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Abstract: Personality traits play an important role in shaping labor market outcomes, but the associated behaviors that lead to these differences are understudied. In this paper, we examine the returns to the Big Five personality traits as well as the mechanisms through which personality affects employment and earnings. We find conscientiousness to be a significant predictor of both employment and earnings. We further show that the association between conscientiousness and earnings operates primarily through one specific behavior, namely, individual effort. Additionally, we can eliminate job characteristics and collective bargaining as potential channels for the positive relationship between conscientiousness and earnings.

JEL Classification: F63, D91, I25, J01, J24

Keywords: Big Five personality traits, Conscientiousness, Labor market returns, Effort

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1 Introduction

The Big Five measure of personality is a five-factor model that broadly captures the differing aspects of an individual's personality. Borrowing from the psychology literature, economists have shown that the Big Five traits predict economic success in both high- and low-income countries (Heckman et al., 2006; Borghans et al., 2008; Heineck and Anger, 2010; Almlund et al., 2011; Heineck, 2011; Prevoo and ter Weel, 2015; Deming, 2017; Gensowski, 2018; Collischon, 2020; Alderotti et al., 2023; Bütikofer and Peri, 2021; Edin et al., 2022). Among these traits, the literature consistently finds conscientiousness and emotional stability to be the strongest predictors of employment and earnings (see Salgado, 1997; Nyhus and Pons, 2005; Almlund et al., 2011; Connelly et al., 2022 and others). However, the specific behaviors that lead to these favorable outcomes remain unclear, especially since the effect of personality traits on labor market outcomes goes above and beyond its effects on years of schooling (Heckman et al., 2006; Borghans et al., 2008; Cattan, 2010).

To the best of our knowledge, this is the first paper to examine the economic returns to personality traits as well as the mechanisms through which personality affects labor market outcomes. We use large-scale micro-level data from the Indonesian Family Life Survey (IFLS) to examine the association between Big Five personality traits and employment and earnings. Our preferred estimates using parental fixed-effects[1] show that, out of the Big Five traits, conscientiousness is the strongest predictor of both employment and earnings. Specifically, a one standard deviation increase in conscientiousness increases the likelihood of employment by 2.7 percentage points and monthly earnings by 43 percent. We then leverage the extensive and detailed data available in the IFLS to investigate the underlying mechanisms through which personality traits affect earnings, focusing on three primary channels of influence: job characteristics, effort, and collective bargaining. To analyze job characteristics, we examine whether a job is managerial, provides benefits, and offers salaried employment. Our findings

[1]Parental fixed-effects account for important sources of unobserved heterogeneity such as genetics and parenting style (Fletcher, 2013, Maczulskij and Viinikainen, 2018, Zumbuehl et al., 2021) that can impact both labor market outcomes and the Big Five personality traits.

suggest that conscientiousness is not a significant predictor of any of these outcomes. We then explore the relationship between Big Five personality traits and various measures of effort, such as the number of hours worked, the number of jobs held, and job tenure. We find a strong link between conscientiousness and all measures of effort: a one standard deviation increase in conscientiousness is associated with a 12 percent increase in hours worked, a 4 percent increase in the number of jobs held, and an additional 4.5 months of work experience or tenure. Lastly, we investigate the connection between personality traits and membership in unions, which can act as a proxy for collective bargaining power. Our findings suggest that there is no significant association between conscientiousness and union membership in Indonesia.

Overall, our results suggest that the positive association between conscientiousness and earnings mainly operates through an increase in effort or, simply put, hard work. We note that our findings do not allow for any causal interpretation, as it is impossible to randomly assign personality traits. Nevertheless, we are able to exploit the panel feature of the IFLS to show that our results are robust to concerns around individual unobserved heterogeneity or ability bias. We also show that our results are robust to Type I error.

The findings of this paper make important contributions to a number of areas in the economics literature. First, this paper adds to a small literature exploring the mechanisms through which personality traits translate to better labor market outcomes. Some studies show that conscientiousness is an important predictor of job performance (Barrick and Mount, 1991; Salgado, 1997 Nyhus and Pons, 2005; Donato et al., 2017; Donato et al., 2017; Connelly et al., 2022)[2] and productivity (Cubel et al., 2016).[3] We expand these lines of

[2]In Barrick and Mount, 1991's meta-analysis, performance is measured through job proficiency, training proficiency, and personnel data: "Job proficiency measures primarily included performance ratings (approximately 85 percent of the measures) as well as productivity data; training proficiency measures consisted mostly of training performance ratings (approximately 90 percent of the measures) in addition to productivity data, such as work sample data and time to complete training results; and personnel data included data from employee files, such as salary level, turnover, status change, and tenure."

[3]Cubel et al. (2016) is however the only paper that examines the effect of personality traits on productivity. It does so in a lab experiment setting with a small sample size and tasks, which limits the external validity of their findings.

research and show that the effect of personality traits primarily operates through the effort channel - conscientious individuals work hard to receive higher earnings - they work longer hours and work on multiple jobs.

Second, this paper adds to a very small literature on the returns to non-cognitive skills from low- and middle-income countries (Bühler et al., 2020). Notably, we expand our investigation beyond earnings while also analyzing the potential mechanisms that affect labor market outcomes. Furthermore, by employing parental fixed-effects, we are better able to isolate the effect of personality traits on labor market outcomes compared to previous studies in this field. This paper is also one of the very few that exploit large-scale household survey data to investigate these relationships. Apart from ours, Bühler et al., 2020 is the only paper to use large-scale household survey data to examine the effects of non-cognitive skills on labor market outcomes.[4] However, they focus on occupational sorting only for those currently working and earnings for non-farm workers.[5] In contrast, we examine the influence of non-cognitive traits on employment and earnings covering all types of work and sectors of employment.

Lastly, our results complement the literature on the malleability of personality traits. Several papers show that parental investments, income, peers, military training, and education have important influence on one's personality (Heckman et al., 2013; Chuang and Schechter, 2015; Kassenboehmer et al., 2018; Akee et al., 2018; Zumbuehl et al., 2021; Dasgupta et al., 2022; Ertola Navajas et al., 2022; Fabregas, 2023). In this paper, we identify specific traits and associated behaviors that can be made the focus of policy interventions. For instance, programs that build discipline, grit, and hard work for children, adolescents, and young adults might bring long-term wage gains for all (Alan et al., 2019; Southwick

[4]Glewwe et al., 2022 also examine the returns to non-cognitive skills, but only for children and young adults in China. Similarly, Díaz et al., 2012 examine the returns to non-cognitive skills for adult respondents in urban Peru only. And Nordman et al., 2018 use linked employer-employee data to explore the role of personality traits in explaining the gender wage gap in Bangladesh, which restricts their findings to the formal sector only.

[5]Only 27% of their sample work in non-farm jobs leaving out a large proportion of the employed from their analysis.

et al., 2019).

The rest of the paper is organized as follows. In Section 2, we describe the data and context. In Section 3, we set up the empirical framework. Section 4 presents the results and concluding remarks follow in Section 5.

2 Context & Data

Context: Indonesia is the tenth largest economy in the world, with a GDP per capita of 4,300 USD in 2021. The labor force participation rate is 67%, totaling over 136 million people, with significant gender differences (82% for men, 52% for women; ILOSTAT, 2022). There has been rapid growth in the services sector which is now the largest sector of employment in Indonesia (close to 50% of the labor force), while the agricultural sector continues to shrink, following a similar growth path as other developing economies. Despite the structural transformation of the economy over the last few decades, Indonesia lags behind other Southeast Asian countries in high-skilled jobs, and is struggling to obtain the productivity gains required for creating a robust middle class. However, the government remains committed to investing in human capital and job creation in order to forge its way to higher income status (Wihardia and Cunningham, 2021). By studying the association between non-cognitive skills and labor market outcomes, our results can be informative to policy makers as they make efforts to improve labor market opportunities in the country.

Data: We use individual-level data from the most recent (2014) wave of the IFLS, a longitudinal household survey conducted in Indonesia since 1993. The IFLS collects extensive demographic, economic, and health data from a sample of over 43,000 individuals. We restrict our sample to respondents aged 30 and above as this is about the age psychologists believe personality traits become stable (Costa Jr and McCrae, 1994; Almlund et al., 2011), resulting in a final sample of 19,389 adults, 5,070 of whom have siblings in the sample.

The Big Five personality traits were developed by psychologists to broadly capture the

differing aspects of an individual's personality, and were included in the 2014 wave of the IFLS.[6] The traits in the Big Five are defined as follows:

1. **Openness to experience:** the tendency to be open to new aesthetic, cultural or intellectual experiences;
2. **Conscientiousness:** tendency to be organized, responsible, and hard working;
3. **Extraversion:** outward orientation rather than being reserved;
4. **Agreeableness:** tendency to act in a cooperative and unselfish manner; and
5. **Emotional stability (inverse of Neuroticism):** predictability and consistency in emotional reactions with absence of rapid mood changes;

Panel A of Table 1 describes the specific questions used to score each personality trait, and Table 2 presents summary statistics of the Big Five traits. Each trait is measured through respondents' answers to a set of three statements. A five-point ordinal scale is used to measure a respondents' agreement with each proposed statement.[7] As a result, each personality trait score ranges from 0 to 15.[8] In addition to measuring each personality trait separately, we also provide a Big Five index which combines the individual traits into a single score (Laajaj et al., 2019). For our empirical analysis, we standardize all personality traits into z-scores using the mean and standard deviation of the respective trait score in the sample.

Panel B of Table 1 provides a detailed description of the labor market outcomes used in this analysis. We use several outcomes from the IFLS, including employment status, monthly earnings, binary indicators that describe job characteristics (whether the job is a managerial position, provides benefits, is salaried), weekly number of hours worked, the

[6]The RAND Corporation, the organization that conducts the IFLS, worked with two leading personality psychologists, Dr. Robert Brent and Dr. Angela Duckworth, to develop the methodology used in the survey.

[7]Answers can range from 1 for "Disagree strongly" to 5 for "Agree Strongly."

[8]The 15-point inventory is a subset of the Big Five Inventory (BFI) 44. While the survey creators tested using a 26 point scale instead, they ran into issues with translation and decided to use the BFI 15.

number of jobs a respondent holds, tenure at current job(s), and a dummy recording a respondent's unionization status. We winsorize all continuous outcome variables at the 99^{th} percentile to attenuate the effect of outliers in the sample and then take logs. Panel B of Table 2 presents summary statistics of earnings and labor market outcomes: 80 percent of the sample is employed and the average monthly earnings are 95 dollars.

Panel C of Table 1 describes the set of covariates used in this analysis. We include demographic characteristics such as age, gender, religion, and ethnicity, as well as two measures of cognition as controls in our main specification. Cognitive skills are an important covariate to include as they are a critical input into labor market outcomes and may confound the effect of personality traits. To evaluate cognitive skills, we use both years of schooling as well as an 8-item Raven's test built in the IFLS survey. The Raven's progressive matrix scores are a measure of fluid intelligence, capturing individuals' ability to solve novel problems and are considered a standard measure of non-verbal cognitive skills. Importantly, the Raven's matrices are also regarded as a test of IQ that is not culturally biased as it does not rely on verbal skills or other skills gained directly through formal education and teaching (Almlund et al., 2011).[9] Summary statistics in panel C of Table 2 show that the average age of the sample is 45 (recall the sample is restricted to those aged 30+), just under half of the participants are men, and the vast majority of respondents are married (86%) and Muslim (90%). While there are a multitude of ethnicities in Indonesia, the largest is Javanese, which make up 45% of the sample.

[9]Previously, only children were asked to complete the Raven's module, but in 2014, adults older than 15 were asked a second set of more difficult Raven's questions given how informative the scores were for measuring cognition.

3 Methods and Results

3.1 Methods

In order to evaluate the pathways by which personality traits may influence employment and earnings, we first need to determine which personality traits influence these labor market outcomes. To measure the returns to the vector of Big Five personality traits, P, on labor market outcomes, Y, we use a standard Mincer (1974) type regression model:

$$Y_{ipd} = \beta_0 + \Sigma_{j=1}^{5} \beta_j P_{ipdj} + \sum_{k \epsilon K} \gamma_k X_{ipdk} + \delta_d + \epsilon_{ipd} \tag{1}$$

Where Y denotes employment and earnings for individual i born to parent p living in district d. We are primarily interested in the coefficients on the Big Five personality trait vector, P. The regression model also includes standard controls (X) for cognition as measured by years of schooling and Raven's test score, as well as demographic controls that account for variation in sex, age, religion, location and ethnicity, as described in Panel C of Table 1. To account for supply-side factors such as local labor market conditions, we further include district fixed-effects. Finally, to allow for unobserved correlation between individuals living in a community we cluster our standard errors at the sub-district level (Wooldridge, 2003).

$$Y_{ipd} = \beta_0 + \Sigma_{j=1}^{5} \beta_j P_{ipdj} + \sum_{k \epsilon K} \gamma_k X_{ipdk} + \mu_p + \delta_d + \epsilon_{ipd} \tag{2}$$

We recognize that OLS estimates from equation (1) are likely to suffer from omitted variables bias. To address this concern, we build on Black et al. (2021), Fletcher (2013), and Maczulskij and Viinikainen (2018), and include parental fixed-effects (μ_p) to control for family-level unobserved confounders in equation (2). The addition of parental fixed-effects captures unobserved heritable and other family characteristics such as parenting style, that may impact both the development of certain personality traits as well as our outcome variables. Therefore, our main specification exploits within-sibling variation in personality

and labor market outcomes. Other econometric concerns, such as ability bias and Type I error are addressed in the robustness section of the paper.

Finally, in order to determine the pathways through which personality traits affect labor market outcomes in the sample, we re-estimate equation (2) using measures of job selection, effort and bargaining power as outcomes. The list of outcome variables used to capture pathways are defined in panel B of Table 1.

3.2 Results

Main Results - Before examining the association between individual personality traits and labor market outcomes, we first measure the aggregate impact of non-cognitive skills. We create an index of all five personality traits (Laajaj et al., 2019), where higher values of the index reflect more intensive personalities, that is, more open, more conscientious, more extraverted, more agreeable, and less neurotic individuals. In Columns (1) and (2) of Table 3, we show that there exists a positive association between the Big Five index and both employment and monthly earnings. Columns (3) and (4) show that these results remain robust to the inclusion of parental fixed-effects: a one standard deviation increase in the Big Five index is associated with a 2.1 percent increase in the probability of employment and a 43 percent increase in monthly earnings. This result aligns with Laajaj et al., 2019's finding of a positive association between the index and income in 6 out of 10 low-and middle-income countries and suggests that, beyond the analysis of specific traits, having overall stronger personality traits is positively associated with success in the labor market.

Next, we disaggregate the overall effect of personality by evaluating the impact of each individual trait on labor market outcomes in Table 4. OLS estimates suggest that each of the personality traits significantly contribute to employment and earnings. In Columns (1) and (2), we find that openness to experience, conscientiousness, and extraversion are positively rewarded, while agreeableness and neuroticism are negatively rewarded in the labor market.

We then include parental fixed-effects in Columns (3) and (4) of Table 4. This reduces

the effect of extraversion, agreeableness, and neuroticism, which no longer have a significant association with labor market participation or earnings, while conscientiousness and openness to experience remain significant at the 1% and 10% level, respectively. We note, however, that the association between openness to experience and labor market outcomes is not robust to corrections for multiple hypothesis testing.

Overall, our results indicate that after including parental fixed-effects, conscientiousness emerges as the largest and most significant predictor of both employment and earnings among the Big Five personality traits. According to our analysis, a one standard deviation increase in conscientiousness is associated with a 2.7 percent increase in the probability of employment and a 43 percent increase in monthly earnings.[10] Although this figure may appear large, it is necessary to consider the variation in the conscientiousness index to gain a better understanding of its meaning. Specifically, in our sample, a one standard deviation increase in conscientiousness corresponds to a 12 percent increase from the average conscientiousness score of 11.6. Thus, our findings suggest that a 12 percent increase in conscientiousness is associated with a 43 percent increase in monthly earnings, which approximately translates to an additional 40 dollars per month. In percentage terms, a one percent increase from the mean value of the conscientiousness index is associated with a three percent increase in monthly earnings. We note that this value is comparable to some of the estimates in the literature. For instance, Bühler et al. (2020) find a comparable coefficient size for the effect of openness to experience in South Asia: a one standard deviation increase in openness to experience is associated with a 45 percent increase in earnings. Similarly, Gensowski (2018) finds that men who score one standard deviation higher on conscientiousness have 16.7 percent higher lifetime earnings in the United States.

[10]We analyze the sensitivity of our results to alternative log transformations and winsorization levels. Following Frazer and Van Biesebroeck (2010), we reproduce our preferred specifications using different log transformations in Table A.1. Our findings appear robust to alternative log transformations of the outcome variables. Similarly, to remove the presence of outliers, we winsorize our outcome variables at the 99th percentile (any income or hours above the 99th percentile is set to the value of the 99th percentile). We reproduce our preferred estimates in Table A.2 using different winsorization levels, and our main findings remain unaffected by the level chosen.

Finally, we also check whether personality traits are rewarded differently for men versus women in the labor market by adding an interaction term between gender and personality traits in equation (2). Regression results are shown in Appendix Table A.3 and suggest that the association between personality traits and labor market outcomes does not differ by gender in our context.

Mechanisms - The literature points to several mechanisms that might explain the effect of conscientiousness on earnings, including education, absenteeism, job sorting, and productivity (Almlund et al., 2011; Caplin et al., 2022; Cubel et al., 2016; Van Biesebroeck et al., 2014). The positive and statistically significant coefficient on conscientiousness in Table 4 suggests that, in our sample, the effect of conscientiousness on earnings goes above and beyond its effect on education. While our data does not allow us to explore the relationship between personality and absenteeism or productivity, we are able to examine several other mechanisms through which conscientiousness might affect earnings that have not yet been explored in the literature. Specifically, we examine three possible channels through which conscientiousness might affect monthly earnings: job selection, effort exerted, and collective bargaining. These results are presented in Table 5.[11] First, to examine whether the effect of conscientiousness works through conscientious individuals selecting into better jobs, we regress binary variables recording (1) whether the respondent is a manager, (2) whether their employer provides them with benefits, and (3) whether the respondent is salaried, on personality traits in Columns (1), (2) and (3), respectively. The statistically insignificant coefficient estimates in all columns suggest that there is no association between conscientiousness and selection into job type, which contrasts with evidence from high-income countries (Ham et al., 2009; Nieken and Störmer, 2010). Regrettably, we lack comparable estimates from low-income countries, but we believe that these findings may be attributed to the prevalence of informality in such settings. That is, the high incidence of informality makes it challenging to discern diverse job types accurately, which might hinder our ability to detect any potential

[11] We also present estimates using the Big Five index in Appendix Table A.4. Results are similar to those of Table 5.

influence of personality on job characteristics.

Second, we explore whether the positive effect of conscientiousness on earnings can be explained by conscientious individuals exerting more effort on the job. In Columns (4), (5) and (6) of Table 5, a one standard deviation increase in conscientiousness is associated with a 12 percent increase in weekly hours worked, a 4 percent increase in the number of jobs held by an individual and a 4.5 months increase in job tenure. This provides suggestive evidence that more conscientious individuals work more and tend to stay at their job for longer time periods. Interpreting these variables as indicators of workers' effort in their respective jobs, these findings provide a plausible explanation for how conscientiousness positively influences monthly earnings. They suggest that individuals high in conscientiousness may achieve higher earnings by exerting greater effort and dedication in their work. In the spirit of Attanasio et al. (2022), we further investigate the relative contributions of each of these factors through a mediation analysis.[12] While we acknowledge that this method cannot establish clear causal links between conscientiousness and our hypothesized mediators (Bullock et al., 2010), this analysis is still informative about how individuals exert effort, and which are the most important channels through which higher effort increases earnings. Results from the mediation analysis suggest that 100 percent of the effect of conscientiousness on earnings is mediated through higher effort; with 81, 17, and 2 percent of the effect being attributed to higher hours worked, higher number of jobs, and longer job tenure, respectively.

Third, we investigate the correlation between conscientiousness and workers' participation in collective bargaining, by regressing a union dummy variable on the five personality traits (see Column (7) of Table 5). We acknowledge that unionization status does not capture individual bargaining, but is a good proxy for measuring collective bargaining power. We do not find that conscientious individuals are more likely to be unionized.

In sum, our analysis suggests that conscientious people have higher monthly earnings mainly because they exert more effort on the job. To our knowledge, our study is the first

[12]These results are presented in Appendix Table A.5.

to identify the positive effect of conscientiousness on effort as a mechanism for the positive association between conscientiousness and monthly earnings.[13] Our finding that conscientiousness increases workers' monthly earnings through higher effort on the job expands the literature's finding that, of the Big Five, conscientiousness is a particularly important determinant of job performance and success in life more generally (Almlund et al., 2011; Barrick and Mount, 1991; Hogan and Holland, 2003; Prevoo and ter Weel, 2015; Salgado, 1997).[14] It also aligns with research that provides evidence for the positive effect of grit on effort and task performance (Alan et al., 2019; Southwick et al., 2019). Finally, the finding that conscientiousness translates into higher effort corroborates evidence of a positive relationship between conscientiousness and productivity (Barrick and Mount, 1991; Cubel et al., 2016; Salgado, 1997).

4 Robustness checks

In this section, we show that our results are robust to two additional concerns. First, to mitigate power concerns and the risk that individual unobserved factors such as ability could confound our results, we replace the main outcome variables (employment and earnings) with the residuals from a regression of labor market outcomes on individual fixed-effects using the 2007 and 2014 rounds of outcome data.[15] The residuals from this procedure capture variation in outcomes that is free of unobserved individual-level heterogeneity such as innate differences in ability. We then use the residuals to replace our dependent variables

[13]Because our approximation of job effort through hours worked differs from the previous studies, we cannot compare the size of our coefficients to previous estimates.

[14]In a meta-analysis of 117 studies, Barrick and Mount, 1991 measure job performance through ratings by managers and training proficiency and find that a one percent increase in conscientiousness is associated with a 22 percent increase in job performance.

[15]We take advantage of the fact that the outcome variables are available over a long time horizon (1993, 1997, 2000, 2007, and 2014). Exploiting the panel aspect of the data, using only the 2007 and 2014 rounds of the outcome variable, we regress our outcome variables on individual fixed- effects to purge all individual time-invariant characteristics from the outcome variables. We then use the predicted residuals from this equation for 2014 as the new outcome variable that is free from the presence of time-invariant unobservables. This method alleviates power-related concerns in that, contrary to using only parental fixed-effects, it preserves the sample size and allows to exploit variation coming from 14,000 to 16,000 observations to estimate our coefficients.

in equation (1). Because this method preserves the size of the sample, it also has the advantage of increasing the statistical power of the tests underlying our estimation. We do not incorporate parental fixed-effects in this specification as a lot of the cross-individual variation in personality traits has already been removed by the procedure described above. Table A.6 presents the estimates resulting from the regression of the residuals on the Big Five personality traits, using a similar specification to that of Columns (1) and (2) of Table 4. Our results are very similar to those of Table 4: the positive association between conscientiousness and employment and earnings persists in this set of results.

Second, to account for the fact that the Type I error increases in the number of outcomes tested, we follow the procedure proposed by Benjamini et al. (2006) and implemented by Anderson(2008). In Table 4, we derive sharpened two-stage q-values. The positive association between conscientiousness and labor market outcomes remains robust to Type I error.

Finally, we do not believe that random measurement error bias should affect our results substantially, since even if measurement error contaminated our data, it would only bias our estimates downward. Therefore, we argue that our coefficients can be interpreted as lower-bound estimates of the associations between personality traits and labor market outcomes.

5 Conclusion

Personality traits determine individual behaviors, attitudes, and preferences that influence labor market outcomes. While the literature shows that favourable personality traits (such as being conscientious and emotionally stable) are well rewarded in the labor market, little is know about the behaviors that drive this association. This paper is the first to clearly identify the behaviors that explain why some traits are more important than others in improving employment and earnings.

Using rich, large-scale, micro-level data from the Indonesian Family Life Survey, we show that among the Big Five personality traits, conscientiousness matters most in explaining

the earnings variation in our sample. We show that conscientious individuals earn more because they work longer hours and hold multiple jobs. Additionally, we are able to rule out the influence of personality traits on collective bargaining power and preferential job characteristics that might explain higher earnings. Our findings are novel in that we explicitly identify the behaviors and qualities through which conscientious individuals increase their labor market outcomes.

These results have important implications for the study of personality traits in the economics literature. First, we show that among the Big Five personality traits, conscientiousness matters - it is the only trait that predicts economic success after controlling for immeasurable family characteristics and genetic endowments. This result contrasts with findings from the literature which points to several traits, but does so using specifications with fewer controls for omitted factors (Heineck, 2011; Deming, 2017; Gensowski, 2018; Bühler et al., 2020; Edin et al., 2022).

Second, we explicitly examine the behaviors of conscientious individuals. We show that conscientious individuals work longer hours, have more than one job, and work for several more years. This is consistent with our idea of the behaviors of conscientious people, who are self-disciplined, achievement striving, and dutiful. It follows that these individuals would be more likely to dedicate time and effort to their work and be committed to their job. Our results also align with research finding that the trait of conscientiousness overlaps with measures of "grit", which is itself associated with being hard-working and driven by sticking to their goals (Credé et al., 2017; Ponnock et al., 2020). All of these behaviors are imitable characteristics that can be adopted by other individuals with aspirations for higher earnings.

Third, our findings could contribute to the design of role model interventions which focus on improving participants' behaviors and aspirations (Serra, 2022). Specifically, our results show that conscientious individuals engage in economically rewarding behaviors and hence have the potential of serving as excellent role models, especially for aspiring youth. Fourth, our findings point to the specific personality traits and associated behaviors that can be

made the focus of policy interventions. For instance, our results suggest that programs that build discipline and hard work among children have the potential of generating long-term gains.

Despite our findings on the effect of conscientiousness and associated behaviors on earnings, there are still important limitations to consider. Firstly, we are not able to rule out the role of other noncognitive skills, such as adaptability, self-esteem, and competitiveness in explaining earnings (Judge and Bono, 2001; Ng et al., 2005; Heckman et al., 2006). Secondly, our use of parental fixed-effects in our preferred specification means that our sample is limited to individuals with siblings, which could raise questions about the generalizability of our findings to the broader population. Thirdly, there may be other mechanisms at play in the link between personality traits and earnings that we have not been able to investigate with our sample. For example, individual bargaining power and increased productivity could be important factors. While Cubel et al., 2016 has shown that personality traits can influence productivity in a lab experiment, the external validity of their findings is uncertain due to their limited sample size and context. Furthermore, there is currently no research examining the connection between personality traits and bargaining power. These questions therefore remain open for future exploration.

6 Tables

Table 1: Variables definitions

Variable name	Definitions
Panel A: Big Five personality traits:	
Openness to experience	Sum of responses (coded on a scale of 1-5) to the following three questions: 1. Is original, comes up with new ideas (Q3); 2. Has an active imagination (Q8); 3. Values artistic, aesthetic experience (Q10)
Conscientiousness	Sum of responses (coded on a scale of 1-5) to the following three questions: 1. Does a thorough job (Q2); 2. Tends to be lazy (Q9 – reverse-coded); 3. Does things efficiently (Q12)
Extraversion	Sum of responses (coded on a scale of 1-5) to the following three questions: 1. Is talkative (Q1); 2. Is reserved (Q4 – reverse-coded); 3. Outgoing, sociable (Q13);
Agreeableness	Sum of responses (coded on a scale of 1-5) to the following three questions: 1. Has a forgiving nature (Q6); 2. Is considerate and kind to almost everyone (Q11); 3. Is sometimes rude to others (Q14 – reverse-coded)
Neuroticism	Sum of responses (coded on a scale of 1-5) to the following three questions: 1. Is relaxed, handles stress well (Q5 – reverse-coded); 2. Worries a lot (Q7); 3. Gets nervous easily (Q15)
Big Five index	Average of the 5 indices described above, reverse-coding neuroticism to indicate a positive outcome
Panel B: Outcomes	
Employed	=1 if respondent answered yes to: (1) Worked for pay last week, (2) primary activity last week was working, trying to work, helping to earn income, (3) worked to earn income for at least one hour last week, (4) has job/business, but temporarily didn't work last week, (5) worked at a family-owned business last week
Log of monthly earnings	Natural log of monthly earnings (primary and secondary salary, net profit, annual bonus/12) in rupiah, winsorized at 99%.
Manager	=1 if the respondent is a manager
Receives benefits	=1 if the respondent receives benefits
Salaried	=1 if respondent has an employer

Table 1 – continued from previous page

Variable name	Definitions
Log of weekly hours worked	Natural log of hours worked last week, winsorized at 99%. If respondent reported no hours worked last week but working = 1, we use natural log of *normal* hours worked in a week. If working = 0, then hours worked = 0
Number of jobs	Number of jobs the respondent has at time of interview
Job tenure	Number of months respondent has been working in her/his job
Union	=1 if the respondent belongs to a union
Panel C: Covariates	
District Code	4 digit code for 2014 kabupaten
Raven's score	Z score for Raven's Progression Matrix. Scores are out of eight.
Years of Schooling	Highest grade completed
Married	=1 if respondent is married
Gender	=1 if male
Age	Age in years
Muslim	=1 if respondent is Muslim
Javanese	=1 if respondent is Javanese
Urban	=1 if respondent resides in an urban area

Table 2: Summary statistics

Variable	Mean (sd)
Panel A: Big Five personality traits	
Openness to experience	11.04 (2.05)
Conscientiousness	11.63 (1.59)
Extraversion	10.30 (1.97)
Agreeableness	11.79 (1.51)
Neuroticism	7.87 (1.98)
Big Five index	10.38 (1.04)
Panel B: Outcomes	
Employed	0.80 (0.40)
Monthly earnings	1,425,046 (2,137,357.40)
Log of monthly earnings	9.88 (6.37)
Manager	0.10 (0.31)
Receives benefits	0.15 (0.36)
Salaried	0.39 (0.49)
Weekly hours worked	34.49 (28.74)
Log of weekly hours worked	2.85 (1.58)
Number of jobs	1.02 (0.64)
Job tenure	110.19 (136.80)
Union	0.08 (0.28)
Panel C: Covariates	

Table 2 – continued from previous page

Variable	Mean (sd)
Raven's score	4.39
	(2.24)
Years of schooling	8.17
	(4.64)
Married	0.86
	(0.35)
Gender	0.47
	(0.50)
Age	44.99
	(11.87)
Muslim	0.90
	(0.31)
Javanese	0.45
	(0.50)
Urban	0.59
	(0.49)
Observations	19,389

Table 3: Labor market returns to the Big Five index

	OLS		Parental FE	
	Employed	Log of monthly earnings	Employed	Log of monthly earnings
	(1)	(2)	(3)	(4)
Big Five index	0.024***	0.414***	0.021**	0.429***
	(0.003)	(0.042)	(0.008)	(0.123)
Sharpened q-values	[0.001]	[0.001]	[0.003]	[0.001]
Observations	19,389	19,255	4,749	4,703
R-squared	0.170	0.241	0.548	0.595
Controls	Yes	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes	Yes
Parental fixed-effects	No	No	Yes	Yes

Notes: Each cell presents the coefficient for the Big 5 index obtained from a regression of the labor market outcomes on the Big 5 index and selected covariates. Robust standard errors are in parentheses, clustered at the sub-district level. Controls included in the regression are listed in Panel C of Table 1. The Big Five index is normalized and presented as a z-score. *** p<0.01, ** p<0.05, * p<0.1.

Table 4: Labor market returns to Big Five traits

	OLS		Parental FE	
	Employed	Log of monthly earnings	Employed	Log of monthly earnings
	(1)	(2)	(3)	(4)
Openness to experience	0.011***	0.280***	0.006	0.239*
	(0.003)	(0.049)	(0.009)	(0.134)
Sharpened q-values	[0.001]	[0.001]	[>0.1]	[>0.1]
Conscientiousness	0.013***	0.167***	0.027***	0.439***
	(0.003)	(0.046)	(0.009)	(0.136)
Sharpened q-values	[0.001]	[0.001]	[0.016]	[0.014]
Extraversion	0.014***	0.222***	0.007	0.089
	(0.003)	(0.042)	(0.008)	(0.132)
Sharpened q-values	[0.001]	[0.001]	[>0.1]	[>0.1]
Agreeableness	-0.010***	-0.151***	-0.012	-0.172
	(0.003)	(0.044)	(0.009)	(0.145)
Sharpened q-values	[0.001]	[0.001]	[>0.1]	[>0.1]
Neuroticism	-0.013***	-0.204***	-0.009	-0.131
	(0.003)	(0.042)	(0.008)	(0.127)
Sharpened q-values	[0.001]	[0.001]	[>0.1]	[>0.1]
Observations	19,389	19,255	4,749	4,703
R-squared	0.172	0.243	0.550	0.597
Controls	Yes	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes	Yes
Parental fixed-effects	No	No	Yes	Yes

Notes: Each cell presents the coefficient for a Big Five personality trait obtained from the regression of labor market outcomes on the Big Five traits and selected covariates. Big Five traits are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors are in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.

Table 5: Labor market returns to Big Five traits: Mechanisms

	Selection into jobs			Effort exerted			Collective bargaining
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Manager	Receives benefits	Salaried	Log of weekly hours worked	Number of jobs	Job tenure	Union
Openness to experience	-0.005	0.013	0.007	0.066*	0.022	-3.042	-0.000
	(0.008)	(0.009)	(0.012)	(0.037)	(0.014)	(2.140)	(0.007)
Sharpened q-values	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]
Conscientiousness	0.006	-0.001	0.017	0.120***	0.044***	4.591**	0.006
	(0.008)	(0.008)	(0.012)	(0.036)	(0.015)	(2.338)	(0.008)
Sharpened q-values	[>0.1]	[>0.1]	[>0.1]	[0.015]	[0.033]	[>0.1]	[>0.1]
Extraversion	-0.003	0.003	-0.005	0.028	0.021	-0.025	0.005
	(0.007)	(0.009)	(0.012)	(0.033)	(0.014)	(1.861)	(0.007)
Sharpened q-values	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]
Agreeableness	0.005	-0.003	-0.016	-0.052	-0.031**	0.584	-0.002
	(0.008)	(0.009)	(0.012)	(0.035)	(0.014)	(2.412)	(0.007)
Sharpened q-values	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]
Neuroticism	-0.014*	-0.001	0.009	-0.052	-0.009	-3.127	-0.004
	(0.008)	(0.009)	(0.011)	(0.033)	(0.014)	(2.043)	(0.007)
Sharpened q-values	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]	[>0.1]
Observations	4,749	4,749	4,703	4,753	4,753	4,753	4,753
R-squared	0.467	0.568	0.553	0.569	0.559	0.551	0.494
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parental fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each cell presents the coefficient for a Big Five personality trait obtained from the regressions of labor market outcomes on the Big Five traits and selected covariates. Big Five traits are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.

7 Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this work the authors used ChatGPT in order to improve the grammar and the quality of language of the text. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

8 Competing interests statement

We have no actual or perceived conflict of interest relating to the research described in this paper.

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A Online Appendix

Table A.1: Labor market returns to Big Five traits: by linear transformation

	Log of monthly earnings				Log of weekly hours worked			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	ln(x+1)	ln(x+0.1)	ln(x+10)	ln(x) or 0 if x=0	ln(x+1)	ln(x+0.1)	ln(x+10)	ln(x) or 0 if x=0
Openness to experience	0.239*	0.275*	0.204*	0.239*	0.066*	0.085	0.040**	0.068*
	(0.134)	(0.157)	(0.112)	(0.134)	(0.037)	(0.056)	(0.019)	(0.037)
Conscientiousness	0.439***	0.513***	0.365***	0.439***	0.120***	0.182***	0.058***	0.121***
	(0.136)	(0.159)	(0.113)	(0.136)	(0.036)	(0.055)	(0.018)	(0.037)
Extraversion	0.089	0.103	0.075	0.089	0.028	0.044	0.014	0.026
	(0.132)	(0.154)	(0.111)	(0.132)	(0.033)	(0.051)	(0.017)	(0.033)
Agreeableness	-0.172	-0.198	-0.146	-0.172	-0.052	-0.080	-0.025	-0.052
	(0.145)	(0.168)	(0.121)	(0.145)	(0.035)	(0.055)	(0.018)	(0.036)
Neuroticism	-0.131	-0.143	-0.118	-0.131	-0.052	-0.074	-0.028*	-0.052
	(0.127)	(0.148)	(0.106)	(0.127)	(0.033)	(0.051)	(0.016)	(0.033)
Observations	4,703	4,703	4,703	4,703	4,753	4,753	4,753	4,753
R-squared	0.597	0.594	0.601	0.597	0.569	0.568	0.562	0.569
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parental fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each cell presents the coefficient for a Big 5 personality trait obtained from the regression of labor market outcomes on the Big 5 traits and selected covariates. Columns (1) and (5) show estimates obtained with the baseline transformations used to produce Table 4. Big Five traits are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.

Table A.2: Labor market returns to Big Five traits: by winsorization level

	Log of monthly earnings		Log of weekly hours worked	
	(1)	(2)	(3)	(4)
	Winc. at 95%	Winc. at 90%	Winc. at 95%	Winc. at 90%
Openness to experience	0.237*	0.232*	0.063*	0.061*
	(0.134)	(0.134)	(0.036)	(0.036)
Conscientiousness	0.440***	0.438***	0.118***	0.116***
	(0.136)	(0.135)	(0.036)	(0.035)
Extraversion	0.089	0.088	0.028	0.027
	(0.132)	(0.132)	(0.033)	(0.032)
Agreeableness	-0.171	-0.169	-0.052	-0.052
	(0.144)	(0.143)	(0.035)	(0.035)
Neuroticism	-0.125	-0.122	-0.051	-0.051
	(0.127)	(0.126)	(0.032)	(0.032)
Observations	4,703	4,703	4,753	4,753
R-squared	0.596	0.594	0.571	0.572
Controls	Yes	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes	Yes
Parental fixed-effects	Yes	Yes	Yes	Yes

Notes: Each cell presents the coefficient estimate on a Big Five trait obtained from regressions of labor market outcomes on the Big Five traits and selected covariates, where we winsorize the outcome variables at the 95th and 90th percentile, respectively. Big Five traits are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.

Table A.3: Labor market returns to Big 5 traits by gender

	Employed	Log of monthly earnings
	(1)	(2)
Male	0.411***	7.511***
	(0.047)	(0.737)
Openness to experience	0.008	0.301
	(0.013)	(0.185)
Openness*Male	0.000	-0.085
	(0.017)	(0.258)
Conscientiousness	0.038***	0.611***
	(0.014)	(0.205)
Conscientiousness*Male	-0.029	-0.429
	(0.018)	(0.287)
Extraversion	0.011	0.205
	(0.014)	(0.212)
Extraversion*Male	-0.008	-0.236
	(0.016)	(0.245)
Agreeableness	-0.013	-0.179
	(0.014)	(0.213)
Agreeableness*Male	0.002	0.027
	(0.016)	(0.256)
Neuroticism	-0.009	-0.074
	(0.013)	(0.188)
Neuroticism*Male	-0.001	-0.133
	(0.016)	(0.258)
Observations	4,749	4,703
R-squared	0.555	0.603
Controls	Yes	Yes
District fixed-effects	Yes	Yes
Parental fixed-effects	Yes	Yes

Notes: This table reports the coefficients on the interaction terms between Big Five personality traits and a dummy that takes the value 1 if a respondent is male, obtained from regressions of labor market outcomes on the Big Five traits and selected covariates where we interact personality traits with the male dummy. Big Five Personality traits are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.

Table A.4: Labor market returns to the Big Five index: mechanisms

	Selection into jobs			Effort exerted			Collective bargaining
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Manager	Receives benefits	Salaried	Log of weekly hours worked	Number of jobs	Job tenure	Union
Big Five index	0.010	0.007	-0.002	0.125***	0.037***	2.961	0.007
	(0.008)	(0.008)	(0.011)	(0.032)	(0.014)	(2.190)	(0.006)
Observations	4,749	4,749	4,703	4,753	4,753	4,753	4,753
R-squared	0.466	0.567	0.552	0.567	0.556	0.549	0.494
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parental fixed-effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each cell presents the coefficient on the Big Five index obtained from regressions of labor market outcomes on the Big Five index and selected covariates. Big Five Personality traits are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.

Table A.5: Mediation analysis

	Mediators as DVs			Mediators as IVs
Dep vars:	Log of weekly hours worked	Number of jobs	Tenure	Log of monthly earnings
Log of weekly hours worked				2.357***
				(0.052)
Number of jobs				1.613***
				(0.121)
Job tenure				0.002***
				(0.001)
Conscientiousness	0.101***	0.034***	2.547**	-0.016
	(0.020)	(0.008)	(1.254)	(0.051)
Controls	Yes	Yes	Yes	Yes
Observations	4,886	4,886	4,886	4,886

Notes: This table presents the resulting coefficients from a mediation analysis of the association between conscientiousness, effort exerted and monthly earnings. DV stands for dependent variables, IV stands for independent variable. Columns (1) to (3) show the coefficient estimates on conscientiousness when we regress the mediators identified in columns (5) to (7) of Table 5 on conscientiousness and similar covariates to those used in column (4) of Table 4. Column (4) shows the coefficient estimates obtained from regressing monthly earnings on the three mediators, conscientiousness, and similar covariates to columns (1) to (3). *** p<0.01, ** p<0.05, * p<0.1.

Table A.6: Labor market returns to Big Five traits: using outcomes' residuals

	OLS	
	Employed	Log of monthly earnings
	(1)	(2)
Openness to experience	0.004*	0.053*
	(0.002)	(0.031)
Conscientiousness	0.007***	0.070**
	(0.002)	(0.031)
Extraversion	0.001	0.023
	(0.002)	(0.027)
Agreeableness	-0.000	0.007
	(0.002)	(0.029)
Neuroticism	0.001	-0.002
	(0.002)	(0.027)
Observations	16,653	14,850
R-squared	0.061	0.068
Controls	Yes	Yes
District fixed-effects	Yes	Yes

Notes: Each cell presents the coefficient estimate on a Big Five trait obtained from the regression of predicted residuals from the regression of 2007 and 2014 rounds of the outcome variables on individual fixed-effects on the Big Five traits and selected covariates. Big Five Personality variables are normalized and presented as z-scores. Controls included in the regression are listed in Panel C of Table 1. Robust standard errors in parentheses, clustered at the sub-district level. *** p<0.01, ** p<0.05, * p<0.1.