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Evidence from a Field Experiment in West Africa

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Abstract

Despite extensive evidence on the importance of non-cognitive skills for labor market outcomes, to what extent training can affect specific skills in adulthood remains an open question. This paper conducts 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. The study found that treated workers were significantly more likely to stay in their job and had higher earnings nine months after the intervention. The findings suggest that non-cognitive skills can be affected later in the life cycle and targeted training can have substantial labor market returns.

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Conscientiousness and labor market returns: Evidence from a field experiment in West Africa

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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 (Nyhus and Pons, 2005; Roberts et al., 2007; Borghans et al., 2008; Soto, 2019; Fletcher, 2013).[1] Conscientiousness, which relates to being punctual, hard working and responsible, is the focus of this paper. It has been widely recognized as a key trait for successful labor market outcomes (Alderotti et al., 2023; 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., 2017).[3] Despite the evidence on conscientiousness as a predictor of positive labor market outcomes, there is a notable lack of evidence on whether training programs aimed at increasing conscientiousness have the potential to affect labor market outcomes in adulthood.

Whether interventions that target specific traits can be effective in improving labor market outcomes is important for policy. Between 230 million and 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 keep jobs, particularly in the presence of substantial search and matching frictions and the high rates of job turnover that have been documented in low-income countries (Abebe et al., 2021, 2020; Banerjee and Sequeira, 2020; Donovan et al., 2023). 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 that incorporate soft-skills, for example, on productivity (Adhvaryu et al., 2023) or earnings (Chioda et al., 2021). Recent experimental evidence also shows promising effects of targeting specific skills, such as personal initiative (Chioda et al., 2021) and generalized self-efficacy (McKelway, 2021).

Providing training in conscientiousness could be particularly important for jobs that require

[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] 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).

minimal formal skills but a high level of conscientiousness.[4] For example, consider barrier workers on construction sites tasked with keeping the site secure. Their main tasks are fairly straightforward: they have to be at their work site on time for their shift and remain there at all times (in often difficult conditions), wear the appropriate equipment (helmet, security jacket and shoes), and allow only authorized individuals and vehicles to pass, making no exceptions. Failure to comply with the rules can result in large losses for a construction company, for example, theft of construction materials or sabotage of the construction. How conscientious a worker is therefore potentially plays an important role for production processes and in turn likely impacts whether a worker can retain their job or advance in a company. There are a wide range of jobs within the manufacturing or services sectors that share the characteristics of requiring relatively low levels of skill but high levels 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 conceptual intervention model, the Sociogenomic Trait Intervention Model (STIM) by Roberts et al. (2017), and an intervention program developed by Stieger et al. (2020) for Swiss participants, which we adapted to our particular context. To conduct our experiment, we collaborated with a large international firm in Dakar, Senegal. Our sample consists of 386 workers employed at baseline in the construction of the new express train (Train Express Regional). 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. To the best of our knowledge, this is the first paper that conducts an experiment to examine the effect of conscientiousness training on labor market outcomes.

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 achieved by showing certain conscientiousness-related behaviors

[4]Evidence from Sweden suggests that non-cognitive skills are particularly strong predictors of labor market outcomes at the lower end of the earnings distribution (Lindqvist and Vestman, 2011).

and experiences more frequently or more intensively (for example, trying to become more punctual at work). To do 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).[5] 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.[6]

We find that receiving conscientiousness skills training increased 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 monthly earnings were about 32 USD higher than those of the control group (a 22.7% increase from average end-line earnings of the control group).[7] We interpret these labor market impacts as "hard" evidence that our training had an impact. We find little evidence that the training shifted self-reported measures of conscientiousness-related skills which we attribute to high average reported response scores at baseline and other possible response biases. Our study therefore also highlights the difficulty of using standard questions to capture essential skills across very different contexts. Finally, our end-line data collection took place after the onset of the COVID-19 pandemic. We find no evidence that there was any interaction between the impact of the treatment and COVID-19.

The paper contributes to three strands of the literature. First, our paper relates to a large literature on the effectiveness of worker training programs (e.g., Carranza and McKenzie, 2024; McKenzie, 2017, 2021; Alfonsi et al., 2020; Card et al., 2011; Attanasio et al., 2011). Specifically, we contribute to a recent branch of this literature that focuses on the effects of soft-skills training programs on labor market outcomes. This literature 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., 2023); effects on both individual earnings and

[5] 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.

[6] 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.

[7] We also explored other margins that could have been affected by the treatment such as weekly hours worked, having a second occupation or self-reported levels of absenteeism. We do not find that the treatment affected any of these margins.

firm profits (Chioda et al., 2021); positive effects on firm profits (Campos et al., 2017); and positive effects on labor market outcomes and expectations but only for women (Acevedo et al., 2020).[8] Not all programs are found to be successful at improving labor market outcomes. Groh et al. (2016), for example, do not find any effect of soft-skills training on hours worked, income or employment of female youth, while Acevedo et al. (2020) find limited effects on men. These programs 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) in a training program.[9]

A paper closely related to ours, although implemented in a very different setting, is Alan et al. (2019), who implement a randomized control trial with elementary school students in Turkey with the aim of affecting grit, which can be considered one facet of conscientiousness. They show that a novel classroom curriculum has large positive impacts on effort and standardized math test scores.[10]

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., 2023). 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., 2017). Most of the current evidence 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 a low-income setting using a simple and low-threshold intervention and also allows us to test the reliability of psychological interventions in different contexts.

The rest of the paper is organized 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.

[8] Aghion et al. (2019) further highlight the role of complementarities between soft skills of some low-skilled workers and the innovativeness of firms.

[9] Through our focus on a specific non-cognitive skill, we also build on the literature that aims to identify which non-cognitive skills are important for labor market outcomes and other measures of personal achievement (e.g., Bowles et al., 2001b,a; Heckman et al., 2006; Deming, 2017; Edin et al., 2022; Glewwe et al., 2022; Donato et al., 2017).

[10] Bryan et al. (2021) presents evidence of positive impacts on income of a theology education program which promoted evangelical Protestant Christian values that they suggest were due to increased grit.

2. Setting and field experiment

2.1. Setting and background

The study took place from April 2019 to May 2020. The setting for our experiment was Dakar, Senegal. Dakar's workforce is, 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 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.

2.2. 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 440 workers on these lists that worked during the day.[11] This 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.[12]

Following recruitment to the study, we administered a baseline survey in April 2019 to collect information on worker characteristics and personality traits. Baseline data was collected for 391 workers. Of these, 386 were in the final sample that was randomized for the intervention.[13] 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.[14]

[11] We excluded 51 workers who worked at night since the data collection was conducted at the site of work and could only be done during the day.

[12] Based on the total number of workers employed by the company before the training across all skill levels, about 40% of workers were part of the experiment.

[13] Five workers were removed from the study because they did not speak Wolof, which was the language used for the intervention.

[14] 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, it was not possible to cluster randomize by work location). This, however, would bias the results against finding

The intervention aims to: (a) present information about the importance and benefits of the four 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.[15] 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 were 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.[16] 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 minute) 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 target 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).[17]

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 and Flückiger, 2017; Roberts et al., 2017; Wrzus and Roberts, 2017). The accumulation of

an effect.

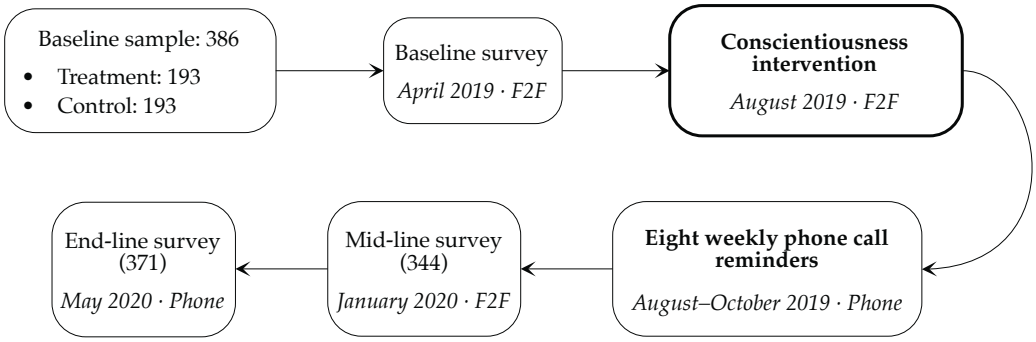
[15]Full details of the content of the training session are provided in Appendix A.

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

[17]We lose a further three observations due to missing data on earnings. Appendix Table B.1 compares baseline characteristics of attrition and non-attrition groups. We do not find any major systematic differences between these groups and any statistically significant differences disappear after controlling for multiple hypothesis testing. We also do not find a statistically significant difference in attrition between the treatment and control groups.

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: Timeline of intervention



Notes: 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.

Figure 1 summarizes the timeline of the intervention and surveys. Appendix Table B.2 shows some basic characteristics of the sample for treatment and control workers. The average age of participants in our study was 36-37 years.[18] 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 measures of the Big 5 personality traits or household-level variables across the treatment and control groups 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. Applying a correction for multiple hypothesis testing eliminates any statistical significance in group differences.

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[19] and that the confidence intervals include zero, suggesting that the differences between groups are not significantly

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

[19] 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. We therefore conclude that our sample is balanced across the treatment and control groups 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:

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

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).[20]

Columns (1) and (2) of Table 1 show that our treatment did not significantly increase the probability of employment at end-line.[21] However, workers in the treatment group were about 10% more likely to keep their job in the construction company.[22] These results are similar when we add baseline controls in column (4).[23] [24] We also explore the reasons why workers left the company. Focusing on workers that had another job at end-line (82 individuals), most left the company because their contract came to an end and either the position was no longer required (38% of cases), the person was dismissed (21% of cases) or the contract was not renewed (35% of cases). There are differences in the reason for leaving

[20] To account for multiple hypothesis testing we also adjust our p-values using List et al.'s (2019) approach. The adjustment corrects for multiple hypothesis testing within specification type for 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.

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

[22] The magnitudes and significance of the treatment coefficients are very similar to those estimated using a logit specification.

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

[24] 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

	(1) Employed	(2) Employed	(3) Still at company	(4) Still at company
Treated	0.066	0.063	0.103**	0.109**
	(0.046)	(0.046)	(0.052)	(0.052)
Constant	0.698***	0.871***	0.456***	0.373**
	(0.034)	(0.127)	(0.037)	(0.147)
Standardized coeff.	0.148	0.143	0.206	0.217
Mean outcome control	0.700	0.700	0.460	0.460
Baseline controls		✓		✓
N	368	368	368	368
R-sq	0.005	0.044	0.011	0.034

Notes: Standard errors 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.

across the treatment and control group. Workers in the treatment group were 22% less likely to leave because the company decided not to renew the contract and this difference is statistically significant. While based on a small sample, it does lend support to the fact that the intervention led to a greater probability of workers being retained at the company.

We next turn to last-month's earnings at end-line.[25] Column (1) in Table 2 shows that the treatment group received significantly higher earnings at end-line: the monthly earnings of those in the treatment group were 17,521 CFA francs (32.26 in 2020 USD) higher than earnings of workers in the control group.[26] 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 also holds, increasing slightly in magnitude. In column (4) we exclude unemployed individuals from the sample and find that those in the treatment group still earn significantly higher wages at end-line.[27]

Overall, our results suggest that there are two main effects of the intervention. First, receiving the conscientiousness training increases the probability that a worker is retained in the company and reduces the likelihood that their contract is not renewed. Second, it increases the earnings of workers, suggesting that the training has the potential to have

[25]Appendix C provides detailed information on how earnings are defined. Where ranges of values are given we choose the mid-point of the range to compute earnings. Our results are robust to using the maximum and minimum values of the range (see Appendix Table C.1).

[26]Earnings were 22.7% higher than the control sample mean at end-line. The average wage at end-line was 86,084 CFAF (158.51 USD) including those with zero earnings and was 120,452 CFAF (221.79 USD) for those that were working and earning.

[27]The results are very similar when we use a log transformation and an inverse hyperbolic sine transformation (see Appendix Table C.1).

Table 2: Earnings

	(1) Earnings	(2) Earnings	(3) Earnings	(4) Earnings
Treated	17521.1**	18739.2**	19431.8**	11699.1*
	(8017)	(8157)	(7669)	(6495)
Constant	77228.4***	44791.5**	22968.0	12632.6
	(5760)	(22241)	(21895)	(16819)
Standardized coeff.	0.227	0.243	0.251	0.180
Mean outcome control	77228.4	77228.4	77228.4	113351.4
Baseline controls		✓	✓	✓
Baseline outcome			✓	✓
N	368	368	368	263
R-sq	0.013	0.045	0.150	0.454

Notes: Standard errors 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. Dependent variable in all specifications is earnings reported by workers at end-line. Unemployed individuals and individuals with zero earnings are excluded from the sample in column (4).

longer-term impacts on the labor market trajectory of workers.

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. One part of the initial training session was dedicated to increasing motivation to change conscientiousness and discussing possible rewards such as getting a raise or helping the company complete the work better or faster. 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).[28] 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). Despite our efforts in carefully validating our measures for the local context, several factors might explain the imperfect scores of the scales: translation issues,[29] cultural differences, social desirability bias or the fact that we asked the questions in an interview format rather than have respondents self-report. These are in line with the concerns raised by Laajaj et al. (2019) that psychometric surveys, often designed with Western, educated, industrialized, rich and democratic (WEIRD) 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, in Figure 2 we show the effect of the treatment on each of the measures of conscientiousness that we collected. While the effect of the intervention is statistically insignificant for most measures, in around 53 percent of cases the effect is positive. The training had a significantly positive impact on four of the 32 conscientiousness items and a significantly negative effect on only one measure. Specifically the four measures which were significantly higher due to the treatment 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.[30]

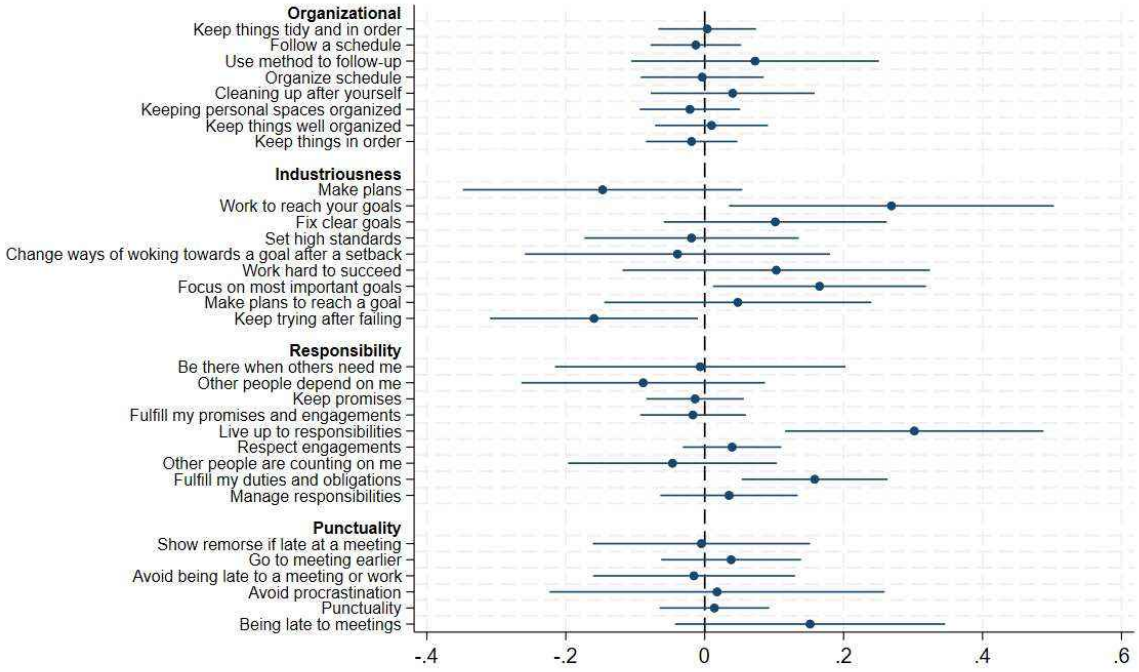
There are several possible explanations for why the effects on the measures of conscientiousness are so small. As mentioned above, these include issues related to the local context, but also could be due to high values for the baseline level of conscientiousness across all measures (ranging from 3.8 to 4.8 for the control group at baseline with an average of 4.4 across all traits) indicating 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.

[28] Given the fact that the end-line survey was conducted over the phone, concerns over the reliability of data on such measures when collected by phone survey and time constraints meant that the conscientiousness module was not included in the end-line.

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

[30] It should be noted that we lose statistical significance when we adjust the p-values using List et al.'s (2019) approach (see Appendix Tables D.3 and D.4).

Figure 2: Impact on conscientiousness measures



Notes: Each marker and line represents the estimated effect of treatment on a given conscientiousness item (i.e., question) and its 90% confidence interval after the intervention. Conscientiousness *items* are grouped by conscientiousness *traits*. Conscientiousness scores range from 1 to 5, and the coefficients represent the change in scores between baseline and midline. Regression results are presented in Appendix Tables D.3 and D.4.

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 into a summary measure. These measures similarly suffer from a high average value at baseline and lack of variation in the measured traits.

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 Five domains (agreeableness, extroversion, neuroticism and openness) shifted in significant ways. (see Appendix Table D.5). 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 have high baseline values.[31]

[31]There is a positive and statistically significant effect of the treatment on emotional stability which suggests that the treatment may have improved the psychological well-being of workers along other dimensions either

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 driven by the company keeping track of trained workers. Observations from the field also 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).[32] 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. We are not aware of any specific policies that the construction company had in place due to the fact that it was involved in the construction of public infrastructure to prevent the spread of COVID-19 other than the general restrictions followed by everyone in the country. Overall, this suggests that the intervention did not interact with the pandemic

directly or through the improved labor market outcomes. The statistical significance of this result is not, however, robust to adjusting for multiple hypothesis testing and so should be treated with caution.

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

in a significant way.

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. The conscientiousness training session was in addition to the regular initial and follow-up security training all workers received. This means that the conscientiousness training session was not the only time workers would have been brought together in the setting of a group session. 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., 2017; 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 increased earnings by up to 32 USD.

Despite the vast empirical evidence on conscientiousness as a predictor for labor market outcomes, to our knowledge this is the first study of a psychological intervention targeted at affecting conscientiousness in the field. The developing country context for the study is particularly relevant given the importance of job creation and the high job turnover rates in these settings. Our study highlights the potential for psychological training of this kind to improve labor market outcomes for low-skill workers. The relatively light-touch nature and modest cost of the intervention of 24 USD per participant makes it amenable for inclusion in programs targeted at employing low-skilled workers.[33] By making our training materials fully available, we hope to facilitate further research on this topic.

[33]This includes 5 days of time for the facilitator (preparation of the training and conducting the training), the follow up phone calls and materials for the training such as pens and paper.

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 of the 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 or less successful at work. On the 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 is 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 being *hardworking* at the workplace? How can these barriers be overcome?
- What are possible barriers to being *punctual* at the workplace? How can these barriers be overcome?
- What are possible barriers to being *responsible* at the workplace? How can these barriers be overcome?
- What are possible barriers to being *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 for being *hardworking* at the workplace? How can these resources be used?
- What are possible resources for being *punctual* at the workplace? How can these resources be used?
- What are possible resources for being *responsible* at the workplace? How can these resources be used?
- What are possible resources for being *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

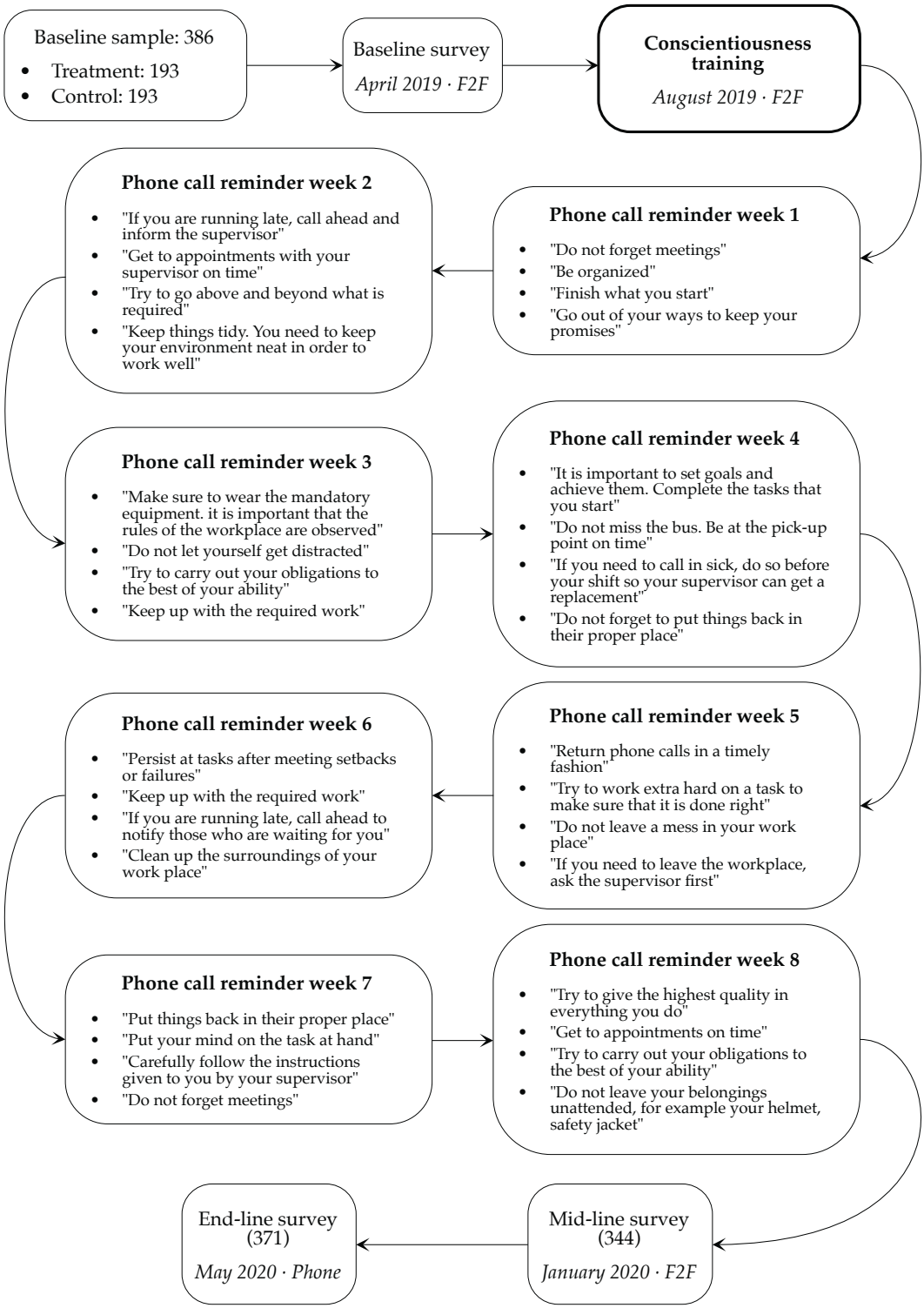
- Try to carry out your obligations to best of your ability.
- Go out of your way to keep your promises.
- If you are running late, call ahead to notify those who are waiting for you.
- If you are running late, call ahead and inform the supervisor.
- If you want to leave the workplace, ask the supervisor 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



Notes: 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)		(2)		(3)				
	Total		Non-Attrition		Attrition		Difference	Cohen's D	
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE	(2)-(3)	Effect size	95% CI
Individual-level variables									
Last earnings	384	109,343	328	110,131	56	104,732	5,399	0.095	-0.188 0.379
		(2,891)		(3,086)		(8,182)			
Female	384	0.086	328	0.098	56	0.018	0.080**	0.285	0.001 0.569
		(0.014)		(0.016)		(0.018)			
Age	384	36.5	328	36.3	56	37.9	-1.570	-0.175	-0.458 0.109
		(0.459)		(0.484)		(1.360)			
Middle school completed	384	0.227	328	0.247	56	0.107	0.140**	0.335	0.051 0.620
		(0.021)		(0.024)		(0.042)			
First formal job	366	0.117	328	0.125	38	0.053	0.072	0.225	-0.112 0.561
		(0.017)		(0.018)		(0.037)			
Recent migrant	360	0.094	323	0.099	37	0.054	0.045	0.154	-0.187 0.494
		(0.015)		(0.017)		(0.038)			
Big 5: Conscientiousness	384	4.66	328	4.66	56	4.68	-0.020	-0.029	-0.312 0.255
		(0.035)		(0.039)		(0.080)			
Big 5: Extraversion	384	3.17	328	3.16	56	3.26	-0.103	-0.092	-0.375 0.192
		(0.057)		(0.061)		(0.160)			
Big 5: Agreeableness	384	4.68	328	4.66	56	4.8	-0.145*	-0.261	-0.545 0.023
		(0.028)		(0.032)		(0.056)			
Big 5: Emotional stability	384	4.17	328	4.18	56	4.17	0.006	0.006	-0.277 0.290
		(0.045)		(0.048)		(0.125)			
Big 5: Openness	384	3.28	328	3.29	56	3.24	0.050	0.056	-0.228 0.339
		(0.046		(0.050)		(0.117)			
Household-level variables									
# Beds in household	384	4.84	328	4.77	56	5.27	-0.500	-0.184	-0.468 0.100
		(0.139)		(0.150)		(0.360)			
# Children in household	384	4.46	328	4.45	56	4.55	-0.105	-0.029	-0.313 0.254
		(0.184)		(0.205)		(0.383)			
# Adults in household	384	6.42	328	6.35	56	6.86	-0.507	-0.133	-0.416 0.151
		(0.195)		(0.205)		(0.589)			
Household debt	384	28,255	328	26,372	56	39,286	-12,914	-0.222	-0.506 0.062
		(2,976)		(3,039)		(9,928)			
Household savings	384	78,385	328	83,841	56	46,429	37,413**	0.370	0.085 0.654
		(5,201)		(5,779)		(10,340)			
Household income	384	52,943	328	53,613	56	49,018	4,595	0.157	-0.126 0.441
		(1,491)		(1,650)		(3,324)			

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. 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) Total		(2) Control		(3) Treatment		Difference	Cohen's D		
Variable	N	Mean/SE	N	Mean/SE	N	Mean/SE	(2)-(3)	Effect size	95% CI	
Individual-level variables										
Last earnings	384	109,343	191	107,437	193	111,230	-3,793	-0.067	-0.267	0.133
		(2,891)		(4,149)		(4,034)				
Female	384	0.086	191	0.089	193	0.083	0.006	0.022	-0.178	0.222
		(0.014)		(0.021)		(0.020)				
Age	384	36.5	191	37.4	193	35.6	1.76*	0.196	-0.005	0.396
		(0.459)		(0.648)		(0.645)				
Completed middle school	384	0.227	191	0.215	193	0.238	-0.024	-0.056	-0.256	0.144
		(0.021)		(0.030		(0.031)				
First formal job	366	0.117	180	0.111	186	0.124	-0.012	-0.039	-0.244	0.166
		(0.017)		(0.023)		(0.024)				
Recent migrant	360	0.094	177	0.085	183	0.104	-0.019	-0.065	-0.272	0.142
		(0.015)		(0.021)		(0.023)				
Big 5: Conscientiousness	384	4.66	191	4.69	193	4.63	0.064	0.093	-0.108	0.293
		(0.035)		(0.046)		(0.054)				
Big 5: Extraversion	384	3.17	191	3.22	193	3.12	0.103	0.092	-0.108	0.292
		(0.057)		(0.083)		(0.079				
Big 5: Agreeableness	384	4.68	191	4.7	193	4.66	0.049	0.088	-0.113	0.288
		(0.028)		(0.037)		(0.043)				
Big 5: Emotional stability	384	4.17	191	4.17	193	4.18	-0.014	-0.016	-0.216	0.184
		(0.045)		(0.065)		(0.063)				
Big 5: Openness	384	3.28	191	3.3	193	3.27	0.024	0.027	-0.174	0.227
		(0.046)		(0.065)		(0.065)				
Household-level variables										
# Beds in household	384	4.84	191	4.84	193	4.84	-0.007	-0.003	-0.203	0.198
		(0.139)		(0.208)		(0.184)				
# Children in household	384	4.46	191	4.61	193	4.32	0.286	0.079	-0.121	0.280
		(0.184)		(0.286)		(0.232)				
# Adults in household	384	6.42	191	6.29	193	6.56	-0.272	-0.071	-0.271	0.129
		(0.195)		(0.288)		(0.264)				
Household debt	384	28,255	191	29,188	193	27,332	1,857	0.032	-0.168	0.232
		(2,976)		(4,455)		(3,961)				
Household savings	384	78,385	191	73,298	193	83,420	-10,121	-0.099	-0.299	0.101
		(5,201)		(7,018)		(7,671)				
Household income	384	52,943	191	53,901	193	51,995	1,906	0.065	-0.135	0.265
		(1,491)		(2,161)		(2,060)				

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. *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.3: Correction for multiple inference of the treatment effects

	Bivariate	Baseline controls	Baseline outcomes
Employed			
Unadjusted *p*-value	0.157	0.170	
List et al. (2019) adjusted p-value	0.166	0.173	
Still at company			
Unadjusted *p*-value	0.048	0.039	
List et al. (2019) adjusted p-value	0.082	0.061	
Last earnings			
Unadjusted *p*-value	0.029	0.022	0.012
List et al. (2019) adjusted p-value	0.079	0.057	0.028
Last earnings (restricted)			
Unadjusted *p*-value			0.073
List et al. (2019) adjusted p-value			0.091

Notes: Each cell contains *p*- or List et al. (2019) adjusted p-value for the multiple regressions presented in Tables 1 and 2. In columns (1) and (2) we correct for testing three hypotheses (three outcome variables and one treatment) within each specification (bivariate and baseline controls), while in column (3) we correct for testing two hypotheses in the specification which includes the baseline outcome, one with the full sample and the other with the sample restricted to positive incomes.

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) Not in company		(2) Still in company		(1)-(2) Pairwise t-test
Variable	N/n	Mean/(SE)	N/n	Mean/(SE)	Mean difference
Security agent helper	179	0.307	187	0.385	-0.078
	[55]	(0.035)	[72]	(0.036)	
Mason	179	0.128	187	0.176	-0.048
	[23]	(0.025)	[33]	(0.028)	
Iron worker	179	0.106	187	0.053	0.053*
	[19]	(0.023)	[10]	(0.016)	
Form setter	179	0.145	187	0.118	0.028
	[27]	(0.026)	[22]	(0.024)	
Carpenter	179	0.011	187	0.000	0.011
	[3]	(0.008)	[0]	(0.000)	
Laborer	179	0.274	187	0.251	0.022
	[49]	(0.033)	[47]	(0.032)	
Driver help	179	0.006	187	0.000	0.006
	[1]	(0.006)	[0]	(0.000)	
Topographer/Topographer helper	179	0.006	187	0.005	0.000
	[1]	(0.006)	[1]	(0.005)	
Flag holder	179	0.000	187	0.005	-0.005
	[0]	(0.000)	[1]	(0.005)	
Specialized laborer/worker	179	0.017	187	0.000	0.017*
	[3]	(0.010)	[0]	(0.000)	

Notes: 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
Tire mechanic*	1	1.22
Total	82	100.00

Notes: 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*.

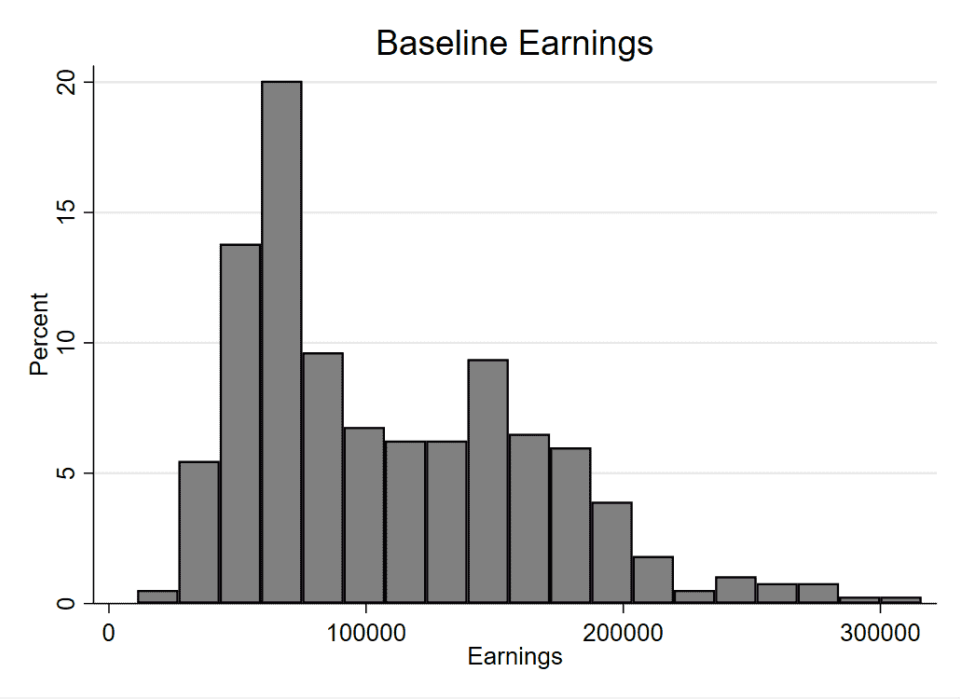
C. Details on earnings computation

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 "midpoint 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 $\frac{180000-130000}{2} = 155,000$.

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 $145000 + \frac{10000-5001}{2} = 147,499.5$. 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. Figure C.1 shows the distribution of earnings at baseline for the sample available at end-line.

Figure C.1: Distribution of earnings at baseline



Notes: This graph shows the distribution of earnings at baseline.

Table C.1: Alternative earnings specifications

	(1) Earnings (Min)	(2) Earnings (Min)	(3) Earnings (Max)	(4) Earnings (Max)	(5) Log earnings	(6) Log earnings	(7) Log earnings	(8) IHS earnings	(9) IHS earnings	(10) IHS earnings	(11) IHS earnings
Treated	19027.1**	11296.5*	19734.9**	12508.4*	0.188**	0.202**	0.162**	0.939	0.942	0.921	0.162**
	(7568.3)	(6398.1)	(7774.3)	(6584.0)	(0.087)	(0.082)	(0.069)	(0.578)	(0.579)	(0.580)	(0.069)
Constant	22503.5	12324.9	23707.8	15079.3	11.411***	10.725***	3.082***	8.247***	9.245***	-2.678***	3.285***
	(21606.7)	(16681.1)	(22226.2)	(16930.8)	(0.068)	(0.219)	(0.897)	(0.421)	(1.637)	(7.262)	(0.953)
Mean outcome control	76335.5	112040.9	78244.9	114843.3	11.41	11.41	11.41	8.25	8.25	8.25	12.10
Baseline controls	✓	✓	✓	✓		✓	✓		✓	✓	✓
Baseline outcome	✓	✓	✓	✓			✓			✓	✓
N	368	263	368	263	263	263	263	368	368	368	263
R-sq	0.151	0.458	0.149	0.448	0.018	0.135	0.372	0.007	0.033	0.041	0.372

Notes: Standard errors 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. Dependent variable in columns (1) and (2) is earnings reported by workers at end-line using the minimum value of the earnings range while the dependent variable in columns (3) and (4) computes earnings using the maximum value of the earnings range. Dependent variable in columns (5) to (7) is the log of earnings reported by workers at end-line. Dependent variable in columns (8) to (11) is the inverse hyperbolic sine transformation of earnings reported by workers at end-line. Unemployed individuals and individuals with zero earnings are excluded from the sample in columns (2), (4), (5) to (7) and column (11).

D. Details on conscientiousness measures

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

Notes: 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. This table 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.2: Conscientiousness traits: reliability of scales

Scale	Round	Cronbach's alpha	Interitem covariance	Number of items
All traits	Baseline	0.789	0.104	32
	Midline	0.785	0.073	32
Organisational	Baseline	0.585	0.090	8
	Midline	0.495	0.034	8
Industriousness	Baseline	0.614	0.210	9
	Midline	0.684	0.219	9
Responsibility	Baseline	0.703	0.152	9
	Midline	0.580	0.079	9
Punctuality	Baseline	0.429	0.144	6
	Midline	0.344	0.066	6

Notes: 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.

Table D.3: Conscientiousness traits: Organisational skill and Industriousness

Organisational skill	(1) Tidy	(2) Follow schedule	(3) Follow-up	(4) Organize schedule	(5) Clean up	(6) Organized personal space	(7) Keep organised	(8) Keep tidy	
Treated	0.004	-0.013	0.072	-0.004	0.040	-0.021	0.010	-0.019	
	(0.039)	(0.038)	(0.107)	(0.053)	(0.072)	(0.045)	(0.051)	(0.040)	
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	
Constant	4.734***	4.686***	3.879***	4.299***	4.145***	4.660***	4.737***	4.740***	
	(0.221)	(0.253)	(0.411)	(0.275)	(0.486)	(0.241)	(0.209)	(0.165)	
Standardized coeff.	0.00923	-0.0354	0.0722	-0.00715	0.061	-0.0534	0.0217	-0.052	
Mean outcome control	4.92	4.93	4.33	4.86	4.75	4.93	4.9	4.95	
N	342	342	342	342	342	342	342	342	
R-sq	0.0307	0.0153	0.0575	0.0485	0.0568	0.01	0.046	0.0131	

Industriousness	(1) Make plans	(2) Work goals	(3) Clear goals	(4) High standards	(5) Change after setback	(6) Work hard	(7) Focus on goals	(8) Plan to reach goal	(9) Keep trying after failure
Treated	-0.147	0.269*	0.102	-0.019	-0.039	0.103	0.165*	0.048	-0.159*
	(0.119)	(0.140)	(0.098)	(0.091)	(0.134)	(0.134)	(0.093)	(0.117)	(0.090)
	[0.997]	[0.802]	[1.000]	[1.000]	[1.000]	[1.000]	[0.902]	[1.000]	[0.915]
Constant	4.310***	3.940***	3.568***	4.473***	4.164***	3.646***	4.665***	3.818***	4.214***
	(0.434)	(0.445)	(0.375)	(0.337)	(0.423)	(0.442)	(0.341)	(0.383)	(0.360)
Standardized coeff.	-0.128	0.203	0.114	-0.0224	-0.032	0.0833	0.195	0.0446	-0.191
Mean outcome control	4.5	3.81	4.48	4.63	4.17	4.2	4.51	4.23	4.68
N	342	342	342	342	342	342	342	342	342
R-sq	0.0778	0.0738	0.0399	0.0153	0.0399	0.0444	0.0282	0.0463	0.0372

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. List et al. (2019) p-values adjusted for multiple hypothesis testing in square brackets. *Mean outcome control*: mean level of the outcome variable for the control group at mid-line. All specifications include baseline controls and the trait measured at baseline.

Table D.4: Conscientiousness traits: Responsibility and Punctuality

Responsibility	(1) Present for others	(2) Dependable	(3) Keep promises	(4) Fullfill engagements	(5) Up to responsibilities	(6) Respect engagements	(7) Others count on me	(8) Fulfill duty	(9) Manage responsibilities
Treated	-0.006	-0.089	-0.014	-0.017	0.302***	0.040	-0.046	0.158**	0.035
	(0.127)	(0.107)	(0.039)	(0.047)	(0.112)	(0.042)	(0.093)	(0.063)	(0.061)
	[0.962]	[1.000]	[1.000]	[1.000]	[0.280]	[1.000]	[1.000]	[0.355]	[1.000]
Constant	3.360***	3.162***	4.348***	4.764***	4.029***	4.811***	4.032***	4.566***	4.402***
	(0.442)	(0.429)	(0.462)	(0.216)	(0.405)	(0.120)	(0.352)	(0.294)	(0.366)
Standardized coeff.	-0.005	-0.088	-0.035	-0.040	0.284	0.100	-0.055	0.268	0.064
Mean outcome control	4.09	4.49	4.91	4.9	4.17	4.88	4.6	4.67	4.77
N	342	342	342	342	342	342	342	342	342
R-sq	0.053	0.086	0.051	0.021	0.085	0.053	0.051	0.062	0.030

Punctuality	(1) Remorse late	(2) Meet earlier	(3) Avoid being late	(4) Avoid procrastination	(5) Punctual	(6) On time at meetings
Treated	-0.005	0.038	-0.015	0.018	0.014	0.152
	(0.098)	(0.060)	(0.084)	(0.144)	(0.050)	(0.119)
	[1.000]	[1.000]	[1.000]	[1.000]	[1.000]	[0.998]
Constant	4.461***	4.550***	4.660***	4.100***	3.831***	3.916***
	(0.263)	(0.235)	(0.225)	(0.435)	(0.497)	(0.398)
Standardized coeff.	-0.005	0.068	-0.019	0.013	0.031	0.138
Mean outcome control	4.69	4.81	4.75	4.31	4.86	4.29
N	342	342	342	342	342	342
R-sq	0.042	0.031	0.031	0.024	0.089	0.061

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. List et al. (2019) p-values adjusted for multiple hypothesis testing in square brackets. *Mean outcome control*: mean level of the outcome variable for the control group at mid-line. All specifications include baseline controls and the trait measured at baseline.

Table D.5: Big 5: Agreeableness and Extroversion

	(1) Extrovert	(2) Agreeable	(3) Emotional stability	(4) Openness to experience
Treated	-0.130	0.063	0.209**	0.111
	(0.115)	(0.052)	(0.094)	(0.099)
	[0.999]	[0.999]	[0.538]	[0.999]
Constant	3.019***	4.079***	3.194***	2.691***
	(0.358)	(0.276)	(0.346)	(0.328)
Standardized coeff.	-0.121	0.133	0.231	0.122
Mean outcome control	3.51	4.82	4.21	3.38
Baseline controls	✓	✓	✓	✓
Trait at baseline	✓	✓	✓	✓
N	342	342	342	342
R-sq	0.081	0.074	0.140	0.034

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. List et al. (2019) p-values adjusted for multiple hypothesis testing in square brackets. *Mean outcome control*: mean level of the outcome variable for the control group at mid-line. *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. *Trait at baseline*: trait measured at baseline as control.

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	-0.389***	-0.398***	0.0341	0.0224	-0.0694	-0.0413	-0.00484
	(0.003)	(0.002)	(0.509)	(0.678)	(0.160)	(0.408)	(0.918)
	[0.039]	[0.023]	[0.985]	[0.999]	[0.839]	[0.986]	[0.994]
Constant	3.830***	3.769***	0.412***	0.520***	0.367***	0.670***	0.725***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Std. coeff.	-0.307	-0.322	0.0689	0.0448	-0.147	-0.0864	-0.0108
N	368	368	368	346	365	368	368
R-sq	0.0236	0.0260	0.0012	0.0005	0.0054	0.0019	0.0000
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	0.00272	-0.0331	-0.00857	-0.0392*	0.0255	0.0363	0.0168
	(0.957)	(0.478)	(0.816)	(0.091)	(0.365)	(0.482)	(0.702)
	[0.956]	[0.991]	[0.995]	[0.645]	[0.981]	[0.995]	[0.992]
Constant	0.374***	0.291***	0.148***	0.0714***	0.0659***	0.560***	0.220***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Std. coeff.	0.0056	-0.0742	-0.0244	-0.1770	0.0944	0.0735	0.0399
N	368	368	368	368	368	368	368
R-sq	0.0000	0.0014	0.0001	0.0078	0.0022	0.0013	0.0004

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. List et al. (2019) p-values adjusted for multiple hypothesis testing 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	-0.390***	-0.404***	0.0278	0.0217	-0.0916*	-0.0476	-0.0100
	(0.003)	(0.001)	(0.592)	(0.693)	(0.056)	(0.338)	(0.831)
	[0.033]	[0.017]	[0.995]	[0.991]	[0.473]	[0.985]	[0.973]
Constant	3.767***	3.717***	0.550***	0.715***	0.441***	0.880***	0.849***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Std. coeff.	-0.308	-0.327	0.0562	0.0434	-0.194	-0.0997	-0.0221
Basel. controls	✓	✓	✓	✓	✓	✓	✓
N	368	368	368	346	365	368	368
R-sq	0.0610	0.0632	0.0304	0.0111	0.1110	0.0512	0.0403
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	0.0057	-0.0445	-0.0194	-0.0359	0.0232	0.0282	0.0127
	(0.910)	(0.350)	(0.587)	(0.115)	(0.407)	(0.586)	(0.774)
	[0.911]	[0.978]	[0.998]	[0.741]	[0.980]	[0.988]	[0.987]
Constant	0.280**	0.519***	0.493***	0.119*	0.110	0.689***	0.251**
	(0.047)	(0.000)	(0.000)	(0.054)	(0.165)	(0.000)	(0.037)
Std. coeff.	0.0118	-0.0995	-0.0553	-0.162	0.0859	0.0570	0.0302
Basel. controls	✓	✓	✓	✓	✓	✓	✓
N	368	368	368	368	368	368	368
R-sq	0.0409	0.0299	0.0689	0.0383	0.0126	0.0429	0.0525

Notes: Standard errors in parentheses, *, **, *** denote significance at 10%, 5% and 1% levels. List et al. (2019) p-values adjusted for multiple hypothesis testing 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.