	-0.162	0.077	-0.189	0.054	1.149***	0.308	-0.348	-0.087	-1.144**	-0.010	0.083	0.178	-0.226
	(0.146)	(0.272)	(0.202)	(0.350)	(0.184)	(0.361)	(0.193)	(0.428)	(0.191)	(0.457)	(0.100)	(0.175)	(0.184)	(0.347)
Targeting conditions:														
TC1: Isolated	0.025	-0.017	-0.050	-0.086	0.053	0.248	0.163	0.062	-0.083	-0.271	-0.013	0.002	0.037	-0.030
	(0.128)	(0.151)	(0.179)	(0.202)	(0.163)	(0.216)	(0.167)	(0.202)	(0.170)	(0.247)	(0.106)	(0.102)	(0.170)	(0.176)
TC2: Receiving hostility	0.106	0.291	0.213	0.400*	0.195	-0.365	0.042	0.448	-0.092	0.475*	0.071	0.017	-0.048	0.188
	(0.127)	(0.188)	(0.185)	(0.215)	(0.169)	(0.327)	(0.175)	(0.282)	(0.172)	(0.255)	(0.107)	(0.160)	(0.176)	(0.251)
TC3: Less exposed	0.081	0.086	0.077	0.085	-0.070	-0.054	0.287*	0.294	0.024	0.013	0.023	0.023	-0.102	-0.101
	(0.117)	(0.135)	(0.167)	(0.170)	(0.155)	(0.215)	(0.169)	(0.221)	(0.154)	(0.205)	(0.100)	(0.103)	(0.155)	(0.166)
TC4: Politically harassed	-0.081	-0.114	0.068	0.042	-0.140	0.049	0.092	0.007	-0.149	-0.326	-0.092	-0.078	-0.154	-0.213
	(0.131)	(0.151)	(0.183)	(0.209)	(0.172)	(0.203)	(0.180)	(0.203)	(0.174)	(0.237)	(0.093)	(0.094)	(0.164)	(0.210)
Referrer characteristics:														
Verifying measure (referring TC)	-0.044	-0.087	-0.016	-0.059	-0.017	0.136*	-0.062	-0.163**	-0.062	-0.211**	0.003	0.017	-0.012	-0.072
	(0.044)	(0.055)	(0.057)	(0.071)	(0.060)	(0.079)	(0.053)	(0.076)	(0.058)	(0.085)	(0.028)	(0.039)	(0.062)	(0.075)
Overall risk factor score	0.073*	0.104*	0.055	0.086	0.108*	0.016	0.067	0.134	0.059	0.152*	-0.030	-0.039	0.022	0.061
	(0.044)	(0.061)	(0.064)	(0.084)	(0.058)	(0.081)	(0.058)	(0.082)	(0.056)	(0.086)	(0.028)	(0.031)	(0.059)	(0.070)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	-0.041	-0.041	2.775	2.775	2.409	2.409	2.378	2.378	2.921	2.921	1.066	1.066	1.986	1.986
Adjusted R^2	0.077	0.075	0.012	0.010	0.145	0.151	0.113	0.111	0.037	0.051	0.006	0.007	0.059	0.062
Mills: coefficient		-0.896		-0.867		3.216		-2.032		-3.189		0.285		-1.238
Mills: *p*-value		0.218		0.316		0.001		0.067		0.001		0.530		0.124
Joint test (*p*-value)														
All Ts = 0	0.722	0.838	0.897	0.860	0.594	0.004	0.251	0.714	0.884	0.040	0.291	0.409	0.523	0.650
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .256, .272, .279, .281, .264, and .128, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

A.7 Heterogeneous Treatment Effects

OLS Interaction Analysis by Referrer Risk Quartiles. Figure A.4 displays TC effects (relative to TC5) on aggregate push and pull risk outcomes by referrer risk quartile for first-order targets.



(a) Push risk

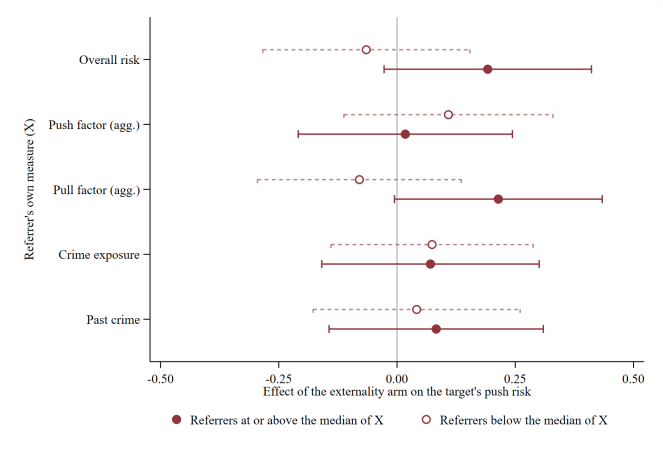
(b) Pull risk

Figure A.4: Targeting Condition Effects by Referrer Risk Quartile (First-Order Targets)

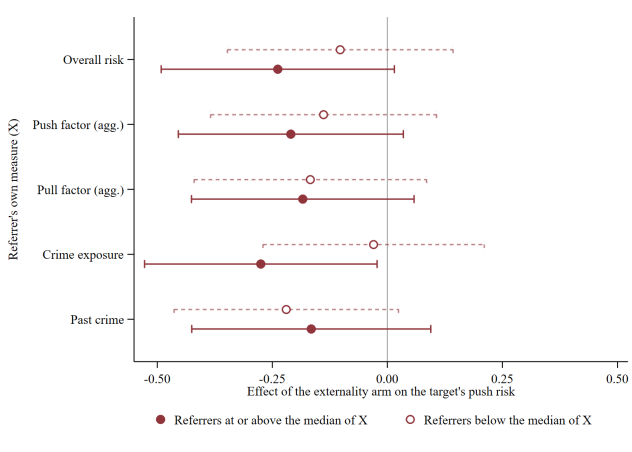
Note. TC effects are relative to TC5 (dropout). Points indicate OLS point estimates; thick lines show 90% confidence intervals; thin lines show 95% confidence intervals. TC5 control group means are reported on the x-axis.

Table A.30 splits the second-order referrers by how they were recruited, by the closeness of the acquaintance who named them, by whether that acquaintance had received the information treatment, by whether they have stayed in a police cell, by their own gang proximity, and by whether they received the post-nomination contact incentive, and reports the information treatment's effect on the target on each side of every split. Under the contact incentive, the payment that offsets the cost of reaching the nominee in the referral decision of Section 3.3, the treatment's effect on the target's past criminal activity disappears, while its effects on push risk, gang proximity and crime exposure do not.

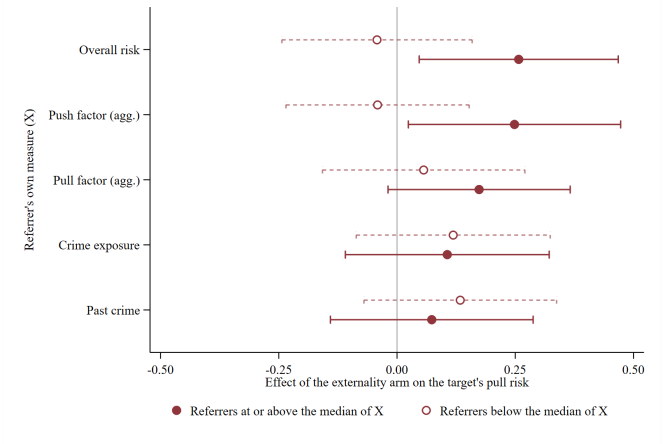
Causal Forest Analysis. We also apply causal forests (Athey et al. 2019) to test for systematic heterogeneity along referrer risk scores and demographic characteristics (sex, age, education, ethnicity, and religion). Best Linear Predictor tests yield insignificant $\hat{\eta}$ coefficients in every treatment–outcome combination for first-order targets and in every combination but the TC2 assignment for second-order targets (Tables A.31 and A.32).



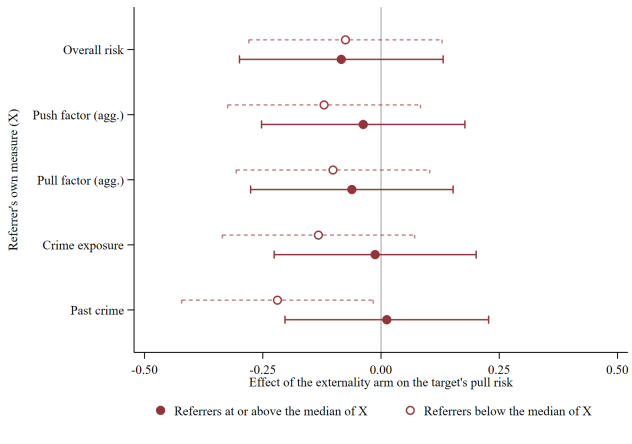
(a) Push risk, first-order referrers



(b) Push risk, second-order referrers



(c) Pull risk, first-order referrers



(d) Pull risk, second-order referrers

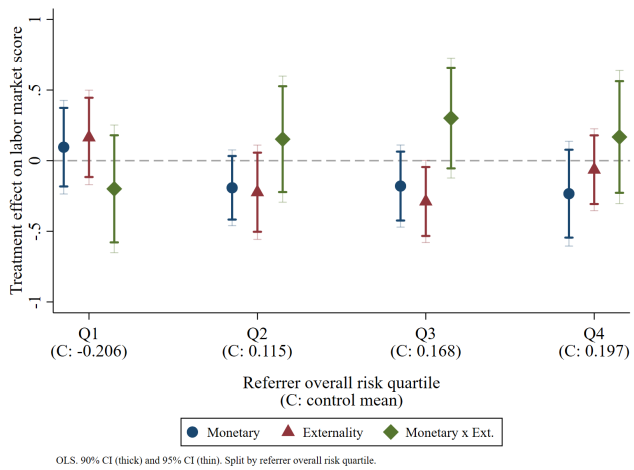
Figure A.5: Externality Arm Effects by the Referrer's Own Risk, First Against Second Order

Note. Each row of a panel splits the referrers by whether their own measure X (the row label) is at or above the median of X over the links of that order, and plots the externality arm's effect on the target's risk in each group, from one OLS regression per row with the arm interacted with the above-median indicator, the referrer controls and fixed effects of Section 5, and standard errors clustered at the referrer and target levels. Bars are 95% confidence intervals. The first-order panels use 1,524 links and the second-order panels 817, about half of them on each side of the median.

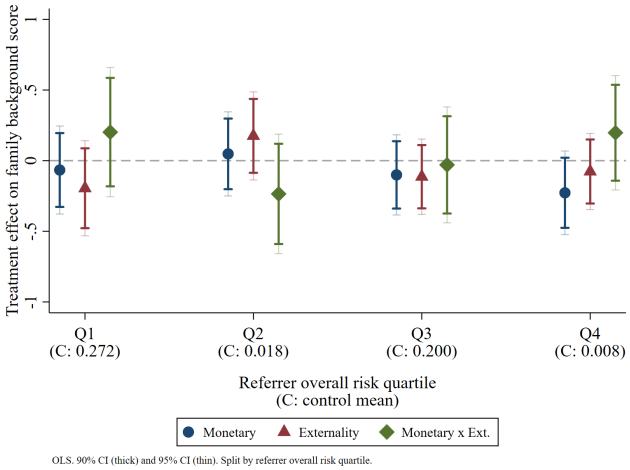
Table A.30: Externality Arm at the Second Order, by How the Referrer Was Recruited

	Push risk factor score	Past criminal activities	Gang proximity	Crime exposure	Stayed in police cell	Referral success
How the referrer was recruited						
Named by an acquaintance	-0.196	-0.315	-0.125	-0.120	-0.105	0.030
	(0.100)	(0.101)	(0.094)	(0.081)	(0.042)	(0.028)
Recruited at a location (TC0)	0.163	-0.027	-0.290	-0.109	-0.031	0.098
	(0.253)	(0.262)	(0.257)	(0.212)	(0.134)	(0.066)
Difference, *p*-value	0.178	0.298	0.542	0.959	0.595	0.328
Links on each side	749 / 68	749 / 68	749 / 68	749 / 68	749 / 68	1670 / 234
Closeness of the acquaintance who named the referrer						
Named by a less close acquaintance	-0.100	-0.169	0.052	0.092	-0.122	0.010
	(0.139)	(0.123)	(0.131)	(0.119)	(0.059)	(0.039)
Named by a closer acquaintance	-0.229	-0.384	-0.213	-0.241	-0.087	0.042
	(0.126)	(0.139)	(0.127)	(0.098)	(0.055)	(0.037)
Difference, *p*-value	0.457	0.212	0.129	0.020	0.650	0.521
Links on each side	313 / 429	313 / 429	313 / 429	313 / 429	313 / 429	779 / 878
Arm of the acquaintance who named the referrer						
Acquaintance not in an externality arm	-0.143	-0.234	-0.228	-0.145	-0.114	0.060
	(0.128)	(0.137)	(0.112)	(0.110)	(0.055)	(0.038)
Acquaintance in an externality arm	-0.206	-0.323	-0.044	-0.099	-0.071	0.017
	(0.128)	(0.125)	(0.128)	(0.099)	(0.055)	(0.033)
Difference, *p*-value	0.711	0.613	0.252	0.742	0.563	0.381
Links on each side	423 / 394	423 / 394	423 / 394	423 / 394	423 / 394	909 / 993
Whether the referrer has stayed in a police cell						
Own stay in a police cell: no	-0.231	-0.164	-0.146	-0.031	-0.097	0.026
	(0.159)	(0.141)	(0.144)	(0.118)	(0.067)	(0.041)
Own stay in a police cell: yes	-0.156	-0.327	-0.147	-0.161	-0.097	0.040
	(0.111)	(0.120)	(0.104)	(0.096)	(0.049)	(0.033)
Difference, *p*-value	0.684	0.365	0.998	0.377	0.993	0.781
Links on each side	246 / 571	246 / 571	246 / 571	246 / 571	246 / 571	628 / 1276
The referrer's own gang proximity						
Own gang proximity below the median	-0.272	-0.277	-0.141	-0.214	-0.088	0.042
	(0.130)	(0.129)	(0.126)	(0.107)	(0.057)	(0.034)
Own gang proximity at or above the median	-0.090	-0.275	-0.145	-0.046	-0.101	0.029
	(0.120)	(0.131)	(0.119)	(0.100)	(0.053)	(0.037)
Difference, *p*-value	0.263	0.992	0.982	0.224	0.862	0.780
Links on each side	384 / 433	384 / 433	384 / 433	384 / 433	384 / 433	950 / 954
Whether the referrer received the post-nomination contact incentive						
Without the contact incentive	-0.172	-0.275	-0.140	-0.124	-0.094	0.035
	(0.096)	(0.098)	(0.089)	(0.078)	(0.041)	(0.026)
With the contact incentive	-0.139	0.070	-0.339	-0.216	0.014	-0.064
	(0.183)	(0.184)	(0.174)	(0.147)	(0.081)	(0.050)
Difference, *p*-value	0.870	0.089	0.308	0.580	0.231	0.084
Links on each side	667 / 150	667 / 150	667 / 150	667 / 150	667 / 150	1544 / 360

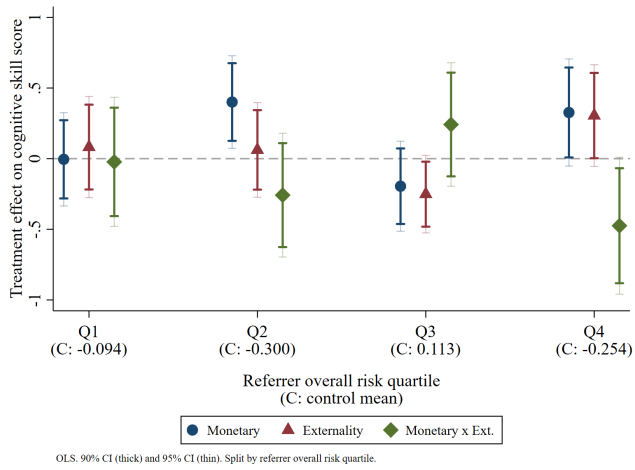
Notes: Second-order referrer–target links. Each block splits the second-order referrers, or in the last block the links, by one characteristic and reports the effect of the information treatment (T2) relative to control on each side, from one regression per column with the treatment indicators interacted with the split indicator. The first five outcomes are the interviewed target's measures, standardized; referral success is estimated on every link. Regressions include the referrer's demographic, ethnicity, religion, interviewer, module start time and survey mode controls, community and cohort fixed effects, and the contact-incentive terms, except in the last block, in which the contact incentive is the split. Standard errors are clustered at the first-order referrer and target levels. The first block separates referrers recruited under the place-based condition, who were found at a location, from those named by an acquaintance under a network-based condition. Closeness is the friendship degree the acquaintance reported for the referrer. Gang proximity is the referrer's own index. Both are split at their median over links. The contact incentive is the payment for the nominee's participation that is revealed after the nominee is fixed. The p-value tests the equality of the two effects. Links on each side are those in the estimation sample.



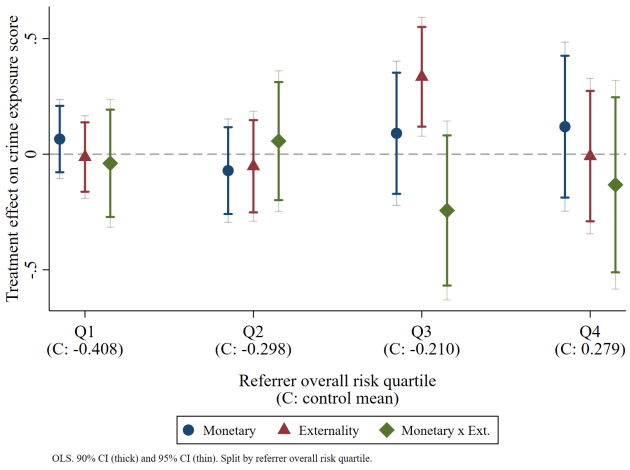
(a) Labor market outcomes



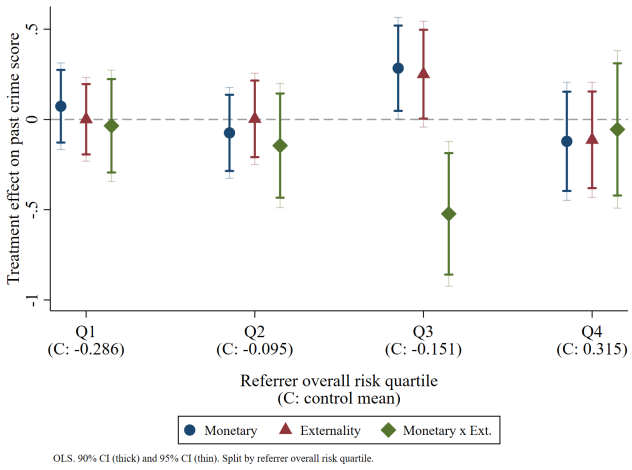
(b) Family background



(c) Cognitive skill



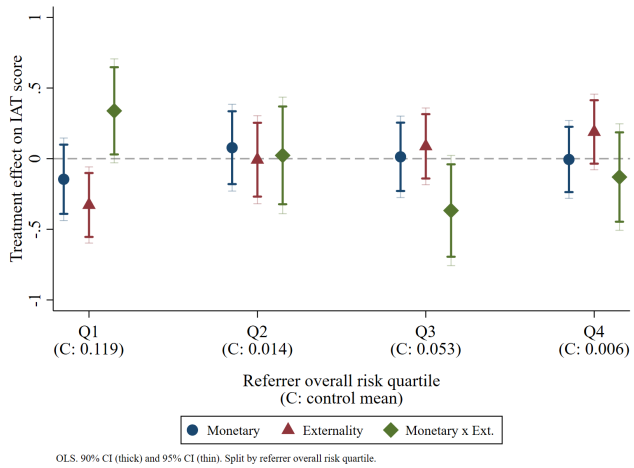
(d) Crime exposure



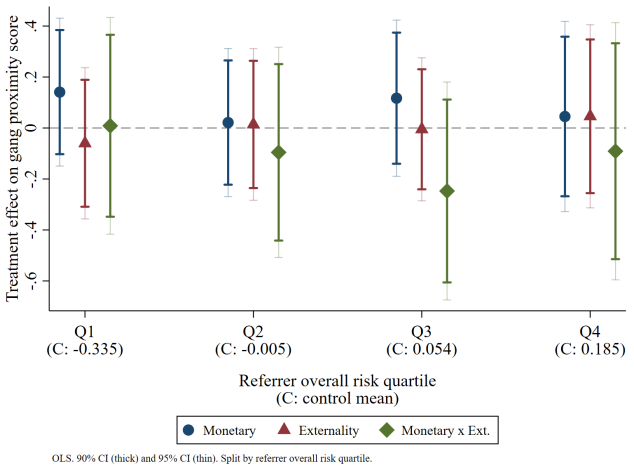
(e) Past criminal activities

Figure A.6: Treatment Effects by Referrer Risk Quartile: Push Factors

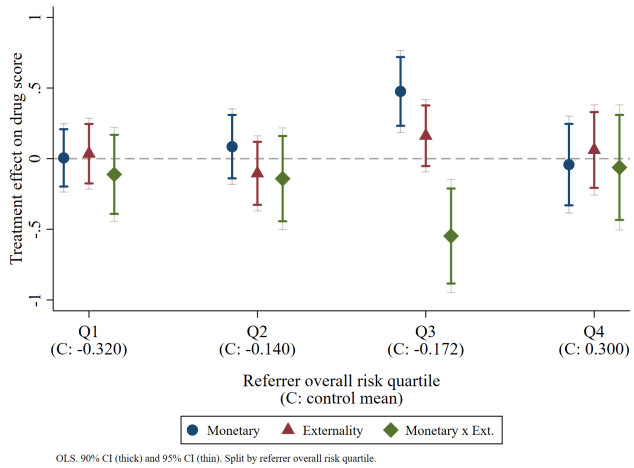
Note. Each panel shows treatment effects on a specific push factor dimension, estimated separately within quartiles of the referrer's overall risk measure. Points indicate OLS point estimates; thick lines show 90% confidence intervals; thin lines show 95% confidence intervals. The reference group is the control (C). Control group means are reported on the x-axis.



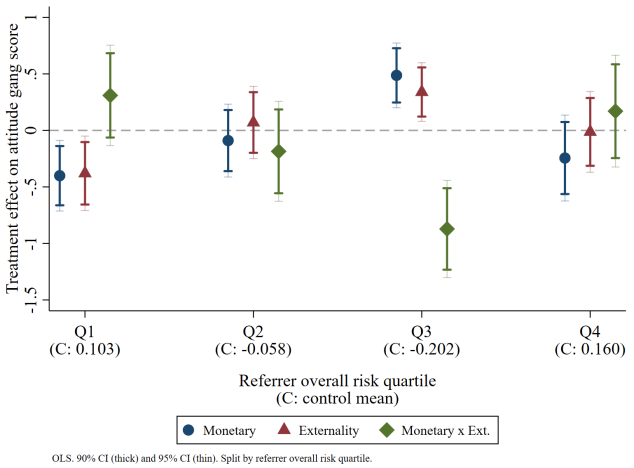
(a) Implicit bias against government



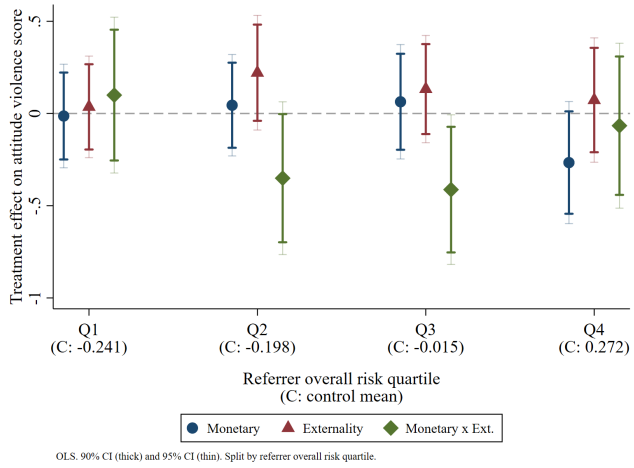
(b) Gang proximity



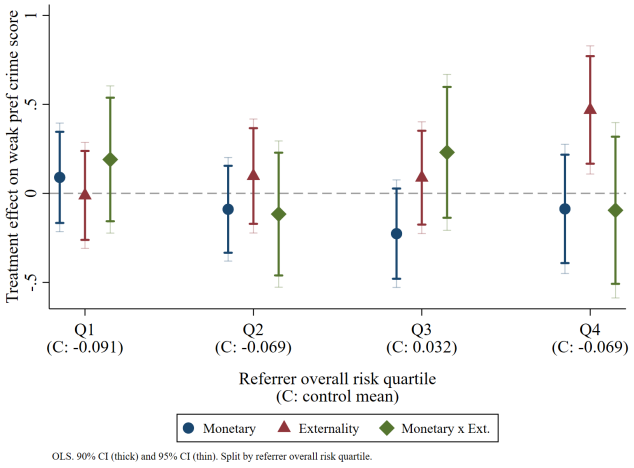
(c) Drug and substance use



(d) Attitudes toward gang activities



(e) Attitudes toward crime and violence



(f) Weak preference for reducing crime

Figure A.7: Treatment Effects by Referrer Risk Quartile: Pull Factors

Note. Each panel shows treatment effects on a specific pull factor dimension, estimated separately within quartiles of the referrer's overall risk measure. Points indicate OLS point estimates; thick lines show 90% confidence intervals; thin lines show 95% confidence intervals. The reference group is the control (C). Control group means are reported on the x-axis.

Table A.31: Heterogeneity Test (FOT)

	T1	T2	T3	TC0	TC1	TC2	TC3	TC4
Panel A: Overall risk								
β (ATE)	0.982	0.933*	1.023	0.990	1.074	0.237	0.985	0.977
	(1.300)	(0.682)	(0.838)	(1.404)	(2.966)	(17.417)	(1.177)	(1.659)
η (Heterogeneity)	-8.061	-0.934	-9.423	-3.383	-13.024	-2.142	-3.164	-13.822
	(1.904)	(1.246)	(1.956)	(1.833)	(2.505)	(1.623)	(1.765)	(2.712)
Panel B: Push risk								
β (ATE)	0.988	0.877	1.298	0.945	0.986	0.843	0.750	0.974
	(0.850)	(1.227)	(2.571)	(0.920)	(1.621)	(0.966)	(3.909)	(2.531)
η (Heterogeneity)	-15.865	-0.615	-19.225	-13.497	-2.294	-9.769	-0.883	-3.342
	(2.014)	(1.081)	(2.410)	(2.243)	(1.462)	(2.197)	(1.572)	(1.643)
Panel C: Pull risk								
β (ATE)	1.130	0.934*	0.995*	1.007	1.059	1.020	0.915	0.955
	(5.524)	(0.649)	(0.754)	(4.057)	(1.050)	(1.576)	(0.942)	(1.796)
η (Heterogeneity)	-3.849	-0.419	-7.065	-6.589	-21.212	-2.719	-18.091	-9.167
	(1.500)	(1.203)	(1.890)	(2.071)	(3.075)	(1.690)	(2.733)	(2.372)
N	739	757	690	404	392	554	524	370

Notes: Columns T1–T3 report treatment effects relative to control group. Columns TC0–TC4 report effects of targeting category assignment relative to TC5. β is the average treatment effect; η measures treatment effect heterogeneity. One-sided p-values testing $H_0 : \eta \leq 0$ vs $H_1 : \eta > 0$. Standard errors clustered at the referrer level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.32: Heterogeneity Test (SOT)

	T2	T4	TC1	TC2	TC3	TC4
Panel A: Overall risk						
β (ATE)	0.970	0.947	1.007	1.032	1.297	0.897
	(0.811)	(1.404)	(2.799)	(1.218)	(5.333)	(25.877)
η (Heterogeneity)	0.164	-1.234	-11.738	1.612**	-1.213	-9.085
	(1.146)	(1.751)	(2.941)	(0.962)	(1.820)	(2.603)
Panel B: Push risk						
β (ATE)	1.003**	0.935	1.018	0.824	0.838	1.067
	(0.606)	(1.598)	(4.475)	(0.924)	(5.113)	(3.367)
η (Heterogeneity)	-0.066	-1.588	-9.448	-21.326	-1.554	-31.320
	(1.119)	(1.809)	(2.474)	(2.819)	(1.795)	(3.185)
Panel C: Pull risk						
β (ATE)	0.947	0.973	0.964	1.136	1.144	0.947
	(2.132)	(2.058)	(2.880)	(2.609)	(2.316)	(3.378)
η (Heterogeneity)	-2.255	-3.920	-11.416	1.886**	-4.314	-11.747
	(1.483)	(2.080)	(2.873)	(0.942)	(1.929)	(2.853)
N	704	456	254	263	297	241

Notes: Columns T2 and T4 report treatment effects relative to control group. Columns TC1–TC4 report effects of targeting category assignment relative to TC5. β is the average treatment effect; η measures treatment effect heterogeneity. One-sided p-values testing $H_0 : \eta \leq 0$ vs $H_1 : \eta > 0$. Standard errors clustered at the referrer level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

A.8 Verifying Measures

The tables below report, for each TC, the regressions of Section 6.4 with the TC's verifying measure and each of its components as the outcome, by OLS and by causal forest, with the controls of the main specification.

Table A.33: First-Order Referral and TC0 Place-Based

Dep. var.: TC-specific verifying measure (z-score)

	TC0 Place-based score	Young men using drugs at meeting point		Young men drinking alcohol at meeting point		Jobless young men in a high-risk cluster at meeting point		High frequency of high-risk activities at meeting point (dummy)	
	(1) OLS	(2) OLS	(3) CF	(4) OLS	(5) CF	(6) OLS	(7) CF	(8) OLS	(9) CF
Referral incentive:									
T1: Monetary incentive	0.069	0.367	0.419	0.531	0.570	-0.032	0.018	-0.028	-0.027
	(0.069)	(0.293)	(0.310)	(0.331)	(0.375)	(0.372)	(0.407)	(0.025)	(0.027)
T2: Externality info	-0.024	0.064	0.072	0.221	0.235	-0.592	-0.578	-0.009	-0.009
	(0.067)	(0.278)	(0.285)	(0.297)	(0.285)	(0.368)	(0.409)	(0.025)	(0.028)
T1 × T2: Interaction	-0.002	-0.253	-0.365	-0.346	-0.460	0.720	0.586	-0.038	-0.037
	(0.105)	(0.442)	(0.440)	(0.494)	(0.508)	(0.550)	(0.623)	(0.032)	(0.036)
Targeting conditions:									
TC0: Place-Based	0.443***	1.208***	-0.305	1.678***	0.327	2.385***	0.035	0.106***	0.118*
	(0.094)	(0.387)	(0.715)	(0.443)	(0.853)	(0.532)	(0.926)	(0.036)	(0.060)
TC1: Isolated	0.020	0.288	-0.114	0.198	-0.163	-0.280	-0.883	-0.015	-0.012
	(0.091)	(0.379)	(0.398)	(0.402)	(0.460)	(0.504)	(0.609)	(0.032)	(0.035)
TC2: Receiving hostility	0.123	0.540	0.283	0.646*	0.425	0.381	-0.013	-0.053*	-0.051*
	(0.076)	(0.332)	(0.346)	(0.344)	(0.377)	(0.447)	(0.500)	(0.027)	(0.028)
TC3: Less exposed	-0.003	0.030	-0.091	0.214	0.114	-0.312	-0.484	0.015	0.015
	(0.084)	(0.354)	(0.331)	(0.348)	(0.330)	(0.497)	(0.481)	(0.031)	(0.033)
TC4: Politically harassed	-0.083	-0.166	-0.289	-0.188	-0.293	-0.574	-0.772*	-0.053*	-0.052*
	(0.088)	(0.386)	(0.358)	(0.383)	(0.360)	(0.489)	(0.451)	(0.031)	(0.030)
Referrer characteristics:									
Verifying measure (referring TC)	0.003	0.033	0.039	-0.051	-0.043	0.033	0.041	0.004	0.004
	(0.024)	(0.107)	(0.106)	(0.117)	(0.112)	(0.132)	(0.144)	(0.010)	(0.009)
Overall risk factor score	0.020	0.077	0.140	0.056	0.118	0.072	0.163	0.019*	0.018*
	(0.031)	(0.133)	(0.136)	(0.139)	(0.132)	(0.163)	(0.194)	(0.010)	(0.011)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.095	4.720	4.720	3.608	3.608	8.091	8.091	0.139	0.139
Adjusted R^2	0.240	0.174	0.177	0.228	0.230	0.194	0.199	0.084	0.084
Mills: coefficient			-2.392		-2.178		-3.561		0.019
Mills: p-value			0.007		0.030		0.001		0.818
Joint test (p-value):									
Equivalence with other TCs	0.000	0.012	0.549	0.001	0.404	0.000	0.152	0.000	0.000
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: Regression results about the risk factors of the first-order targets. The dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .103, .0716, .0764, and .153, respectively. Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. The reference group for targeting conditions is TC5 (dropout). The selection equation is common to all columns. The excluded instruments give $\chi^2 = 7.78$ with $p = 0.020$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.34: Referral and TC1 Isolation

Dep. var.: TC-specific verifying measure (z-score)

	TC1 Isolation score		Degree of isolation (0-10)		Feel isolated or hard to make friends recently (dummy)		Number of friends to share personal concerns with		Not having a phone (dummy)		Number of close contacts available on the phone		Number of message threads (7d)		Number of phone calls made (7d)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF	(15) OLS	(16) CF
Panel A: First-order targets																
Referral incentive:																
T1: Monetary incentive	0.126*	0.125*	0.335	0.346	0.054	0.056*	0.019	0.014	-0.013	-0.011	0.001	-0.028	-1.949	-1.855	-2.105**	-2.046**
	(0.071)	(0.069)	(0.255)	(0.267)	(0.034)	(0.034)	(0.185)	(0.181)	(0.023)	(0.022)	(0.805)	(0.855)	(1.242)	(1.275)	(1.070)	(0.990)
T2: Externality info	0.193***	0.191***	0.177	0.166	0.043	0.041	0.082	0.084	0.018	0.019	-0.195	-0.175	-3.847***	-3.853***	-2.674***	-2.646***
	(0.067)	(0.069)	(0.242)	(0.264)	(0.032)	(0.037)	(0.206)	(0.201)	(0.025)	(0.025)	(0.763)	(0.826)	(1.176)	(1.227)	(1.012)	(0.920)
T1 × T2: Interaction	-0.206**	-0.197**	-0.550	-0.529	-0.077*	-0.074	-0.264	-0.264	-0.011	-0.017	0.489	0.462	3.768**	3.640**	2.387*	2.189*
	(0.094)	(0.094)	(0.352)	(0.365)	(0.047)	(0.049)	(0.283)	(0.275)	(0.035)	(0.034)	(1.144)	(1.260)	(1.626)	(1.703)	(1.384)	(1.268)
Targeting conditions:																
TC0: Place-Based	0.072	0.162	0.598*	0.211	0.033	-0.030	-0.065	0.306	0.043	-0.058	-0.143	-0.372	-0.336	-4.481*	-0.371	-2.833
	(0.091)	(0.183)	(0.338)	(0.646)	(0.044)	(0.076)	(0.216)	(0.462)	(0.035)	(0.057)	(1.199)	(2.522)	(1.397)	(2.535)	(1.343)	(2.470)
TC1: Isolated	0.197**	0.221**	0.559*	0.474	0.091**	0.077	-0.128	-0.041	-0.001	-0.027	-1.180	-1.235	-1.454	-2.482	-2.883**	-3.536**
	(0.089)	(0.109)	(0.327)	(0.387)	(0.045)	(0.052)	(0.218)	(0.262)	(0.032)	(0.035)	(1.088)	(1.244)	(1.387)	(1.690)	(1.302)	(1.484)
TC2: Receiving hostility	0.113	0.126	0.449	0.368	0.037	0.024	0.166	0.234	0.028	0.011	-1.197	-1.210	-0.712	-1.446	-1.138	-1.535
	(0.089)	(0.098)	(0.314)	(0.349)	(0.040)	(0.041)	(0.210)	(0.237)	(0.030)	(0.032)	(0.987)	(1.049)	(1.396)	(1.491)	(1.399)	(1.474)
TC3: Less exposed	0.070	0.075	-0.197	-0.238	-0.015	-0.021	0.362	0.392	0.004	-0.003	0.235	0.252	-1.916	-2.251*	-1.957*	-2.129
	(0.084)	(0.089)	(0.309)	(0.292)	(0.042)	(0.040)	(0.236)	(0.277)	(0.030)	(0.034)	(1.107)	(1.130)	(1.216)	(1.310)	(1.172)	(1.310)
TC4: Politically harassed	0.033	0.040	0.160	0.115	0.041	0.034	0.297	0.334	0.014	0.005	-0.320	-0.332	-0.068	-0.446	-0.379	-0.572
	(0.101)	(0.109)	(0.323)	(0.333)	(0.046)	(0.045)	(0.250)	(0.301)	(0.035)	(0.034)	(1.193)	(1.159)	(1.559)	(1.542)	(1.476)	(1.655)
Referrer characteristics:																
Verifying measure (referring TC)	0.007	0.006	0.080	0.076	0.015	0.014	0.048	0.049	-0.009	-0.009	0.212	0.219	-0.264	-0.265	-0.151	-0.136
	(0.023)	(0.022)	(0.086)	(0.089)	(0.011)	(0.012)	(0.076)	(0.077)	(0.009)	(0.010)	(0.288)	(0.307)	(0.338)	(0.348)	(0.311)	(0.310)
Overall risk factor score	0.047*	0.042	0.081	0.082	-0.008	-0.007	-0.116	-0.124	0.013	0.017	-0.812***	-0.791**	-0.151	-0.026	-0.391	-0.279
	(0.026)	(0.028)	(0.105)	(0.093)	(0.014)	(0.015)	(0.077)	(0.081)	(0.012)	(0.013)	(0.287)	(0.311)	(0.405)	(0.466)	(0.404)	(0.439)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.162	-0.162	2.556	2.556	0.351	0.351	1.984	1.984	0.128	0.128	6.639	6.639	8.954	8.954	8.983	8.983
Adjusted R^2	0.123	0.124	0.284	0.282	0.262	0.260	0.081	0.082	0.054	0.057	0.048	0.048	0.061	0.063	0.033	0.034
Mills: coefficient		0.150		-0.436		-0.073		0.485		-0.152		-0.378		-5.905		-3.934
Mills: *p*-value		0.518		0.601		0.466		0.356		0.046		0.902		0.096		0.201
Joint test (*p*-value):																
Equivalence with other TCs	0.167	0.210	0.040	0.183	0.150	0.136	0.136	0.324	0.698	0.709	0.513	0.555	0.556	0.224	0.102	0.040
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets																
Referral incentive:																
T2: Externality	-0.138*	-0.146*	-0.504*	-0.656**	-0.055	-0.078*	0.174	0.092	-0.022	-0.030	1.900**	1.809*	1.225	0.989	0.242	0.374
	(0.073)	(0.084)	(0.275)	(0.319)	(0.036)	(0.044)	(0.223)	(0.289)	(0.028)	(0.035)	(0.941)	(1.063)	(1.227)	(1.462)	(0.876)	(0.969)
T4: Friend	0.031	0.036	0.226	-2.241**	0.035	-0.283**	0.194	-1.106	0.061	-0.066	2.081	-1.231	-0.629	-4.663	-1.523	-1.348
	(0.125)	(0.251)	(0.496)	(0.947)	(0.066)	(0.125)	(0.441)	(0.774)	(0.053)	(0.125)	(2.037)	(3.164)	(1.787)	(3.909)	(1.436)	(2.877)
Targeting conditions:																
TC1: Isolated	0.002	-0.002	-0.133	-0.539	0.013	-0.040	0.126	-0.097	-0.017	-0.042	0.324	-0.164	-0.060	-0.666	-0.813	-0.735
	(0.107)	(0.134)	(0.416)	(0.514)	(0.055)	(0.068)	(0.352)	(0.406)	(0.047)	(0.060)	(1.410)	(1.666)	(1.765)	(2.318)	(1.391)	(1.561)
TC2: Receiving hostility	-0.017	-0.051	0.324	1.713**	0.030	0.206**	0.279	0.975	-0.043	0.008	-0.512	1.694	0.054	2.576	0.925	1.138
	(0.105)	(0.137)	(0.415)	(0.700)	(0.053)	(0.095)	(0.500)	(0.634)	(0.042)	(0.063)	(1.285)	(2.182)	(1.726)	(2.307)	(1.403)	(1.761)
TC3: Less exposed	0.094	0.088	0.162	0.156	0.016	0.015	-0.007	-0.019	-0.002	-0.006	0.451	0.515	-1.495	-1.447	-2.263*	-2.197*
	(0.103)	(0.100)	(0.410)	(0.430)	(0.054)	(0.058)	(0.334)	(0.336)	(0.043)	(0.054)	(1.495)	(1.516)	(1.658)	(1.766)	(1.209)	(1.164)
TC4: Politically harassed	0.041	0.030	-0.374	-0.746	-0.045	-0.094	-0.466	-0.677	0.015	-0.012	-0.878	-1.255	-0.041	-0.547	-0.721	-0.586
	(0.110)	(0.141)	(0.432)	(0.520)	(0.061)	(0.067)	(0.399)	(0.447)	(0.046)	(0.063)	(1.261)	(1.634)	(1.958)	(2.432)	(1.418)	(1.499)
Referrer characteristics:																
Verifying measure (referring TC)	-0.029	-0.025	0.116	-0.245	0.020	-0.027	0.190	0.004	-0.013	-0.029	0.579*	0.059	0.276	-0.347	0.153	0.149
	(0.029)	(0.042)	(0.125)	(0.163)	(0.019)	(0.027)	(0.203)	(0.213)	(0.018)	(0.025)	(0.349)	(0.568)	(0.430)	(0.632)	(0.362)	(0.508)
Overall risk factor score	-0.030	-0.035	0.148	0.376**	0.023	0.052**	0.066	0.180	0.022	0.031	-0.298	0.067	1.367**	1.782**	0.851	0.888
	(0.039)	(0.046)	(0.144)	(0.182)	(0.019)	(0.024)	(0.142)	(0.176)	(0.017)	(0.020)	(0.482)	(0.651)	(0.664)	(0.762)	(0.542)	(0.617)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	-0.038	-0.038	2.801	2.801	0.383	0.383	2.091	2.091	0.149	0.149	6.497	6.497	6.737	6.737	7.310	7.310
Adjusted R^2	0.138	0.134	0.297	0.301	0.265	0.265	0.128	0.131	0.049	0.040	0.015	0.013	0.068	0.067	0.060	0.057
Mills: coefficient		0.073		-7.403		-0.944		-3.851		-0.351		-10.603		-12.466		-0.107
Mills: *p*-value		0.895		0.001		0.003		0.042		0.223		0.183		0.135		0.987
Joint test (*p*-value):																
Equivalence with other TCs	0.769	0.789	0.489	0.045	0.767	0.097	0.379	0.080	0.708	0.939	0.911	0.718	0.825	0.484	0.051	0.085
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .0367, .283, -.0353, .363, -.0283, -.0241, and -.0269, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.35: Referral and TC2 Hostility

Dep. var.: TC-specific verifying measure (z-score)

	TC2 Hostility score		Degree of hostility you received from other ethnic groups		Degree of hostility received from other religious groups	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF
Panel A: First-order targets						
Referral incentive:						
T1: Monetary incentive	-0.077	-0.075	-0.423*	-0.423	0.004	0.011
	(0.079)	(0.076)	(0.254)	(0.274)	(0.199)	(0.183)
T2: Externality info	-0.085	-0.084	-0.447*	-0.451**	-0.010	-0.004
	(0.080)	(0.075)	(0.245)	(0.224)	(0.200)	(0.196)
T1 × T2: Interaction	0.151	0.146	0.726**	0.743**	0.071	0.037
	(0.116)	(0.103)	(0.368)	(0.345)	(0.285)	(0.276)
Targeting conditions:						
TC0: Place-Based	-0.045	-0.012	-0.135	0.003	-0.080	-0.049
	(0.104)	(0.164)	(0.363)	(0.612)	(0.262)	(0.435)
TC1: Isolated	0.041	0.047	-0.313	-0.276	0.386	0.379
	(0.111)	(0.114)	(0.363)	(0.381)	(0.291)	(0.291)
TC2: Receiving hostility	0.065	0.072	0.341	0.360	0.010	0.022
	(0.097)	(0.101)	(0.329)	(0.345)	(0.241)	(0.243)
TC3: Less exposed	-0.024	-0.022	-0.034	-0.029	-0.069	-0.065
	(0.104)	(0.100)	(0.355)	(0.308)	(0.255)	(0.261)
TC4: Politically harassed	-0.124	-0.120	-0.371	-0.362	-0.219	-0.207
	(0.106)	(0.092)	(0.360)	(0.341)	(0.256)	(0.240)
Referrer characteristics:						
Verifying measure (referring TC)	0.053*	0.053*	0.136	0.134	0.109	0.112
	(0.030)	(0.029)	(0.097)	(0.102)	(0.075)	(0.074)
Overall risk factor score	-0.004	-0.003	-0.001	-0.010	-0.014	-0.006
	(0.035)	(0.035)	(0.111)	(0.104)	(0.083)	(0.083)
N	1524	1524	1524	1524	1524	1524
Reference group mean	-0.001	-0.001	2.071	2.071	0.881	0.881
Adjusted R^2	0.084	0.084	0.094	0.094	0.030	0.029
Mills: coefficient		0.022		0.237		-0.082
Mills: *p*-value		0.913		0.759		0.882
Joint test (*p*-value):						
Equivalence with other TCs	0.465	0.415	0.157	0.196	0.373	0.514
Controls	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets						
Referral incentive:						
T2: Externality	-0.119	-0.140	-0.305	-0.383	-0.246	-0.270
	(0.082)	(0.092)	(0.255)	(0.286)	(0.212)	(0.238)
T4: Friend	-0.146	-0.618**	-0.314	-1.719*	-0.343	-1.177*
	(0.157)	(0.268)	(0.459)	(0.926)	(0.430)	(0.675)
Targeting conditions:						
TC1: Isolated	-0.096	-0.176	-0.167	-0.397	-0.255	-0.402
	(0.132)	(0.154)	(0.402)	(0.530)	(0.358)	(0.375)
TC2: Receiving hostility	-0.018	0.247	0.020	0.826	-0.086	0.371
	(0.136)	(0.192)	(0.403)	(0.585)	(0.390)	(0.570)
TC3: Less exposed	-0.127	-0.129	-0.510	-0.511	-0.131	-0.138
	(0.120)	(0.144)	(0.355)	(0.401)	(0.344)	(0.391)
TC4: Politically harassed	-0.164	-0.237	-0.276	-0.484	-0.442	-0.578
	(0.136)	(0.176)	(0.409)	(0.516)	(0.371)	(0.461)
Referrer characteristics:						
Verifying measure (referring TC)	-0.056	-0.124**	-0.161	-0.368**	-0.102	-0.221
	(0.050)	(0.059)	(0.132)	(0.165)	(0.147)	(0.168)
Overall risk factor score	-0.022	0.022	-0.232*	-0.100	0.082	0.157
	(0.042)	(0.056)	(0.140)	(0.192)	(0.107)	(0.138)
N	811	811	811	811	811	811
Reference group mean	-0.061	-0.061	1.740	1.740	0.886	0.886
Adjusted R^2	0.080	0.084	0.108	0.110	0.046	0.049
Mills: coefficient		-1.431		-4.254		-2.536
Mills: *p*-value		0.038		0.041		0.184
Joint test (*p*-value):						
Equivalence with other TCs	0.635	0.243	0.525	0.208	0.707	0.578
Controls	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .184, and .257, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.36: Referral and TC3 Exposure

Dep. var.: TC-specific verifying measure (z-score)

	TC3 Exposure score		Relative freq. of going to in-group outside for consumption		Relative freq. of going to in-group outside for work		Not going outside for consumption in outgroup outside areas		Not going outside for work in outgroup outside areas		Do not frequently interact with other ethnic group		Do not frequently interact with other religious group	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF
Panel A: First-order targets														
Referral incentive:														
T1: Monetary incentive	0.068	0.074	-0.011	-0.010	0.011	0.011	0.017	0.019	0.014	0.014	0.023	0.024	0.009	0.010
	(0.088)	(0.096)	(0.018)	(0.021)	(0.014)	(0.015)	(0.017)	(0.020)	(0.015)	(0.014)	(0.022)	(0.024)	(0.026)	(0.029)
T2: Externality info	0.039	0.040	-0.001	-0.001	0.015	0.016	0.008	0.009	0.004	0.004	-0.001	-0.001	-0.017	-0.017
	(0.084)	(0.088)	(0.019)	(0.020)	(0.014)	(0.015)	(0.016)	(0.017)	(0.015)	(0.015)	(0.022)	(0.024)	(0.025)	(0.028)
T1 × T2: Interaction	-0.056	-0.072	-0.001	-0.003	-0.002	-0.004	-0.014	-0.017	-0.007	-0.008	-0.023	-0.025	-0.023	-0.024
	(0.117)	(0.120)	(0.025)	(0.027)	(0.021)	(0.020)	(0.023)	(0.025)	(0.021)	(0.019)	(0.031)	(0.036)	(0.038)	(0.040)
Targeting conditions:														
TC0: Place-Based	-0.109	-0.449**	-0.016	-0.095*	0.001	-0.035	-0.036	-0.112**	0.001	-0.021	-0.013	-0.026	-0.080**	-0.083
	(0.108)	(0.198)	(0.025)	(0.049)	(0.019)	(0.034)	(0.023)	(0.044)	(0.019)	(0.035)	(0.030)	(0.053)	(0.035)	(0.056)
TC1: Isolated	0.004	-0.082	0.004	-0.016	-0.000	-0.009	-0.004	-0.024	0.006	0.000	0.004	0.000	-0.017	-0.018
	(0.100)	(0.100)	(0.022)	(0.023)	(0.019)	(0.021)	(0.021)	(0.023)	(0.018)	(0.019)	(0.031)	(0.034)	(0.036)	(0.039)
TC2: Receiving hostility	0.043	-0.014	0.007	-0.007	0.008	0.002	-0.008	-0.021	0.006	0.002	0.047	0.045*	0.010	0.009
	(0.095)	(0.099)	(0.022)	(0.023)	(0.018)	(0.020)	(0.020)	(0.023)	(0.016)	(0.017)	(0.029)	(0.026)	(0.032)	(0.032)
TC3: Less exposed	0.123	0.098	0.018	0.012	0.011	0.009	0.023	0.017	0.026	0.025	0.019	0.018	-0.037	-0.037
	(0.093)	(0.093)	(0.020)	(0.019)	(0.018)	(0.018)	(0.020)	(0.018)	(0.016)	(0.017)	(0.029)	(0.029)	(0.033)	(0.034)
TC4: Politically harassed	-0.028	-0.058	0.018	0.011	-0.010	-0.013	0.001	-0.006	-0.022	-0.024	0.027	0.027	-0.029	-0.029
	(0.110)	(0.113)	(0.022)	(0.024)	(0.021)	(0.021)	(0.022)	(0.023)	(0.020)	(0.020)	(0.030)	(0.032)	(0.036)	(0.036)
Referrer characteristics:														
Verifying measure (referring TC)	-0.005	-0.004	0.001	0.001	0.002	0.002	-0.002	-0.002	-0.002	-0.002	-0.007	-0.007	-0.004	-0.004
	(0.031)	(0.030)	(0.006)	(0.006)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.009)	(0.010)	(0.010)	(0.011)
Overall risk factor score	-0.010	0.002	-0.004	-0.002	0.000	0.002	-0.008	-0.006	0.004	0.005	0.008	0.008	-0.003	-0.003
	(0.033)	(0.030)	(0.008)	(0.008)	(0.006)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)	(0.008)	(0.009)	(0.010)	(0.012)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.057	-0.057	-0.041	-0.041	-0.040	-0.040	-0.188	-0.188	-0.088	-0.088	0.094	0.094	0.133	0.133
Adjusted R^2	0.117	0.120	0.134	0.136	0.052	0.053	0.119	0.122	0.046	0.047	0.112	0.112	0.119	0.120
Mills: coefficient		-0.500		-0.111		-0.054		-0.112		-0.032		-0.022		-0.006
Mills: *p*-value		0.043		0.063		0.173		0.034		0.435		0.740		0.937
Joint test (*p*-value):														
Equivalence with other TCs	0.223	0.070	0.607	0.206	0.901	0.652	0.057	0.030	0.121	0.143	0.340	0.423	0.078	0.363
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets														
Referral incentive:														
T2: Externality	-0.023	-0.019	-0.013	-0.012	0.000	0.002	-0.008	-0.004	0.014	0.011	-0.013	-0.015	-0.036	-0.035
	(0.079)	(0.090)	(0.018)	(0.020)	(0.014)	(0.016)	(0.017)	(0.018)	(0.014)	(0.018)	(0.022)	(0.025)	(0.027)	(0.032)
T4: Friend	0.036	0.019	-0.008	-0.010	-0.019	-0.008	0.028	0.086	0.006	-0.069*	0.054	0.047	0.006	0.042
	(0.144)	(0.233)	(0.035)	(0.059)	(0.029)	(0.046)	(0.031)	(0.053)	(0.024)	(0.040)	(0.044)	(0.075)	(0.050)	(0.084)
Targeting conditions:														
TC1: Isolated	-0.170	-0.175	-0.038	-0.039	-0.024	-0.021	-0.003	0.006	-0.030	-0.043*	0.001	0.000	-0.052	-0.045
	(0.135)	(0.136)	(0.031)	(0.031)	(0.024)	(0.027)	(0.028)	(0.030)	(0.022)	(0.025)	(0.038)	(0.042)	(0.043)	(0.044)
TC2: Receiving hostility	-0.166	-0.162	-0.030	-0.031	-0.023	-0.026	-0.003	-0.040	-0.034	0.007	-0.008	-0.003	-0.048	-0.065
	(0.136)	(0.170)	(0.032)	(0.042)	(0.024)	(0.036)	(0.030)	(0.039)	(0.023)	(0.030)	(0.036)	(0.056)	(0.044)	(0.064)
TC3: Less exposed	0.116	0.114	0.015	0.014	0.002	0.003	0.058**	0.058**	-0.012	-0.012	0.055	0.055	-0.012	-0.011
	(0.123)	(0.121)	(0.028)	(0.028)	(0.023)	(0.024)	(0.026)	(0.029)	(0.020)	(0.022)	(0.036)	(0.040)	(0.041)	(0.042)
TC4: Politically harassed	0.015	0.010	-0.001	-0.003	-0.007	-0.004	0.018	0.025	-0.016	-0.029	0.058	0.058	0.021	0.027
	(0.131)	(0.137)	(0.030)	(0.031)	(0.024)	(0.026)	(0.028)	(0.032)	(0.021)	(0.025)	(0.037)	(0.048)	(0.044)	(0.050)
Referrer characteristics:														
Verifying measure (referring TC)	0.070*	0.069	0.024***	0.024*	0.006	0.007	0.016*	0.025**	0.001	-0.010	0.009	0.008	-0.015	-0.011
	(0.042)	(0.056)	(0.009)	(0.012)	(0.008)	(0.011)	(0.008)	(0.010)	(0.006)	(0.009)	(0.013)	(0.017)	(0.013)	(0.018)
Overall risk factor score	0.065	0.066	0.016*	0.016	0.013	0.012	0.007	0.001	-0.002	0.005	0.027**	0.028**	0.005	0.002
	(0.044)	(0.052)	(0.010)	(0.012)	(0.009)	(0.011)	(0.009)	(0.012)	(0.009)	(0.010)	(0.012)	(0.014)	(0.013)	(0.017)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.013	0.013	-0.028	-0.028	-0.018	-0.018	-0.169	-0.169	-0.095	-0.095	0.092	0.092	0.125	0.125
Adjusted R^2	0.154	0.155	0.125	0.125	0.042	0.042	0.109	0.108	0.068	0.073	0.142	0.143	0.166	0.167
Mills: coefficient		-0.053		-0.005		0.027		0.180		-0.225		-0.019		0.105
Mills: *p*-value		0.925		0.973		0.806		0.213		0.031		0.913		0.625
Joint test (*p*-value):														
Equivalence with other TCs	0.043	0.057	0.160	0.281	0.611	0.703	0.017	0.019	0.513	0.422	0.107	0.337	0.374	0.421
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of 1.41, 1.71, 1.62, 1.82, .399, and .331, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.37: Referral and TC4 Harassment

Dep. var.: TC-specific verifying measure (z-score)

	TC4 Harassment score		Degree of harassment you experienced by police/govt officers		Received any police harassment (dummy)		Number of forms of police harassment		Number of types of police harassment		Received any harassment from govt officials (dummy)		Number of forms of harassment from govt officials		Number of types of harassment from govt officials	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF	(9) OLS	(10) CF	(11) OLS	(12) CF	(13) OLS	(14) CF	(15) OLS	(16) CF
Panel A: First-order targets																
Referral incentive:																
T1: Monetary incentive	0.103	0.102	0.357	0.357	0.038	0.039	0.077	0.075	0.087	0.088	0.016	0.015	0.021	0.021	0.009	0.008
	(0.074)	(0.074)	(0.289)	(0.291)	(0.036)	(0.041)	(0.061)	(0.067)	(0.073)	(0.081)	(0.021)	(0.022)	(0.026)	(0.027)	(0.033)	(0.033)
T2: Externality info	-0.015	-0.015	-0.112	-0.127	-0.005	-0.005	0.000	-0.001	0.027	0.026	-0.010	-0.010	-0.003	-0.003	-0.012	-0.011
	(0.073)	(0.069)	(0.303)	(0.280)	(0.036)	(0.038)	(0.062)	(0.062)	(0.070)	(0.075)	(0.019)	(0.021)	(0.024)	(0.026)	(0.030)	(0.031)
T1 × T2: Interaction	-0.184*	-0.180*	-0.751*	-0.698	-0.103**	-0.103*	-0.160*	-0.155	-0.225**	-0.223**	-0.002	-0.002	-0.015	-0.015	0.017	0.015
	(0.102)	(0.099)	(0.420)	(0.425)	(0.052)	(0.056)	(0.092)	(0.096)	(0.102)	(0.108)	(0.027)	(0.028)	(0.033)	(0.034)	(0.043)	(0.044)
Targeting conditions:																
TC0: Place-Based	0.039	0.123	0.304	0.935	0.042	-0.010	0.089	0.164	0.120	0.085	-0.014	0.038	-0.038	0.002	-0.041	-0.022
	(0.094)	(0.170)	(0.415)	(0.664)	(0.047)	(0.080)	(0.078)	(0.151)	(0.091)	(0.170)	(0.024)	(0.044)	(0.033)	(0.057)	(0.041)	(0.063)
TC1: Isolated	0.079	0.100	0.255	0.420	0.044	0.032	0.112	0.131	0.120	0.111	0.002	0.014	-0.018	-0.009	-0.005	-0.001
	(0.097)	(0.118)	(0.408)	(0.438)	(0.048)	(0.055)	(0.082)	(0.101)	(0.094)	(0.104)	(0.026)	(0.030)	(0.033)	(0.039)	(0.043)	(0.048)
TC2: Receiving hostility	0.047	0.061	0.110	0.201	0.048	0.038	0.093	0.106	0.067	0.059	-0.000	0.009	-0.009	-0.001	-0.039	-0.035
	(0.087)	(0.102)	(0.361)	(0.392)	(0.042)	(0.048)	(0.073)	(0.088)	(0.079)	(0.097)	(0.024)	(0.024)	(0.033)	(0.033)	(0.038)	(0.037)
TC3: Less exposed	0.015	0.021	-0.133	-0.104	0.018	0.014	0.053	0.058	0.065	0.062	-0.002	0.002	-0.020	-0.016	-0.007	-0.005
	(0.090)	(0.097)	(0.367)	(0.370)	(0.043)	(0.042)	(0.070)	(0.074)	(0.084)	(0.086)	(0.024)	(0.027)	(0.032)	(0.037)	(0.042)	(0.043)
TC4: Politically harassed	0.307***	0.314***	0.937**	0.984**	0.111**	0.106**	0.219**	0.225**	0.278***	0.274***	0.051	0.056*	0.045	0.049	0.065	0.068
	(0.107)	(0.118)	(0.400)	(0.424)	(0.049)	(0.048)	(0.086)	(0.096)	(0.100)	(0.104)	(0.032)	(0.031)	(0.043)	(0.044)	(0.054)	(0.054)
Referrer characteristics:																
Verifying measure (referring TC)	-0.020	-0.020	-0.057	-0.063	0.003	0.003	0.015	0.015	0.020	0.020	-0.011	-0.011	-0.018*	-0.017	-0.023**	-0.023*
	(0.027)	(0.027)	(0.107)	(0.106)	(0.012)	(0.013)	(0.021)	(0.022)	(0.026)	(0.027)	(0.008)	(0.009)	(0.010)	(0.011)	(0.011)	(0.012)
Overall risk factor score	0.028	0.025	0.305**	0.272**	0.031**	0.032*	0.034	0.031	0.055*	0.055	-0.009	-0.011	-0.014	-0.015	-0.023*	-0.023
	(0.030)	(0.036)	(0.124)	(0.139)	(0.016)	(0.018)	(0.028)	(0.029)	(0.031)	(0.035)	(0.008)	(0.010)	(0.011)	(0.012)	(0.013)	(0.015)
N	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	-0.038	-0.038	3.972	3.972	0.414	0.414	0.577	0.577	0.643	0.643	0.076	0.076	0.078	0.078	0.091	0.091
Adjusted R^2	0.136	0.136	0.101	0.100	0.149	0.150	0.183	0.183	0.166	0.166	0.024	0.024	0.021	0.022	0.038	0.038
Mills: coefficient		0.124		1.009		-0.069		0.117		-0.042		0.068		0.052		0.019
Mills: *p*-value		0.542		0.239		0.504		0.496		0.844		0.203		0.428		0.818
Joint test (*p*-value):																
Equivalence with other TCs	0.046	0.029	0.074	0.051	0.245	0.178	0.185	0.315	0.104	0.129	0.437	0.394	0.288	0.642	0.141	0.364
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets																
Referral incentive:																
T2: Externality	-0.114	-0.118	-0.411	-0.417	-0.015	-0.022	-0.099	-0.102	-0.069	-0.077	-0.018	-0.016	-0.019	-0.017	-0.053	-0.053
	(0.078)	(0.087)	(0.328)	(0.298)	(0.036)	(0.035)	(0.071)	(0.067)	(0.079)	(0.077)	(0.021)	(0.026)	(0.023)	(0.030)	(0.036)	(0.043)
T4: Friend	0.015	-0.312	-0.276	-1.634	0.050	-0.108	0.012	-0.265	0.055	-0.197	-0.026	-0.045	0.021	0.005	-0.012	-0.093
	(0.147)	(0.286)	(0.574)	(1.173)	(0.070)	(0.126)	(0.131)	(0.263)	(0.136)	(0.229)	(0.038)	(0.079)	(0.058)	(0.105)	(0.061)	(0.126)
Targeting conditions:																
TC1: Isolated	-0.010	-0.065	-0.114	-0.330	0.044	0.019	0.143	0.099	0.014	-0.027	-0.045	-0.049	-0.035	-0.038	-0.040	-0.056
	(0.123)	(0.136)	(0.518)	(0.592)	(0.058)	(0.068)	(0.113)	(0.125)	(0.119)	(0.136)	(0.034)	(0.034)	(0.039)	(0.038)	(0.052)	(0.058)
TC2: Receiving hostility	-0.086	0.113	-0.652	0.214	-0.018	0.077	-0.019	0.159	-0.046	0.105	-0.023	-0.011	-0.011	-0.002	-0.019	0.021
	(0.132)	(0.236)	(0.548)	(0.963)	(0.065)	(0.100)	(0.120)	(0.200)	(0.129)	(0.215)	(0.036)	(0.054)	(0.041)	(0.062)	(0.052)	(0.076)
TC3: Less exposed	0.109	0.111	0.019	0.034	0.054	0.055	0.162	0.165	0.018	0.019	0.011	0.011	0.013	0.012	0.056	0.055
	(0.122)	(0.139)	(0.503)	(0.580)	(0.058)	(0.071)	(0.111)	(0.135)	(0.115)	(0.135)	(0.038)	(0.036)	(0.040)	(0.040)	(0.060)	(0.055)
TC4: Politically harassed	0.145	0.099	0.372	0.197	0.073	0.051	0.132	0.096	0.010	-0.026	0.019	0.016	0.029	0.026	0.066	0.051
	(0.139)	(0.160)	(0.570)	(0.615)	(0.067)	(0.074)	(0.126)	(0.138)	(0.133)	(0.136)	(0.039)	(0.043)	(0.042)	(0.050)	(0.060)	(0.072)
Referrer characteristics:																
Verifying measure (referring TC)	-0.006	-0.054	-0.137	-0.342*	0.002	-0.022	-0.009	-0.051	-0.015	-0.053	0.006	0.003	0.009	0.007	-0.007	-0.018
	(0.039)	(0.056)	(0.173)	(0.205)	(0.020)	(0.029)	(0.040)	(0.056)	(0.036)	(0.055)	(0.012)	(0.017)	(0.013)	(0.019)	(0.019)	(0.022)
Overall risk factor score	0.040	0.073	0.102	0.246	0.022	0.037	0.055	0.084*	0.039	0.064	-0.001	0.001	0.006	0.008	-0.004	0.003
	(0.045)	(0.062)	(0.169)	(0.256)	(0.021)	(0.028)	(0.042)	(0.051)	(0.043)	(0.056)	(0.011)	(0.015)	(0.014)	(0.019)	(0.017)	(0.021)
N	811	811	811	811	811	811	811	811	811	811	811	811	811	811	811	811
Reference group mean	0.046	0.046	4.145	4.145	0.432	0.432	0.699	0.699	0.669	0.669	0.090	0.090	0.088	0.088	0.127	0.127
Adjusted R^2	0.144	0.145	0.077	0.075	0.187	0.188	0.206	0.205	0.172	0.173	0.026	0.026	0.018	0.018	0.059	0.060
Mills: coefficient		-1.032		-4.350		-0.488		-0.885		-0.783		-0.066		-0.052		-0.244
Mills: *p*-value		0.213		0.178		0.158		0.216		0.258		0.746		0.834		0.405
Joint test (*p*-value):																
Equivalence with other TCs	0.399	0.769	0.425	0.927	0.535	0.902	0.283	0.806	0.985	0.985	0.199	0.313	0.476	0.645	0.287	0.398
Controls	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .0507, .462, .265, .232, .666, .579, and .39, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

Table A.38: Referral and TC5 Dropout

Dep. var.: TC-specific verifying measure (z-score)

	TC5 Dropout score		Years remaining until 16 years of education		Incorrect answers in reading non-basic English words (share)		Incorrect answers in non-basic numeracy questions (share)	
	(1) OLS	(2) CF	(3) OLS	(4) CF	(5) OLS	(6) CF	(7) OLS	(8) CF
Panel A: First-order targets								
Referral incentive:								
T1: Monetary incentive	-0.261***	-0.258***	-0.400*	-0.384*	-0.050***	-0.051***	-0.034**	-0.034**
	(0.085)	(0.079)	(0.230)	(0.225)	(0.019)	(0.018)	(0.016)	(0.016)
T2: Externality info	-0.137	-0.135	-0.248	-0.245	-0.037*	-0.037**	0.006	0.006
	(0.093)	(0.085)	(0.236)	(0.220)	(0.020)	(0.018)	(0.018)	(0.017)
T1 × T2: Interaction	0.211*	0.196*	0.304	0.265	0.064**	0.062**	-0.011	-0.012
	(0.117)	(0.116)	(0.325)	(0.304)	(0.025)	(0.025)	(0.022)	(0.023)
Targeting conditions:								
TC0: Place-Based	-0.363***	-0.640***	-1.034***	-2.028***	-0.039*	-0.054	-0.041*	-0.075**
	(0.101)	(0.163)	(0.273)	(0.503)	(0.023)	(0.033)	(0.023)	(0.034)
TC1: Isolated	-0.301***	-0.371***	-0.965***	-1.212***	-0.031	-0.035	-0.023	-0.032
	(0.112)	(0.110)	(0.299)	(0.335)	(0.024)	(0.024)	(0.026)	(0.028)
TC2: Receiving hostility	-0.227**	-0.272***	-0.729***	-0.898***	-0.026	-0.027	-0.013	-0.019
	(0.099)	(0.098)	(0.262)	(0.251)	(0.023)	(0.022)	(0.024)	(0.026)
TC3: Less exposed	-0.255**	-0.273***	-0.766***	-0.838***	-0.021	-0.021	-0.037	-0.040
	(0.100)	(0.103)	(0.262)	(0.260)	(0.022)	(0.022)	(0.023)	(0.025)
TC4: Politically harassed	-0.229**	-0.252**	-0.601**	-0.689**	-0.013	-0.014	-0.054**	-0.057**
	(0.109)	(0.105)	(0.289)	(0.303)	(0.025)	(0.024)	(0.023)	(0.024)
Referrer characteristics:								
Verifying measure (referring TC)	0.017	0.018	0.072	0.074	-0.001	-0.001	0.005	0.005
	(0.026)	(0.024)	(0.066)	(0.062)	(0.005)	(0.006)	(0.008)	(0.008)
Overall risk factor score	0.100***	0.111***	0.278***	0.312***	0.015**	0.016**	0.006	0.007
	(0.033)	(0.035)	(0.094)	(0.096)	(0.007)	(0.007)	(0.006)	(0.007)
N	1524	1524	1524	1524	1524	1524	1524	1524
Reference group mean	0.155	0.155	5.690	5.690	0.081	0.081	0.070	0.070
Adjusted R^2	0.048	0.050	0.064	0.067	0.032	0.031	0.032	0.034
Mills: coefficient		-0.413		-1.441		-0.025		-0.049
Mills: *p*-value		0.069		0.015		0.595		0.241
Joint test (*p*-value):								
Equivalence with other TCs	0.026	0.002	0.008	0.002	0.593	0.624	0.096	0.013
Controls	✓	✓	✓	✓	✓	✓	✓	✓
Panel B: Second-order targets								
Referral incentive:								
T2: Externality	-0.043	-0.068	-0.170	-0.272	0.015	0.015	-0.033	-0.037
	(0.080)	(0.092)	(0.241)	(0.227)	(0.017)	(0.020)	(0.020)	(0.025)
T4: Friend	0.088	-0.302	0.054	-1.240	0.029	0.028	0.001	-0.094
	(0.153)	(0.291)	(0.450)	(0.902)	(0.029)	(0.063)	(0.035)	(0.072)
Targeting conditions:								
TC1: Isolated	0.069	-0.002	-0.020	-0.236	0.005	0.002	0.039	0.025
	(0.136)	(0.161)	(0.395)	(0.496)	(0.028)	(0.031)	(0.034)	(0.036)
TC2: Receiving hostility	-0.036	0.159	-0.434	0.263	0.004	-0.006	0.024	0.083
	(0.130)	(0.209)	(0.360)	(0.553)	(0.025)	(0.045)	(0.034)	(0.057)
TC3: Less exposed	-0.012	-0.019	-0.124	-0.133	0.008	0.005	-0.006	-0.005
	(0.129)	(0.160)	(0.367)	(0.467)	(0.028)	(0.030)	(0.027)	(0.030)
TC4: Politically harassed	0.069	-0.001	0.066	-0.139	0.018	0.013	0.006	-0.006
	(0.129)	(0.169)	(0.395)	(0.532)	(0.027)	(0.030)	(0.033)	(0.039)
Referrer characteristics:								
Verifying measure (referring TC)	-0.047	-0.101*	-0.220**	-0.408**	-0.002	-0.001	-0.001	-0.015
	(0.039)	(0.055)	(0.111)	(0.159)	(0.010)	(0.013)	(0.010)	(0.014)
Overall risk factor score	0.007	0.039	0.075	0.189	-0.009	-0.010	0.010	0.020
	(0.046)	(0.053)	(0.131)	(0.159)	(0.009)	(0.011)	(0.011)	(0.015)
N	811	811	811	811	811	811	811	811
Reference group mean	0.065	0.065	5.353	5.353	0.056	0.056	0.097	0.097
Adjusted R^2	0.035	0.037	0.041	0.041	0.011	0.003	0.021	0.021
Mills: coefficient		-1.135		-3.802		0.010		-0.295
Mills: *p*-value		0.122		0.063		0.953		0.153
Joint test (*p*-value):								
Equivalence with other TCs	0.914	0.924	0.680	0.964	0.978	0.993	0.680	0.398
Controls	✓	✓	✓	✓	✓	✓	✓	✓

Notes: the dependent variable in columns (1)–(3) is an index created via PCA as a linear combination of the dependent variables in the subsequent columns, standardized at the referrer level, with coefficients of .19, 2.66, and 1.5, respectively. The selection equation is common to all columns. The excluded instruments give $\chi^2 = 0.73$ with $p = 0.695$. Bootstrap standard errors in parentheses (cluster bootstrap at the first-order-referrer level, 200 replications). Controls include referrer demographics, ethnic and religious group dummies, interviewer dummies, prior contact treatment exposure, verifying measure, overall risk measure, and community-specific time trends. Residence community, survey month, and within-referrer TC order fixed effects are absorbed. Standard errors are clustered at the level of the target and the first-order referrer, and are computed via bootstrap for the control function (CF) approach. Significance levels: $p < 0.10$ (*), $p < 0.05$ (**), $p < 0.01$ (***).

B Cost-Benefit Analysis: Details

The tables of this appendix share four conventions. All levels are per 1,000,000 KES of program spending; the plan does not depend on the budget, and its value is linear in it. Write R for the number of referral rounds in a chain: *chains stopped after one round* solves the plan under $R \leq 1$, and *chains continue* under $R \leq 2$, the depth at which the referral process is estimated, with the plan choosing at every node whether to continue. A superscript on W names the restrictions imposed on the plan, as defined in Appendix B.1.5. Brackets give a 90% interval, the 5th to the 95th percentile of the replications of Appendix B.2.5, each difference taken within a replication; the levels that impose (U) hold their full-sample design across replications, and a replication in which the held design falls below a level it contains reports that level, which censors the difference at zero.

B.1 Model and Solution

B.1.1 The Design Space

The sets $\mathcal{T}_r$ and $\mathcal{K}_r$ and the limits $\bar{n}_r$ of (5) are not implied by the model, and what referral-based targeting is worth depends on which actions the planner may take. The model holds them at the cells the experiment fielded, with $\mathcal{T}_1 = \{\text{C}, \text{T1}, \text{T2}, \text{T3}\}$ and $\mathcal{T}_r = \{\text{C}, \text{T2}, \text{T4}\}$ for $r \geq 2$, $\mathcal{K}_1(\tau) = \{\text{TC0}, \ldots, \text{TC5}\}$ and $\mathcal{K}_r(\tau) = \{\text{TC1}, \ldots, \text{TC5}\}$ for $r \geq 2$ at every incentive τ other than T4, and $\bar{n}_1 = 4$, $\bar{n}_r = 2$, the numbers of TCs administered per first-order and per second-order referrer in the field. Every quantity the planner uses is then a coefficient estimated on the cell in which it is applied, and the question the model answers is how much better the fielded design could have been run.

We also solve the problem on an extended design space, in which the limit is set above the number of TCs either round offers and therefore binds nowhere, letting the planner run all six TCs at the first order and all five that remain at the second. The menus are unchanged, and every coefficient the planner uses is still applied in the cell on which it was estimated; the extension lifts one constraint alone. The sample size fixed that limit, because the assignment had to spread respondents across incentives and TCs. It extrapolates in one place, since the success probabilities are estimated under assigned loads of four TCs at the first order and two at higher orders and the extension applies them to loads of up to six. Whether the constraint binds is measured rather than assumed, and the solution reports how many TCs the plan uses and what share of the referrers it engages sit at the cap.

The friend incentive stays at the second order, where it was assigned, and the place-based TC at the first, where the referrer names a location in their own neighborhood; at a higher order the referrer would be someone recruited at such a location, an overlap the model cannot represent. Under both, $\mathcal{K}_r(\text{T4})$ holds a single unconditioned prompt rather than a set of TCs, reducing z to one dummy under that incentive, since the experiment never ran T4 together with a TC and no coefficient exists for that cell. TC0's near-mechanical success rate partly reflects the location-based construction of its links rather than a behavioral margin, a convention the optimizer inherits wherever the TC is available, at the first order in the model and at every order in the extension.

At most one target is recruited per referrer–TC pair, as in the experiment, and a second nominee under the same TC is outside the design space for two reasons. The field never pursued one, and the success probability and the risk measure of a second nominee under a

TC are not estimated. The person contacted under a TC is the one the referrer rated highest on it, and the coefficients estimated on those people do not carry over to a second nominee.

Tables B.39 to B.41 bound the margin the restriction leaves out. Under each TC a referrer names up to four people and rates each of them on the condition's own scale, and the enumerator pursued the highest-rated one. The scale is the condition's own: TC1 isolation and TC2 hostility received on 0–10, TC3 frequency of leaving the community on eight levels, TC4 harassment received, and TC5 the grade at which the person left school, on which a lower grade is the higher-risk person; ranks on TC5 are taken on the negative of the grade. Between a third and a half of referrers named a second person, who is rated lower on the same scale and whom the referrer can introduce less often (Table B.39). The people contacted under different TCs are different people, and a person contacted under one TC is rated well below the people contacted under another TC on that TC (Table B.40); asking one referrer under multiple TCs brings different people rather than the same person counted under multiple conditions.

Table B.41 values a second nominee against the next TC asked of the same referrer, at depth one under the uniform design that asks everyone. Along the best bundle of each size, the welfare gained when a TC enters is the value of one more contact under it, net of its cost. A second nominee under that TC is one more contact with a lower success rate and a payoff no higher than the first's, available only where a second person was named, and its value is at most the share who named one, times the second nominee's introducibility relative to the first's, times the TC's own increment; counting only second nominees rated at or beyond the median of those contacted under the TC lowers the bound further. On these bounds a second nominee under the same TC is worth about as much as the third TC asked of the same referrer, less than it once the rating is used, and far less than the second TC. The comparison is conservative in the direction that favors the second nominee, because the uniform design asks everyone and its later TCs pay less than the plan's, which asks only where a TC pays.

Table B.39: Nomination Roster and the Contacted Nominee, by Targeting Condition

			Contacted	Rating, own scale			Can be introduced	
Condition	Referrers	Named two or more	is top-rated	First	Second	Second − first	First	Second
TC1	532	0.32	0.97	8.2	6.2	-2.01 (0.16)	0.86	0.59
TC2	843	0.35	0.97	8.0	5.7	-2.25 (0.14)	0.88	0.57
TC3	958	0.30	0.84	5.6	4.1	-1.48 (0.10)	0.72	0.66
TC4	544	0.49	0.95	8.4	6.7	-1.72 (0.12)	0.84	0.66
TC5	554	0.46	0.91	8.7	10.0	1.21 (0.11)	0.78	0.78

Notes: One row per targeting condition, over referrers who named at least one person under it (main survey). Named two or more: share of those referrers naming at least two people under the condition. Contacted is top-rated: among referrers whose contacted nominee matches a listed name, the share whose contacted nominee carries the highest rating on the condition. The rating columns are over referrers who rated at least two people: the mean rating of the top-rated and of the second-rated person, ties broken by the order the names were given, and the mean of their difference with its standard error in parentheses. Can be introduced: the share of top-rated and of second-rated people the referrer said they could introduce, same referrers. Across conditions, a referrer who had someone contacted under at least one condition had 2.04 people contacted, of whom 2.01 were distinct; 69% had contacts under two or more conditions (1,566 referrers).

B.1.2 Information Used in the Plan

The NGO does not observe an individual's overall risk measure or referrer quality when it decides what to run, so the knowledge it carries is the posterior over that pair given everything the chain has elicited. We summarize the posterior by its first two moments and carry them

Table B.40: The Referrer's Rating of the Contacted Nominee on Each Targeting Condition

	Rated on				
	TC1	TC2	TC3	TC4	TC5
Mean rating (number of nominees)					
Contacted under TC1	**6.47** (499)	2.68 (492)	4.49 (491)	3.03 (385)	9.21 (106)
Contacted under TC2	4.61 (753)	**6.28** (770)	4.52 (729)	3.82 (607)	9.65 (146)
Contacted under TC3	4.36 (883)	2.38 (869)	**4.24** (890)	3.10 (741)	9.25 (183)
Contacted under TC4	3.62 (489)	2.60 (474)	4.76 (463)	**7.08** (496)	9.17 (106)
Contacted under TC5	4.10 (492)	2.42 (477)	5.06 (479)	3.87 (410)	**9.11** (386)
Share rated at least as far into the condition as the mean of the nominees contacted under it					
Contacted under TC1	–	0.20	0.50	0.22	0.40
Contacted under TC2	0.35	–	0.52	0.27	0.30
Contacted under TC3	0.32	0.20	–	0.21	0.41
Contacted under TC4	0.28	0.19	0.58	–	0.41
Contacted under TC5	0.31	0.21	0.64	0.26	–

Notes: Each row is the set of nominees contacted under one targeting condition; each column is the condition the referrer rated them on. The diagonal, in bold, is the rating on the condition the person was contacted under, which is the rating the enumerator used to choose whom to pursue; the off-diagonal cells are the Q6G block, in which the referrer rated the contacted nominee on each of the other four conditions. The lower panel gives, for each off-diagonal cell, the share of those ratings at or beyond the mean rating of the nominees contacted under the column's condition (at or below on TC5). The TC5 column was added in questionnaire version 9 and is missing by design for earlier respondents. Main survey.

Table B.41: A Second Nominee Under One Targeting Condition Against the Next Condition in the Request

				Second nominee, relative to the first			Bound on a second nominee		
Enters	Request	Welfare	Increment	Named	Introducible	At or beyond median	Payoff equal	Rating-adjusted	Next TC
TC0	0	411.6	14.0	–	–	–	–	–	9.7
TC4	0+4	421.3	9.7	0.49	0.79	0.55	3.8	2.1	3.0
TC2	0+2+4	424.3	3.0	0.35	0.64	0.53	0.7	0.4	-2.2
TC5	0+2+4+5	422.1	-2.2	0.46	1.01	0.65	0.0	0.0	-2.0
TC3	0+2+3+4+5	420.1	-2.0	0.30	0.91	0.60	0.0	0.0	-1.9
TC1	0+1+2+3+4+5	418.2	-1.9	0.32	0.68	0.56	0.0	0.0	–

Notes: Depth one, the uniform design that asks every individual under the same TCs with the first-order incentive of the base level, per 1,000,000 KES; random sampling gives 397.6. Each row adds one TC to the request, the best set of its size among all subsets; Request lists the TCs asked, Welfare is the level of that request, Increment the welfare gained when the entering TC is added, net of contact costs, and Next TC the increment of the TC entering on the following row. Named: share of referrers who named a second person under the entering TC; Introducible: the second-rated person's introducibility relative to the first-rated's; At or beyond median: share of second-rated people rated at or beyond the median rating of the people contacted under that TC. Payoff equal: the increment a second nominee under the entering TC could add if every second-rated person paid off as much as the first and succeeded at the relative introducibility, Named $\times$ Introducible $\times$ Increment. Rating-adjusted: the same, counting only second-rated people at or beyond the median, Payoff equal $\times$ At or beyond median. Both are upper bounds whether the contact cost is paid per attempt or per success. Averaged across TC1 to TC5, the multiplier on the increment is 0.31 with payoff equal and 0.18 rating-adjusted. TC0 names a location rather than a person and has no second nominee.

beside the verifying measures and the observed characteristics q, twelve numbers in the estimated process. The NGO's knowledge moves in three steps, and each is measured against the referral process it is supposed to describe.

Selection. Using a TC at an individual whose risk measure is uncertain selects among the people that individual could refer, so the knowledge the NGO carries into the referral is the prior tilted by the success probability. The tilt is a one-dimensional integral against the posterior's marginal for the risk measure, which we evaluate by Gauss–Hermite quadrature. Against a Monte Carlo of the same integral at 960 combinations of b and a design and twenty thousand draws, the quadrature agrees to a median relative difference of 2.5×10^{-4} and a maximum of 5.1×10^{-3}.

Propagation. The referred individual's risk measure is the intensive margin's conditional mean at the referrer's type, plus referrer quality, plus noise, and the elicited measure is the same construction with its own coefficients. Because neither is linear in the referrer's risk measure, we match the first two moments of the pair rather than transforming the posterior exactly. We test this at a degenerate posterior, where the variance is set near machine precision and the means at the referrer's own realised (x, a), so that selection plays no part and only the referral process is under test. Over 480 referrer-design pairs at fifteen hundred draws each, the two means and the three distinct covariance entries agree with the simulated child at standardized differences whose distribution is standard normal: the means have sample means of 0.04 and 0.03 against standard deviations of 1.07 and 1.03, no pair among the 480 exceeds four standard errors on either mean, and quadrupling the draw count leaves the distribution where it is.

Observation. The referred individual's own elicited measure is realized and the posterior conditions on it. This step is exactly linear and Gaussian, and against the standard conditioning formulas at two hundred random symmetric positive-definite systems its worst absolute error is 1.8×10^{-15}.

Accuracy of the two-moment summary. Because propagation is not linear, the referred individual's true posterior is not Gaussian and we carry a Gaussian with its first two moments instead. The posterior enters the planner's problem through exactly two expectations of a nonlinear function of the risk measure, namely the payoff and the success probability, and the size of the restriction is the difference between those two expectations under the simulated child and under the Gaussian that matches its moments. Over 600 referrer-design pairs at two thousand draws, the Gaussian summary understates the payoff by 2.6% on average, with a fifth-to-ninety-fifth percentile range of 1.1% to 4.7%, and it moves the success probability by 0.03%.

The asymmetry between the two channels is the shape the summary discards: the referred individual's risk measure is right-skewed, with a mean skewness of 0.30, and the payoff is convex in it while the success probability is a probit that is close to linear over the range the posterior covers. The direction is one-sided. The random-sampling benchmark is evaluated at a first-order individual's posterior, whose marginal for the risk measure is Gaussian by construction; the understatement falls on referred individuals alone and the referral gains we report are lower than the same model with an exact posterior would deliver.

The collocation set. The value function is represented on a set of b the plan can reach, generated by walking the referral process forward from the sampled individuals under every design and drawing at each step. The set is drawn once from a fixed seed and held across the point estimate and every bootstrap replication. It contains 315,744 of them, of which the two thousand the fit uses are a random subsample, and the ceiling on predicted risk binds at 29 of them.

B.1.3 The Planner's Recursion

Whether a chain continues from a referrer given the pair $(\tau, \boldsymbol{z})$ is the dummy

$$D(\boldsymbol{z}) = \mathbf{1}\Big\{ \textstyle\sum_{k \in \mathcal{K}_r(\tau)} z_k \geq 1 \Big\},$$

and depth is the realized length of the chains this dummy generates. Let $\Omega_r^{\pi}(b_r)$ and $C_r^{\pi}(b_r)$ be the expected payoff and cost of the tree that plan π grows from an r-th order referrer with knowledge b_r, $d_{k\tau,r} \in \{0,1\}$ indicate whether the referral under TC k succeeds, and $p_{k\tau,r}(b_r)$ the probability that TC k under incentive τ delivers an interviewed target. Setting $\pi_r(b_r) = (\tau, \boldsymbol{z})$, the two satisfy

$$\Omega_r^{\pi}(b_r) = \sum_{k \in \mathcal{K}_r(\tau)} z_k \, p_{k\tau,r}(b_r) \, \mathbb{E}\big[\overline{w}(b_{r+1}) + \Omega_{r+1}^{\pi}(b_{r+1}) \,\big|\, b_r,\, d_{k\tau,r} = 1\big],$$

$$C_r^{\pi}(b_r) = c_{\text{ref}} \, D(\boldsymbol{z}) + \sum_{k \in \mathcal{K}_r(\tau)} z_k \Big[c_k^{\text{try}} + p_{k\tau,r}(b_r) \Big(c_k^{\text{tgt}} + c_{\tau}^{\text{inc}} + \mathbb{E}\big[C_{r+1}^{\pi}(b_{r+1}) \,\big|\, b_r,\, d_{k\tau,r} = 1\big] \Big) \Big],$$

where b_{r+1} is the NGO's knowledge at the recruited target, and c_{ref}, c_k^{try}, c_k^{tgt} and c_{τ}^{inc} are the costs of the referral module for one referrer, of contacting the nominations TC k produces, of interviewing one target, and of the incentive paid under a monetary incentive for a TC whose referral succeeds and is verified. The module is charged once however many TCs are used under it, each TC costs c_k^{try} whether or not it ends in an interview, and c_k^{tgt} and c_{τ}^{inc} wait on success. Both objects are zero at orders above the limit $\bar{R}$.

Summing the payoff over the TCs used at one individual assumes that neither the success probability nor the target's type depends on which other TCs are used alongside.[44]

The multiplier $\nu \geq 0$ on the budget constraint of (7) separates the problem across referrers, and the value of an r-th order referrer at b is

$$V_r(b;\nu) = \overline{w}(b) + \Omega_r^{\pi^*}(b) - \nu \, C_r^{\pi^*}(b), \qquad \pi^* \in \arg\max_{\pi} \Big\{ \Omega_r^{\pi}(b) - \nu \, C_r^{\pi}(b) \Big\}, \tag{B.1}$$

which nets every referral in the referrer's tree against the budget it absorbs, with the terminal value

$$V_{\bar{R}+1}(b;\nu) = \overline{w}(b). \tag{B.2}$$

The net value of the best TC set under incentive τ at price ν is

$$g_{\tau,r}(b) = \max_{\boldsymbol{z} \in \{0,1\}^{|\mathcal{K}_r(\tau)|}:\, \sum_k z_k \leq \bar{n}_r} \Big\{ \sum_{k \in \mathcal{K}_r(\tau)} z_k \, \psi_{k\tau,r}(b) \;-\; \nu \, c_{\text{ref}} \, D(\boldsymbol{z}) \Big\}, \tag{B.3}$$

with $\psi_{k\tau,r}$ the value of (8) and $D(\boldsymbol{z})$ the continuation dummy above, and the value of a referrer restates (B.1) one referrer at a time as

$$V_r(b;\nu) = \overline{w}(b) \;+\; \max_{\tau \in \mathcal{T}_r} g_{\tau,r}(b), \tag{B.4}$$

[44] Because a_i is common to every TC used at the same individual, the risks of the targets recruited from one referrer are correlated. That correlation leaves Ω_r^{π} and C_r^{π} unaffected, since both depend on the success indicators only through their marginal probabilities, but it does affect the distribution of realized depth and reach. We assume that, conditional on the referrer's type, the outcomes of the TCs used at one individual are independent.

with the terminal value (B.2) closing it. Because the first term of (B.3) is additive in z, the best set retains the TCs with the largest positive $\psi_{k\tau,r}$, at most $\bar{n}_r$ of them, and runs the referral only if their sum covers the referral module cost. Let $z^*_{\tau,r}(b)$ denote the maximizer, $S^*_{\tau,r}(b)$ the TCs it retains, and $\tau^*_r(b)$ the incentive attaining $\max_\tau g_{\tau,r}(b)$. The plan asks an individual to refer exactly when $S^*_{\tau^*_r,r}(b)$ is non-empty, and $g_{\tau,r}(b) \geq 0$ everywhere because $z = \mathbf{0}$ is feasible. Substituting (B.3) into (B.4) gives the recursion the solver evaluates.

The transition of the type along a successful link collects (6) with the law of motion of referrer quality and of the observed characteristics,

$$x_j = s(\cdot) + a_i + \varepsilon^x_{ij}, \quad \widetilde{x}_{k,j} = \tilde{s}_k(\cdot) + \varepsilon^{\widetilde{x}}_{ij}, \quad q_j \sim G_q(\,\cdot \mid x_i, \widetilde{x}_{k,i}, q_i; k, \tau), \quad a_j = \varrho\, a_i + \zeta_j, \tag{B.5}$$

each conditional on $d_{k\tau,r} = 1$, with $\mathbb{E}[\zeta_j \mid a_i] = 0$ and $\mathrm{Var}(\zeta_j) = (1-\varrho^2)\,\sigma^2_a$. On a place-based link $a_j = \zeta_j$ with variance $\sigma^2_{a,0}$, which Appendix B.2.1 sets to zero. In the estimated process q is gender and the protocol fixes G_q at the point mass $q_j = q_i$, and a chain never crosses genders. The verifying measures that (B.5) does not generate are completed as Appendix B.2.1 describes.

Linearity of welfare and spending in N_0 abstracts from overlap between referral trees, which Appendix B.1.4 measures.

B.1.4 Per-Referrer Welfare Computation

The value function is computed by backward recursion from the terminal value of (B.2) over the orders at which the plan may refer. It is represented on a polynomial basis in b, cubic in the posterior mean of the overall risk measure, quadratic in each verifying measure, and linear in the posterior mean of referrer quality and in the three distinct entries of its covariance, and one step applies the comparison defined by (8), (B.3) and (B.4) at the collocation set before projecting the resulting values back onto the basis. Target draws are made once and reused in every sweep, so the map is deterministic on the sample. Because the fitted value is linear in its coefficients, the expectation over draws is precomputed as an averaged basis matrix for each design, which makes the cost of a sweep independent of the number of draws. Welfare and cost are recovered from the Lagrangian value by a companion recursion under the same active set. The identity between the two holds to the precision of the basis they are fitted on, and it certifies that the reported welfare and cost belong to the plan the value function selected rather than confirming that the plan is optimal.

Separability and branching. What separability extrapolates is effort: the probability $p_{k\tau,r}(\cdot)$ is estimated on respondents who were asked multiple TCs, and applying it to an individual assigned fewer of them assumes that performance under one TC does not depend on how many are asked. Under the incentive τ^* that attains (B.4), the expected number of targets recruited from an r-th order referrer is

$$m_r(b) = \sum_{k \in \mathcal{K}_r(\tau^*_r)} z^*_{k,\tau^*_r,r}(b)\; p_{k\tau^*_r,r}(b), \tag{B.6}$$

which exceeds one whenever multiple TCs clear the threshold in (B.3) and succeed often enough.

The limit on referral rounds. Because $m_r(b)$ in (B.6) can exceed one, an unbounded chain need not have a finite value; with $\bar{R}$ finite the value function is $\bar{R}$ applications of the one-round comparison to (B.2). Because z is discrete, the expected number of successful referrals falls in jumps as the price rises.

Locating the price. Substituting the binding sampling rate into the Lagrangian of (7) gives, for each candidate price, the maximized surplus per sampled individual

$$F(\nu) = \max_{\pi} \int \left(\overline{w}(b) - \nu\, c^{\text{init}} + \Omega_1^{\pi}(b) - \nu\, C_1^{\pi}(b) \right) dH(b). \tag{B.7}$$

$F(\nu)$ is positive exactly when some policy buys welfare at a rate better than ν, and where finite it is a maximum of functions affine in ν and therefore convex and decreasing, so the root ν^* of $F(\nu) = 0$ is unique; the bisection is a bracketing variant of the Dinkelbach scheme for a linear-fractional program. F is evaluated on a bracket and ν^* found by bisection, with every evaluation logged and a divergent evaluation recorded as $F = +\infty$ and read as a price below the critical one. Because the inner maximization is itself approximate, we do not claim the superlinear convergence of the exact Dinkelbach iteration. The reported level is resolved to the width of the final bracket, which is logged with each solution, and the monotonicity of F across the evaluated points is verified after the fact rather than assumed.

Ceiling on predicted risk. To prevent the convex welfare function from amplifying extrapolation error, we truncate predicted target risk at the maximum observed value among successfully referred targets in the estimation sample ($\bar{x} = \max_{j:d_j=1} x_j$).

Overlap at the sampled rate. The linearity itself cannot be tested here, since the experiment sampled one catchment at a single rate and no variation in the sampling rate is observed. The overlap it abstracts from can be observed. At the rate the experiment used, 2.81% of successfully referred individuals were reached through more than one referrer, and one referrer names the same individual under two TCs in 1.6% of cases. The rate that bears on cost is the one at nomination rather than at recruitment, because a nomination two referrers both make is pursued twice whether or not either attempt succeeds, and the model charges each pursuit through c_k^{try} while treating each as a fresh contact; 24.87% of the names referrers gave were given by more than one of them. That last figure matches individuals on the recorded name, so it counts two spellings of one name as two people and two people who share a name as one.

These rates describe the mix of TCs the experiment fielded rather than the mix the optimal plan chooses (Figure 8); they bound the overlap the plan would generate rather than measuring it. The model has no finite population and draws each target from a distribution, so overlap is structurally zero inside the simulation while a duplicated contact would add cost without adding payoff. The bias is therefore one-directional, overstating welfare where chains overlap, and it is largest in the approach that runs the longest chains, which is the individualized one the results favor.

Optimizing on estimated primitives. The expectations the plan takes are evaluated in closed form or by quadrature rather than by averaging draws, so there is no draw noise for the maximization to harvest. Estimation error in the referral process remains, and Appendix B.2.5 measures the tilt it gives the point estimate. Convexity converts measurement noise in the overall risk measure into welfare as well, because the expectation of e^x increases with the variance of x; approaches that select more strongly on the verifying measures harvest more of this noise, so the comparisons across approaches are not immune to it either.

Policy approach. The decision and the value are functions of that same object, and no rule is evaluated at information it could not read. The only restriction on the approach is the summary of the posterior by its first two moments, whose cost Appendix B.1.2 reports.

Nesting repair. Finite-sample error can violate the containment order of Appendix B.1.5, a level with more letters exceeding a level with fewer. Any violation is repaired by substituting the solution of the contained level, at the point estimate and within each replication, and every

repair is written to the solution log rather than absorbed silently; the share of replications in which a term of the decomposition read a repaired level is reported with it.

B.1.5 Restrictions on the Plan

For a set of plans $\Pi' \subseteq \Pi$, the welfare per unit of budget that (7) attains with π restricted to Π' is

$$W(\Pi') = \max_{\pi \in \Pi'} \frac{\int \left(\overline{w}(b) + \Omega_1^{\pi}(b)\right) dH(b)}{\int \left(c^{\text{init}} + C_1^{\pi}(b)\right) dH(b)}, \tag{B.8}$$

which the solver locates as the root of (B.7) with the maximization taken over Π'.

The restrictions as sets of plans. Let a^0 stand for any $(\tau, \mathbf{0})$, the design that asks for no referral, at which the incentive is immaterial, and let $\pi_r(\mathcal{B}_r) = \{\pi_r(b) : b \in \mathcal{B}_r\}$ be the designs a plan uses at order r. The four restrictions of Section 7.1 are the sets

$$\begin{aligned}
\Pi^{\text{S}} &= \left\{\pi \in \Pi : a^0 \notin \pi_r(\mathcal{B}_r) \text{ or } \pi_r(\mathcal{B}_r) = \{a^0\} \text{ for every } r\right\},\\
\Pi^{\text{U}} &= \left\{\pi \in \Pi : |\pi_r(\mathcal{B}_r) \setminus \{a^0\}| \leq 1 \text{ for every } r\right\},\\
\Pi^{\text{N}} &= \left\{\pi \in \Pi : \textstyle\sum_k z_k \leq 1 \text{ for every } (\tau, \boldsymbol{z}) \in \pi_r(\mathcal{B}_r) \text{ and every } r\right\},\\
\Pi^{\text{R}} &= \left\{\pi \in \Pi : \pi_r(\mathcal{B}_r) = \{a^0\} \text{ for every } r \geq 2\right\}.
\end{aligned}$$

Levels. A level with several letters is the value of the intersection, $W^{\text{SUN}} = W(\Pi^{\text{S}} \cap \Pi^{\text{U}} \cap \Pi^{\text{N}})$, with $W = W(\Pi)$ and $W^{\text{rs}} = \int \overline{w}(b)\, dH(b)/c^{\text{init}}$ in closed form. The plan that asks nobody at any order belongs to every set, and every level is therefore at least W^{rs}. An intersection of more sets is smaller, and adding a letter therefore never raises the level. Under (R) the limit is $\bar{R} = 1$, and every other level is solved at the reported limit $\bar{R} = 2$.

Computation under (U). Under (U) the design of each order is searched over the menus of Appendix B.1.1. With (N) the search is exhaustive over the single-TC designs at both orders, each combination solved by (B.8). Without (N) the design is a set of TCs under one incentive, chosen by ranking the TCs of each incentive by the sample mean of their one-round net value at the price of the single-TC level with the same letters and taking the best size, at both orders and under the second-order incentive of that level. The levels W^{SU} and W^{U} and their first-order counterparts are therefore lower bounds on (B.8), and every term of Section 7.1 that reads them inherits the bound; at the first order an exhaustive search over every subset of TCs returns the ranked set. In the computation the design held at orders $r \geq 2$ is one and the same, which coincides with the definition at $\bar{R} = 2$ and restricts the levels with (U) only in the profile of Appendix B.3.5.

Computation under (S). Under (S) without (U) every referrer is asked and the design is chosen per state: the TCs with positive net value up to the limit on the number of TCs per referrer, or the single TC whose net value is least negative where none is positive, one TC under (N). Without (S) the plan asks only where the net value of the design is positive, and under (S) either every referred individual at an order is asked or none is.

Repair and replications. Where the search for a level reports less than a level it contains, the contained level's plan is reported, since it is a plan of the larger set, and the repair is written to the solution log. In the replications of Appendix B.2.5 the levels that impose (U) hold the design chosen at the point estimate and are re-solved at that design under each replication's referral process, and the other levels are re-solved in full.

The decomposition. The decomposition of Section 7.1 takes W^{SUNR} as the base. The referral term is $W^{\text{SUNR}} - W^{\text{rs}}$; the main effect of a letter is the level with that letter lifted from the base minus the base; the complementarity of two letters is the level with both lifted minus the base minus the two main effects; and the remainder collects the three- and four-way terms. The referral term, the four main effects, the six complementarities and the remainder sum to $W - W^{\text{rs}}$. The Shapley value of a letter averages, over the twenty-four orders in which the four letters can be lifted from the base, the increase in the level when that letter is lifted, and the four Shapley values sum to $W - W^{\text{SUNR}}$. Table B.56 reports every term as a share of $W - W^{\text{rs}}$, with its replication interval taken term by term within a replication.

B.1.6 Mechanism Decomposition

Let θ collect the estimated referral process of Appendix B.2.1, the coefficients of $p_{k\tau,r}(\cdot)$, $s(\cdot)$ and $\tilde{s}_k(\cdot)$ together with σ_a^2 and ϱ, let θ_{-e} be the same process with element e switched off, and let ν^* be the multiplier at the solution of (7) under θ. With the element off the plan is re-solved at that price,

$$\pi_{-e} \in \arg\max_{\pi \in \Pi_{-e}} \int \left(\overline{w}(b) + \Omega_1^{\pi}(b) - \nu^* \left(c^{\text{init}} + C_1^{\pi}(b) \right) \right) dH(b),$$

where every object, the posterior in b included, is evaluated under θ_{-e}, and Π_{-e} is Π for every element but the incentives, for which it is the set of plans confined to the control condition, $\mathcal{T}_r = \{\text{C}\}$ at every r. The loss from element e is

$$L_e = W^{\text{opt}} - \frac{\int \left(\overline{w}(b) + \Omega_1^{\pi_{-e}}(b) \right) dH(b)}{\int \left(c^{\text{init}} + C_1^{\pi_{-e}}(b) \right) dH(b)},$$

the welfare per unit of budget under the full process minus the welfare per unit of budget that π_{-e} attains under θ_{-e}. Holding the price fixed keeps the budget margin where the full referral process set it, and re-solving the plan makes each loss the welfare a planner who knew the element was absent would give up at that price.

Element (i) sets to zero the TC intercepts, their interactions with the referrer's verifying measure and with the incentives, and the referrer's verifying measure, in $p_{k\tau,r}(\cdot)$, $s(\cdot)$ and $\tilde{s}_k(\cdot)$. Element (ii) sets to zero the referrer-risk polynomial in the same three equations and its second-order shift in $s(\cdot)$ and $\tilde{s}_k(\cdot)$. Element (iii) leaves every coefficient in place and restricts the menu, which also removes the friend prompt, an incentive. Element (iv) sets $\sigma_a^2 = 0$, and element (v) sets $\varrho = 0$.

The last two rows of Table B.57 are checks rather than elements, one setting the incentive coefficients to zero while leaving the menu open, the other switching off elements (i), (ii) and (iv) together with the incentive coefficients.

B.2 Estimation and Inference

B.2.1 Estimation Details

The pooled sample contains referrer–target–TC observations across two referral rounds, a subset of which resulted in successful referrals. Both margins share a common set of covariates as in the reduced-form specifications in Section 5.

Common linear index. The covariates enter both margins through the linear index:

$$h_i = \sum_{k=0}^{4} \gamma_k \cdot \mathbb{1}\{TC = k\} + \xi\, \widetilde{x}_{k,0i} + \sum_{k=0}^{4} \xi_k \cdot \mathbb{1}\{TC = k\} \cdot \widetilde{x}_{k,0i} + \kappa' x_{0i}^{\text{poly}} + \beta_\tau' T_i + \kappa_\tau'(T_i \otimes x_{0i}^{\text{poly}}) + Z_i'\Theta + \text{FE},$$

where x_{0i}^{poly} is a cubic in the referrer's overall risk measure, T_i collects treatment indicators (monetary, externality, their interaction, SOR externality, and friend referral), and Z_i includes demographics and interviewer fixed effects.

Extensive margin. The probability of a successful referral follows a probit:

$$P(d_{ij} = 1) = \Phi(h_i + \Theta_{\text{excl}}' Z_i^{\text{excl}}), \tag{B.9}$$

where Z_i^{excl} contains the contact-phase treatment and its interactions, which enter the probit but are excluded from the intensive margin, providing the exclusion restriction for the selection correction.

Intensive margin. For target outcome $y_j \in \{x_j, \widetilde{x}_{k,j}\}$, the structural equation is:

$$y_j = h_i + \rho_1^{(1)} \lambda_i \cdot \mathbb{1}\{r = 1\} + \rho_1^{(2)} \lambda_i \cdot \mathbb{1}\{r = 2\} + \rho_2 \lambda_{0i}^{\text{FOR}} \cdot \mathbb{1}\{r = 2\} + \varepsilon_j,$$

where λ_i is the inverse Mills ratio from the probit and $\lambda_{0i}^{\text{FOR}}$ is the inherited IMR computed from the originating first-order referrer's characteristics for round-2 observations. In estimation, the exogenous components of h_i (TC indicators, verifying measures, demographics, and fixed effects) are projected out via the Frisch–Waugh–Lovell theorem, and the reported structural coefficients correspond to the risk polynomial, treatment effects, and their interactions.

Round invariance. The round-invariance restriction of Section 7.2 is tested by Wald statistics on the joint equality of structural parameters across rounds for the two outcome equations (Appendix Table B.43). The externality incentive is coded by round, one coefficient block with its risk interactions on first-order links and one on second-order links, and the same table tests the equality of the two blocks, which is rejected for the verifying measure and marginally for overall risk. Standard errors are two-way clustered at the first-order referrer and target levels.

Error structure. We impose the structural assumption that the selection error u_{ij} and the outcome errors $(\varepsilon_{ij}^{x}, \varepsilon_{ij}^{\widetilde{x}})$ are jointly normal, conditional on the referrer's type,

$$\begin{pmatrix} u_{ij} \\ \varepsilon_{ij}^{x} \\ \varepsilon_{ij}^{\widetilde{x}} \end{pmatrix} \;\Big|\; (x_i, \widetilde{x}_{k,i}, a_i) \sim \mathcal{N}\left(\mathbf{0},\; \begin{pmatrix} 1 & \rho_{u,x}\,\sigma_{\varepsilon,x} & \rho_{u,\widetilde{x}}\,\sigma_{\varepsilon,\widetilde{x}} \\ \rho_{u,x}\,\sigma_{\varepsilon,x} & \sigma_{\varepsilon,x}^2 & \rho_{x,\widetilde{x}}\,\sigma_{\varepsilon,x}\,\sigma_{\varepsilon,\widetilde{x}} \\ \rho_{u,\widetilde{x}}\,\sigma_{\varepsilon,\widetilde{x}} & \rho_{x,\widetilde{x}}\,\sigma_{\varepsilon,x}\,\sigma_{\varepsilon,\widetilde{x}} & \sigma_{\varepsilon,\widetilde{x}}^2 \end{pmatrix} \right),$$

so that conditional on success the conditional means $s(\cdot)$ and $\tilde{s}_k(\cdot)$ are linear in the inverse Mills ratio of the referral-success index of (B.9). The empirical distribution of the residuals net of the selection correction and referrer quality, denoted $\hat{G}_k^{\varepsilon}$, depends only on the TC k.

Referrer quality. The intensive-margin residual for overall risk decomposes into referrer quality and idiosyncratic link noise, $\hat{\varepsilon}^x_j = a_i + e_j$. Forming residual cross-products over unordered within-group pairs, the moment over targets referred by the same referrer identifies $\mathrm{Var}(a) = \sigma^2_a$, since distinct targets of one referrer share only the common a_i. The moment along referrer–target chains, excluding the referrer's own link, identifies the transmitted component $\varrho\,\sigma^2_a$, and ϱ is the ratio of the chain moment to σ^2_a. The analogous second-generation moments recover the same two objects through a separate route and serve as an overidentifying check on the transmission model. Figure B.8a reports the variance decomposition with its replication interval, and Figure B.8b plots the chain moment behind ϱ as a binned conditional mean. The residual pairs net of a_i form the nonparametric estimate of $\hat{G}^{\varepsilon}_k$ used in the simulation.

Referrer quality on place-based links. The moments are formed on network-based links. Under the place-based TC a referrer names a location rather than a person, and at most one target is recruited per referrer and TC, so no two targets of one referrer are recruited under TC0 and the same-referrer moment does not exist on place-based links. The model therefore carries the referrer effect on a place-based link as a separate object, $\sigma^2_{a,0}$, and sets it to zero: a target recruited at a location carries none of the referrer's quality, and a chain that runs through a place-based link does not transmit a across it. The pairs of one place-based and one network-based target of the same referrer, which a pooled moment would include, have a negative mean cross-product and pull the pooled estimate of σ^2_a to about a third of the network-based one, consistent with the referrer effect on a place-based link being a different object from the one on network-based links.

Completing the verifying measures. The success probability of a TC depends on the verifying measure of that TC, so a plan free to use any of the six needs all six components at every individual, while the transition generates only the one matched to the TC under which the target was referred. Each remaining component is drawn from its estimated conditional mean given the target's risk measure, a cubic in that measure, with the residual vectors resampled jointly across components so that their cross-correlation is preserved, and the completion model is estimated on the interviewed sample.

We treat the completed components as inputs to the success probability and not as signals, and the posterior at a referred individual conditions on the elicited component alone. A completed component is generated from the target's risk measure and therefore does carry information about it, and a posterior conditioning on all six would be sharper than the one we carry; the posterior we carry is the weakly less informative of the two, and the plan it selects is correspondingly conservative. Two rounds of referral data cannot test whether the conditional distribution of the unmatched components differs between individuals reached by random sampling and individuals reached through referral, since the six verifying measures are measured the same way in both but the referral design never varies which component is matched.

Table B.42 reports the coefficient estimates with bootstrap standard errors from first-order-referrer-cluster replications.

Pooling the externality incentive across rounds. Appendix Table B.44 re-solves the plan with the externality incentive's coefficients pooled across rounds. Under that coding the plan uses the externality incentive at the second round as well, and its gain over random sampling falls from about 29% to about 23%, because pooling dilutes the first-order effect the plan relies on.

Figure B.9 plots the estimated intensive margin, the predicted overall risk measure of a target against the referrer's, by TC and incentive; the slope is the risk-based homophily the plan relies

Table B.42: Structural Parameter Estimates

Panel A. Targeting conditions (TC5 excluded)						
	TC0	TC1	TC2	TC3	TC4	
Extensive	6.018***	0.307***	0.228***	0.108	0.104	
	(0.258)	(0.091)	(0.079)	(0.071)	(0.083)	
Overall risk	−0.237	−0.027	0.037	−0.048	0.039	
	(0.212)	(0.079)	(0.073)	(0.073)	(0.079)	
Verifying score	−0.607***	−0.357***	−0.222**	−0.114	0.038	
	(0.231)	(0.098)	(0.092)	(0.087)	(0.091)	
Panel B. Treatments						
	T1	T2	T3	T4		
Extensive	−0.087	−0.097	0.104	−0.104		
	(0.104)	(0.105)	(0.150)	(0.167)		
Overall risk	0.057	0.121	−0.296**	−0.035		
	(0.095)	(0.097)	(0.140)	(0.144)		
Verifying score	−0.074	0.004	−0.016	−0.116		
	(0.099)	(0.096)	(0.147)	(0.099)		
Panel C. Referrer characteristics						
C.1 Overall risk polynomial						
	1st order	2nd order	3rd order			
Extensive	−0.132	−0.051	0.035			
	(0.084)	(0.056)	(0.031)			
Overall risk	0.064	−0.008	0.014			
	(0.079)	(0.035)	(0.025)			
Verifying score	0.020	−0.009	0.012			
	(0.081)	(0.046)	(0.022)			
C.2 TC-specific verifying score						
	TC0	TC1	TC2	TC3	TC4	TC5
Extensive	−0.020	0.040	−0.169**	−0.091	−0.034	0.107
	(0.110)	(0.123)	(0.079)	(0.083)	(0.092)	(0.066)
Overall risk	0.098	−0.119	0.041	0.024	0.066	−0.027
	(0.084)	(0.078)	(0.069)	(0.072)	(0.083)	(0.054)
Verifying score	0.150	−0.029	0.146	0.122	0.004	0.030
	(0.118)	(0.116)	(0.107)	(0.097)	(0.111)	(0.075)
Panel D. Treatment × risk interactions						
	T1	T2	T3	T4		
Extensive						
1st order	−0.051	0.285**	−0.174	0.376		
	(0.122)	(0.134)	(0.204)	(0.299)		
2nd order	0.016	0.095	−0.022	0.156		
	(0.094)	(0.084)	(0.125)	(0.118)		
3rd order	−0.005	−0.133**	0.093	−0.110		
	(0.050)	(0.057)	(0.079)	(0.131)		
Overall risk						
1st order	0.051	0.052	−0.111	0.066		
	(0.113)	(0.140)	(0.190)	(0.189)		
2nd order	−0.016	−0.053	0.050	−0.042		
	(0.059)	(0.059)	(0.099)	(0.073)		
3rd order	−0.006	0.038	−0.022	−0.031		
	(0.037)	(0.051)	(0.069)	(0.061)		
Verifying score						
1st order	0.023	−0.144	0.195	−0.129		
	(0.108)	(0.131)	(0.176)	(0.163)		
2nd order	−0.037	−0.010	0.049	−0.031		
	(0.061)	(0.068)	(0.097)	(0.066)		
3rd order	0.003	0.089*	−0.115**	0.023		
	(0.031)	(0.048)	(0.056)	(0.059)		
Selection correction and controls						
	IMR (r1)	IMR (r2)	FOR IMR	SOR ext.		
Extensive	—	—	—	−0.040		
				(0.092)		
Overall risk	−0.026	−0.070	0.149	−0.135		
	(0.220)	(0.261)	(0.141)	(0.096)		
Verifying score	−1.123***	−1.034***	−0.100	−0.204**		
	(0.300)	(0.336)	(0.174)	(0.102)		
Probit N = 5,332; Intensive margin N = 2,341						

Notes: Structural parameter estimates for the referral process. The extensive margin is estimated by probit; the intensive margin is estimated by OLS with Heckman selection correction after FWL projection on exogenous controls. TC5 (dropped out) is the excluded targeting condition. T4 (friend referral) is assigned only to second-order referrers. Bootstrap standard errors (in parentheses) from 189 FOR-cluster-level replications. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

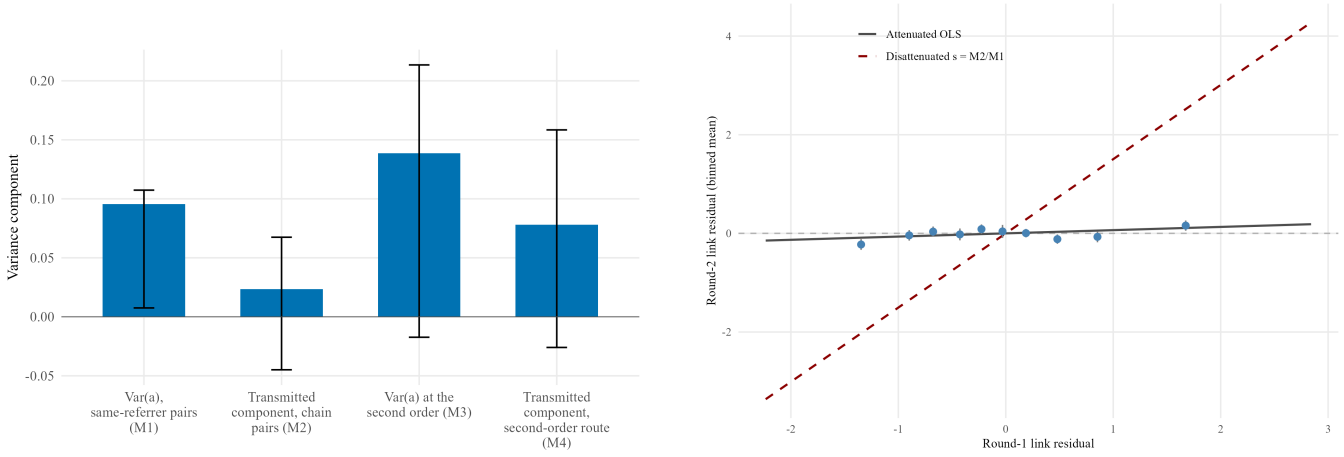
Table B.43: Wald Tests: Round-Invariance of the Higher-Order Risk Polynomial and of the Externality Arm

Outcome	W	df	p-value
overall	0.415	2	0.8127
verify	1.126	2	0.5694
overall, externality arm	9.434	4	0.0511
verify, externality arm	13.369	4	0.0096

Table B.44: Sensitivity of the Plan to Pooling the Externality Incentive Across Rounds

Coding of the externality incentive	Welfare	Gain over random sampling (%)	Share of sampled individuals asked (%)	Control, second round (%)	Externality incentive, second round (%)
Externality incentive coded by round (reported)	521.3	31.1	48.5	100.0	0.0
Externality incentive pooled across rounds	497.1	25.0	49.5	13.9	86.1

Notes: The reported technology codes the externality incentive by round, one coefficient block on first-order links and one on second-order links, each with its own interactions with the referrer's risk. The second row re-estimates the technology with one block on every link of the externality incentive, re-solves the individualized plan at the reported cap on the extended design space, and reads its incentive shares by round as in Figure 8. Appendix Table B.43 tests the equality of the two blocks.



(a) Variance decomposition of referrer quality

(b) Transmission of referrer quality across generations

Figure B.8: Referrer Quality: Variance Components and Transmission

Note. Panel (a): Variance components of the intensive-margin residual for overall risk on network-based links, identified from residual cross-products: $\mathrm{Var}(a) = \sigma_a^2$ from same-referrer target pairs (M_1) and its second-generation counterpart (M_3), and the transmitted component $\varrho\,\sigma_a^2$ from referrer–target chain pairs (M_2) and its second-generation counterpart (M_4). Bars are the full-sample moments, the values the welfare computation uses. Whiskers are 90% intervals, the 5th to the 95th percentile across 200 bootstrap replications that resample first-order referrers, including the replications whose welfare solve did not converge. Overlapping M_1 versus M_3 and M_2 versus M_4 are consistent with the single-component transmission model. The intervals are wide because these are small covariance moments estimated on a modest number of clusters. Panel (b): Binned conditional mean of the round-2 residual (recruited second-order target) against the recruiting referrer's round-1 residual, with the own link excluded. A flat profile indicates little propagation of the referrer's network advantage to the next generation; the attenuated OLS slope is close to zero, while the disattenuated transmitted share $\varrho = M_2/M_1$ is about 1.5 and the simulation caps it at one.

on at the second round, and the externality incentive raises the curve most at referrers at higher risk.

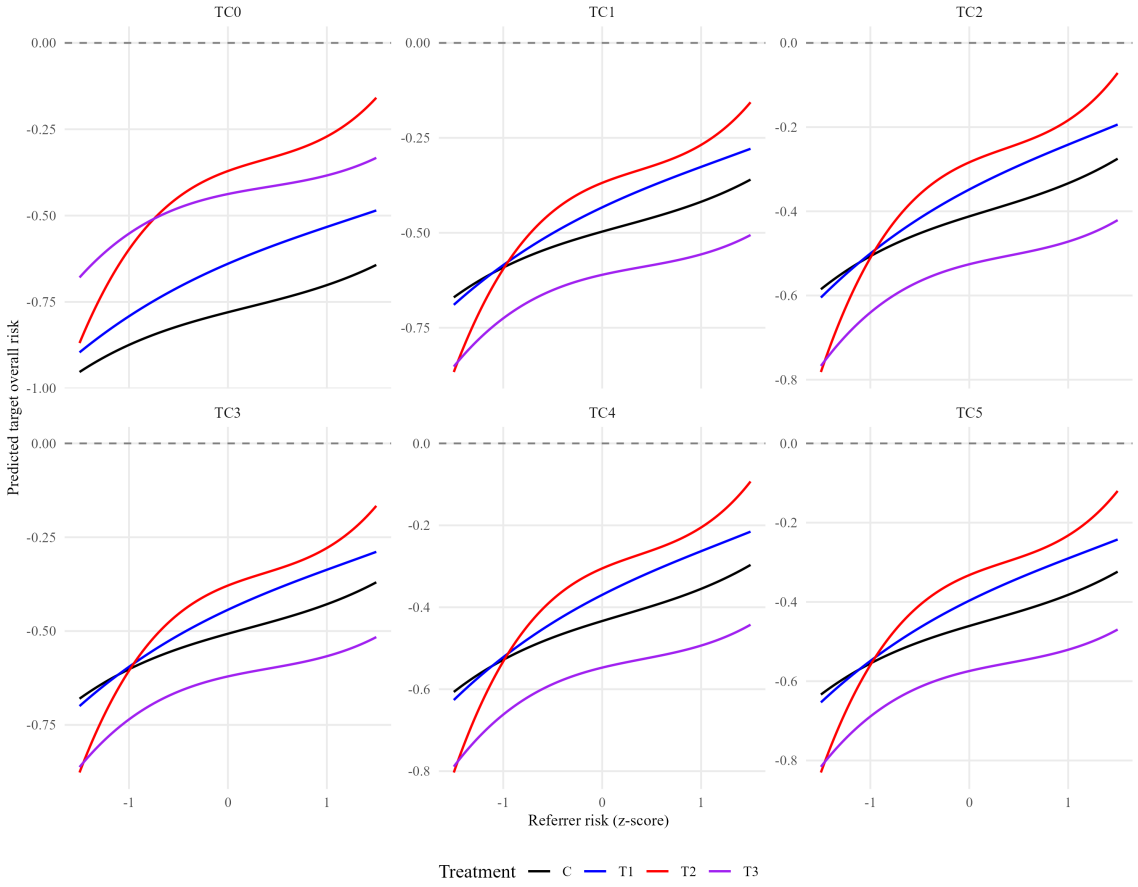


Figure B.9: Screening Functions by TC and Incentive

Note. Each panel shows the predicted target overall risk against the referrer's overall risk, by incentive.

Appendix B.2.2 checks the pooled second-order specification against the second-order referrers who were themselves recruited under the place-based TC.

B.2.2 Diagnostic on Place-based TC and Second-Order Referral

Place-based TC (TC0) asks referrers to identify a location rather than a named individual, and is assigned only in the first referral round. First-order targets recruited under TC0 who are subsequently selected as second-order referrers therefore entered the referral process through a place-based channel, whereas all other second-order referrers were recruited through network-based TCs. If TC0-origin second-order referrers differ systematically in their ability to produce successful referrals or in the quality of the targets they reach, the pooled intensive-margin specification of Section 7.2 could be misspecified.

Conditional mean differences. We augment the pooled intensive-margin equation by interacting each structural covariate block (risk polynomial, treatment indicators, treatment-by-risk interactions, TC indicators, and TC-specific verifying measures) with an indicator for whether the second-order referrer was recruited under TC0. For each block and for the joint set of all interactions, we compute a Wald F-statistic with cluster-robust variance at the first-order referrer level. Results are reported in Panel A of Table B.45.

Virtual second-order targets. Panel B compares the actual referral outcomes of these TC0-recruited individuals (their "virtual second-order targets") to those of network-origin second-order referrers; none of the comparisons is statistically significant.

Residual dispersion. Panel C of Table B.45 reports Brown–Forsythe tests for equality of residual variance between TC0-origin and network-origin second-round observations, separately for overall risk and the verifying measure. Neither test rejects the null of equal variance.

None of the three diagnostics rejects, and the welfare computation keeps the pooled specification.

Table B.45: TC0-origin SOR diagnostic

Panel A. Conditional mean: Wald tests for TC0-origin SOR interactions

	Overall risk		Verifying score	
Parameter block	F	p	F	p
Risk polynomial	1.698	0.1653	1.419	0.2352
Treatment	0.311	0.8173	0.207	0.8916
Treatment x risk	5.276	<0.001	0.654	0.7509
TC dummies	0.426	0.8307	1.509	0.1835
Verify score	1.227	0.2893	3.084	0.0052
All (joint)	4.326	<0.001	2.189	<0.001

Panel B. Virtual SOTs: targets of TC0-imputed FOTs vs. actual network SOTs

	Virtual	Actual	Diff.	p
Overall risk (raw)	-0.102	-0.063	-0.039	0.6756
Verifying score (raw)	0.110	0.047	0.062	0.4942
Overall risk (residual)	-0.019	-0.000	-0.019	0.8185
Verifying score (residual)	-0.103	-0.001	-0.102	0.2284

Panel C. Residual dispersion

	TC0-origin	Network	Ratio	BF p
Overall risk variance	0.6376	0.8648	0.74	0.0785
Verifying score variance	0.5676	1.0410	0.55	0.1457
Within-SOR $\hat{\sigma}_a^2$	0.4010	0.1144	3.51	—

Notes: Round-2 sample: 811 observations (67 TC0-origin SOR, 744 network-origin). Virtual SOTs: 137 targets of 79 TC0-imputed FOTs vs. 744 actual network SOTs. Panel A: Wald F-tests for joint significance of TC0-origin SOR interaction terms; cluster-robust variance (FOR level). Panel B: Welch t-tests comparing virtual SOT outcomes to actual network SOTs. Panel C: Brown–Forsythe test for variance equality; within-SOR sibling cross-products for referrer-effect variance. Within-SOR pairs: TC0-origin = 14, network = 152. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

B.2.3 Welfare Calibration

The welfare function $w(x_j) = \delta\hat{\beta}\, e^{x_j}$ is motivated by the empirical relationship between the overall risk measure and self-reported criminal offenses. We construct a committed crime score by weighting self-reported frequencies of four criminal offenses over the past 12 months by their

maximum statutory penalties under the Kenyan Penal Code: fighting (1 year), stealing (3 years), beating (5 years), and robbery (14 years). Figure 5b plots this score against the exponentiated overall risk measure, controlling for demographic characteristics. A Poisson regression of the crime score on the overall risk measure confirms the approximately exponential relationship, and the OLS coefficient of the exponentiated risk measure is the conversion factor $\hat{\beta}$ from exponentiated risk to expected penal years.

That Poisson regression also estimates a slope on the risk measure, which is the curvature the data carry, and the payoff of Section 7.2 sets the exponent to one instead of to it. The two agree only if the estimated slope is one, and because the value the calibration places on the upper tail moves directly with the exponent, this is a choice the reported levels rest on rather than a feature of the fitted relationship. Table B.46 re-solves the individualized approach with the exponent set to one half, three quarters and one and a quarter. The gain over random sampling runs from about half of its reported size to about 1.4 times it, and the share of individuals the plan asks moves by about eight percentage points.

Table B.46: Sensitivity of the Gain to the Curvature of the Payoff

Exponent κ	Random sampling	Individualized	Gain over random sampling	Gain relative to $\kappa = 1$	Share engaged
0.50	272.8	333.9	61.2	0.49	0.555
0.75	318.8	406.1	87.3	0.71	0.508
1.00	397.6	521.3	123.8	1.00	0.485
1.25	529.4	706.7	177.3	1.43	0.471

Notes: Each row sets the payoff to $w(x) = \delta\hat{\beta}\, e^{\kappa x}$ and re-solves the unrestricted plan on the extended design space; random sampling is re-valued under the same payoff. Levels are not comparable across rows because the unit of the payoff changes with κ; the column to read is the gain relative to $\kappa = 1$. Share engaged is the fraction of sampled individuals the plan asks to refer.

B.2.4 Cost Calibration

Every price the recursions charge is enumerator time valued at the wage the survey paid, plus the respondent payment where one is made. Table B.47 states each parameter, the minutes behind it, and what it prices; the durations are medians on the calibration sample.

The interview cost c^{init} covers transit, the interview without the referral module and the respondent payment, and is charged at every sampled individual whether or not the plan asks them to refer. The referral module cost c_{ref} is the module's own time and does not vary with the incentive. It is charged at every person the plan asks to refer rather than once per chain, because each such person sits through the referral module themselves. The incentive c_{τ}^{inc} is paid under the monetary incentives for each TC whose referral succeeds and is verified, at the verification rate the data show. The target interview cost c_{k}^{tgt} covers the target interview, measured on targets who were not asked to refer so that the referral module is priced once, and the respondent payment, and is charged only where the referral succeeds. For the place-based TC the coordination time reflects the distinct logistics of location-based recruitment, which yields a separate c_{0}^{tgt}.

The contact a TC triggers is charged whether or not it ends in an interview. A person-based TC puts nominations in front of the enumerator, who contacts the ones the referrer says can be introduced. Both pieces of c_k^{try} are observed counts rather than success rates. The number of contacts a TC generates is the contacted links per module run, and the time one contact takes is the coordination time divided by the number of contacts it covers, which is read off the contact order of a referrer's first successful link. The place-based TC takes no share of this, since the referrer names a location rather than a queue of candidates, and its coordination time stays inside c_0^{tgt}.

Table B.48 reports the unrestricted plan re-solved at $\bar{R} = 2$ on the extended design space with the cost of interviewing a target scaled by factors from one half to three, the first-order interview cost unchanged. Raising the cost by 25% cuts the gain over random sampling by more than half, and doubling it removes almost all of the gain. Cutting the cost by 25% nearly doubles the gain, and halving it triples it. The gain is therefore convex in the cost. The share of sampled individuals the plan asks falls from about 63% at half the cost to about 2% at twice it. The gain never turns negative, because the plan that asks nobody is available at every cost.

B.2.5 Bootstrap Inference

Each replication re-estimates the probit, the intensive margins, the residual distributions and (σ_a^2, ϱ) on resampled first-order clusters.

Re-selecting the best single design in every replication would induce upward bias in the estimated welfare, because for any random vector with positive variance the expected maximum exceeds the maximum of the expectations. We therefore adopt the same plug-in approach as at the point estimate and hold the design of the uniform rows at its point-estimate value across replications. The full-sample estimate is produced by the same solver as the replications. Of 100 replications, 98 converged, and the two that did not returned a negative estimate of σ_a^2 on the resampled links, which leaves the referrer-quality draw undefined.

The replications also measure the tilt itself. The mean replication exceeds the point estimate by an amount that rises with how much of the plan an approach re-optimizes. It is nothing at the random-sampling benchmark, whose welfare does not depend on the estimated referral process at all, small for the levels that impose (U), whose single design is held at its point-estimate value, and largest for the unrestricted plan, which re-selects the design, the threshold and the stopping rule in every replication. The same pattern appears in the regime that cuts chains after one round, so the gap is a property of optimizing on estimated primitives rather than of anything in how the recursion is solved.

We report the bootstrap bias, the mean replication minus the point estimate, beside the level rather than subtracting it from the center. The correction is defined on the mean, and the replication distribution has a long right tail, generated by resampled referral processes under which the plan requests far more referral than at the point estimate. A center built on that mean would move with the tail; the bias is small against the interval at every approach, and the reader can subtract it. The level of the gain over the random-sampling benchmark is the part most exposed, since the benchmark carries no maximization and the individualized approach carries the most. The ordering of the approaches is solved under the referral process at the point estimate and is not affected, and the mechanism decomposition holds one plan fixed across the elements it switches off, so the tilt enters its two terms alike and largely cancels.

A replication whose re-estimated referral process makes the structural estimation fail is recorded as a failure rather than passed over, since dropping it would select on the outcome:

Table B.47: Cost Calibration

Parameter	KES	Enumerator minutes	What it prices
c^{init}	1,287.2	104.4	Interviewing one sampled individual: transit, the interview without the referral module, and the respondent payment. Charged at every sampled individual.
c_{ref}	71.8	6.9	The referral module itself. Charged once at each individual the plan asks to refer, under every incentive.
c_k^{try}	130.1	12.5	Contacting the nominations one targeting condition generates. Charged wherever the plan uses the TC, whether or not the contact ends in an interview.
c_k^{tgt}	888.7	66.1	The target interview, measured on targets not asked to refer, and the respondent payment. Charged only where the referral succeeds.
c_0^{tgt}	1,126.0	88.9	The same for the place-based condition, which keeps its coordination time because it generates no nominations to contact.
c_τ^{inc}	21.5		The incentive under the monetary incentives, paid for each TC whose referral succeeds and is verified, at the verification rate the data show.

Notes: An enumerator day costs 5,000 KES over 480 contracted minutes, so a minute is 10.42 KES, and the respondent payment is 200 KES. The minutes column is the value net of the respondent payment where one is paid, divided by the minute wage; every parameter here is enumerator time priced at that wage, plus the payment. The contact cost is 0.944 contacts per targeting condition used at 13.23 minutes each, where the contacts per condition are the contacted links per referral module and the minutes are the coordination time divided by the number of contacts a referrer makes before the first success. All durations are medians on the calibration sample.

Table B.48: Sensitivity of the Gain to the Recruiting Cost

Cost multiplier	Recruiting cost (KES)	Random sampling	Individualized	Gain over random sampling	Share engaged	Reached, relative to random sampling	Payoff per individual reached, relative
0.50	464	397.6	784.1	386.5	0.633	1.67	1.18
0.75	696	397.6	623.5	225.9	0.617	1.32	1.19
1.00	928	397.6	521.3	123.8	0.485	1.09	1.21
1.25	1,160	397.6	454.6	57.0	0.366	0.94	1.21
1.50	1,392	397.6	415.9	18.3	0.205	0.91	1.15
2.00	1,857	397.6	400.0	2.4	0.022	0.99	1.02
3.00	2,785	397.6	397.9	0.3	0.007	0.99	1.01

Notes: Each row multiplies the calibrated cost of recruiting a referred individual by the first column and re-solves the unrestricted plan on the extended design space with the interview cost unchanged; random sampling recruits no one through referral and does not change. Share engaged is the fraction of sampled individuals the plan asks to refer. Reached is the number of individuals interviewed per million shillings over random sampling's, and payoff per individual reached is the welfare per individual interviewed over random sampling's; their product is the individualized level over the random-sampling level.

the replications that fail are the ones under which the plan would have run the most referral, which is the right tail of the welfare distribution. Replication time is uncorrelated with the welfare a replication returns, so the completed set is not selected on the outcome either.

The scope of these intervals is parameter uncertainty. They describe how the answer moves when the referral process is re-estimated on a resampled set of clusters, and they do not describe sampling of the population from which the NGO would draw its referrers.

The second round's contribution to the optimal plan's welfare, the difference within each replication between the levels with chains continuing and with chains stopped after one round, is positive in every replication, with a mean of about 42 and a 5th percentile of about 11.

Simulated and recruited targets compared. Because the payoff is convex in risk, a simulator whose targets were less dispersed than the individuals the experiment recruited would understate the referral's value. A simulated first-generation target has about nine tenths the dispersion of a recruited first-order target and a mean about two tenths of a standard deviation higher, and the two effects leave the exponentiated mean, which is what the payoff is proportional to, about 4% higher in the simulation than in the data. How much of that 4% is a distortion we cannot say from this comparison, and two things other than distortion separate the samples.

The simulated targets are recruited under the designs the optimal plan chooses while the recruited ones arrive under the designs the experiment assigned, so part of the difference is what an optimizing plan is for. The intensive margin is estimated with a correction for selection into being interviewed, and the simulator evaluates it with that correction set aside, so it describes the risk measure of a nominee rather than of the subset the contact phase brought in. Applying the correction would raise the simulated mean; the composition the model reaches is therefore that of the nominee pool rather than of the individuals the NGO would interview.

The individuals the experiment recruited through referral have a lower exponentiated risk on average than the sampled population does. The truncation the simulator applies to a predicted risk, at the largest risk observed among recruited individuals, binds at one simulated target in ten thousand, and no sampled individual lies above it, leaving it no part in the comparison. The comparison bounds the direction in which the simulator could distort the payoff; it is not a test of the estimated referral process against the experiment.

Audit of the solution. Two checks accompany each reported solution. An independent forward simulation of the individualized plan, valuing each person reached at their drawn overall risk measure, returns a level about 4% above the recursion and reach within 2% of it (Appendix B.1.2). The share of replications in which the nesting repair of Appendix B.1.4 applied is given with the intervals.

B.2.6 Split-Sample Check

The plan is chosen and valued on the same estimated referral process, and the reported gain therefore carries the optimism of in-sample selection. To measure it, the first-order clusters are split at random into two halves. On each half the referral process is re-estimated and the plan solved. The plan chosen on one half is then simulated on the process estimated on the other half, which it has never seen, and compared with the plan chosen on that half and simulated on it, the in-sample counterpart at the same sample size. Both directions are averaged, random sampling is the same in every cell, and the halving is repeated 100 times with 10 forward draws per cell. Of the 100 halvings, 89 can be solved, the other 11 giving a negative estimate of the variance of unobserved referrer quality on one half, without which the plan's beliefs are not

defined. Over the 89 solved halvings, the in-sample gain over random sampling averages about 166 and the out-of-sample gain about 106. Table B.49 reports the in-sample and the out-of-sample gain over random sampling, their difference, the share of the in-sample gain retained out of sample, and the share of halvings in which the out-of-sample gain is positive. Both halves carry half the clusters, and the optimism measured here is therefore an upper bound on the full sample's. The plan retains about 64% of its in-sample gain out of sample. The out-of-sample gain is positive in every solved halving, and its average is about 86% of the gain reported in Section 7.3. The replication intervals of Appendix B.2.5 reflect the sampling variation of the estimated referral process, and this check reflects the optimism of a plan chosen and valued on the same estimate. Each half's plan is recorded with its design use by round, and Figure 8, panels (c) and (d), draw these split-sample plans against the full-sample plan.

Table B.49: Split-Sample Check of the Unrestricted Plan

Continuation	In-sample gain	Out-of-sample gain	Optimism	Share of the gain retained	Splits with a positive out-of-sample gain	Splits
Chains continue	165.9 (2.8)	106.0 (3.3)	60.0	0.64	1.00	89

Notes: The procedure is that of Appendix B.2.6. Gains are over random sampling; optimism is the in-sample gain minus the out-of-sample gain, and the share retained is the out-of-sample gain over the in-sample gain. Standard errors in parentheses are over the splits. Each cell is valued by 10 forward-simulation draws; a split on which the variance of referrer quality is estimated negative on one half is not counted.

B.3 Additional Results

B.3.1 Information at the Sampled Individual

Table B.50 reports the level the plan attains under each subset of the six verifying measures the plan's decisions at the sampled individual may condition on, and under that individual's own risk measure and unobserved referrer quality, an upper bound on what any interview-based measure could add. Each restricted level takes each decision on the margins projected onto the measures it conditions on, and its loss is measured against the level with all six measures built the same way. Any one of the six measures alone attains between about 93% and 98% of the gain over random sampling. The TC4 measure alone attains all but about 2% of the gain, and the other five measures without the TC4 measure lose about 5%. With the sampled individual's own risk measure and unobserved referrer quality known, the gain would be about 60% larger. The six measures therefore recover about 63% of the gain from full knowledge of the sampled individual. One verifying measure overlaps the overall measure by construction, in that the TC5 score is built from the same non-basic literacy and numeracy items, with the sign reversed, that enter the cognitive-skills component of the overall measure. For that TC part of what the six verifying measures reveal about the risk measure is definitional, which works to understate the cost of the restriction and to blur the line between the TC and homophily elements of the mechanism decomposition.

Table B.50: Welfare by the Information the Plan May Use at the Root

Root information set	Welfare	Gain over random sampling	Loss against all six, projected	Share engaged	Men engaged	Women engaged
Random sampling	397.6	0.0	123.4	0.000	–	–
W^{SUN}	415.8	18.2	105.2	1.000	–	–
W^{UN}	452.2	54.6	68.8	0.617	–	–
All six measures (reported plan)	521.3	123.8	-0.3	0.485	0.769	0.003
All six measures, projected decisions	521.0	123.4	0.0	0.522	0.822	0.013
Only the place-based measure	513.1	115.5	7.9	0.629	1.000	0.000
Only the verifying measure 1	512.7	115.2	8.3	0.629	1.000	0.000
Only the verifying measure 2	512.5	114.9	8.5	0.629	1.000	0.000
Only the verifying measure 3	513.5	115.9	7.5	0.629	1.000	0.000
Only the verifying measure 4	519.0	121.4	2.0	0.541	0.857	0.003
Only the verifying measure 5	513.2	115.6	7.9	0.631	1.000	0.003
All but the place-based measure	521.0	123.4	0.0	0.524	0.828	0.009
All but the verifying measure 1	520.7	123.1	0.3	0.514	0.809	0.013
All but the verifying measure 2	520.8	123.2	0.2	0.523	0.824	0.013
All but the verifying measure 3	520.9	123.3	0.1	0.526	0.828	0.013
All but the verifying measure 4	514.4	116.8	6.6	0.627	0.996	0.000
All but the verifying measure 5	519.6	122.0	1.5	0.535	0.848	0.003
Own risk index and referrer effect known	594.4	196.8	-73.4	0.284	0.450	0.003

Notes: Every row solves the unrestricted plan through the same welfare-per-shilling root at the reported cap and design space, and differs only in what the root referrer's decisions may read. Share engaged is the fraction of sampled individuals the plan asks to refer, and men engaged and women engaged are that fraction within each gender. Below the root the plan reads the one measure the recruiting condition elicits, as in the reported plan. In the rows that restrict the measures, the root's belief is formed from the measures it may read and each decision is taken on the projection of the per-design margins onto those measures and gender, with the realised value charged at the exact margin; the all-six projected row is the same construction with nothing removed, and loss is that row minus the row shown. The last row gives the root its own risk index and referrer effect exactly, so it bounds what any interview-based measure could add. Random sampling and the two single-design levels are repeated from the welfare-levels table.

B.3.2 Referral Chains by Round

Appendix Figures B.10 and B.11 simulate referral chains forward from every sampled individual under the estimated referral process, ten chains per individual over five rounds, and record the risk measure of every target. Under the uniform design asked of everyone, every individual reached is asked to refer under the design of W^{SUN}, and a chain ends only when a referral fails. Under the unrestricted plan, solved with a limit of five rounds, the plan decides at every individual reached whether to ask and with which design. The third regime keeps the plan's first round and asks every target afterwards for a friend under no TC, the friend prompt of the second-order referrals. Its chains therefore differ from the plan's only in the later requests. The fourth regime takes the plan's decisions at every round and draws the individuals reached at the later rounds from the referral process with risk-based homophily switched off, element (ii) of Appendix B.1.6, so that what separates it from the plan is homophily alone.

The uniform design lets the targets' risk measure regress toward the sampled mean from both sides, because a referrer's risk measure predicts a target's with a slope well below one. The gap between chains from the sampled individuals the plan asks and chains from those it does not therefore narrows from about 0.6 standard deviations at the first round to about 0.25 at the fifth. The plan holds the mean risk measure of its targets between 0.3 and 0.4 standard deviations above the sampled mean at every round, whatever the risk measure of the sampled individual the chain starts from.

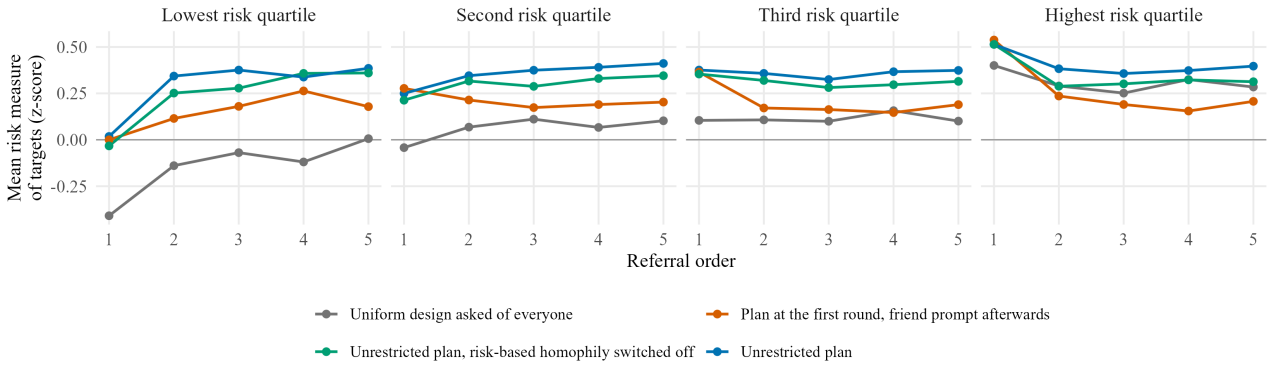
It asks most of the targets at later rounds, about 84% at the second and about half at the fifth, and what holds the risk up is the designs it requests, multiple TCs per referrer, which deliver more targets, and more of them from referrers at higher risk, because the success probability rises with the referrer's risk measure. With the friend prompt in place of the plan's later requests, the mean risk measure of targets falls from about 0.4 standard deviations above the sampled mean at the first round to about 0.2 from the second round on, about half of the plan's level. With risk-based homophily switched off and the plan's decisions held fixed, the mean risk measure of targets runs about 0.06 standard deviations below the plan's from the second round on, and a chain from the top quartile reaches the top decile as often, in about 57% of the simulations.

By the fifth round a chain from an individual in the top quartile of measured risk has reached a target in the top decile in about 57% of the simulations under the plan, about 44% with the friend prompt and about 21% under the uniform design, and a chain from the bottom quartile in about a tenth under either. The plan asks under about five TCs at each referrer and the uniform design one, and the shares therefore reflect the number of targets a chain reaches as well as their risk measure.

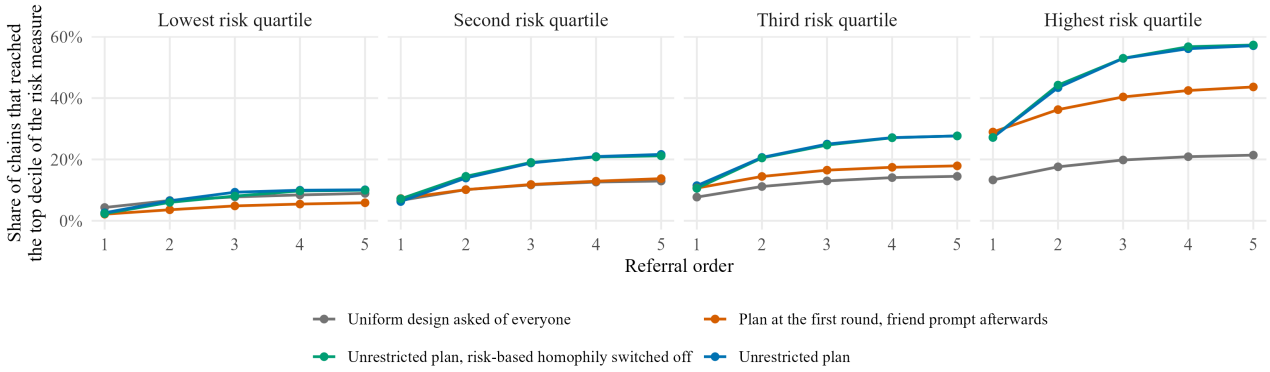
B.3.3 Welfare Levels and Decomposition

Table B.51 reports the sixteen levels W^{ℓ} of Appendix B.1.5 on the extended design space, with chains stopped after one round, which imposes (R), and with chains continuing, and Table B.53 repeats them on the design space the experiment fielded. Table B.54 places the two side by side, and its Gap column is what the limit on the number of TCs per referrer costs each level. At the unrestricted level the gap is about 3% of the level on the extended design space.

The TC and incentive columns give, for the levels that impose (U), the design held at each order, multiple TCs joined by a plus sign where (N) is not imposed. For the other levels they give the modal TC and the modal incentive at each order among the referrers the plan asks, and at those levels the two columns need not describe one design. All levels are per 1,000,000



(a) Mean risk measure of targets, by the quartile of the sampled individual's risk measure



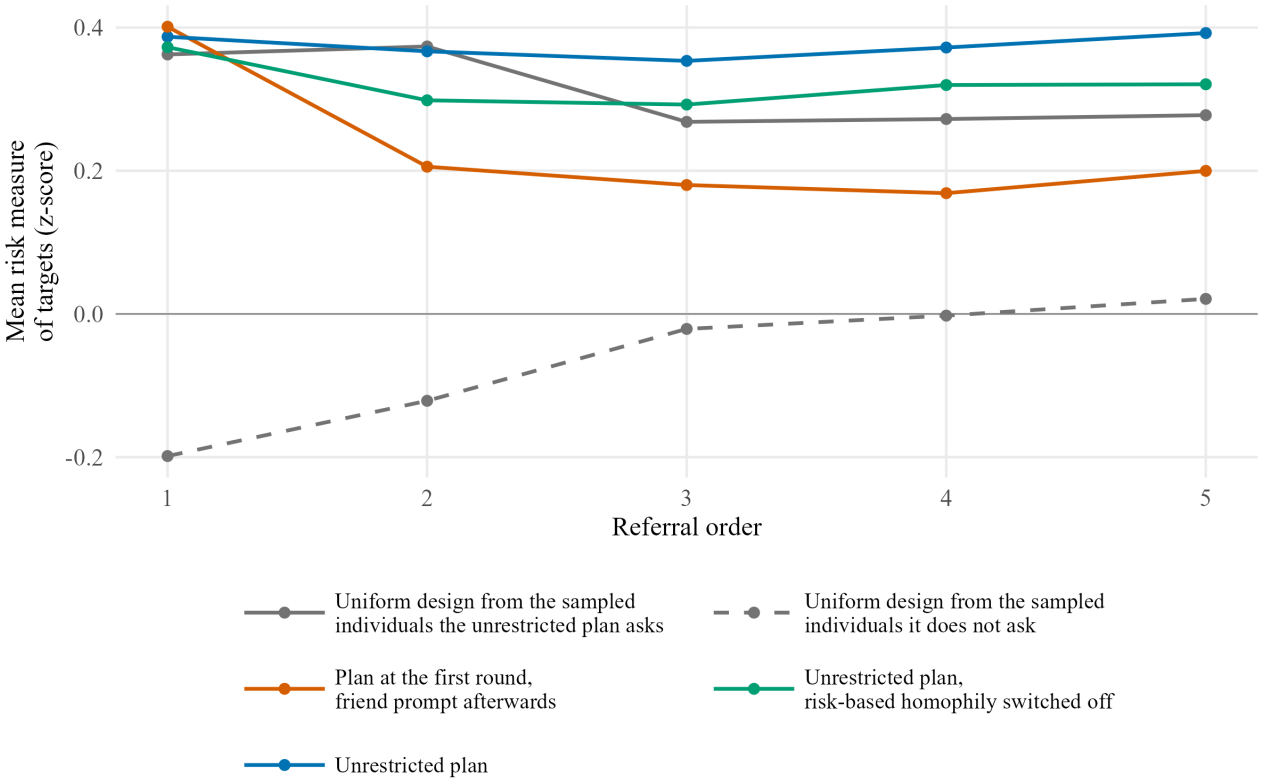
(b) Share of chains that have reached an individual in the top decile of the risk measure

Figure B.10: Risk Measure of Targets along Referral Chains, by Referral Order

Note. Forward simulation of referral chains from the 858 sampled individuals under the estimated referral process, ten chains per individual over five referral orders, with the referral process estimated at the second order applied again beyond it. Uniform design asked of everyone: every individual reached is asked under the design of W^{SUN}, TC0 under the externality message at the first order and TC4 under the control condition afterwards. Unrestricted plan: the plan solved with a limit of five orders decides at every individual reached whether to ask and with which design; it asks 15%, 29%, 37% and 70% of the sampled individuals in the four quartiles at the first order. Plan at the first round, friend prompt afterwards: the plan's first order, after which every target is asked for a friend under no TC. Unrestricted plan, risk-based homophily switched off: the plan's decisions at every order, with the individuals reached at the later orders drawn from the referral process in which the referrer's risk measure has no effect on the success probability, the target's risk measure, or the target's verifying measure. Quartiles are of the risk measure of all sampled individuals; under the unrestricted plan, with or without homophily, and the friend prompt the chains in a quartile start from the sampled individuals the plan asks. Panel (a) averages the risk measure of targets at each order over chains that reached a target at that order; panel (b) counts a chain as having reached the top decile once any target has a risk measure above the 90th percentile of the sampled individuals, over every sampled individual and simulation, so a sampled individual the plan does not ask counts as not reached.

KES of program spending.

Table B.52 reports the unrestricted plan's engagement by gender and the level it attains when one gender is ineligible to refer. Table B.55 reports the share of welfare the unrestricted plan generates at each round. Table B.56 reports the terms of the decomposition behind Figure 9, each with its replication interval, its share of the gain over random sampling, and the shares of replications in which the term is positive and in which a level it uses was repaired.



(a) Mean risk measure of targets, from the sampled individuals the plan asks and from those it does not

Figure B.11: Risk Measure of Targets by Referral Order, from the Sampled Individuals the Plan Asks and Does Not Ask

Note. Forward simulation of referral chains from the 858 sampled individuals under the estimated referral process, ten chains per individual, five referral orders. Uniform design asked of everyone: every individual reached is asked under the design of W^{SUN}, TC0 under the externality incentive at the first order and TC4 under the control condition afterwards. Unrestricted plan: the plan solved with a limit of five orders decides at every individual reached whether to ask and with which design; it asks 15%, 29%, 37% and 70% of the sampled individuals in the four quartiles of measured risk at the first order. Plan at the first round, friend prompt afterwards: the plan's first order, after which every target is asked for a friend under no TC, the friend prompt of the second-order referrals. Unrestricted plan, risk-based homophily switched off: the plan's decisions at every order, with the individuals reached at the later orders drawn from the referral process in which the referrer's risk measure has no effect on the success probability, the target's risk measure, or the target's verifying measure. The dashed line is the uniform design's chains from the sampled individuals the five-round plan does not ask, and the four solid lines start from the sampled individuals it asks. The panel averages the risk measure of targets at each order, over chains that reached a target at that order. Beyond the second order the referral process estimated at the second order is applied again.

Table B.51: Welfare Levels under the Restrictions

Level	Chains stopped after one round		Chains continue									
	Welfare	Gain over random sampling	Welfare	Gain over random sampling	Referrers	Referred	Reached	Share engaged	TC ($r = 1$)	Incentive ($r = 1$)	TC ($r = 2$)	Incentive ($r = 2$)
Random sampling	397.6	–	397.6	–	0	0	777	0.000	–	–	–	–
W^{SUN}	411.6	14.0	415.8	18.2	353	441	794	1.000	TC0	T2: Externality	TC4	C
	[397.6, 468.5]	[0.0, 70.9]	[397.6, 477.6]	[0.0, 80.0]								
W^{SU}	424.3	26.7	441.4	43.8	108	726	834	1.000	TC0+TC4+TC2+TC5	T2: Externality	TC4+TC2+TC5+TC3	C
	[397.6, 496.8]	[0.0, 99.2]	[397.6, 520.6]	[0.0, 123.0]								
W^{SN}	418.3	20.7	428.2	30.6	392	392	784	1.000	TC0	T2: Externality	–	–
	[397.6, 488.6]	[0.0, 91.0]	[404.7, 500.9]	[7.1, 103.3]								
W^{S}	469.4	71.8	510.3	112.7	118	725	843	1.000	TC4	T2: Externality	–	–
	[421.2, 556.3]	[23.6, 158.7]	[447.7, 608.8]	[50.2, 211.2]								
W^{UN}	440.0	42.4	452.2	54.6	274	348	793	0.617	TC0	T2: Externality	TC4	C
	[405.6, 499.9]	[8.0, 102.3]	[411.1, 519.1]	[13.5, 121.5]								
W^{U}	485.9	88.3	519.2	121.6	64	704	849	0.443	TC0+TC4+TC2+TC5+TC3+TC1	T2: Externality	TC4+TC2+TC5+TC3+TC1	C
	[428.5, 568.1]	[30.9, 170.5]	[454.9, 619.0]	[57.3, 221.4]								
W^{N}	440.9	43.3	454.1	56.5	279	344	792	0.622	TC0	T2: Externality	–	–
	[419.1, 513.5]	[21.5, 115.9]	[429.1, 533.2]	[31.5, 135.6]								
W	486.9	89.3	521.3	123.8	74	692	844	0.485	TC0	T2: Externality	TC2	C
	[435.8, 572.6]	[38.2, 175.0]	[465.2, 625.6]	[67.6, 228.0]								
Experiment's assignment	382.0	-15.6	388.0	-9.6	160	658	818	1.000	–	–	–	–

Notes: Welfare is the social payoff and the gain that payoff minus the random-sampling benchmark's. Referrers counts the sampled individuals the plan engages, referred those recruited through referral, and reached every individual interviewed; share engaged is the fraction of sampled individuals the plan engages. TC and incentive are the modal TC and the modal incentive at each round: at the first round among the sampled individuals the plan engages, and at the second among the referred individuals the plan runs a referral from, each state counted for the number of individuals the chain delivers to it. For the levels that impose U the TC and incentive columns give the design held for everyone asked at that order, several conditions joined by a plus sign where N is not imposed; for the other levels the second-order design varies with the state and the columns are filled for the unrestricted plan only. The last row evaluates the referral process as the experiment ran it, every sampled individual asked to refer under the incentive and the TCs their randomization assigned and every first-order target asked again under the second-order assignment, with the same estimated referral process; it is a fixed plan and carries no interval. Brackets give the 90 per cent replication interval of Appendix B.2.5.

Table B.52: The Individualized Plan by Gender

Eligible referrers	Welfare	Gain over random sampling	Share engaged	Men engaged	Women engaged	Women among the engaged
Pooled	521.3	123.8	0.485	0.769	0.003	0.002
	[465.2, 625.6]	[67.6, 228.0]	[0.434, 0.633]	[0.688, 0.998]	[0.000, 0.029]	[0.000, 0.022]
Men only	521.3	123.7	0.484	0.769	0.000	0.000
Women only	400.1	2.5	0.034	0.000	0.091	1.000

Notes: Each row solves the unrestricted plan on the whole sampled population through the same welfare-per-shilling root; the second and third rows make one gender ineligible to refer, so the plan may engage only men or only women while random sampling still interviews everyone. Gender enters the estimated referral process at every round by protocol, a target's gender being the referrer's, so the engaged set of the pooled plan reflects the estimated referral process and the calibrated costs rather than a choice. Share engaged is the fraction of sampled individuals the plan runs a referral from; men engaged and women engaged are that fraction within each gender; the last column is the share of the engaged set that is female. Brackets give the 90 per cent replication interval of Appendix B.2.5.

Table B.53: Welfare Levels on the Fielded Design Space

Continuation	Level	Welfare	N reached	N referred	Share engaged	Modal design
Chains stopped after one round	Random sampling	397.6	777	0	0.000	–
Chains stopped after one round	W^{SUN}	411.6	798	362	1.000	TC0, T2: Externality
Chains stopped after one round	W^{SU}	424.3	819	525	1.000	TC0, T2: Externality
Chains stopped after one round	W^{SN}	418.3	785	313	1.000	TC0, T2: Externality
Chains stopped after one round	W^{S}	461.4	816	499	1.000	TC4, T2: Externality
Chains stopped after one round	W^{UN}	440.0	792	261	0.593	TC0, T2: Externality
Chains stopped after one round	W^{U}	477.7	819	442	0.488	TC0, T2: Externality
Chains stopped after one round	W^{N}	440.9	791	256	0.593	TC0, T2: Externality
Chains stopped after one round	W	480.5	820	442	0.507	TC0, T2: Externality
Chains continue	Random sampling	397.6	777	0	0.000	–
Chains continue	W^{SUN}	415.8	794	441	1.000	TC0, T2: Externality
Chains continue	W^{SU}	438.9	818	639	1.000	TC0, T2: Externality
Chains continue	W^{SN}	428.2	784	392	1.000	TC0, T2: Externality
Chains continue	W^{S}	490.2	820	623	1.000	TC4, T2: Externality
Chains continue	W^{UN}	452.2	793	348	0.617	TC0, T2: Externality
Chains continue	W^{U}	503.4	824	584	0.509	TC0, T2: Externality
Chains continue	W^{N}	454.1	792	344	0.622	TC0, T2: Externality
Chains continue	W	507.3	825	587	0.527	TC0, T2: Externality

Notes: N reached counts every individual interviewed and N referred those recruited through referral. Share engaged is the fraction of sampled individuals the plan engages, and the modal design is the modal TC and incentive among them. Levels are solved on the design space the experiment fielded, four TCs per first-order referrer and two thereafter, and carry no interval because the replications were run on the extended design space alone.

Table B.54: Design Space Comparison

Level	Fielded design space	Extended design space	Gap
Random sampling	397.6	397.6	0.0
W^{SUN}	415.8	415.8	0.0
W^{SU}	438.9	441.4	2.6
W^{SN}	428.2	428.2	0.0
W^{S}	490.2	510.3	20.0
W^{UN}	452.2	452.2	0.0
W^{U}	503.4	519.2	15.8
W^{N}	454.1	454.1	0.0
W	507.3	521.3	14.1

Notes: Each level is solved with chains continuing on the design space the experiment fielded and on the extended one of Appendix B.1.1, which differ only in the cap on TCs per referrer; the gap is the second column minus the first.

Table B.55: Welfare by Realized Depth

Design space	Continuation	Through one referral round	Second round	Third round and beyond
Fielded design space	Chains stopped after one round	1.000	0.000	0.000
Fielded design space	Chains continue	0.614	0.386	0.000
Extended design space	Chains stopped after one round	1.000	0.000	0.000
Extended design space	Chains continue	0.432	0.568	0.000

Notes: Shares of the total welfare of the unrestricted plan at its own welfare-per-shilling solution, including the payoff of the sampled individuals themselves, who are interviewed whatever the plan then decides. The columns partition welfare by how many referral rounds produced it and sum to one by construction. Stopping every chain after one referral makes that partition degenerate; letting chains continue lets a chain run on wherever the continuation margin is positive. The estimation sample observes two referral rounds, so the last column is the part the round-invariance assumption extrapolates.

Table B.56: Decomposition of the Gain over Random Sampling

Term	Gain	Interval	Share of the gain	Share of replications positive	Share of replications censored
Referral					
Single referral from everyone	14.0	[0.0, 70.9]	0.11	0.65	0.35
Lifting one restriction at the base					
Referrer screening	28.4	[8.0, 38.0]	0.23	1.00	0.35
Referrer-specific design	6.7	[0.0, 42.8]	0.05	0.94	0.35
Multiple referrals	12.7	[0.0, 34.6]	0.10	0.67	0.47
Second-round referral	4.2	[0.0, 22.1]	0.03	0.52	0.56
Complementarity of two restrictions					
Screening $\times$ design	-5.9	[-11.9, 10.7]	-0.05	0.23	0.35
Screening $\times$ multiple referrals	33.1	[10.0, 53.1]	0.27	0.98	0.47
Screening $\times$ second round	7.9	[0.4, 17.1]	0.06	1.00	0.56
Design $\times$ multiple referrals	38.3	[13.5, 55.8]	0.31	1.00	0.47
Design $\times$ second round	5.7	[0.0, 19.8]	0.05	0.91	0.56
Multiple referrals $\times$ second round	12.9	[-2.7, 32.9]	0.10	0.66	0.67
Remainder					
Three- and four-way terms	-34.3	[-67.0, 5.2]	-0.28	0.10	0.68
Shapley value					
Referrer screening	30.0	[20.0, 42.1]	0.24	1.00	0.68
Referrer-specific design	13.1	[10.0, 40.8]	0.11	1.00	0.68
Multiple referrals	46.5	[15.2, 83.0]	0.38	1.00	0.68
Second-round referral	20.2	[5.4, 53.1]	0.16	1.00	0.68

Notes: Terms as defined in Appendix B.1.5, at the base that imposes S, U, N, R; the share column divides each term by the unrestricted plan's gain over random sampling. Share positive is the share of replications in which the term is positive. A term is censored in a replication when a level it reads took a contained level's plan there, which puts the term at zero; the last column reports that share. Brackets give the 90 per cent replication interval of Appendix B.2.5.

B.3.4 Mechanism Contributions

Table B.57 reports the five contributions at the solution under the full referral process. Confining the plan to the control condition is the largest loss whether chains stop after one round or continue, about 13% of the plan's welfare with chains stopped after one round and about 9% with chains continuing. With chains continuing, the plan so confined still attains about 19% more welfare than random sampling.

Table B.57: Mechanism Decomposition at the Full-Process Shadow Price

Element switched off	Welfare without it	Loss	Share of full (%)
Chains stopped after one round			
TC and verifying measures	468.6	18.3	3.8
Risk-based homophily	477.8	9.1	1.9
Incentives	424.6	62.3	12.8
Referrer quality	476.5	10.4	2.1
Incentive coefficients only	461.1	25.8	5.3
Four elements jointly	397.6	89.3	18.3
Chains continue			
TC and verifying measures	500.1	21.2	4.1
Risk-based homophily	497.5	23.9	4.6
Incentives	472.6	48.8	9.4
Referrer quality	513.4	7.9	1.5
Transmission of referrer quality	519.9	1.5	0.3
Incentive coefficients only	503.0	18.3	3.5
Four elements jointly	397.6	123.8	23.7

Notes: Each row switches off one element of the referral process and re-solves the unrestricted plan with that element removed, under each depth cap in turn, with the plan and the price solved at that cap, with the price $\nu^* = 5.21 \times 10^{-4}$ held at its value under the full referral process. Loss is that policy's welfare with the element on minus its welfare with the element off, and share of full is the loss as a percentage of welfare with every element on under the same depth cap, which is 521.3 when chains continue. The losses do not sum to the total because the elements interact. The last two rows are diagnostics rather than elements of the decomposition, the first switching off the incentive coefficients while leaving the incentive menu in place and the second switching off the TC and verifying measures, homophily, the incentive coefficients and referrer quality together.

B.3.5 The Limit on Referral Rounds

Figure B.13 carries the reported plan past the limit on rounds the tables use, so that what that limit gives up can be read rather than assumed. Allowing chains of up to five rounds raises the unrestricted level by about 6% over the reported plan at two rounds, with the referral process estimated at the second round applied at the rounds beyond it.

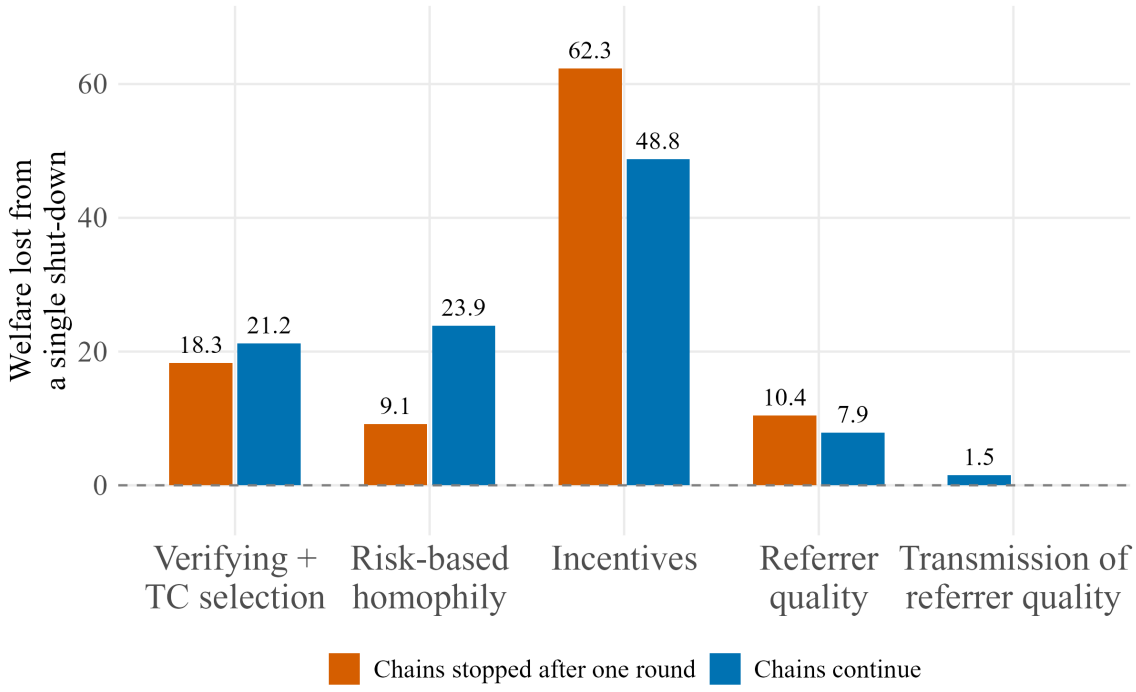


Figure B.12: Mechanism Contributions

Note. Each bar is the welfare lost, per 1,000,000 KES of program spending, when one element of the referral process is switched off, with the price ν held at the level it takes under the full referral process and the plan re-solved, at $\bar{R} = 1$ and $\bar{R} = 2$; the values are those of Table B.57.

B.3.6 Additional Figures

Panel (a) of Figure B.14 compares the distribution of the overall risk measure among the individuals the plan recruits at the first round with the individuals the experiment recruited and with the sampled population; the plan's recruits sit to the right of both, and the experiment's recruits to the left of the sampled population, which is the pattern behind the plan's higher average payoff in Section 7.3. Panel (b) of Figure B.14 plots, over the sampled individuals the plan asks to refer, the density of the expected number of individuals their referral tree recruits, with chains stopped after one round and with continuation; continuation moves most of the mass from about three recruits per referrer to about ten. Panel (c) of Figure B.14 splits the expected recruits of a referrer's tree into the referrer's own recruits and those the rounds below add, against the posterior mean of the referrer's risk; both rise with the referrer's risk, and the rounds below add more than the referrer's own round at every level of it.

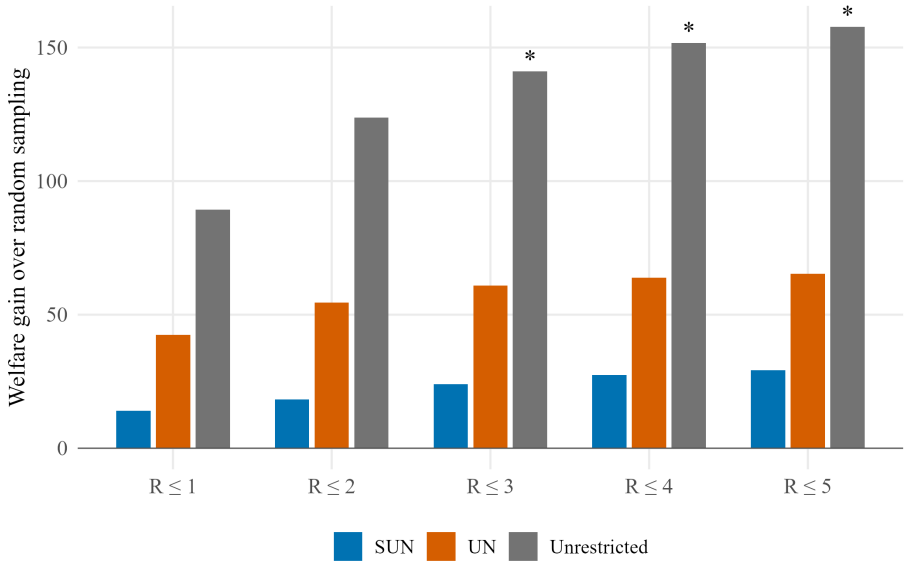
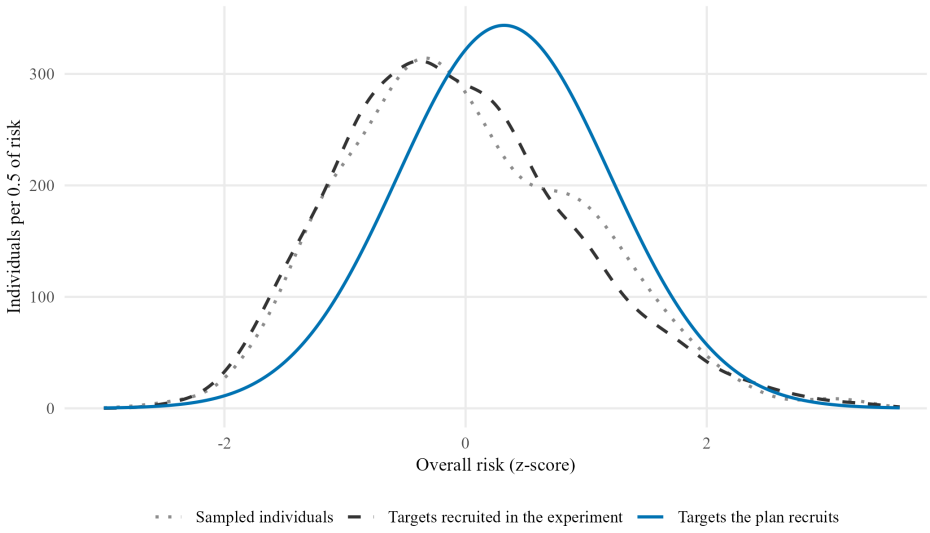
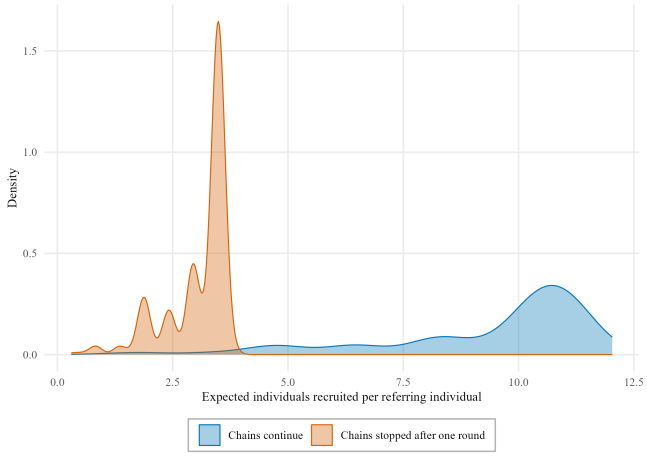


Figure B.13: Welfare against the Limit on Referral Rounds

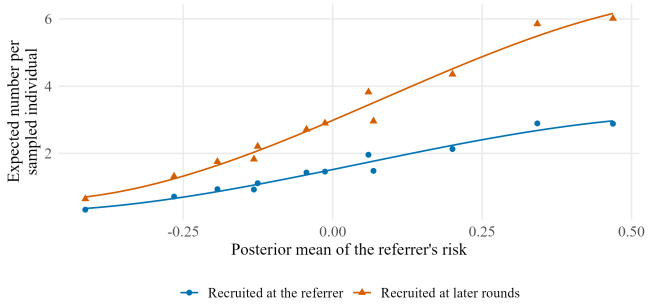
Note. Welfare net of the random-sampling benchmark, per 1,000,000 KES of program spending, for each approach under limits of one to five referral rounds, at the point estimate and without intervals. A larger limit admits every plan a smaller one admits, so welfare cannot fall with the limit; where the solved level does fall, the shallower level is carried forward and the bar is flat by construction rather than by economics. Bars beyond the second round apply the referral process estimated at the second round at orders the experiment did not run, and at those rounds the individualized level sits above the solver's bracket price, so the levels there are indicative.



(a) Risk measure of the individuals recruited at the first round



(b) Expected recruits per referrer asked



(c) Recruits at the referrer and in later rounds

Figure B.14: Recruits under the Unrestricted Plan

Note. Panel (a): The overall risk of the individuals the individualized plan recruits at the first round, of the individuals the experiment recruited at the first round, and of the sampled individuals. The plan's series is read off the solved plan, taking at each referrer and each TC it uses the posterior the NGO would hold at the recruited target, weighted by the probability that the TC succeeds and by whether the plan engages that referrer. All three are scaled to the number of targets the experiment recruited. Panel (b): Density of the expected number of individuals a referral tree recruits, across the sampled individuals the individualized plan asks to refer, under the model's own design space. The two curves are the same plan with chains stopped after one referral round and with continuation left to the plan. Panel (c): A referrer's tree split into what their own node recruits and what the rounds below it add, against the posterior mean of the referrer's risk, under the individualized plan with continuation allowed.

C Detailed Study Design

C.1 Details of Referral Incentives

The treatment scripts are provided below. These scripts represent the actual messages read aloud to participants during different treatment conditions, with bold formatting maintained to indicate emphasized portions. Bracketed text such as {part varies across TC} indicates where specific content was customized based on the targeting condition (TC) being administered. Each message is shown at the beginning of the referral module. The structure of reminder messages before each nomination question for each TC is also presented for each group.

C.1.1 C: Control group

[Beginning message.] This survey aims to find young people who are in vulnerable situations. We provide some of them with a job training program, developed by an NGO Accept International, to help program participants find stable jobs and increase their income.

In the following questions, we ask you to refer to someone you know that matches particular criteria.

[No reminder message is provided for the control group.]

C.1.2 T1: Monetary incentive

[Beginning message.] This survey aims to find young people who are in vulnerable situations. We provide some of them with a job training program, developed by an NGO Accept International, to help program participants find stable jobs and increase their income.

In the following questions, we ask you to refer someone you know who matches particular criteria. **If you can introduce someone who matches the criteria we mentioned, we will give you an additional reward of 50KES to appreciate your efforts. Please be sure that these additional rewards will not be paid if you bring someone who does not match the criteria.**

[Reminder message.] Again, if you can introduce **someone {who matches the criteria we mention}**, we will give you an **additional reward of 50KES** to appreciate your efforts.

C.1.3 T2: Externality

[Beginning message.] This survey aims to find young people who are in vulnerable situations. We provide some of them with a job training program to help program participants find stable jobs and increase their income.

The training was developed by an NGO Accept International, which specializes in de-radicalizing youths who are at risk of being involved in criminal activities, including joining criminal gang groups. In 2018, they led one of Nairobi's three largest gang organizations with 170 members to dissolution.

Therefore, in addition to improving the lives of training participants themselves, our training might **benefit you** from building a more peaceful and stable community.

You benefit from the reduction of criminal, illegal, violent, and gang-related activities in your community, because improved economic opportunities by the training program mitigates the vulnerability of such youths and makes it more difficult for criminal groups to recruit local populations.

In the following questions, we ask you to refer to someone you know that matches particular criteria.

[Reminder message.] Again, by nominating a relevant person you know, you contribute to increasing the number of vulnerable youths joining the training program. As more such youths join the training, we can improve their market-oriented income opportunities and reduce the chances of them being approached or recruited by gang-related groups, so **you will eventually benefit** from reducing criminal, illegal, violent, and gang-related activities in your community by mitigating the vulnerability of such youths.

C.1.4 T3 = T1 + T2: Interaction

[Beginning message.] This survey aims to find young people who are in vulnerable situations. We provide some of them with a job training program to help program participants find stable jobs and increase their income.

The training was developed by an NGO Accept International, which specializes in de-radicalizing youths who are at risk of being involved in criminal activities, including joining criminal gang groups. In 2018, they led one of Nairobi's three largest gang organizations with 170 members to dissolution.

Therefore, in addition to improving the lives of training participants themselves, our training might **benefit you** from building a more peaceful and stable community.

You benefit from the reduction of criminal, illegal, violent, and gang-related activities in your community, because improved economic opportunities by the training program mitigates the vulnerability of such youths and makes it more difficult for criminal groups to recruit local populations.

In the following questions, we ask you to refer someone you know who matches particular criteria. **If you can introduce someone who matches the criteria we mentioned, we will give you an additional reward of 50KES to appreciate your efforts. Please be sure that these additional rewards will not be paid if you bring someone who does not match the criteria.**

[Reminder message.] Again, by nominating a relevant person you know, you contribute to increasing the number of vulnerable youths joining the training program. As more such youths join the training, we can improve their market-oriented income opportunities and reduce the chances of them being approached or recruited by gang-related groups, so **you will eventually benefit** from reducing criminal, illegal, violent, and gang-related activities in your community by mitigating the vulnerability of such youths. In addition, if you can introduce **someone {who matches the criteria we mention}**, we will give you an **additional reward of 50KES** to appreciate your efforts.

C.1.5 T4: Friend referral

[Beginning message.] Could you name 4 close friends?

[This treatment is only shown once, and no reminder message is shown.]

C.2 Details of Targeting Conditions

The scripts for TCs are provided below. These scripts represent the actual messages read aloud to participants during different treatment conditions, with bold formatting maintained to indicate emphasized portions.

[TC0: Place-Based.] Do you know any seemingly high-risk spots such as specific streets, buildings, or intersections, not individuals of young men? The high-risk spots mean places with high exposures to or involvement in illegal and criminal activities, such as drugs, thefts, and violence. Keep them blank if the respondent pointed out 0 or 1 spot.

[TC1: Isolated.] Sometimes, certain people in your community might feel isolated and find it hard to make friends or connect with others. Do you know anyone who has a small number of friends that they can rely on by talking via phone or sharing concerns? Please name a few. **Here, you can mention someone you have already named earlier.**

[TC2: Receiving hostility.] Among those you know in your community, can you think of someone who experienced hostile behaviors, such as physical and psychological violence, from other ethnic groups **or other religious groups**? Please let us know as many names as possible. **Here, you can mention someone you have already named earlier.**

[TC3: Less exposed.] Among those you know in your community, can you identify someone who has **NOT visited other neighborhoods outside of {(respondent's own neighborhood)} frequently** for any purpose, including consumption and work? Please let us know as many names as possible. Here, you can mention someone you have already named earlier.

[TC4: Politically harassed.] Do you know someone who was treated unfairly, attacked, or harassed by police or government because of their beliefs or actions? If so, please let us know a few names who had the worst experiences. **Here, you can mention someone you have already named earlier.**

[TC5: Dropped out.] Do you know anyone who has dropped out of primary or secondary school and stopped going to school since then? If so, please let us know a few names of those who dropped out the earliest. **Here, you can mention someone you have already named earlier.**

D Implicit Association Test

We implement an Implicit Association Test (Greenwald et al. 1998, IAT), which aims to capture psychological associations between concepts (such as race or religion) and evaluations (such as good or bad). IATs are conducted during the survey on the tablet device where the questionnaire survey is administered. We use IATGEN, developed by Carpenter et al. (2019) and Santos et al. (2026), which incorporates IAT into the survey software Qualtrics in an offline environment with local languages.

The IAT consists of six rounds measuring implicit associations between target categories. Participants use keyboard responses ('E' and 'I' keys) to categorize images as quickly as possible.

The first two rounds serve as single category practice sessions. In round one, participants categorize Insurgent images using the 'E' key and Government images using the 'I' key. Round two follows the same format with Happy face images (E key) versus Sad face images (I key).

Rounds three through six involve combined category testing where two categories are simultaneously displayed in opposite corners. The test alternates between compatible and incompatible pairings: Insurgent + Happy face categories are paired with the 'E' key while Government + Sad face categories use the 'I' key, then the pairings reverse with Insurgent and Sad face (E key) versus Government and Happy face (I key). Category positions alternate between rounds to control for spatial bias.

Each round lasts approximately 20 seconds with images appearing centrally while category labels remain in top corners. Incorrect responses trigger a red 'X' mark requiring correction before proceeding. The software continuously records response times and error rates throughout the task.

Figures D.15 to D.18 show the pictures used in the IAT.[45]

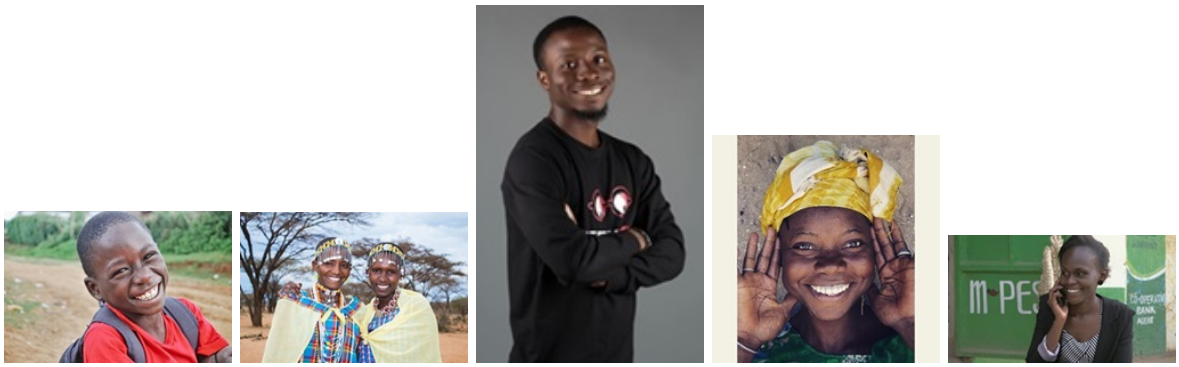


Figure D.15: Happy Photos Used for IAT

[45] All pictures are copyright-free (CC-zero) or free to share (CC-2.0).



Figure D.16: Sad Photos Used for IAT

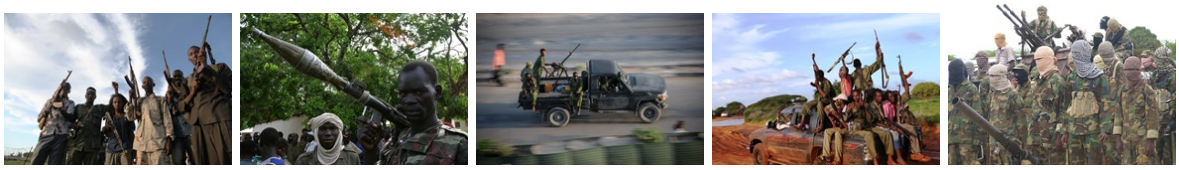


Figure D.17: Insurgent Photos Used for IAT

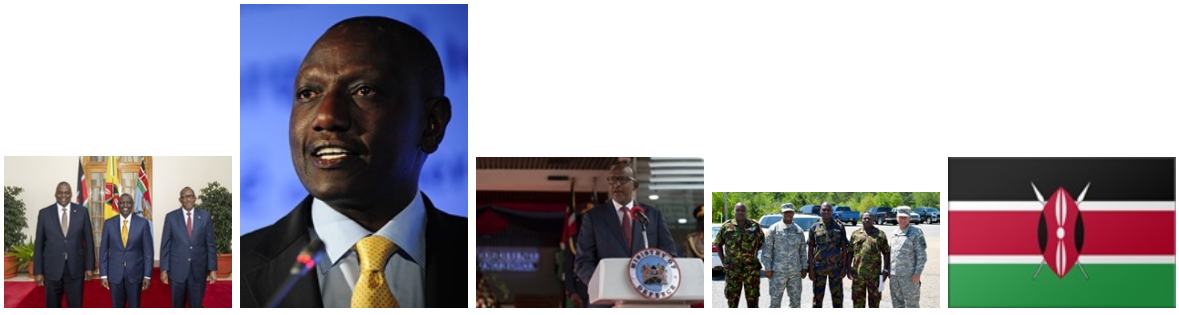


Figure D.18: Government Photos Used for IAT

E Study Pre-Analysis Plan

Our analysis largely follows the Pre-Analysis Plan (PAP) registered with the AEA RCT Registry (AEARCTR-0015272). Regarding the empirical framework, there is one minor clarification. The PAP specified the analysis at the target level, which could be interpreted as aggregating outcomes across the multiple Targeting Conditions (TCs) under which a target might have been referred. However, since each referrer–target link is uniquely associated with a single TC, a more precise approach is to conduct the analysis at the referrer–target–TC level. This allows us to directly estimate the distinct effects of each TC, as captured by the γ^k coefficients in equations (3) and (4), which aligns perfectly with the core research questions outlined in the PAP. This modification does not alter the hypotheses being tested but refines the empirical specification to better match the experimental design, thereby increasing the precision of our estimates for TC-specific effects.