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Martina Kirchberger, Mathias Allemand, Sveta Milusheva, Carol Newman, Brent Roberts, Vincent Thorne

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Conscientiousness and Labor Market Returns: Evidence from a Field Experiment in West Africa

Mathias Allemand[1]
University of Zurich

Martina Kirchberger[2,*]
Trinity College Dublin and CEPR

Sveta Milusheva[3]
The World Bank

Carol Newman[2,*]
Trinity College Dublin

Brent Roberts[4]
University of Illinois at Urbana-Champaign

Vincent Thorne[2]
Trinity College Dublin

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Abstract

Non-cognitive skills are increasingly recognized as important determinants of labor market outcomes. To what extent specific skills can be affected in adulthood remains an open question. We conducted a randomized controlled trial with low-skilled employed workers in Senegal where workers were randomly assigned to receive a training intervention designed to affect conscientiousness-related skills. We found that treated workers were significantly more likely to stay in their job and have higher wages nine months after the intervention. Our findings suggest that non-cognitive skills can be affected even later in the life cycle and can have substantial labor market returns.

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[1] Department of Psychology, University of Zurich.

[2] Department of Economics, Trinity College Dublin.

[3] Development Impact Evaluation Department, The World Bank.

[4] Department of Psychology, University of Illinois at Urbana-Champaign.

[*] Corresponding authors: martina.kirchberger@tcd.ie, cnewman@tcd.ie.

1. Introduction

A large body of evidence highlights a link between the Big Five personality traits (agreeableness, conscientiousness, extroversion, neuroticism and openness) and outcomes in the work place (Roberts et al., 2007; Soto, 2019; Borghans et al., 2008; Bowles et al., 2001; Fletcher, 2013; Nyhus and Pons, 2005).[1] One such trait, conscientiousness, which relates to being punctual, hard working and responsible, emerges as a key trait for successful labor market outcomes, such as job performance and productivity (Barrick et al., 2001; Cubel et al., 2016; Dudley et al., 2006).[2] It has long been thought that the Big Five personality traits are immutable in adulthood and not amenable to intervention efforts. However, recent theories in psychology propose that mindfulness and behavioral change techniques can help to shift beliefs and behaviors and modify skills to increase traits such as conscientiousness. This can be achieved by creating awareness about personality and its importance and by teaching behavior change skills (Allemand and Flückiger, 2017; Roberts et al., 2017a).[3]

To what extent interventions that target specific traits can be effective in improving labor market outcomes remains an open question. Between 230 to 450 million new workers are expected to enter the labor force in Africa by 2030 (World Economic Forum, World Bank and African Development Bank, 2017; World Economic Forum, 2017). This places considerable pressure on young people to find and maintain jobs, particularly in the presence of substantial search and matching frictions and high rates of turnover documented in low-income countries (Abebe et al., 2021, 2020; Banerjee and Sequeira, 2020; Donovan et al., 2021). McKenzie (2021) highlights the potential for non-traditional training incorporating psychology and focusing on essential non-cognitive skills to improve labor market outcomes. A number of recent studies have demonstrated positive impacts of comprehensive skills training programs, for example, on productivity (Adhvaryu et al., forthcoming) or earnings (Chioda et al., 2021). Soft-skills training programs could be important for jobs that require minimal skills but a high level of conscientiousness.

This paper examines the impact of a targeted conscientiousness training intervention for low-skilled workers on employment, wages and job retention. To do this, we combine methods and insights from both economics and psychology. The training program is based on a recent conceptual intervention model, the Sociogenomic Trait Intervention Model

[1] In these studies, the Big Five personality traits have been found to be predictors of income, long-term unemployment, job stability, job performance, job satisfaction, extrinsic and intrinsic career success and financial security.

[2] Conscientiousness is a spectrum of constructs describing individual differences in the propensity to be self-controlled, responsible to others, hardworking, orderly, and rule abiding (Roberts et al. 2009; Roberts et al. 2014). It includes inter-related facets such as industriousness, organization, self-control, responsibility, persistence, decisiveness, conventionality, and punctuality.

[3] For example, initial evidence from high-income contexts shows that psychological interventions using smartphone apps can help people to change personality traits in desired directions in adulthood (Stieger et al., 2020, 2021).

(STIM) by Roberts et al. (2017a), and a recent intervention program developed by Stieger et al. (2020) for Swiss participants, which we adapted to our particular context. Our sample consists of 386 workers employed at baseline in the construction of a new express train in Dakar, Senegal. The training consisted of an initial two-hour in-person session, conducted on company premises during work hours by a trained professional, external to the company, on how to be more conscientious at work, followed by a series of weekly short phone calls to workers over eight weeks reminding them of different ways to behave more conscientiously at work. Workers were randomly assigned to the treatment and control groups. The control group did not receive any additional training beyond the standard training protocols implemented by the company when new workers take up employment and periodically throughout the duration of their contract.

The framework for the intervention builds on the assumption that a trait like conscientiousness is a system of continuous and varying trait-related behaviors and experiences that can be manifest as a skill (i.e., the momentary, optimal expression of a trait). Hence, the main aim of the intervention is to help people change the behaviors and experiences associated with a domain of conscientiousness in a way that ensures that the change is enduring. This could be by showing certain conscientiousness-related behaviors and experiences more frequently or more intensively (for example, trying to become more punctual at work). To achieve this, the STIM uses behavioral activation theory, a form of cognitive behavior therapy used to treat depression (Lejuez et al., 2001; Magidson et al., 2014).[4] The intervention aims to motivate and to activate the participants by changing and promoting conscientiousness-related behaviors and experiences. We target four important skill-based facets of conscientiousness that are specifically important in the context of work: industriousness, punctuality, responsibility and orderliness (Roberts et al., 2014). Changes in these skills may have positive effects on labor market outcomes. If participants demonstrate more conscientiousness-related behaviors and experiences, such as punctuality, responsibility, or orderliness, in a work context, and this behavior is observed and valued by their supervisors, they are more likely to be retained in their posts and see their improved performance reflected in higher wages.[5]

We find that receiving conscientiousness skills training increases job retention and wages nine months after the end of the intervention. Workers in the treatment group were 10% more likely to remain employed by the construction company and their last reported monthly earnings were about 40 USD higher than those of the control group (a 20% increase from average baseline earnings). We interpret these labor market impacts as "hard" evidence that

[4]Behavioral activation to treat depression is a method to re-motivate and reactivate depressed patients. The conditions and consequences that trigger and maintain the depressive behavior must be identified and changed. Depressive behavior is replaced step-by-step with potentially rewarding activities.

[5]Over the longer-term, the positive reinforcement that conscientiousness-related behaviors by workers are rewarded by supervisors could in turn encourage further conscientious behavior leading to a positive cycle that could lead to longer-term positive effects such as influencing whether someone is promoted or finds alternative employment.

our training had an impact. Examining shifts in self-reported measures of conscientiousness-related skills, we find respondents are more likely to find it easier to "work towards reaching one's goals", to "live up to your responsibilities", to "focus on one's most important goals" and to "fulfill one's duties and obligations". We treat these results as suggestive evidence that the training affected conscientiousness-related skills; the reliability of our scales of self-reported measures, while acceptable by conventional standards, is low due to high average reported response scores and/or other response biases. Our study therefore also highlights the difficulty of using standard questions to capture essential skills across very different contexts.

The paper contributes to three strands of the literature. First, our paper contributes to a recent literature on the effects of various soft-skills training programmes on labor market outcomes that finds substantial effects on individuals' ability to maintain a job (Barrera-Osorio et al., 2021), returns to the firm with no effect on wages (Adhvaryu et al., forthcoming), effects on both individual earnings and firm profits (Chioda et al., 2021), positive effects on firm profits (Campos et al., 2017) or positive effects only for women (Acevedo et al., 2020). Groh et al. (2016), on the the other hand, do not find effects on either hours worked, income or employment.[6] These programmes typically train workers on a combination of skills, such as communication, writing, time management, negotiation, and emotional regulation. We add to this literature by providing evidence on the effectiveness of targeting one of the key traits for labor market outcomes (conscientiousness).[7] A recent paper by Bryan et al. (2021) found that a theology education program which promoted evangelical Protestant Christian values had a positive impact on income that appears to be due to increased grit, which can be considered one facet of conscientiousness. Our experiment is the first, to our knowledge, to target different facets of conscientiousness and focuses on the impact on labor market outcomes.

Second, we contribute to a recent literature that points out distinctive features of labor markets in low-income countries, such as the high prevalence of non-salaried work (Bandiera et al., 2022), significant search and matching frictions (Abebe et al., 2021, 2020; Banerjee and Sequeira, 2020) or the high turnover for low-earnings jobs (Donovan et al., 2021). Our evidence suggests that improving conscientiousness might play an important role in increasing job tenure.

Third, we contribute to an ongoing debate about whether particular traits can be changed in adulthood and answer this question in the context of low-skilled workers in a low-income country (Allemand and Flückiger, 2017; Roberts et al., 2017a). Most of the current evidence

[6] Aghion et al. (2019) further highlight the role of complementarities between soft skills of low-skilled workers and a firm's other assets.

[7] We also relate to a large literature on the effectiveness of worker training programs. For examples and overviews, see McKenzie (2017), McKenzie (2021), Alfonsi et al. (2020), Card et al. (2011) or Attanasio et al. (2011).

stems from research in high-income countries with high-skilled samples (Stieger et al., 2020, 2021). Our experiment allows us to examine whether conscientiousness-related skills can be activated in this particular setting using a simple and low-threshold intervention and also allows us to test the reliability of psychological interventions in vastly different contexts from which they were originally designed.

The rest of the paper is organised as follows. In Section 2 we present the setting for our study, and describe the experiment and the data. Section 3 presents the results and discusses possible mechanisms and potential caveats to the study. Section 4 concludes.

2. Setting and field experiment

Setting and background

The study took place from April 2019 to May 2020. The setting for our experiment was Dakar, Senegal. Dakar's workforce are, on average, aged 30 years old, 49% have attended middle school, and 72% are employed in low-skilled occupations or are self-employed (Agence Nationale de la Statistique et de la Démographie Sénégal and ICF, 2020). We worked with a company that forms part of a joint venture involved in the construction of a new 36 km long railway express train connecting the city center of Dakar with Diamniadio, a new city established outside of Dakar, and in a second phase with the new international airport. The express train is one of the flagship projects of the government's five-year strategic plan which highlighted the need for improving transport in the Greater Dakar Area. The first phase of construction started in 2017 and was completed in 2020.

Field Experiment

Workers employed at the company responsible for the construction of the new express train in Dakar were recruited for the study. Having a sample of workers employed by the same company allows us to hold unobservable determinants of conscientiousness constant, such as how motivating supervisors are, company work atmospheres and management styles. To select our sample, the company provided us with a list of workers in low-skilled positions that were working on different portions of the tracks of the express train. There were a total of 386 workers on these lists, which formed our sample. Almost two thirds of the sample were manual workers, barrier workers, and security agents. The remainder were other types of workers on the construction site that were classified by the company as having a low level of qualifications.

Following recruitment to the study, we administered a baseline survey in April 2019 to collect information on worker characteristics and personality traits. After the baseline, half of the workers were randomly selected to receive the behavioral activation intervention

focused on conscientiousness. All workers selected for the intervention took part.[8]

The intervention aims to: (a) present information about the importance and benefits of the four important aspects of conscientiousness at work; (b) increase the motivation to change conscientiousness states; (c) provide instructions to activate conscientiousness states; and (d) prompt behavioral practice using reminders to activate the conscientiousness states.[9] The intervention consisted of two components. The first component was a group training session with an average of 24 participants that lasted 2 hours, for eight groups in total. The length of the session and the number of participants was similar to other training sessions that workers received on safety and security. The session was hosted by a professional consultant with experience delivering training of this kind in Senegal.[10] The training was conducted in the local language, Wolof, to ensure that workers fully understood all of the material. During the session, the trainer explained different concepts regarding non-cognitive skills to workers in the treatment group, in particular conscientiousness, with an emphasis on how improvements in such skills can lead to long-term benefits for the worker. The control group did not receive any additional training beyond the standard training provided by the company to all workers, which includes an initial security training at the start of the contract and periodic sessions throughout the duration of the project.

The second component consisted of weekly reminders for eight weeks via short phone calls (less than 1 min) to activate non-cognitive skills change. Calls were made by a survey company. Reminders were randomized across weeks and all workers received the same set of reminders each week. During each call, workers were given personal skills reminders, such as, "Make sure not to leave your place of work at any time without replacement", that targets conscientiousness. Phone calls were also conducted in Wolof.

A mid-line survey was conducted in January 2020, and an end-line survey was conducted by phone in May 2020. Our sample started with the 386 individuals interviewed at baseline. At mid-line, 344 answered our survey (10.9% attrition), while at end-line we were able to reach 371 respondents (3.1% attrition).[11]

Despite the fact that this light touch intervention has a relatively low "dose", it is expected that the repeated reminders function as triggers that initiate the conscientiousness states in the daily life of the workers and instigate change processes. Skill change can be best elicited through repeating behaviors that differ from typical, trait-like behavior (Allemand

[8]It is possible that there were spill-over effects between the treatment and control groups (given that workers were assigned to different locations on the construction site depending on the company's needs). This, however, would bias the results against finding an effect.

[9]Full details of the content of the training session are provided in Appendix A.

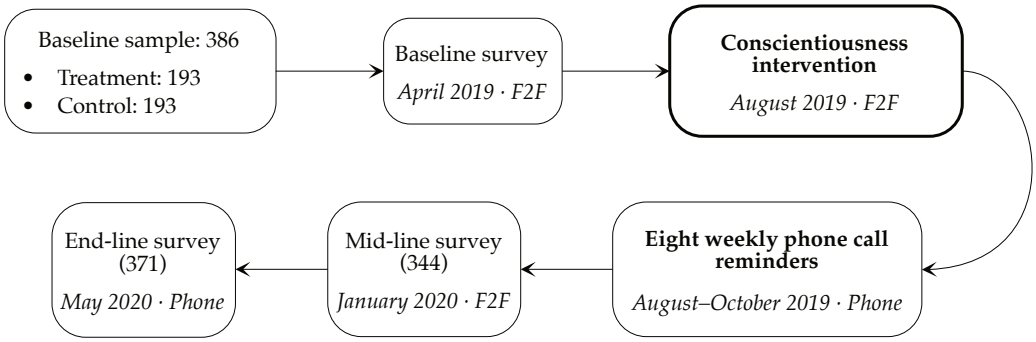
[10]The consultant has previously led several training programs in Senegal in personal development, conflict management, judicial defense and youth support.

[11]Appendix Table B.1 compares baseline characteristics of attrition and non-attrition groups. We do not find any systematic differences between these groups after controlling for multiple hypothesis testing. We also do not find differences in attrition between the treatment and control groups.

and Flückiger, 2017; Roberts et al., 2017a; Wrzus and Roberts, 2017). The accumulation of conscientiousness-related behaviors and experiences should eventually lead to more habitual behaviors and experiences, and personality change through bottom-up processes. Demonstrating more conscientiousness-related behaviors in the workplace, such as punctuality, responsibility, or orderliness, is desirable from both the employer's and the individual's perspective. A more punctual and responsible worker is more likely to be retained by the company and receive a higher wage. This may in turn lead workers to feel that they are living up to the expectations placed on them, promoting even more conscientiousness-related behaviors and experiences in the future.

Figure 1 summarizes the timeline of the intervention and surveys. Appendix Table B.2

Figure 1: Timeline of intervention



Note: This figure shows the timeline of the intervention for the treatment group. The number of respondents is in parenthesis. *F2F* indicates the survey or intervention was done face-to-face, while phone surveys are coded with *Phone*. See Appendix Figure A.1 for a more detailed version.

shows some basic characteristics of the sample for treatment and control workers. The average age of participants in our study was 36-37 years.[12] The vast majority were male and only around one-fifth had completed middle school. For most, this was not their first formal job and about one tenth of the sample were recent migrants. We do not find any statistically significant difference in baseline traits or household-level variables across the treatment and control group with the exception of worker age: treatment workers were slightly younger than control workers but this difference is only marginally statistically significant at conventional levels.

Following Cumming (2014), we also report Cohen's *d* measures and their 95% confidence intervals in the last columns of Appendix Table B.2 for the differences between treatment and control groups. We find that Cohen's *d* are all smaller than 0.2[13] and that the confidence intervals include zero, suggesting that the differences between groups are not significantly

[12]Our sample is slightly older than the general workforce in Dakar. This is due to the company recruiting workers with some prior experience.

[13]This is the conventional cut-off value for Cohen's *d* below which effects are considered small or very small (Sawilowsky, 2009).

different from each other. While some of the household-level baseline characteristics are different when looking at them individually, Cohen's d is always below 0.2. Further, applying a correction for multiple hypothesis testing eliminates any statistical significance in group differences. We therefore conclude that our sample is balanced across the treatment and control group on these baseline characteristics. Throughout the paper, we report our results with and without baseline controls.

3. Results and discussion

This section presents our key results. We start by showing the effects of the intervention on the probability of being employed, the probability of still working at the construction company and on wages. We then discuss possible mechanisms and potential limitations of our study.

3.1. Main results

Table 1 shows the results of a simple ordinary least squares regression of the following equation

$$y_{i,t=3} = \beta_0 + \beta_1 T_i + \beta_2 X_{i,t=1} + \varepsilon_{i,t=3} \tag{1}$$

where $y_{i,t=3}$ is the outcome of interest for worker i at end-line, T_i is an indicator for whether the worker is in the treatment or the control group, $X_{i,t=1}$ are baseline individual and household controls which include sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings and household income, and ε_i is a statistical noise term. We show the unconditional results in columns (1) and (3) and add the controls in columns (2) and (4).[14]

Columns (1) and (2) of Table 1 show that our treatment did not significantly increase the probability of employment at end-line.[15] However, workers in the treatment group were about 10% more likely to keep their job in the construction company.[16] These results are similar when we add baseline controls in column (4).[17] [18]

[14] To account for multiple hypothesis testing we also compute sharpened q-values which control for the false discovery rate. They are computed following Anderson (2008) and correct for multiple hypothesis testing within groups of outcomes. The results are presented in Appendix Table B.3. All of our results on labor market outcomes are robust to this correction.

[15] At end-line, 72% of the sample were still employed and 51% were still employed at the construction company.

[16] The magnitudes and significance of the treatment coefficients are robust to a logit specification.

[17] We do not find any differences in the probability of remaining in the company by baseline occupations (see Appendix Table B.4).

[18] About two-thirds of workers who left the company stayed in the construction sector, with an additional 15% of workers employed in wood and metal work, carpentry and craftsmanship (see Appendix Table B.5).

Table 1: Labor market outcomes at end-line

	(1) Employed	(2) Employed	(3) Still at company	(4) Still at company
Treated	0.0613	0.0580	0.103**	0.109**
	(0.187)	(0.213)	(0.048)	(0.039)
Constant	0.694***	0.895***	0.456***	0.373**
	(0.000)	(0.000)	(0.000)	(0.010)
Standardized coeff.	0.137	0.130	0.206	0.217
Baseline controls		✓		✓
N	371	371	368	368
R-sq	0.00472	0.0428	0.0106	0.0344

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income.

We next turn to last-month's earnings at end-line.[19] Column (1) in Table 2 shows that the treatment group received significantly higher earnings at end-line. Their monthly earnings rose by a sizeable amount of 22,545 CFA francs (41.51 in 2020 USD) compared to the control group.[20] The positive impact on wages is robust to the inclusion of baseline controls in column (2). In column (3) we additionally control for earnings at baseline (baseline outcome) and the result holds, increasing slightly in magnitude.

In light of the higher probability of retention within the company shown in Table 1, we next explore to what extent the earnings impacts are driven by keeping a job at the construction company by controlling for whether a worker is still employed by the company in column (4). Table 2 shows that workers employed by the construction company did earn significantly higher wages, which explains part of the result, but there was also an additional effect of the training of 15,759 CFAF (29.02 in 2020 USD) that workers earned, irrespective of where they were working at end-line.

[19] Appendix C provides detailed information on how earnings are defined.

[20] This represent a 20% increase from average baseline earnings. The average wage of workers at end-line was 84,146 CFAF (155.13 USD).

Table 2: Earnings at end-line

	(1) Last earnings	(2) Last earnings	(3) Last earnings	(4) Last earnings
Treated	22544.7***	23816.3***	24408.6***	15759.7**
	(0.005)	(0.003)	(0.001)	(0.018)
Still at company				73271.0***
				(0.000)
Constant	72751.5***	44534.9**	21716.9	-1626.4
	(0.000)	(0.045)	(0.304)	(0.930)
Standardized coeff.	0.289	0.306	0.313	0.202
Mean outcome control gr.	112644.92	112644.92	112644.92	112644.92
Baseline controls		✓	✓	✓
Baseline outcome			✓	✓
N	370	370	370	367
R-sq	0.0210	0.0599	0.169	0.378

Note: *p*-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household,total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: earnings measured at baseline.

3.2. Mechanisms

We now turn to potential mechanisms that could explain the improvements in the labor market outcomes that we observe. We consider three possible mechanisms. First, the training could have directly affected conscientiousness-related skills and this in turn affected labor market outcomes by making workers capable of being more responsible and hard-working and thereby more productive. Second, the training could have affected other qualities, such as agreeableness or openness, and these led to participants keeping their jobs. In turn, longer tenure allowed workers to acquire conscientiousness skills and these impacted their earnings. Third, it is possible that the firm kept track of who was trained and on the basis of this, retained workers and paid them higher wages. We discuss each of these potential channels in turn.

First, to measure the direct effect of the intervention on conscientiousness, we measured conscientiousness-related skills before the training at baseline and after the training at mid-line using a 32-item questionnaire measuring skill-based versions of four facets of conscientiousness: responsibility, industriousness, organization and punctuality (Soto et al.,

2022). Using face-to-face interviews, each respondent was asked to answer a set of questions on "how easy or difficult it is to" behave in a particular way relating to each of the scales. Responses were recorded using a five-point scale ranging from one (very difficult) to five (very easy). Details on the conscientiousness-related skill measures used are provided in Appendix D and Appendix Table D.1.

While not perfect, the reliability metrics of the psychometric scales (Cronbach's alpha and the interitem covariance, reported in Appendix Table D.2) are acceptable, and the reliability of the overall conscientiousness skill scale is satisfactory (Taber, 2018). Several factors might explain the imperfect scores of the scales: translation issues[21], cultural differences, social desirability bias or the fact that we asked the questions in an interview format rather than have respondents self-report. More generally, this highlights that psychometric surveys, often designed with university students in Western cultures in mind, may not be easily translatable to different contexts, especially in developing countries and for low-skilled workers.

With these caveats in mind, we found that the training had an impact on four out of the 32 conscientiousness items and report the results in Table 3. Specifically these are: how easy or difficult is it for you to (1) work towards reaching your goals; (2) focus on your most important goals; (3) live up to your responsibilities; and (4) fulfill your duties and obligations.

We did not find a statistically significant effect on any of the other conscientiousness skills or the overall conscientiousness skill scale (see Appendix Tables D.3 to D.11). The high value of the constant term in all specifications indicates very high response scores, saturated close to their maximum value of five. This might be because respondents feel pressured into making positive judgements about themselves to appear socially desirable or signal their willingness to keep their job at the construction company. Such high baseline scores leave little room for change/improvement in these measures as a result of the intervention.

Despite this, the results suggest that individuals who received the training report at least some increased levels of conscientiousness skills along some of the facets. Magnitudes of the effects range between a 0.16 point increase on the five-point scale for "focusing on one's most important goals" and a 0.30 point increase for "living up to one's responsibilities". These increases are robust to the inclusion of skill scores at baseline and the same set of controls as in Tables 1 and 2.[22] We also explored other margins that could have been affected by

[21]The measures we used were translated from English into French and then into the local language Wolof, which may affect reliability.

[22]It should be noted that we lose statistical significance when we adjust the p-values using the sharpened q-values (see Appendix Table B.3). This is not surprising given the large number of traits considered. As such, these findings should be treated as providing suggestive evidence of the impact of the training on conscientiousness-related behaviors. We also performed a principal component analysis on the four facets of conscientiousness to reduce the dimensionality, extracting either the first principal component of each facet and then examining the impact of the treatment, or combining the first principal component of each facet

Table 3: Conscientiousness skills

	(1) Reach goals	(2) Focus on goals	(3) Responsible	(4) Fulfill duty
Treated	0.268*	0.162*	0.298*	0.162*
	(0.059)	(0.081)	(0.009)	(0.011)
Constant	3.941***	4.666***	4.030***	4.566***
	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.202	0.192	0.281	0.274
Mean outcome control gr.	3.47	4.33	4.15	4.53
N	343	343	343	343
R-sq	0.074	0.028	0.084	0.063

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. Personality skills are measured at baseline and midline. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. All specifications include baseline controls and skill measured at baseline. Baseline controls include sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Reach goals* and *Focus on goals* both measure the industriousness skill, while *Responsible* and *Fulfill duty* measure the responsibility skill. Appendix Table D.3 presents specifications excluding the control variables.

the treatment such as hours worked per week, having a second occupation or self-reported levels of absenteeism. We do not find that the treatment affected any of these margins.[23]

Second, an alternative mechanism is that the intervention affected other personality domains. For example, it could be that workers in the treatment group felt that the company had chosen them specifically to invest in. Because of this, they behaved more respectfully towards their supervisors and colleagues. This in turn raised their tenure which allowed them to acquire better levels of conscientiousness which was then reflected in their labor market outcomes. To examine this mechanism, we explored whether any of the other Big 5 domains (agreeableness, extroversion, neuroticism and openness) shifted in significant ways. We do not find any clear evidence supporting this alternative mechanism (all coefficients are insignificant when we control for multiple hypothesis testing), although it should be noted that these scores also suffer from high baseline values. Further, we re-estimate the earnings equation (Table 2) and include an interaction term between remaining in the company and treatment (see Appendix Table B.6). The interaction term is not statistically significant

into a summary measure. These measures similarly suffer from a high average value at baseline and lack of variation in the measured traits leading to very high p-values.

[23]Hours worked are already quite high at baseline, with a mean of 61.4 hours worked and a standard deviation of 11.3 making it difficult for workers to increase hours or take a second job. Further, most workers employed at the company take the company bus to the construction site and back home, so that there is not much scope for an individual worker to adjust their hours worked.

suggesting that the effect of training was the same whether an individual is employed by the construction company or not. This suggests that the effects are not working exclusively through longer tenure at the company.

Third, we cannot rule out that the company kept track of who we trained and kept workers because they knew they were trained, although this information was not shared with the company. While this could contribute to the employment retention effects, positive wage effects for workers who left the company would not be driven by this. This suggests that our results are not totally driven by the company keeping track of trained workers. Moreover, observations from the field do not support this hypothesis. Supervisors tend to be in close contact with their workers, and closely monitor their behavior. Given how important it is for the company to be able to rely on workers to perform responsibly in these roles, it is unlikely that the company would not take into account the actual performance of workers in their performance evaluations.

Overall, the evidence is supportive of a mechanism whereby our intervention affected worker conscientiousness and this in turn affected their labor market outcomes, although more research is needed to better measure conscientiousness skills in such contexts.

3.3. Potential Limitations

We note two limitations to our study. First, end-line data collection took place after the onset of the COVID-19 pandemic and it is possible that our intervention interacted with the pandemic. For example, given that the training aimed to make individuals more conscientious it is possible that they were more careful during the pandemic and lost their jobs due to wanting to stay at home rather than run the risk of exposure to the virus by going to work. On the other hand, more conscientious individuals might have felt a greater responsibility to go to work. To measure whether the intervention affected the impact of COVID-19 on the behavior of the workers, the end-line survey asked a number of questions on how the pandemic impacted their livelihoods. One set of questions asked respondents to compare current incomes and expenditures to before the start of the pandemic, specifically in February 2020. We do not find any significant differences in the extent to which treated and control individuals reported lower incomes, lower transfers and gifts, higher health expenditures, lower savings or more borrowing (see Appendix Tables E.1 and E.2).[24] We find that individuals in the control group reported having taken more measures to prevent the spread of the virus but do not find any differences in the rate at which treatment and control individuals displayed symptoms, or lost their main source of income as a result of COVID-19. Overall, this suggests that the intervention did not interact with the pandemic in a significant way.

[24]We only find a small statistically significant difference for education expenditures, which is higher for the control group.

A second concern relates to the lack of an active control group. For the first part of the intervention, the training session, it is worth noting that general security training sessions were common for all workers at the company. Workers were brought together in similarly sized groups to the conscientiousness training session for these security training sessions. For the phone reminders, providing messages that were different in content to the conscientiousness messages would constitute a different treatment arm rather than an active control group. Moreover, reminders relating to different aspects of the general security training that all workers received would look similar to the phone reminders that the treatment group received. As such, an active control group was not included in the study.

Finally, it is worth mentioning that our results capture relatively medium-term impacts. While beyond the scope of this paper, future research should also seek to measure longer-term impacts.

4. Conclusion

We used a randomized controlled trial to test the impact of a conscientiousness training intervention for low-skilled workers in an urban developing country setting on employment, wages and job retention. The training program was based on recent work in the field of psychology (Roberts et al., 2017a; Stieger et al., 2020) and was designed to affect conscientiousness traits among workers. We found that providing conscientiousness training significantly affected the probability that the workers were still employed by the company at end-line and their level of earnings.

To our knowledge, this is one of the first studies that tests a psychological intervention of this kind in the field. The developing country context for the study is particularly relevant given the importance of job creation and the problem of job turnover in these settings. Our study highlights the potential for psychological training of this kind to improve labor market outcomes for low-skill workers. By making our training materials fully available we hope to facilitate further research on this topic.

Furthermore, while we find some suggestive evidence that the training affected the conscientiousness skills of the treated workers, our study also underlines the challenges associated with using standard, self-reported measures, to capture personality skills across different contexts, with different types of populations, in different languages and across different levels of literacy. Future research that provides guidance on the appropriate instruments to use in settings outside university campuses is vital for being able to pin down the precise channels through which interventions aimed at affecting non-cognitive skills in such contexts work.

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Appendix (For Online Publication)

A. Details on Experiment

A.1. Curriculum of the psychological intervention

1. Introduction and goals of the group training session

Duration: 5 min

- Introduction to group training session and warm-up
- Present outline and the goals of the session
- Present expectations (e.g., willingness to participate in group discussions)

2. Present information about the importance and benefits of conscientiousness at work

Duration: max. 25 min

2.1. Present facts about conscientious behaviors at work

Present information about factors and skills that can make people more successful or less successful at work. On one hand, research has shown that skills ["keeping one's work place clean" "following through with commitments"] and experiences [setting and achieving goals] are important for success at work and satisfaction with the job. On the other hand, research has also shown that a lack of skills or willingness to learn the skills are related to job-related difficulties [being repeatedly late to work]. This group session will introduce and discuss the importance and benefits of four important skills in the context of work and beyond.

Present definitions of the four "non-cognitive" skills (i.e., industriousness, punctuality, responsibility, and orderliness (Roberts et al., 2007); [please simplify the definitions to fit the needs of the participants]:

- *Industriousness* captures the tendencies to work hard, aspire to excellence, and persist in the face of challenges.
- *Punctuality* reflects the simple tendency to show up on time to previously scheduled appointments. Being punctual appears important when considering one's ability to plan, work hard to get somewhere, avoid temptations that might lead one to be late, care enough to meet other people on time, and understand the rules and conventions surrounding one's social group.

- *Responsibility:* On the high end of the spectrum, responsibility reflects the tendency to follow through with promises to others and follow rules that make social groups work more smoothly. On the low end, it reflects the tendency to be an unreliable partner in achievement settings and to break one's promises.

- *Orderliness* encompasses the overarching tendency to be "prepared", which includes tendencies toward neatness, cleanliness, and planfulness on the positive side, or disorderliness, disorganization, and messiness on the negative end of the spectrum.

2.2. Transfer of the definitions to real-life work context

Transfer the definitions to the everyday work life contexts of the participants to make them more comprehensible and realistic to participants [provide specific examples and scenarios from the job as barrier workers to motivate the discussion].

- What does it specifically mean to be *hardworking* at my workplace/in my job? (e.g., invest efforts into work; complete tasks; help site vehicles to cross; observe all rules; secure train passages; remove all stones etc.; monitor equipment; take tours through the allocated area; work as hard as everyone else on the site)

- What does it specifically mean to be *punctual* at my workplace/in my job? (e.g., show up on time; be on time in the morning at the bus pick-up point; be punctual for meetings with supervisor)

- What does it specifically mean to be *responsible* at my workplace/in my job? (e.g., to follow work-related rules; consult the supervisor in case of a delay or absences; inform the supervisor in case of a problem)

- What does it specifically mean to be *orderly* at my workplace/in my job? (e.g., keep the workplace in order; keep the torch clean in the building barracks, workplace or surroundings of the workplace; do not leave your own uniform e.g., helmets, vests, etc. unattended)

3. Increase the motivation to change conscientiousness

Duration: max. 20 min

3.1. Discuss possible rewards of being conscientious

Discuss real or hypothetical situations/scenarios in the everyday work life of the participants, showing how certain skills lead to *better work outcomes*. The goal of this task is to motivate participants' behaviors. It should be made clear what participants would gain when they habitually show conscientious behaviors:

- What are possible positive consequences or rewards (for the individual, for others, for the workplace) of being *hardworking* at the workplace? [getting a raise; helping the company complete the work better or faster]
- What are possible consequences or rewards (for the individual, for others, for the workplace) of being *punctual* at the workplace? [not losing your job; getting another job with the same company]
- What are possible consequences or rewards (for the individual, for others, for the workplace) of being *responsible* at the workplace? [helping the entire organization to be better thus making the company successful leading to keeping your job and future jobs]
- What are possible consequences or rewards (for the individual, for others, for the workplace) of being *orderly* at the workplace? [avoiding accidents and not hurting yourself or others]

3.2. Discuss possible costs of low conscientiousness

Discuss real or hypothetical situations/scenarios in the everyday work life of the participants, showing how missing or poorly trained skills leads to *poor work outcomes*. The goal of this task is to motivate participants' behaviors by pointing to possible costs [please provide realistic examples and scenarios]:

- What are possible negative consequences or costs (for the individual, for others, for the workplace) of being *lazy* at the workplace? [less likely to receive a recommendation for another job; less likely to be given other opportunities]
- What are possible negative consequences or costs (for the individual, for others, for the workplace) of being *unpunctual* at the workplace? [making other coworkers in a previous shift have to stay late]
- What are possible negative consequences or costs (for the individual, for others, for the workplace) of being *unreliable* at the workplace? [slow-down work for everyone; less likely to be asked to continue working for the company]
- What are possible negative consequences or costs (for the individual, for others, for the workplace) of being *disorganized* and *messy* at the workplace? [higher likelihood of hurting yourself or someone else in the workplace]

4. Provide instruction on how to activate conscientious behaviors

Duration: max. 40 min

4.1. Behavioral activation tasks / behavioral "experiments" in daily work life

To pursue their specific goals and to perform the four important skills in the context of work, participants have to practice and repeat the goal-related behaviors in the same work context repeatedly so that the contexts may elicit the behaviors [the specific behavioral activation tasks / "behavioral experiments" based on the list in the appendix can be used for the discussion].

4.2. Possible barriers to perform the four important skills

Discuss possible barriers that may hinder participants to perform the skills (e.g., individual barriers, work-related barriers).

- What are possible barriers to be *hardworking* at the workplace? How can these barriers be overcome?
- What are possible barriers to be *punctual* at the workplace? How can these barriers be overcome?
- What are possible barriers to be *responsible* at the workplace? How can these barriers be overcome?
- What are possible barriers to be *orderly* at the workplace? How can these barriers be overcome?

4.3. Possible resources to perform the four important skills

Discuss possible resources that may help participants to perform the skills (e.g., social support).

- What are possible resources to be *hardworking* at the workplace? How can these resources be used?
- What are possible resources to be *punctual* at the workplace? How can these resources be used?
- What are possible resources to be *responsible* at the workplace? How can these resources be used?
- What are possible resources to be *orderly* at the workplace? How can these resources be used?

4.4. Identification of goals and goal setting

Participants specify one specific goal for each of the four skills (i.e., industriousness, punctuality, responsibility, and orderliness) they would like to pursue in the next weeks. For each

of the four specific goals, participants have to generate one *specific goal* in the form of an *if-then plan* (e.g., "If I see a car right in front of the barrier, then I check all the rules before I let the car pass" [industriousness]; "If I have a meeting with my supervisor, then I will do everything I can to be there on time" [punctuality], "If I want to leave the workplace, then I will ask the supervisor first" [responsibility]; "If I start to work, then I will keep things tidy" [orderliness]) [please provide simple examples from the daily life work context]. This task also may help to identify specific situations in which participants can perform specific goal-related behaviors: What are typical work-related situations ("if") in which participants perform the behaviors and the four skills, respectively ("then")?

The goal setting process should follow the SMART criteria:

- *Specific:* Goals must be clearly defined (not vague, but as precise as possible).
- *Measurable:* Goals must be measurable.
- *Attainable/attractive:* The goals must be attainable and desirable for the person.
- *Realistic:* The goal set must be possible and feasible.
- *Timely:* It must be possible to set a reasonable time limit to achieve the goal including time limits for smaller steps.

Behavior Activation Through Reminders

Prompt behavioral practice by weekly reminders to activate conscientiousness behaviors

Procedure

Every week each participant will get a short phone call with 4 reminders targeted toward each of the four skills. For each phone call, 4 behavioral activation tasks / "behavioral experiments" (1 task per facet of conscientiousness) can be randomly [or, sequentially] selected from the list below.

Appendix: Behavioral Activation Tasks / "Behavioral Experiments"

Here is a set of broad and specific behavioral activation tasks / "behavioral experiments" [this list can be expanded with more specific tasks depending on the participants' daily work life].

Industriousness

Broad reminders

- Try to have high standards and work toward them.

- Try to go above and beyond of what is required.
- Try to work as hard as the majority of people around you.
- Try to give the highest quality in everything you do.
- Try to do more than what is required.
- It's important to set goals and achieve them.
- Complete the tasks you start.
- Persist at tasks after meeting setbacks or failures.
- Try to work extra hard on a project to make sure that it is done right.
- Complete the projects you start.
- Finish what you start.
- Put your mind on the task at hand.
- Get things done quickly.
- Always know what you are doing.
- Do not let yourself get distracted.
- Do not postpone decisions.
- Finish what you start, e.g., checking a vehicle, cleaning a rail, touring through an area for monitoring, unloading a truck.
- Get things done quickly.
- Do not let yourself get distracted, e.g., by another vehicle while checking one vehicle.

Specific reminders

- Help site vehicles to cross the rail:
  - Try to give the highest quality in everything you do, e.g., check all the rules before you let a car pass (headlights on, rear red lights on, no children, no people in the load area, the car has a numbered red badge, etc.)
  - Put your mind on the task at hand, e.g., when checking a vehicle crossing the rail.

- Secure train passages:
  - Try to give the highest quality in everything you do, e.g., check that there are no stones, sand or holes in the rail at all.
  - Put your mind on the task at hand, e.g., when a train is arriving, and you prevent pedestrians and vehicles from passing.
- Monitoring equipment:
  - Put your mind on the task at hand, e.g., touring through an area to monitor small railway equipment.
- Unloading trucks:
  - Try to give the highest quality in everything you do, e.g., try to unload the equipment of a truck as properly as you can.
  - Put your mind on the task at hand, e.g., when you are unloading a truck.

Punctuality

- Do not forget meetings.
- Keep up with required work.
- Get to appointments with your supervisor on time.
- Do not miss the bus; be at the picking up point on time.
- Return phone calls in timely fashion.

Responsibility

- Try to carry out your obligations to best of your ability.
- Go out of your way to keep your promises.
- If you are running late, call ahead to notify those who are waiting for you.
- If you are running late, call ahead and inform the supervisor.
- If you want to leave the workplace, ask the supervisor first.
- Unloading trucks: In event of a problem, register the truck number and call the supervisor.

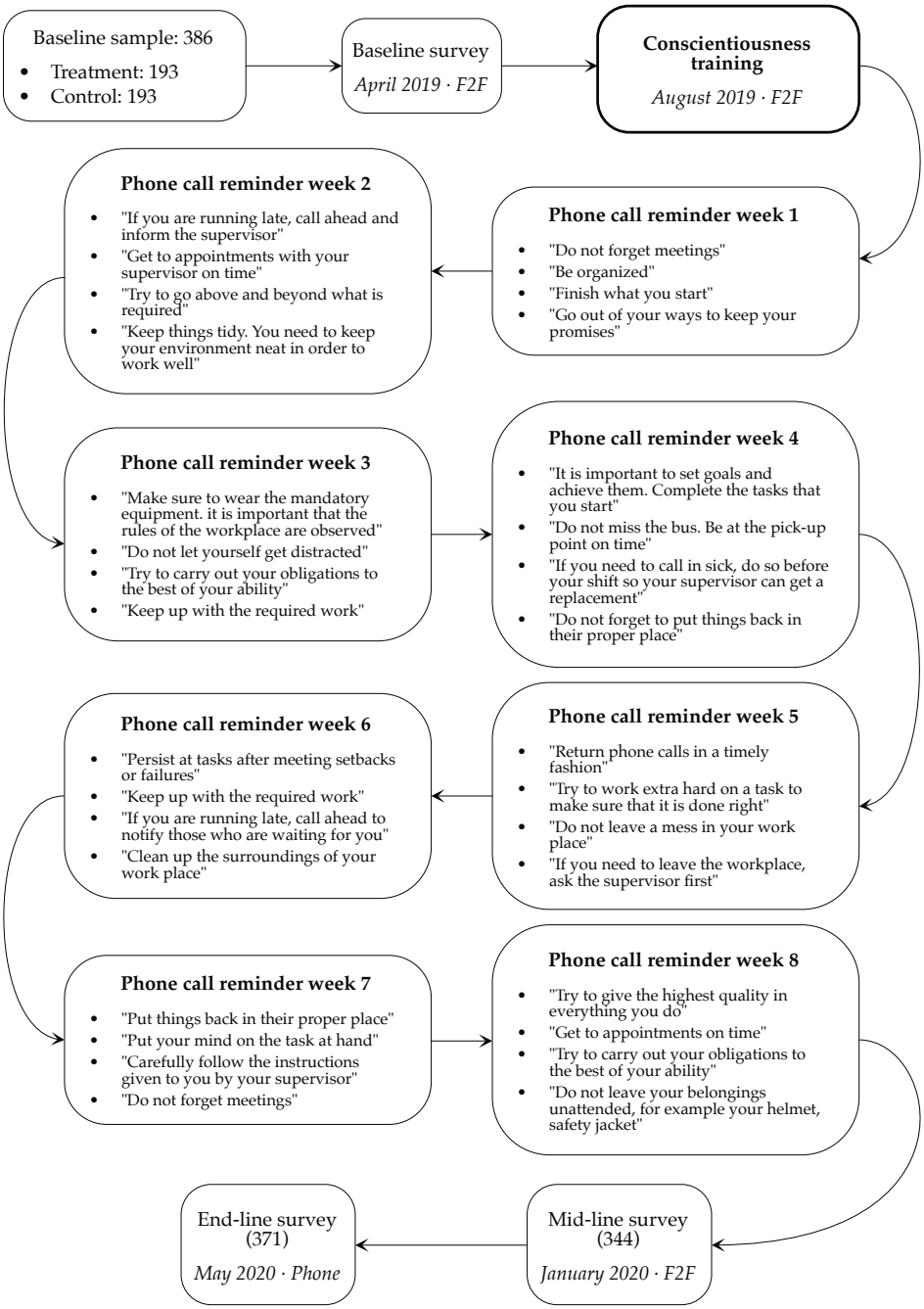
- If you need to call in sick, do so before your shift so your supervisor can get a replacement.

Orderliness

- Keep your environment neat in order to work well.
- Be organized.
- Do not forget to put things back in their proper place.
- Clean up the surroundings of your workplace.
- Do not leave a mess in your work place.
- Tidy up your work place.
- Put things back in their proper place.
- Do not leave your belongings unattended, e.g., orange project jacket, helmet.
- Keep things tidy.
- See that rules are observed, e.g., do not make fire around the workstation, do not wear earphones on your ears at the workstation, wear your mandatory equipment.

A.2. Detailed timeline

Figure A.1: Detailed timeline of the intervention and surveys, including phone call reminders' contents



Note: This Figure expands on Figure 1 and shows the main conscientiousness reminders for each follow-up phone call. The number of respondents is in parenthesis. *F2F* indicates the survey or intervention was done face-to-face, while phone surveys are coded with *Phone*.

B. Additional tables

Table B.1: Sample characteristics at baseline for attrition vs non-attrition groups

	(1) Non-attrition		(2) Attrition		(3) Total		t-test Difference	Cohen's D		
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE	(1)-(2)	Effect size	95% CI	
Individual-level variables										
Last earnings	332	1.11e+05	54	1.16e+05	386	1.12e+05	-4475.682	-0.066	-0.353	0.222
		[3228.205]		[14796.793]		[3453.839]				
Female	332	0.096	54	0.019	386	0.085	0.078*	0.279	-0.009	0.567
		[0.016]		[0.019]		[0.014]				
Age	332	36.352	54	37.296	386	36.484	-0.944	-0.105	-0.393	0.183
		[0.483]		[1.366]		[0.457]				
Middle school	332	0.244	54	0.111	386	0.225	0.133**	0.319	0.030	0.607
		[0.024]		[0.043]		[0.021]				
First formal job	330	0.124	38	0.053	368	0.117	0.072	0.223	-0.113	0.559
		[0.018]		[0.037]		[0.017]				
Recent migrant	325	0.098	37	0.054	362	0.094	0.044	0.152	-0.188	0.492
		[0.017]		[0.038]		[0.015]				
Reach goals	332	3.518	54	3.370	386	3.497	0.148	0.101	-0.187	0.388
		[0.079]		[0.220]		[0.075]				
Focus on goals	332	4.398	54	4.315	386	4.386	0.083	0.086	-0.202	0.374
		[0.052]		[0.137]		[0.049]				
Up to responsabilities	332	4.220	54	3.926	386	4.179	0.294*	0.274	-0.015	0.562
		[0.057]		[0.171]		[0.055]				
Fulfill duty	332	4.503	54	4.593	386	4.516	-0.090	-0.108	-0.396	0.179
		[0.046]		[0.107]		[0.042]				
Household-level variables										
# Beds in household	332	4.792	54	5.185	386	4.847	-0.393	-0.145	-0.433	0.143
		[0.149]		[0.369]		[0.138]				
# Children in household	332	4.452	54	4.500	386	4.459	-0.048	-0.013	-0.301	0.274
		[0.203]		[0.395]		[0.183]				
# Adults in household	332	6.349	54	6.889	386	6.425	-0.539	-0.141	-0.429	0.146
		[0.203]		[0.610]		[0.194]				
Household debt	332	26731.928	54	37962.963	386	28303.109	-1.12e+04	-0.193	-0.481	0.095
		[3064.672]		[9661.929]		[2963.524]				
Household savings	332	83734.940	54	48148.148	386	78756.477	35586.792**	0.350	0.061	0.638
		[5752.068]		[10876.423]		[5209.624]				
Household income	332	53448.795	54	49351.852	386	52875.648	4096.943	0.140	-0.147	0.428
		[1631.964]		[3439.215]		[1484.070]				

Note: The *Attrition* group includes all individuals who missed at least one round (either the mid-line or end-line survey, or both). *Recent migrant* is defined as living for three years or less in current location and moved from outside Dakar. *Middle school* indicates whether an individual has completed middle school. Applying multiple hypothesis correction, any statistical significance in group difference disappears.

Table B.2: Sample characteristics at baseline

	(1)		(2)		(3)		t-test	Cohen's D		
	Control		Treatment		Total		Difference			
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE	(1)-(2)	Effect size	95% CI	
Individual-level variables										
Last earnings (in th.)	193	112.645	193	111.230	386	111.937	1.415	0.021	-0.179	0.220
		(5.618)		(4.034)		(3.454)				
Female	193	0.088	193	0.083	386	0.085	0.005	0.018	-0.181	0.218
		(0.020)		(0.020)		(0.014)				
Age	193	37.326	193	35.642	386	36.484	1.684*	0.188	-0.012	0.388
		(0.644)		(0.645)		(0.457)				
Middle school	193	0.212	193	0.238	386	0.225	-0.026	-0.062	-0.261	0.138
		(0.030)		(0.031)		(0.021)				
First formal job	182	0.110	186	0.124	368	0.117	-0.014	-0.043	-0.247	0.162
		(0.023)		(0.024)		(0.017)				
Recent migrant	179	0.084	183	0.104	362	0.094	-0.020	-0.068	-0.275	0.138
		(0.021)		(0.023)		(0.015)				
Reach goals	193	3.472	193	3.523	386	3.497	-0.052	-0.035	-0.235	0.164
		(0.106)		(0.105)		(0.075)				
Focus on goals	193	4.332	193	4.440	386	4.386	-0.109	-0.113	-0.313	0.086
		(0.073)		(0.066)		(0.049)				
Up to responsibilities	193	4.145	193	4.212	386	4.179	-0.067	-0.062	-0.262	0.137
		(0.079)		(0.076)		(0.055)				
Fulfill duty	193	4.528	193	4.503	386	4.516	0.026	0.031	-0.168	0.231
		(0.057)		(0.062)		(0.042)				
Household-level variables										
# Beds in household	193	4.850	193	4.845	386	4.847	0.005	0.002	-0.198	0.201
		(0.206)		(0.184)		(0.138)				
# Children in household	193	4.596	193	4.321	386	4.459	0.275	0.076	-0.123	0.276
		(0.283)		(0.232)		(0.183)				
# Adults in household	193	6.290	193	6.560	386	6.425	-0.269	-0.071	-0.270	0.129
		(0.286)		(0.264)		(0.194)				
Household debt	193	29274.611	193	27331.606	386	28303.109	1943.005	0.033	-0.166	0.233
		(4418.191)		(3961.204)		(2963.524)				
Household savings	193	74093.264	193	83419.689	386	78756.477	-9326.425	-0.091	-0.291	0.109
		(7054.669)		(7671.283)		(5209.624)				
Household income	193	53756.477	193	51994.819	386	52875.648	1761.658	0.060	-0.139	0.260
		(2140.630)		(2059.713)		(1484.070)				

Note: Last earnings is given in thousand CFA francs, Senegal's local currency. *Recent migrant* is defined as living for three years or less in current location and moved from outside Dakar. *Middle school* indicates whether an individual has completed middle school. Correcting for multiple hypothesis eliminates any statistical significance between group differences.

Table B.3: Correction for multiple inference of the treatment effects

	Bivariate	Baseline controls	Baseline outcomes
***Panel A* · Labour market outcomes**			
Employed			
Unadjusted p-value	0.187	0.213	
Sharpened q-value	0.078	0.077	
Still at company			
Unadjusted p-value	0.048	0.039	
Sharpened q-value	0.051	0.042	
Last earnings			
Unadjusted p-value	0.005	0.003	
Sharpened q-value	0.017	0.010	
***Panel B* · Conscientiousness skills**			
Reach goals			
Unadjusted p-value	0.027	0.048	0.059
Sharpened q-value	0.371	0.916	1.000
Focus on goals			
Unadjusted p-value	0.096	0.082	0.081
Sharpened q-value	1.000	1.000	1.000
Responsible			
Unadjusted p-value	0.006	0.008	0.009
Sharpened q-value	0.187	0.268	0.219
Fulfill duty			
Unadjusted p-value	0.010	0.013	0.011
Sharpened q-value	0.187	0.268	0.219

Note: Each cell contains p- or q-values for the multiple regressions presented in Table 1 to 3. In Panel A, we correct for testing three hypotheses (three outcome variables and one treatment), while in Panel B we correct for 32 hypotheses (all conscientiousness items). The sharpened q-values are calculated using the Stata code from Anderson (2008).

Table B.4: Occupations at baseline of workers still employed in the construction company vs workers not employed in the company at end-line

	(1)		(2)		T-test
	Not in company		Still in company		Difference
Variable	N/n	Mean/SE	N/n	Mean/SE	(1)-(2)
Security agent helper	181	0.304	187	0.385	-0.081
	[55]	(0.034)	[72]	(0.036)	
Mason	181	0.127	187	0.176	-0.049
	[23]	(0.025)	[33]	(0.028)	
Iron worker	181	0.105	187	0.053	0.051*
	[19]	(0.023)	[10]	(0.016)	
Form setter	181	0.149	187	0.118	0.032
	[27]	(0.027)	[22]	(0.024)	
Carpenter	181	0.017	187	0.000	0.017*
	[3]	(0.010)	[0]	(0.000)	
Laborer	181	0.271	187	0.251	0.019
	[49]	(0.033)	[47]	(0.032)	
Driver help	181	0.006	187	0.000	0.006
	[1]	(0.006)	[0]	(0.000)	
Topographer/Topographer helper	181	0.006	187	0.005	0.000
	[1]	(0.006)	[1]	(0.005)	
Flag holder	181	0.000	187	0.005	-0.005
	[0]	(0.000)	[1]	(0.005)	
Specialized laborer/worker	181	0.017	187	0.000	0.017*
	[3]	(0.010)	[0]	(0.000)	
Unspecified worker	181	0.000	187	0.005	-0.005
	[0]	(0.000)	[1]	(0.005)	

Note: This table compares the occupations at baseline of those, at end-line, that remained in the construction company with those that did not. In square brackets, the number of individuals per occupation either still in the construction company or not.

Table B.5: Activity sector for workers who left the construction company

	Freq.	Pct.
Construction	53	64.63
Wood and metal work, carpentry, craftmanship	12	14.63
Dealer/Salesman/Retail sales	8	9.76
Electrician	1	1.22
Driver	1	1.22
Cleaner	1	1.22
Security/Guardian/Soldier	1	1.22
Agriculture, farming, fisherman	3	3.66
Daily worker	1	1.22
Tyre mechanic*	1	1.22
Total	82	100.00

Note: Sector measured at end-line. Out of the 181 respondents not working in the company at end-line, 82 had other jobs, 97 were unemployed and 2 had left the labour market. * The French expression was *vulgarisateur*.

Table B.6: Earnings at end-line with interaction

	(1) Last earnings	(2) Last earnings	(3) Last earnings
Treated	24408.6***	15759.7**	23697.7**
	(0.001)	(0.018)	(0.013)
Still at company		73271.0***	80942.9***
		(0.000)	(0.000)
Treated × Still at company			-15480.5
			(0.244)
Constant	21716.9	-1626.4	-5341.4
	(0.304)	(0.930)	(0.776)
Standardized coeff.	0.313	0.202	0.304
Mean outcome control gr.	112644.92	112644.92	112644.92
Baseline controls	✓	✓	✓
Baseline outcome	✓	✓	✓
N	370	367	367
R-sq	0.169	0.378	0.378

Note: Columns 1 and 2 are columns 3 and 4 from Table 2 and added to help comparison with main results. *p*-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household,total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: earnings measured at baseline.

C. Details on earnings computation

Earnings were measured in different ways in the three survey rounds. At baseline, all workers were asked both their last wage and, as a consistency check, the range where their last wage fell. At mid-line, due to survey constraints, we could only ask whether their wage had risen or fallen compared to baseline, and by how much it rose or fell. At end-line, workers still employed at the construction company were again asked whether their wage varied and by how much, while workers employed elsewhere were asked the amount they earned and the range where that amount fell, just as in baseline.

From this, we computed interpolated wages at end-line for workers still at the construction company. First, we checked that the exact wage had been reported at baseline: if that was missing, we used the range to infer the exact wage, using "mid point estimates", i.e., the median point in each range category. For example, if a worker did not report the exact wage, but indicated that her wage was in the third category, which corresponds to a wage between 130,000 and 180,000 CFAF, then we infer that her exact wage was $\frac{180000-130000}{2} = 155000$.

Next, using the answers to the items "did your wage rise or fall since baseline?" and "by how much did it rise or fall?", we interpolated mid-line wages. The amount by which wages rose or fell was also given as a range, so we also applied the midpoint estimates to infer an exact amount for the increase or decrease. For instance, if baseline wage was 145,000 CFAF and the worker reported an increase between 5,001 and 10,000 CFAF, the interpolated wage for mid-line would be $145000 + \frac{10000-5001}{2} = 147499.5$. We applied the same procedure for end-line wages of workers still working in the construction company. For workers who had left the construction company, we proceeded in the same fashion as in baseline: we used the exact wage, and if missing we inferred the amount using the midpoint of the range category.

D. Details on conscientiousness measures

D.1. Description of conscientiousness questions

At baseline and midline, we measure conscientiousness using a 32-item questionnaire. Four conscientiousness scales are defined, and each item measures a specific one of them. These four scales are responsibility, industriousness, organizational and punctuality. Table D.1 describes each item and its associated scale. Each respondent was asked in face-to-face interviews to answer the questions by using a five-point scale: (1) very difficult, (2) fairly difficult, (3) neither easy nor difficult, (4) fairly easy, and (5) very easy.

Table D.1: Conscientiousness traits: list of all items

Conscientiousness trait	How easy or difficult is it to...
Organizational	Keep things tidy and in order
	Follow a schedule
	Use a method to follow-up
	Organize schedule
	Clean up after yourself
	To keep personal spaces organized
	Keep things well organized
	Keep things in order
Industriousness	Make plans
	Work to reach your goals
	Fix clear goals
	Set high standards
	Change ways of working towards a goal after a setback
	Work hard to succeed
	Focus on most important goals
	Make plans to reach a goal
	Keep trying after failing
Responsibility	Be there when others need me
	That other people depend on me
	Keep promises
	Fulfill my promises and engagements
	Live up to responsibilities
	Respect engagements
	That other people are counting on me
	Fulfill my duties and obligations
	Manage responsibilities
Punctuality	Show remorse if late at a meeting
	Go to meeting early
	Avoid being late to a meeting or work
	Avoid procrastination
	Be punctual
	Be late to meetings

D.2. Reliability of scales

Table D.2: Conscientiousness traits: reliability of scales

Scale	Round	Cronbach's alpha	Interitem covariance	Number of items
All traits	Baseline	0.793	0.106	32
	Midline	0.785	0.073	32
Organisational	Baseline	0.588	0.091	8
	Midline	0.495	0.034	8
Industriousness	Baseline	0.615	0.21	9
	Midline	0.684	0.219	9
Responsibility	Baseline	0.707	0.155	9
	Midline	0.58	0.079	9
Punctuality	Baseline	0.428	0.144	6
	Midline	0.343	0.065	6

Note: Each of the 32 conscientiousness question relates to one of the four conscientiousness traits. This table reports the reliability of each of these traits, as measured by Cronbach's α and interitem covariance, as well as the overall reliability.

D.3. Impact of treatment on conscientiousness skills

Table D.3: Conscientiousness skills: alternative specifications

	(1) Reach goals	(2) Focus on goals	(3) Responsible	(4) Fulfill duty
Treated	0.316**	0.152*	0.317***	0.165***
	(0.027)	(0.096)	(0.006)	(0.010)
Constant	3.811***	4.509***	4.178***	4.669***
	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.238	0.180	0.299	0.274
N	343	343	343	343
R-sq	0.0143	0.0081	0.0224	0.0194

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; Specification excludes all baseline controls.

Table D.4: Conscientiousness traits: Organisational skill I

	(1) Tidy	(2) Follow schedule	(3) Follow-up	(4) Organize schedule
Treated	0.00316	-0.0131	0.0732	-0.00418
	(0.941)	(0.739)	(0.498)	(0.938)
	[1.000]	[1.000]	[1.000]	[1.000]
Constant	4.734***	4.686***	3.874***	4.299***
	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.00811	-0.0366	0.0730	-0.00844
Mean outcome control gr.	4.58	4.77	4.18	4.5
Baseline controls	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓
N	343	343	343	343
R-sq	0.0307	0.0153	0.0578	0.0486

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.5: Conscientiousness traits: Organisational skill II

	(1) Clean up	(2) Organized personal space	(3) Keep organized	(4) Keep tidy
Treated	0.0393	-0.0217	0.00960	-0.0189
	(0.582)	(0.620)	(0.845)	(0.634)
	[1.000]	[1.000]	[1.000]	[1.000]
Constant	4.146***	4.660***	4.737***	4.740***
	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.0596	-0.0547	0.0213	-0.0525
Mean outcome control gr.	4.72	4.77	4.84	4.8
Baseline controls	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓
N	343	343	343	343
R-sq	0.0570	0.0100	0.0461	0.0132

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.6: Conscientiousness traits: Industriousness skill I

	(1) Make plans	(2) Work goals	(3) Clear goals	(4) High standards	(5) Change after setback
Treated	-0.149	0.268*	0.104	-0.0210	-0.0376
	(0.221)	(0.059)	(0.285)	(0.822)	(0.777)
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]
Constant	4.312***	3.941***	3.557***	4.478***	4.161***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	-0.131	0.202	0.117	-0.0248	-0.0308
Mean outcome control gr.	3.96	3.47	4.26	4.22	3.93
Baseline controls	✓	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓	✓
N	343	343	343	343	343
R-sq	0.0781	0.0738	0.0404	0.0153	0.0398

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.7: Conscientiousness traits: Industriousness skill II

	(1) Work hard	(2) Focus on goals	(3) Plan to reach goal	(4) Keep trying after failure
Treated	0.115	0.162*	0.0491	-0.155*
	(0.391)	(0.081)	(0.673)	(0.087)
	[1.000]	[1.000]	[1.000]	[1.000]
Constant	3.632***	4.666***	3.818***	4.213***
	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.0931	0.192	0.0461	-0.187
Mean outcome control gr.	4.15	4.33	3.75	4.37
Baseline controls	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓
N	343	343	343	343
R-sq	0.0448	0.0278	0.0463	0.0365

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.8: Conscientiousness traits: Responsibility skill I

	(1) Present for others	(2) Dependable	(3) Keep promises	(4) Fullfill engagements	(5) Up to responsabilities
Treated	-0.0104	-0.0901	-0.0139	-0.0181	0.298***
	(0.935)	(0.396)	(0.743)	(0.694)	(0.009)
	[1.000]	[1.000]	[1.000]	[1.000]	[0.219]
Constant	3.362***	3.162***	4.348***	4.781***	4.030***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	-0.00887	-0.0900	-0.0355	-0.0431	0.281
Mean outcome control gr.	3.99	4.27	4.83	4.77	4.15
Baseline controls	✓	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓	✓
N	343	343	343	343	343
R-sq	0.0532	0.0868	0.0514	0.0207	0.0844

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.9: Conscientiousness traits: Responsibility skill II

	(1) Respect engagements	(2) Others count on me	(3) Fullfill duty	(4) Manage responsibilities
Treated	0.0393	-0.0487	0.162**	0.0334
	(0.361)	(0.592)	(0.011)	(0.578)
	[1.000]	[1.000]	[0.219]	[1.000]
Constant	4.811***	4.034***	4.566***	4.401***
	(0.000)	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.0994	-0.0580	0.274	0.0609
Mean outcome control gr.	4.75	4.3	4.53	4.61
Baseline controls	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓
N	343	343	343	343
R-sq	0.0528	0.0511	0.0629	0.0296

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.10: Conscientiousness traits: Punctuality skill I

	(1) Remorse late	(2) Meet earlier	(3) Avoid being late
Treated	-0.000120	0.0373	-0.0164
	(0.999)	(0.540)	(0.852)
	[1.000]	[1.000]	[1.000]
Constant	4.457***	4.550***	4.661***
	(0.000)	(0.000)	(0.000)
Standardized coeff.	-0.000137	0.0670	-0.0204
Mean outcome control gr.	4.16	4.66	4.41
Baseline controls	✓	✓	✓
Trait at baseline	✓	✓	✓
N	343	343	343
R-sq	0.0410	0.0314	0.0315

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

Table D.11: Conscientiousness traits: Punctuality skill II

	(1) Avoid procrastination	(2) Punctual	(3) On time at meetings
Treated	0.0148	0.0135	0.154
	(0.919)	(0.778)	(0.192)
	[1.000]	[1.000]	[1.000]
Constant	4.103***	3.832***	3.914***
	(0.000)	(0.000)	(0.000)
Standardized coeff.	0.0111	0.0299	0.140
Mean outcome control gr.	3.85	4.79	4.25
Baseline controls	✓	✓	✓
Trait at baseline	✓	✓	✓
N	343	343	343
R-sq	0.0243	0.0890	0.0614

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened *q*-values in square brackets. *Mean outcome control gr.*: mean level of the outcome variable for the control group at baseline. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income. *Baseline outcome*: trait measured at baseline.

E. COVID-19 related questions

Table E.1: Impact of treatment on COVID-19 outcomes: bivariate regressions

Panel A	(1) Protective measures	(2) Effective measures	(3) Display symptoms	(4) Contract change	(5) Lost income	(6) Income decrease	(7) HH income decrease
Treated	-0.404***	-0.414***	0.0341	0.0224	-0.0694	-0.0443	-0.00855
	(0.003)	(0.002)	(0.509)	(0.678)	(0.160)	(0.374)	(0.856)
	[0.020]	[0.020]	[1.000]	[1.000]	[0.787]	[1.000]	[1.000]
Constant	3.809***	3.749***	0.412***	0.520***	0.367***	0.667***	0.721***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Std. coeff.	-0.310	-0.325	0.0689	0.0448	-0.147	-0.0925	-0.0189
N	371	371	368	346	365	371	371
R-sq	0.0241	0.0265	0.00119	0.000503	0.00543	0.00214	0.0000900
Panel B	(8) Transfers received decrease	(9) Food expend. increase	(10) Health expend. increase	(11) Educ expend. increase	(12) Transfers sent increase	(13) Savings decrease	(14) Borrowing increase
Treated	0.000756	-0.0343	-0.00924	-0.0391*	0.0249	0.0330	0.0155
	(0.988)	(0.459)	(0.800)	(0.088)	(0.374)	(0.521)	(0.723)
	[1.000]	[1.000]	[1.000]	[0.542]	[1.000]	[1.000]	[1.000]
Constant	0.372***	0.290***	0.148***	0.0710***	0.0656***	0.557***	0.219***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Std. coeff.	0.00156	-0.0770	-0.0264	-0.177	0.0925	0.0667	0.0369
N	371	371	371	371	371	371	371
R-sq	0.000000611	0.00148	0.000174	0.00787	0.00214	0.00112	0.000341

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened q-values in square brackets.

Table E.2: Impact of treatment on COVID-19 outcomes: full-controls regressions

Panel A	(1) Protective measures	(2) Effective measures	(3) Display symptoms	(4) Contract change	(5) Lost income	(6) Income decrease	(7) HH income decrease
Treated	-0.412***	-0.425***	0.0278	0.0217	-0.0916*	-0.0500	-0.0137
	(0.002)	(0.001)	(0.594)	(0.693)	(0.056)	(0.314)	(0.771)
	[0.017]	[0.017]	[1.000]	[1.000]	[0.287]	[1.000]	[1.000]
Constant	3.882***	3.831***	0.550***	0.715***	0.441***	0.897***	0.871***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Std. coeff.	-0.316	-0.335	0.0562	0.0434	-0.194	-0.104	-0.0303
Baseline controls	✓	✓	✓	✓	✓	✓	✓
N	371	371	368	346	365	371	371
R-sq	0.0589	0.0615	0.0304	0.0111	0.111	0.0521	0.0417

Panel B	(8) Transfers received decrease	(9) Food expend. increase	(10) Health expend. increase	(11) Educ expend. increase	(12) Transfers sent increase	(13) Savings decrease	(14) Borrowing increase
Treated	0.00368	-0.0462	-0.0188	-0.0361	0.0227	0.0241	0.0131
	(0.942)	(0.322)	(0.600)	(0.117)	(0.424)	(0.640)	(0.764)
	[1.000]	[1.000]	[1.000]	[0.475]	[1.000]	[1.000]	[1.000]
Constant	0.292**	0.524***	0.492***	0.120*	0.112	0.705***	0.258**
	(0.036)	(0.000)	(0.000)	(0.058)	(0.151)	(0.000)	(0.032)
Std. coeff.	0.00760	-0.104	-0.0538	-0.164	0.0845	0.0486	0.0312
Baseline controls	✓	✓	✓	✓	✓	✓	✓
N	371	371	371	371	371	371	371
R-sq	0.0412	0.0315	0.0695	0.0384	0.0128	0.0445	0.0493

Note: p-values in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels; sharpened q-values in square brackets. *Baseline controls*: sex, age, completed middle school, number of beds in household, number of children in household, number of adults in household, total (formal and informal) household debt, total household savings, household income.