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Personality, occupational sorting and routine work

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Title: Personality, occupational sorting and routine work

Purpose – A prominent labour market feature in recent decades has been the increase in abstract and service jobs, while the demand for routine work has declined. This article examines whether the components of Type A behaviour predict workers’ selection into non-routine abstract, non-routine service and routine jobs.

Design/methodology/approach – Building on the work by Barrick *et al.* (2013), this article first presents how the theory of purposeful work behaviour can be used to explain how individuals with different levels of Type A components sort into abstract, service and routine jobs. Then, using longitudinal data, it examines whether the components of Type A behaviour predict occupational sorting. Estimations were performed based on the linear regression method.

Findings – The results show that the Type A dimension “leadership” was associated with a higher level of abstract and service job tasks in occupation. High eagerness-energy and responsibility were also positively linked with occupation’s level of abstract tasks. These results suggest that workers sort into jobs that allow them to pursue higher-order implicit goals.

Originality/value – Job market polarisation towards low-routine jobs has had a pervasive influence on the labour market during the past few decades. Based on high-quality data that combine prime working-age register information on occupational attainment with information about personality characteristics, the findings contribute to our knowledge of how personality characteristics contribute to occupational sorting in terms of this important job aspect.

Key words: Occupation, Personality, Hunter-Wolf, Type A behaviour, Routine-Biased Technological Change.

1. Introduction

Occupations differ substantially in terms of earnings, skill requirements, prestige level, and task content. Additionally, workers differ in their skills and dispositions, such as work values, vocational interests, self-evaluations and personality traits. The process in which job seekers with divergent characteristics and the available jobs are matched in the labour market (i.e., occupational sorting) has long intrigued researchers, and the interest in this process has encouraged researchers to identify factors that are linked to this sorting process.

Previous studies have found that work values, vocational interests such as Holland's taxonomy, self-evaluations and higher-order personality traits such as the five major personality traits, i.e., the Big Five, predict workers' job choice decisions. For example, there is evidence that positive core self-evaluations are positively correlated with job complexity (Judge *et al.*, 2000) and that people are likely to choose jobs whose value content is in congruence with their own value orientation (Judge and Bretz, 1992). Based on the findings in the Big Five framework, emotionally stable, extraverted, open and conscientious workers sort into jobs with greater decision-making latitude, while disagreeable individuals have more physically demanding and dangerous jobs (Sutin and Costa, 2010). Likely the most widely used model in this context is Holland's theory of vocational personalities, which asserts that individuals with different combinations of six personality types (Realistic, Investigative, Artistic, Social, Enterprising and Conventional (RIASEC)) select themselves into work environments that match their personality types (Holland, 1997; Nauta, 2010). Subsequent research has shown that RIASEC types are significant predictors of people's occupational choices (e.g., Woods and Hampson, 2010).

A prominent explanation for this occupational sorting process is that personality characteristics can be interpreted as attributes that affect workers' job performance. In the Big Five framework, conscientiousness has been the strongest job performance predictor across several work performance criteria and across occupational groups. Additionally, high emotional stability and low neuroticism have generally been found to positively predict job performance (Burch and Anderson, 2009; Cubel *et al.*, 2016). Apart from personality, positive core self-evaluations have also been linked to better job performance. Based on the meta-analysis by Judge and Bono (2001), core self-evaluations were identified to predict job performance as well or even better than conscientiousness.

Personality characteristics may also affect occupational sorting through motivational processes. The theory of purposeful work behaviour developed by Barrick *et al.* (2013) explains how differences in personality traits drive individuals to strive for higher-order implicit goals – communion, status, autonomy, and achievement – to greater or lesser degrees. These higher-order goals often guide individuals' behaviour even if they are not consciously aware of them. According to Barrick *et al.* (2013), communion striving is the extent to which individuals are motivated to achieve meaningful contact and to interact in harmonious ways with others at work, whereas status-striving motivation represents an individual's desire to exert power and influence over others. Individuals with high autonomy-striving motivation seek to gain control and understanding of the work environment and pursue personal growth opportunities, whereas individuals with elevated achievement striving have a high need to demonstrate personal competence and to experience a sense of accomplishment. The extent to which job characteristics allow individuals to pursue their higher-order implicit goals affects the level of experienced meaningfulness, which, in turn,

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3 affects motivational striving and, therefore, work-related outcomes such as occupational
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5 sorting (Barrick *et al.*, 2013).
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10 Although the role of personality characteristics in occupational sorting has generated growing
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12 interest among scholars, an understudied topic in this strand of research still remains. One of
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14 the central labour market features in industrial countries over the past decades has been a
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16 secular increase in low-routine jobs accompanied by a decline in the number of routine jobs.
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18 A central driver of this phenomenon is technological progress in information technology and
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20 the collapse of the price of computing power, which has led to a rapid substitution of labour
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22 by computer technology in routine tasks (Goos *et al.*, 2014). Autor *et al.* (2003, p. 1283)
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24 define routine tasks as activities that “can be accomplished by machines following explicit
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26 programmed rules” (see also Acemoglu and Autor, 2011; Goos *et al.*, 2014). Thus, routine
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28 tasks are characterized by precise, well-understood step-by-step processes with low task
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30 variability, and they often require repetitive physical motion, monitoring or non-complex
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32 cognitive skills (Goos *et al.*, 2010). Examples of occupations with a high level of routine job
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34 tasks include “drivers and mobile plant operators” (International Standard Classification of
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36 Occupations (ISCO-88) code 83), “stationary plant and related operators” (ISCO-88 code 81)
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38 and “machine operators and assemblers” (ISCO-88 code 82) (Goos *et al.*, 2010, Table 4).
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40 Additionally, clerical jobs such as bookkeeping include a significant number of tasks that can
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42 be characterized as routine intensive (Acemoglu and Autor, 2011; Goos *et al.*, 2014).
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51 Non-routine tasks, by contrast, are defined as activities that require “flexibility, creativity,
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53 generalized problem-solving capabilities, and complex communication” (Autor *et al.*, 2003,
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55 p. 1322). These tasks are characterized by high situational variability, which requires
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57 adaptability, therefore making them difficult to replace with computers. Non-routine tasks
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can be further subdivided into abstract tasks and service tasks. According to Acemoglu and Autor (2011), abstract tasks are “activities that require problem-solving, intuition, persuasion, and creativity”. Goos *et al.* (2010, Table C1) further provide a list of variables that describe worker characteristics, worker requirements and general work activities of abstract job tasks. These variables include, for example, complex problem solving, creativity, critical thinking, coordination, communication ability, and decision-making. Examples of occupations with a high level of abstract job tasks include “managers” (ISCO-88 codes 12 and 13), “physical, mathematical and engineering professionals” (ISCO-88 code 21) and “life science and health professionals” (ISCO-88 code 22) (Goos *et al.*, 2010, Table 4). Service tasks, on the other hand, are activities that involve caring for others (Goos *et al.*, 2010, p. 18). Characteristics that describe service tasks include service orientation, social perceptiveness, selling, assisting or caring for others, resolving conflicts and negotiating with others, active listening, and establishing and maintaining interpersonal relationships (Goos *et al.*, 2010, Table C1). Examples of jobs with a high level of service job tasks include “life science and health professionals” (ISCO-88 code 22), “managers” (ISCO-88 codes 12 and 13) and “models, salespersons, and demonstrators” (ISCO-88 code 52) (Goos *et al.*, 2010, Table 4).

For simplicity, we call jobs that have the preponderance of abstract, service and routine tasks abstract, service and routine jobs, respectively. The importance of personality characteristics in the occupational sorting process has been identified in several earlier studies, and it is also likely that these traits affect the way workers select themselves into abstract, service and routine jobs. This paper examines how personality characteristics, measured by the components of Type A behaviour (aggression, leadership, responsibility, and eagerness-energy), are related to occupational sorting in terms of a job task’s routine dimension. We first present how the theory of purposeful work behaviour by Barrick *et al.* (2013) can be

used to explain how individuals with different levels of Type A components sort themselves into abstract, service and routine jobs. Then, using longitudinal data, we examine how these components at age 15 predict occupational sorting at the prime working age.

2. Type A behaviour and its components

The origins of the Type A behaviour pattern can be found in the work of Friedman and Rosenman (1959), who observed that work behaviours of men with elevated levels of cardiac risk factors followed consistent patterns. This insight motivated the Western Collaborative Group Study, which revealed that persons who were at risk of coronary heart disease shared common behavioural patterns, namely, competitive achievement striving, time urgency and impatience, aggression and hostility (Espens *et al.*, 2017). Friedman and Rosenman (1974) termed this type of behavioural pattern the “Type A” personality. Subsequently, Type A behaviour has been linked to multiple work and career outcomes, such as job satisfaction, work performance, and entrepreneurial interests (e.g., Bluen *et al.*, 1990; Jamal, 1990; Jamal and Baba, 2003; Viinikainen *et al.*, 2017), and better performance in jobs with high task variety (Lee *et al.*, 1988).

The measurements of Type A behaviour among adults have primarily been conducted using a Structured Interview approach or self-reported Jenkins Activity Survey (Espens *et al.*, 2017). However, because these tests assess adult behaviour, such as job involvement, they cannot be appropriately used with children (Wolf *et al.*, 1982). To account for this shortcoming, Wolf *et al.* (1982) created a self-administered Type A measure called the Hunter-Wolf A-B rating scale, which assesses psychosocial factors that contribute to the risk of coronary heart disease during the early years. The Hunter-Wolf scale consists of 24 items that assess different

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dimensions of Type A behaviour on a continuum. Based on factor analysis on 23 of these items (one item referring to school behaviour was dropped because some participants did not attend school at the time of measurement), Ravaja *et al.* (1996) identified four components of Type A behaviour: leadership, responsibility, eagerness-energy, and aggression.¹ The results obtained by Bluen *et al.* (1990) suggest that the use of different dimensions of Type A behaviour can be more predictive of work performance than the global Type A construct. Consequently, in this paper, we focus on the four components of Type A behaviour.

3. Hypothesized links among Type A behaviour, implicit goals, and job tasks

Since abstract, service and routine tasks differ in content, they are likely to attract workers with divergent motivational needs. The theory of purposeful work behaviour by Barrick *et al.* (2013) proposes how differences in the Big Five personality traits lead individuals to strive for four higher-order implicit goals (communion, status, autonomy, and achievement) to different degrees and how this process may affect occupational sorting. In Section 3.1, we first provide a set of hypothesized links between the components of Type A behaviour and the four higher-order goals. In Section 3.2, we explain the extent to which abstract, service, and routine job tasks are likely to provide opportunities to pursue these goals. Based on these arguments, in Section 3.3, we provide testable hypotheses on how differences in Type A components affect occupational sorting.

3.1 Type A dimensions and higher-order implicit goals

¹ The items related to each dimension are presented in Table 2.

Based on the Hunter-Wolf scale items (Ravaja *et al.*, 1996), individuals high in leadership like to take charge of things, and they feel that their peers often choose them to be leaders in various activities. Thus, individuals high in leadership seek opportunities to fulfil their desire to gain influence and power, which matches well with status-striving motivational need. High leadership is also related to wide interests, which foster learning and promote the ability to understand and control the environment, thus helping to fulfil autonomy-striving status (Barrick *et al.*, 2013). Leadership is also related to a willingness to take charge and a willingness to win. These are related to achievement striving, which represents an individual's desire to complete tasks efficiently and thus to demonstrate personal competence and a sense of accomplishment.

Responsibility is associated with ambition, being hardworking and a tendency to take things seriously, whereas individuals high in eagerness-energy are prone to do things quickly and think about many things at the same time (Ravaja *et al.*, 1996). These traits match with achievement striving motivational need, which refers to a high need to demonstrate personal competence and to experience a sense of accomplishment.

Finally, based on the Hunter-Wolf scale items (Ravaja *et al.*, 1996), an individual high in aggression gets angry and loses his/her temper easily. The individual may find it difficult to wait or may tend to interrupt when someone else is talking. These characteristics are inversely related to high communion striving, which refers to the needs to interact well with others and to want to maintain positive relations with other people (Barrick *et al.*, 2013).

Hence, we argue the following.

Hypothesis 1a: High leadership is associated with high status-striving, autonomy-striving and achievement-striving motivations.

Hypothesis 1b: High responsibility and eagerness-energy are associated with high achievement-striving.

Hypothesis 1c: High aggression is associated with low communion striving.

3.2 Higher-order implicit goals and job tasks

Job tasks that provide opportunities to gather power and to enhance one's own status motivate individuals with high status-striving motivation (Barrick *et al.*, 2013). Abstract job tasks are likely to provide these opportunities; thus, we would expect that abstract tasks attract individuals with high status-striving motivation. On the other hand, because service tasks and routine tasks typically provide limited opportunities to acquire power or status, it is likely that these tasks will not be motivating to high status-striving individuals.

Abstract job tasks allow workers to engage in divergent and creative mental activities, which allow independence and involve high task variety. These job task characteristics satisfy the curious nature of autonomy-striving individuals who aim to maintain control over the way in which job tasks are completed (Barrick *et al.*, 2013). Moreover, service tasks involve situational variability and therefore require autonomy and adaptability. Thus, we would also expect service tasks to fulfil autonomy-striving motivation, albeit likely to a lesser extent than for abstract tasks. Routine tasks typically provide few opportunities for autonomy striving, which limits their attractiveness among high autonomy-striving individuals.

Abstract job tasks are likely to involve high task identity, i.e., the degree to which job tasks involve completing a whole identifiable piece from beginning to end, which fits well with high achievement-striving motivation to demonstrate personal competence and get things done in a timely, efficient way. Service tasks are also likely to have high task identity, which facilitates an individual's achievement striving. Although the ability to complete tasks efficiently and on time is valuable in routine jobs, the task identity in these jobs is likely to be low, which makes them relatively less attractive to high achievement-striving individuals.

Finally, abstract job tasks include coordination and communication that involves interpersonal interaction, and this may attract workers with high communion-striving motivation. Furthermore, service tasks provide opportunities to interact with other people in cooperative ways, which is consistent with communion-striving motivation. Routine job tasks instead include relatively little social interaction, which reduces the opportunities to fulfil communion-striving motivation through these job tasks. Based on these arguments, we propose the following hypotheses.

Hypothesis 2a: A high status-striving motivational need increases the likelihood that an individual sorts into an abstract job and decreases the likelihood that an individual sorts into a service or routine job.

Hypothesis 2b: A high autonomy-striving motivational need increases the likelihood that an individual sorts into an abstract or service job and decreases the likelihood that an individual sorts into a routine job.

Hypothesis 2c: A high achievement-striving motivational need increases the likelihood that an individual sorts into an abstract or service job and decreases the likelihood that an individual sorts into a routine job.

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Hypothesis 2d: A high communion-striving motivational need increases the likelihood that an individual sorts into an abstract or service job and decreases the likelihood that an individual sorts into a routine job.

3.3 Type A dimensions and job tasks: Testable hypotheses

Based on the arguments presented in Sections 3.1 and 3.2, we now present testable hypotheses on how differences in Type A components are linked to occupational sorting. We will test these hypotheses empirically in Section 5.

Hypothesis 3a. High leadership increases the likelihood that an individual sorts into an abstract job. Whether high leadership increases or decreases the likelihood that an individual sorts into a service job is unclear. The net effect depends on the relative importance of status-striving, autonomy-striving, and achievement-striving motivations. High leadership decreases the likelihood that an individual sorts into a routine job.

Hypothesis 3b. High responsibility increases the likelihood that an individual sorts into an abstract or service job and decreases the likelihood that an individual sorts into a routine job.

Hypothesis 3c. High eagerness-energy increases the likelihood that an individual sorts into an abstract or service job and decreases the likelihood that an individual sorts into a routine job.

Hypothesis 3d. High aggression decreases the probability that an individual sorts into an abstract or service job and increases the probability that an individual sorts into a routine job.

Table 1 summarizes the hypothesized relationships among Type A dimensions, higher-order implicit goals and job task characteristics.

< Table 1 here >

4. Method

4.1 Participants and design

The participants were drawn from the Cardiovascular Risk in Young Finns Study (YFS). This ongoing study began in 1980, when 4,320 participants in six age cohorts (aged 3 (cohort 1), 6 (cohort 2), 9 (cohort 3), 12 (cohort 4), 15 (cohort 5), and 18 (cohort 6) years) were randomly chosen from five Finnish university hospital regions using the national population register (Raitakari *et al.*, 2008). A total of 3,596 individuals participated in the study in 1980. The YFS contains information on the components of Type A behaviour. In this study, we use information that was obtained when the participants were 15 years old (cohort 4 in 1983, cohort 3 in 1986 and cohort 2 in 1989; for the youngest and the two oldest age cohorts, information on Type A dimensions at age 15 is not available). Our estimation sample ($N = 1,142$, 52% female, 48% male, average age = 33 years as of 2004) is thus smaller than the total sample size.

To obtain information on the participants' occupational statuses, the YFS was linked to the Finnish Longitudinal Employer-Employee Data (FLEED) of Statistics Finland. This linking was based on unique personal identification codes, and there were no misreported codes. Therefore, we avoid problems created by errors in record linkages (e.g., Ridder & Moffitt, 2007), and every person in the YFS data is also identified in the FLEED. The FLEED records the participants' occupational statuses using the International Standard Classification of Occupations (ISCO-88 2-digit level) standard in 2004-2009 when the participants in our

estimation sample were between 30 and 41 years of age. Because cross-sectional occupation data are prone to idiosyncratic components, such as economic fluctuations, we utilise individuals' occupational information over the entire period 2004-2009. In this way, we avoid the problem that idiosyncratic components related to cross-sectional data influence the results. Additionally, information on the highest obtained educational degree in 2009 is drawn from the FLEED. To account for the participants' parental background, we linked the FLEED to the Longitudinal Population Census (LPC) of Statistics Finland using unique personal identification codes. The LPC contains information on parental education and annual income in 1980.

4.2 Statistical methods

We use a linear regression method (ordinary least squares, OLS) to estimate how the components of Type A behaviour are related to sorting into abstract, service and routine jobs over the period 2004-2009. Thus, instead of regressing higher-order implicit goals on Type A behaviour characteristics and job tasks on goals, we use a reduced-form specification in which job characteristics are regressed on Type A behaviour characteristics and goals are factored out. We follow this approach because individuals are typically unaware of the higher-order goals that guide their behaviour (Barrick *et al.*, 2013); thus, measuring such goals is very challenging in empirical applications. All models include controls for cohort, sex and family background (parental education and income in 1980).

We analyse Type A behaviour as a potential causal factor affecting workers' selection into abstract, service and routine jobs. Because behavioural characteristics were measured before participants had gained any significant labour market experience, the possible bias resulting

from reverse causality is eliminated. This approach is a major advantage since it is possible that labour market experiences affect behavioural patterns. Labour market measures, on the other hand, were measured at prime working age. The Type A behaviour characteristics reflect underlying personality traits that also likely affect occupational sorting. As long as Type A behaviour is an appropriate proxy for unobserved personality traits, causal inference is feasible. Otherwise, it is possible that personality traits are confounding factors that lead to omitted variable bias in our results. Because of this, we prefer to be conservative and avoid using causal terminology when interpreting the results.

Gender-based occupational segregation is an empirical fact in western countries (OECD, 2006), Finland included. Therefore, we examine whether gender has a moderating effect on Type A behaviour-based occupational sorting. To examine these moderator effects, we estimate interaction models incorporating additional variables into the models that are products of the main terms. As another potential moderator, we consider education, which also has a strong link to occupational sorting. All statistical analyses were performed using STATA 14.2.

4.3 Measures

4.3.1 Type A behaviour

The measures of Type A behaviour in this study are based on factor analysis conducted by Ravaja *et al.* (1996). Based on 23 items of the Hunter-Wolf A-B rating scale (Wolf *et al.*, 1982), Ravaja *et al.* (1996) identified four components of Type A behaviour. The items, which were ranked on a 7-point scale, are shown in Table 2, and reliability, as assessed by

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Cronbach’s alpha, was as follows in 1983: leadership, .65; responsibility, .64; aggression, .68; and eagerness-energy, .56 (Ravaja *et al.* (1996). The original Hunter-Wolf A-B rating scale consisted of 24 items, which assessed different dimensions of Type A behaviour. Because some participants did not attend school at the time of measurement, one of the original items referring to school behaviour was dropped from the measurements (Ravaja *et al.*, 1996).

< Table 2 here >

4.3.2 Job task measures

To characterize peoples’ jobs, we linked the occupational status (based on FLEED) to information in Goos et al. (2010). Goos et al. (2010, Table 4) report the preponderance of abstract, service, and routine tasks for each occupation for the ISCO-88 2-digit-level occupations. A major advantage of these measures is that they are not directly linked to educational attainment but instead describe the actual content of a job.

5. Results

Correlations, means and standard deviations are reported in Table 3. The correlations show that higher leadership ($r = 0.21, p < 0.01$), responsibility ($r = 0.11, p < 0.01$), and eagerness-energy ($r = 0.13, p < 0.01$) were related to a higher level of abstract job tasks in occupation. These three characteristics were also positively related to occupation’s service task preponderance, although in the case of leadership, the correlation coefficient was lower ($r = 0.12, p < 0.01$). The level of occupation’s routine job tasks had a negative correlation with

leadership ($r = -0.14$, $p < 0.01$), responsibility ($r = -0.14$, $p < 0.01$), eagerness-energy ($r = -0.12$, $p < 0.01$), and aggression ($r = -0.06$, $p < 0.05$).

Concerning background variables, being female was positively ($r = 0.40$, $p < 0.01$) and negatively ($r = -0.30$, $p < 0.01$) related to the occupation's level of service and routine tasks, respectively. Older age was positively related to the level of routine tasks ($r = 0.06$, $p < 0.05$) and negatively related to the level of abstract task ($r = -0.07$, $p < 0.05$) in occupation. Higher parental socioeconomic status (education and earnings) was positively correlated with occupation's level of abstract tasks ($p < 0.01$) and service tasks ($p < 0.05$) and negatively correlated with the level of routine tasks ($p < 0.01$). Finally, having a university-level education was negatively correlated with the level of occupation's routine tasks ($r = -0.37$, $p < 0.01$) and positively correlated with the level of occupation's abstract tasks ($r = 0.52$, $p < 0.01$) and service tasks ($r = 0.25$, $p < 0.01$).

The correlations in Table 3 also show that the Type A dimension "leadership" in particular was positively correlated with parental education and earnings ($p < 0.01$) and that all four behaviour dimensions were correlated with mother's education ($p < 0.05$). We also found significant correlations with gender and all four dimensions of Type A behaviour ($p < 0.05$). Thus, personality characteristics may reflect omitted gender or family background variables and have no independent effect on labour market outcomes. Controlling for these predetermined variables is therefore important because these factors may confound the associations between personality and occupational outcomes. Because age was also correlated with occupational sorting, we augmented all our models with a full set of cohort indicators.

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< Table 3 here >

5.1 Connections between dimensions of Type A behaviour and occupation’s job task characteristics

The OLS estimates for the baseline model are reported in Table 4. The results show that a one-standard deviation increase in leadership was related to a 0.11-point higher level of abstract job tasks ($p < 0.01$), a 0.8-point higher level of service tasks ($p < 0.01$) and a 0.09-point lower level of routine tasks ($p < 0.01$) in occupation. Higher responsibility was related to higher levels of abstract tasks ($\beta = 0.07$; $p < 0.01$) and lower levels of routine tasks ($\beta = -0.08$; $p < 0.01$) in occupation, but the association between responsibility and service tasks was not significantly different from zero ($\beta = 0.03$; $p = 0.108$). Higher eagerness-energy was also positively related with occupation’s level of abstract tasks ($\beta = 0.06$; $p < 0.5$), but connections between this trait and the level of occupation’s service and routine tasks were not statistically significant ($\beta = 0.02$, $p = 0.421$; $\beta = -0.03$; $p = 0.318$, respectively). We found no connections between aggression and any of the occupation’s job task measures ($p > 0.164$).

< Table 4 here >

5.2 Moderating effects of participant sex and education

The extent to which the findings of Table 3 differ between men and women is shown in Table 5. The only significant difference between men and women was related to sorting into routine jobs. While among men, higher responsibility and eagerness-energy were related to a lower probability of working in routine jobs, among women, these behavioural characteristics were

not related to occupational sorting in terms of occupations' routine task preponderance.

Among women, higher aggression was associated with a lower level of routine job tasks in occupation ($\beta = -0.07$, $p = 0.035$), but for men, this coefficient was not significant. However, this gender difference was non-significant.

< Table 5 here >

Table 6 shows the moderating effects of education on the relationship between Type A traits and job characteristics. None of the interaction effects was significant, suggesting that the way components of Type A behaviour predict occupational sorting does not differ by educational attainment.

< Table 6 here >

6. Discussion

The findings of this study provide further evidence that personality characteristics are important determinants of occupational sorting. Based on our empirical findings, higher leadership, responsibility and eagerness-energy were related to a higher preponderance of abstract job tasks; higher leadership was associated with a higher preponderance of service tasks; and lower leadership and responsibility were related to a higher preponderance of routine job tasks in occupation. Thus, our results are in accordance with previous studies that have identified the importance of personality in occupational sorting (e.g., Antecol and Cobb-Clark, 2013; Borghans *et al.*, 2008; Cobb-Clark and Tan, 2011; Heckman *et al.*, 2006; Judge

et al., 2000; Kruger and Schkade, 2008). In the next sections, we will discuss at greater length the results obtained and their consistency with the aforementioned hypotheses 3a-3d.

Regarding leadership (Hypothesis 3a), we hypothesized that because abstract job tasks have high task identity and because they provide opportunities to obtain power and enhance status, high leadership would increase the likelihood that an individual sorts into an abstract job. Our empirical results supported this hypothesis: higher leadership was positively related to occupation's abstract task preponderance in the pooled sample as well as among women and men separately. Another hypothesis regarding leadership was that high leadership may either increase or decrease the likelihood that an individual sorts into a service job because two opposite forces are at work: service job tasks provide high leadership individuals opportunities to strive for autonomy and achievement but only limited opportunities for status attainment. Based on our empirical findings, the former force seems to dominate the overall relationship, i.e., high leadership was positively related to occupation's service task preponderance. Finally, we hypothesized that high leadership would decrease the likelihood that an individual sorts into a routine job. Our empirical results supported this hypothesis, and the result applied to both women and men.

In the context of responsibility (Hypothesis 3b) and eagerness-energy (Hypothesis 3c), we hypothesized that abstract job tasks and service job tasks that allow striving for achievement are likely to attract individuals with high responsibility and eagerness-energy. Thus, high responsibility or eagerness-energy would increase the likelihood that an individual sorts into occupations with a high level of abstract or service tasks. Our pooled sample results supported the hypotheses that high responsibility and eagerness-energy are linked to a higher level of abstract tasks in occupation, but among women, the point estimates were statistically

non-significant. The pooled coefficients regarding responsibility and eagerness-energy as predictors of sorting into service jobs were also positive (i.e., in accordance with our hypotheses) but non-significant. It may be that because our sample size is relatively small ($N = 1,142$), the significance tests do not have enough power to reject the null hypothesis. Another possibility is that these behavioural dimensions are not important predictors of occupational sorting in terms of the level of service tasks. In the context of routine job tasks, we hypothesized that high responsibility and high eagerness-energy would decrease the likelihood that an individual sorts into a job with a high level of routine tasks. Among men, our empirical results supported the notion that individuals with higher eagerness-energy and responsibility would be less likely to sort into routine jobs, which is consistent with our prior hypotheses.

Concerning aggression, we hypothesized that high aggression lowers the probability that an individual sorts into an occupation with a high level of abstract job tasks (Hypothesis 3d). The rationale for this hypothesis was that because individuals with high aggression may face discordant work situations in job tasks that require social interaction, they may avoid such circumstances. However, we did not find support for this hypothesis. Previous research has shown that high agreeableness, which is related to aggression, is related to lower earnings (e.g., Judge *et al.*, 2012; Mueller and Plug, 2006). One explanation for this phenomenon is that agreeable people who value social harmony may feel that reputation building or advancement in organizational position undermines this harmony (Judge *et al.*, 2012). This hinders agreeable (or low-aggression) individuals from pursuing high positions in organizational hierarchy, i.e., jobs that are often characterized by a high level of abstract job tasks. Although people with high aggression may perceive work situations that require social interaction discordant with their motivational needs, this behavioural trait may also drive

individuals to pursue higher status; thus, the net effect on the probability of sorting into abstract jobs is ambiguous. Since service jobs also require social interaction, we hypothesized that communion-striving motivation would reduce the probability that high-aggression individuals sort into service jobs. However, the connection between aggression and the level of service job tasks in occupation was negligible, and we did not find support for this hypothesis. Finally, we hypothesized that high aggression would increase the probability that an individual sorts into a routine job. We did not find empirical support for this hypothesis either. Among women, our results even suggested the opposite, i.e., that higher aggression would decrease the likelihood that an individual sorts into an occupation with a high level of routine job tasks. Overall, our findings imply that aggression was not a strong predictor of occupational sorting in terms of the occupation's level of routine job tasks.

Our results implied that there are some gender differences in the way Type A behavioural dimensions predict occupational sorting. The finding that there are gender differences in the way that personality characteristics are related to occupational sorting has also been documented in earlier studies (e.g., Antecol and Cobb-Clark, 2013; Cobb-Clark and Tan, 2011). Our results showed that while higher eagerness-energy and responsibility were negatively related to occupation's routine task preponderance among men, these characteristics did not have predictive value among women. The observed gender differences may result from gender-based occupational segregation (OECD, 2006), and a closer scrutiny of how males and females sort into different types of routine jobs might shed more light on this result.

We also tested whether education moderates the association between behavioural characteristics and occupational sorting. However, we did not find support for such effects.

The measures of occupation's routine, service, and abstract job task preponderances were constructed such that they are not directly linked to educational attainment but instead describe the actual content of a job. The absence of moderating effects suggests that similar behavioural characteristics predict occupational sorting in terms of these job characteristics regardless of educational qualifications.

This study has some limitations that should be taken into account when interpreting the current findings. First, the reliabilities of the Hunter-Wolf subscales were acceptable but somewhat low. This fact might reflect the young age of the participants at the time that these personality characteristics were measured (Jokela and Keltikangas-Järvinen, 2009). Using measures that have low reliability leads to low statistical power that increases the probability of Type II error (i.e., false negative) (VanVoorhis and Morgan, 2007); thus, our results can be considered conservative. However, the Hunter-Wolf measures we use in this paper have also been used in several previous articles, and the measures have displayed high predictive validity (e.g., Hintsa *et al.*, 2010; Keltikangas-Järvinen *et al.*, 2007; Yang *et al.*, 2012). Second, although most of our empirical results were consistent with the hypotheses derived from the theory of purposeful work behaviour (Barrick *et al.*, 2013), our results do not directly demonstrate that the components of Type A behaviour would be related to higher-order goals or quantify the extent to which higher-order implicit goals would explain the sorting process. Future research should shed more light on these mechanisms. Third, measuring behavioural characteristics in adolescence, i.e., before any labour market experience, eliminates the possibility that labour market success would shape behaviour, which is a significant advantage. However, behavioural traits may change as young people grow up and mature. Based on YFS, the temporal stability of Type A components is high; 3-year stability among participants who were between 12 and 24 years old at baseline varied

between $r = 0.50$ and $r = 0.63$, and correspondingly, 15-year stability varied from $r = 0.31$ and $r = 0.50$ (Keltikangas-Järvinen *et al.*, 2007). There are also important normative changes, i.e., aggressiveness decreased over time, responsibility and eagerness-energy increased over time, and leadership remained stable (Hintsa *et al.*, 2014). Considering potential bias resulting from changes in dimensions of Type A behaviour, individual variations in change are more problematic than normative development. This is because individual-level differences in changes would alter the rank order of Type A dimensions between individuals, whereas normative changes would just affect the average level of each trait, leaving the individual-level differences unchanged. Given that individual differences in change are random, such changes would lead to downward-biased estimates.

Several studies have focused on the connections between the Big Five personality traits and occupational sorting (e.g., John and Thomsen, 2014; Sutin and Costa, 2010). In this study, we used the Hunter-Wolf scale, which was designed to measure behaviour, which arguably has a potentially important role as a determinant of labour market success and occupational choices later in life. Because the Big Five personality began to gain popularity in the later part of the 1980s (Digman, 1990), analyses where pre-labour market personality characteristics predict prime working-age earnings would typically not be feasible using the Big Five. Information about the Big Five personality traits is also not available in the early follow-ups of YFS. Future studies could, however, assess how Big Five traits are related to occupational sorting in terms of job task abstract, service, and routine dimensions.

The main strength of this study is the use of longitudinal data, which makes it possible to address three major potential problems. First, because personality characteristics were measured before individuals had gained labour market experience, reverse causality is

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3 unlikely to explain the results. Second, longitudinal data mitigate the problem that
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5 idiosyncratic components related to cross-sectional data, such as economic fluctuations, drive
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7 the results. Finally, the use of personality measures and occupational characteristics, which
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9 are both based on individuals' own assessments, is potentially problematic if personality
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11 affects the way in which individuals assess their jobs (Hamermesh, 2004). In our empirical
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13 setting, personality and job characteristics are obtained from different sources; thus, the
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15 potential bias resulting from self-reported information on occupational characteristics can be
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17 ignored.
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Table 1. Relationships between dimensions of Type A characteristics, higher-order implicit goals and job tasks.

(1)	(2)	(3)	(4)
Dimension of Type A behaviour	Higher-order implicit goals (Barrick <i>et al.</i> , 2013)	Relevant job task characteristics (Barrick <i>et al.</i> , 2013)	Job tasks
High leadership	<u>Status</u> Influence, prestige, power	Power Status	Abstract + Service - Routine -
High leadership	<u>Autonomy</u> Gaining understanding and control over the environment; Control over how and when to complete job tasks	Independence Creative thinking Decision making Task variety	Abstract + Service + Routine -
High leadership High responsibility High eagerness-energy	<u>Achievement</u> Desire to complete tasks efficiently and on time	High task identity	Abstract + Service + Routine -
Low aggression	<u>Communion</u> Acceptance, getting along with others	Interdependence Interaction outside organization	Abstract + Service + Routine -

Note: Table indicates (i) which dimensions of Type A behaviour are linked to each of the higher-order goals (columns 1 and 2); (ii) the relevant job task characteristics related to higher-order goals (columns 2 and 3); and (iii) how well abstract, service, and routine jobs tasks match with each higher-order goal (+/- job tasks match well/not well with the higher-order goal; column 4).

Table 2. Items of the Type A dimensions.

Type A dimensions	Items
Leadership	I always take charge of things. My peers always choose me to be a leader in various activities. I always want to win. I like to tell others what to do. I have many hobbies. I am interested in many things.
Responsibility	I am hard driving. It bothers me if I am late. I take things seriously
Eagerness-energy	I am always in a hurry. I walk at a fast pace. I think time often passes quickly. I talk quickly. I eat quickly. I think about many things at the same time. I drink quickly.
Aggression	It takes very little to get me angry. I tend to get into fights easily. I often interrupt when someone else is talking I find it difficult to wait. I talk loudly. I like to argue with others. I lose my temper easily.

Reference: Jokela and Keltikangas-Järvinen, 2009.

Table 3. Means, standard deviations, and correlations.

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Average level of abstract job tasks in occupation 2004-2009	0.23	0.82	1.00													
2. Average level of service job tasks in occupation 2004-2009	0.31	0.77	0.41**	1.00												
3. Average level of routine job tasks in occupation 2004-2009	-0.31	0.94	-0.52**	-0.67**	1.00											
4. Leadership	4.18	0.86	0.21**	0.12**	-0.14**	1.00										
5. Responsibility	4.65	1.06	0.11**	0.12**	-0.14**	0.13**	1.00									
6. Eagerness-energy	4.65	0.65	0.13**	0.10**	-0.12**	0.29**	0.05	1.00								
7. Aggression	3.76	0.90	0.01	0.04	-0.06*	0.17**	-0.20**	0.27**	1.00							
8. Gender	0.52	0.50	-0.04	0.40**	-0.30**	-0.07*	0.14**	0.07*	0.08**	1.00						
9. Age in 2004 (years)	32.93	2.46	-0.07*	-0.02	0.06*	-0.01	0.03	-0.04	0.05	-0.01	1.00					
10. University education (2004)	0.25	0.43	0.52**	0.25**	-0.37**	0.15**	0.13**	0.10**	0.03	0.05	-0.16**	1.00				
11. Income father (1980)	8647.71	5239.79	0.23**	0.16**	-0.17**	0.13**	0.03	0.12**	0.01	0.00	-0.02	0.23**	1.00			
12. Income mother (1980)	4445.60	3286.80	0.12**	0.07*	-0.09**	0.14**	0.01	0.10**	0.01	-0.04	0.11**	0.13**	0.28**	1.00		
13. University education father (1980)	0.10	0.30	0.29**	0.13**	-0.17**	0.14**	0.04	0.06	-0.04	-0.03	-0.09*	0.24**	0.46**	0.26**	1.00	
14. University education mother (1980)	0.07	0.26	0.19**	0.09**	-0.13**	0.10**	0.07*	0.07*	-0.06*	-0.05	-0.08**	0.23**	0.30**	0.43**	0.49**	1.00

Note: $N = 1,142$. M, mean value; SD, standard deviation; * $p < 0.05$; ** $p < 0.01$; Gender: male = 0, female = 1. University education: no university degree = 0, university degree = 1.

Table 4. Associations between Type A dimensions and job characteristics.

	Average level of abstract job tasks in occupation 2004-2009			Average level of service job tasks in occupation 2004- 2009			Average level of routine job tasks in occupation 2004- 2009		
	b	SE	β	b	SE	β	b	SE	β
Leadership	0.13**	0.03	0.11	0.10**	0.02	0.08	-0.11**	0.03	-0.09
Responsibility	0.06**	0.02	0.07	0.03	0.02	0.03	-0.07**	0.03	-0.08
Eagerness- energy	0.08*	0.04	0.06	0.03	0.04	0.02	-0.04	0.04	-0.03
Aggression	-0.00	0.03	-0.00	-0.00	0.02	-0.00	-0.04	0.03	-0.04
Female	-0.07	0.05	-0.03	0.61**	0.04	0.31	-0.55**	0.05	-0.28
Income, father (1980)	0.00**	0.00	0.08	0.00**	0.00	0.07	-0.00**	0.00	-0.09
Income, mother (1980)	0.00	0.00	0.00	0.00	0.00	0.02	-0.00	0.00	-0.02
High education, father (1980)	0.53**	0.09	0.16	0.15*	0.08	0.05	-0.27**	0.10	-0.08
High education, mother (1980)	0.11	0.11	0.03	0.08	0.10	0.02	-0.19	0.11	-0.05
Cohort born in 1971	-0.00	0.06	-0.00	0.01	0.05	0.01	0.06	0.06	0.03
Cohort born in 1968	-0.10	0.06	-0.05	-0.02	0.05	-0.01	0.11	0.06	0.05
R2	0.14			0.21			0.16		

Note: $N = 1,142$. b, regression coefficient; SE, heteroscedasticity robust standard error; β , x-standardized coefficient; * $p < 0.05$; ** $p < 0.01$. Gender: male = 0, female = 1.

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Table 5. Associations between Type A dimensions and job characteristics. Interactions by gender.

	Average level of abstract job tasks in occupation 2004-2009			Average level of service job tasks in occupation 2004-2009			Average level of routine job tasks in occupation 2004-2009		
	b	SE	β	b	SE	β	b	SE	β
Leadership	0.10*	0.04	0.09	0.13**	0.04	0.12	-0.14*	0.05	-0.12
Responsibility	0.10**	0.03	0.11	0.06*	0.03	0.07	-0.14**	0.04	-0.15
Eagerness-energy	0.16**	0.06	0.10	0.10	0.06	0.06	-0.14*	0.07	-0.09
Aggression	0.01	0.05	0.01	-0.05	0.04	-0.05	0.01	0.06	0.01
Female x Leadership	0.05	0.06	0.11	-0.08	0.05	-0.17	0.06	0.06	0.13
Female x Responsibility	-0.08	0.05	-0.19	-0.06	0.04	-0.16	0.14**	0.05	0.35
Female x Eagerness- energy	-0.14	0.08	-0.34	-0.13	0.07	-0.31	0.19*	0.08	0.46
Female x Aggression	-0.03	0.06	-0.07	0.08	0.05	0.17	-0.09	0.06	-0.19
Female	0.86*	0.42	0.43	1.52**	0.38	0.76	-2.01**	0.47	-1.00
Income, father (1980)	0.00**	0.00	0.08	0.00**	0.00	0.08	-0.00**	0.00	-0.10
Income, mother (1980)	0.00	0.00	0.00	0.00	0.00	0.01	-0.00	0.00	-0.01
High education, father (1980)	0.52**	0.09	0.16	0.15	0.08	0.05	-0.27*	0.10	-0.08
High education, mother (1980)	0.10	0.12	0.03	0.08	0.10	0.02	-0.18	0.11	-0.05
Cohort born in 1971	-0.01	0.06	-0.00	-0.00	0.05	-0.00	0.07	0.06	0.03
Cohort born in 1968	-0.10	0.06	-0.05	-0.02	0.05	-0.01	0.11	0.06	0.05
R2	0.14			0.22			0.18		

Note: $N = 1,142$. b, regression coefficient; SE, heteroscedasticity robust standard error; β , x-standardized coefficient; * $p < 0.05$; ** $p < 0.01$. Gender: male = 0, female = 1.

Table 6. Associations between Type A dimensions and job characteristics. Interactions by education.

	Average level of abstract job tasks in occupation 2004-2009			Average level of service job tasks in occupation 2004-2009			Average level of routine job tasks in occupation 2004-2009		
	b	SE	β	b	SE	β	b	SE	β
Leadership	0.09**	0.03	0.08	0.07**	0.03	0.06	-0.10**	0.04	-0.08
Responsibility	0.03	0.02	0.03	0.02	0.02	0.03	-0.07*	0.03	-0.07
Eagerness-energy	0.09*	0.04	0.06	0.01	0.04	0.01	-0.04	0.05	-0.03
Aggression	-0.03	0.03	-0.02	-0.01	0.03	-0.01	-0.02	0.03	-0.02
High education x Leadership	0.00	0.06	0.01	0.02	0.06	0.05	0.08	0.07	0.15
High education x Responsibility	-0.03	0.04	-0.07	-0.02	0.05	0.05	0.09	0.05	0.19
High education x Eagerness-energy	-0.08	0.08	-0.17	0.04	0.08	0.07	0.04	0.10	0.09
High education x Aggression	0.02	0.06	0.03	0.01	0.06	0.02	-0.04	0.06	-0.08
High education	1.32**	0.44	0.58	0.12	0.44	0.05	-1.42**	0.53	-0.62
Female	-0.11*	0.04	-0.05	0.60**	0.04	0.30	-0.53**	0.05	-0.26
Income, father (1980)	0.00	0.00	0.03	0.00*	0.00	0.06	-0.00	0.00	-0.05
Income, mother (1980)	-0.00	0.00	-0.01	0.00	0.00	0.01	-0.00	0.00	-0.01
High education, father (1980)	0.40**	0.09	0.12	0.11	0.08	0.03	-0.19	0.10	-0.06
High education, mother (1980)	-0.05	0.11	-0.01	0.03	0.10	0.01	-0.08	0.11	-0.02
Cohort born in 1971	0.03	0.05	0.02	0.02	0.05	0.01	0.03	0.06	0.02
Cohort born in 1968	0.03	0.05	0.02	0.03	0.05	0.02	0.01	0.06	0.00
R2	0.32			0.23			0.24		

Note: $N = 1,142$. b, regression coefficient; SE, heteroscedasticity robust standard error; β , x-standardized coefficient; * $p < 0.05$; ** $p < 0.01$. Gender: male = 0, female = 1.