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Transactions between Big-5 personality traits and job characteristics across 20 years

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Although understanding the relationship between the individual and work environment is a core concern of organizational research, few studies have examined longitudinal transactions between Big-5 personality traits and job characteristics. Building on research in personality and job design we develop hypotheses detailing transactions between Big-5 personality traits (i.e., openness, conscientiousness, extraversion, agreeableness, neuroticism) and two key job characteristics (i.e., job discretion and workload). Specifically, we hypothesize and test transactions with regard to the effects of job characteristics on personality, the effects of personality on job characteristics, and the reciprocal effects between these constructs. Our findings, based on a latent change score analysis of data collected over three waves across 20 years, show strongest support for the effects of job characteristics on personality, particularly the effects of workload on personality change in openness, extraversion, and agreeableness. We found no effects of job discretion on personality, limited support for the effects of personality on job characteristics (except a positive effect of neuroticism on job discretion), and no evidence of reciprocal effects.

Practitioner points

- Job demands can alter employee personality. Employees who consistently experienced high workloads over a 20-year period incurred developmental increases in three personality traits – extraversion, openness, and agreeableness – such that they became more outgoing and assertive, more curious, and broadminded, as well as more helpful and sympathetic.
- Employees who experienced high job discretion did not incur similar development changes in personality.

Organizational research has traditionally emphasized the ‘relative stability’ of personality, focusing, in particular, on the ‘Big-Five’ personality traits which represent five broad descriptions a person’s typical pattern of thinking, feeling, and behaving (McCrea & Costa, 1994; Roberts & DelVecchio, 2000; Roberts, Walton, & Viechtbauer, 2006). However, a growing body of research suggests that personality traits are not fixed but develop across the life course (Roberts, 2006; Roberts & Mroczek, 2008) with workplace characteristics and experiences being a major driver of adult personality change (Tasselli, Kildyff, &

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Landis, 2018; Woods, Wille, Wu, Lievens, & De Fruyt, 2019). Similarly, there is growing appreciation that personality can influence how employees craft their work environment, especially their job (Barrick, Mount, & Li, 2013). Understanding the transactions between personality and the work environment therefore ‘represents a vital research direction’ (Tasselli et al., 2018, p. 482) because it offers insight on how employees shape, and are shaped by, their job and work environment (Parker, Van den Broeck, & Holman, 2017).

Current theoretical models that are relevant to transactions between personality and the work environment in organizational settings include the ASTMA model (Roberts, 2006) and the DATA model (Woods et al., 2019). These models cover personality–work environment transactions in general and identify Big-Five personality traits (i.e., conscientiousness, extraversion, openness to experience, agreeableness, and neuroticism) and job characteristics (e.g., workload, job discretion) as key drivers of such transactions. However, our understanding of transactions between Big-Five personality traits and job characteristics is restricted by the non-trivial theoretical and methodological limitations of existing research.

From a theoretical perspective, the ASTMA model (Roberts, 2006) and the DATA model (Woods et al., 2019) provide broad descriptions of the *types of transactions* that can occur between personality and the work environment, but neither model provides detailed explanations of the *nature of transactions* that might occur between Big-Five traits and job characteristics. For example, they do not detail how conscientiousness might alter workload, or how workload might shape conscientiousness. Furthermore, previous empirical studies on Big-Five traits and job characteristics have been limited in their theoretical descriptions (Sutin & Costa, 2010; Wu, 2016). Consequently, we lack a detailed theoretical account of transactions between Big-Five traits and job characteristics.

From a methodological perspective, most studies of the Big-Five and job characteristics are cross-sectional (e.g., Acuña, Gómez, & Juristo, 2009; Ng, Ang, & Chan, 2008; Törnroos et al., 2013). Only four are longitudinal (Brousseau & Prince, 1981; Kohn & Schooler, 1982; Sutin & Costa, 2010; Wu, 2016). Consequently, there is little longitudinal evidence for transactions between the Big-Five and job characteristics. Furthermore, although existing longitudinal studies of the Big-Five and job characteristics have examined their relationship over 5 and 10 years, we currently know little about whether or how they influence each other over longer periods. Examining longer time frames is valuable because adult personality development is typically incremental and slow (Roberts & Mroczek, 2008). In addition, no study has collected data on both variables at three or more time points, meaning they have not been able to test reciprocal effects. For example, that a Big-Five trait at Time 1 increases a job characteristic at Time 2, and that the job characteristic increase then leads to a subsequent change in the Big-Five trait at Time 3.

To address these limitations, the aim of this study is to build on our existing theoretical and empirical understanding of personality–work environment transactions by developing and testing hypotheses concerning transactions between Big-Five personality traits and two job characteristics, namely, job discretion and workload. We focus on job discretion (i.e., the extent to which employees have freedom and control over the content and timing of job tasks) and workload (i.e., the amount and difficulty of job tasks) as they represent important aspects of the job in relation to personality change due to their strong influence on employee behaviours and experiences (Humphrey, Nahrgang, & Morgeson, 2007; Karasek & Theorell, 1990; Parker & Wall, 1998) and because they are among the main job characteristics that employees try to obtain or alter (Rudolph, Katz, Lavigne, & Zacher, 2017). We test our hypotheses using longitudinal data drawn from the Midlife in

the United States (MIDUS) study of ageing that included a survey administered to adult participants three times over 20 years (Ryff et al., 2016).

Our paper makes four significant contributions. First, we build on existing theoretical models to develop detailed hypotheses concerning transactions between Big-Five personality traits and job characteristics. Specifically, we start with the ASTMA model that provides a broad account of personality–work environment transactions (Roberts, 2006). We then integrate this model with insights from models of personality development (Woods et al., 2019; Wrzus & Roberts, 2017), trait activation theory (Tett & Burnett, 2003), and job design theories (Bakker & Demerouti, 2007) to theorize transactions concerning the effects of job characteristics on the Big-Five, and with insights from the theory of purposeful work behaviour (Barrick et al., 2013) to theorize transactions concerning the effects of the Big-Five on job characteristics. It must also be noted that existing theories and empirical evidence do not always provide a concrete basis for setting hypotheses about specific Big-Five-job characteristic transactions. As a result, some hypotheses are somewhat preliminary in nature, and where it is not possible to set hypotheses, our research is exploratory in nature. Second, we test our hypotheses using longitudinal data thereby adding new empirical evidence on whether Big-Five personality traits shape, or are shaped by, job characteristics. Third, we test transactions between the Big-Five and job characteristics over a longer period (20 years) than previous research, using truly longitudinal data (i.e., both variables assessed at three time points) that illuminates whether effects are sustained over a significant proportion of adult working lives and which provides a novel test of reciprocal relationships between the Big-Five and job characteristics. Fourth, we enrich our general understanding of the relationship between personality and the work environment and complement work in this domain that has examined other personality traits (e.g., proactivity) and features of the work environment (e.g., occupational characteristics, Woods et al., 2019).

Theoretical background and hypothesis development

Of those models concerned with personality–environment transactions (Wrzus & Roberts, 2017), the ASTMA model is the most comprehensive model that is directly relevant to organizational settings. The ASTMA model proposes that five broad types of transaction occur between employee personality and the work environment (See Figure 1 for a description of each type; Roberts, 2006; Roberts & Nickel, 2017). Recent theoretical argumentation, however, suggests that transactions which occur frequently and repetitively during everyday working life are the key drivers of change in personality and job characteristics (Woods et al., 2019). Thus, we focus our theoretical explanations on transformation transactions, which describe how the environment shapes personality change, and manipulation transactions, which describe how employees change their work environment. Because the ASTMA model does not detail how these transactions manifest between Big-Five traits and job characteristics, we draw on additional theoretical perspectives to develop specific hypotheses for transformation and manipulation transactions between Big-Five traits and job characteristics.

Transformation hypotheses: How job discretion and workload transform employee personality

The core premise of transformation transactions in the ASTMA model is that employees' prolonged and frequent exposure to work environments can activate or trigger behaviours outside of normal trait levels that over time become ingrained as personality

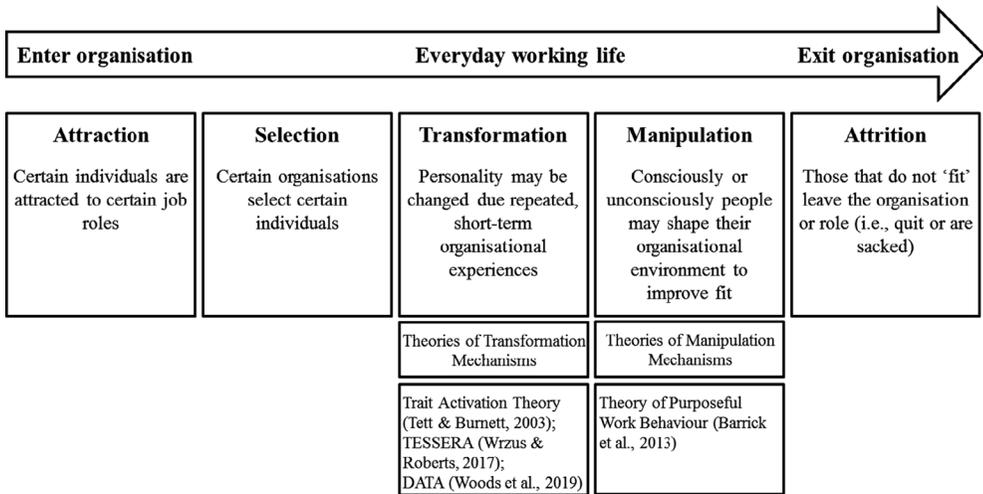


Figure 1. A depiction of the person–environment transactions that occur across working life, according to the ASTMA model (Roberts, 2006) and additional theories that can be used to further elucidate the mechanisms by which the transactions occur.

change (Roberts, 2006). In other words, if one’s job characteristics require one to frequently behave in a highly extraverted manner, one will likely become more extraverted (see also the DATA model of Woods et al., 2019 and the TESSERA model of Wrzus & Roberts, 2017). However, the ASTMA model nor other models of personality change provide detailed accounts of which Big-Five traits are likely to be shaped by which job characteristics. Such explanations can, however, be derived, in part, from trait activation theory (Tett & Burnett, 2003) which posits that Big-Five personality traits are expressed in response to trait-relevant cues in task characteristics (such as workload and job discretion) that indicate the types of behaviour expected and needed to succeed. For example, we could hypothesize that the prolonged exposure to a particular job characteristic (e.g., workload) and its trait-relevant cues (e.g., diligence, planning) may activate relevant personality traits (e.g., conscientiousness) and lead to an increase in that trait overtime (Hudson & Fraley, 2015). Explanations can be also extrapolated from job design theory and research. In particular, the job demands-resources model (Bakker & Demerouti, 2007) asserts that job demands (i.e., characteristics of the job that require sustained effort) and job resources (i.e., characteristics of the job that are functional in achieving work goals, dealing with work demands, and promoting personal development) have a range of behavioural outcomes related to learning, performance and coping (Humphrey et al., 2007). The prolonged exposure to particular job characteristics may therefore sustain a level of behaviour that results in personality change. Job discretion, for example, can promote perspective taking and creative behaviour (Axtell, Parker, Holman, & Totterdell, 2007; Holman et al., 2012), such that prolonged exposure to job discretion may increase openness to experience. However, unlike trait activation theory, the job demands-resources model does not provide a specific account linking job characteristics to personality, so we base our hypotheses for transformation transactions on trait activation theory and supplement these arguments with ideas drawn from job design research.

Workload

Workload is a job demand that represents the amount and difficulty of tasks performed by an employee. A high workload may therefore provide a number of trait-relevant cues (e.g., effort, diligence) that trigger particular behaviours and stimulate the use of behaviours to help cope and deal with tasks demands, which if repeated over a prolonged time, might lead to changes in personality (Wrzus & Roberts, 2017).

Extraversion. Trait activation theory posits that task situations that cue for energy and activity will activate extraversion-related behaviours (Tett & Burnett, 2003). High workload is a task situation that seems likely to cue for increased energy and activity. As such, trait activation theory suggests that a high workload will stimulate extraverted behaviours, particularly those aspects of extraversion associated with increased activity, namely agency and assertiveness (DeYoung, Quilty, & Peterson, 2007). A similar prediction can be made from job demands-resources theory (Bakker & Demerouti, 2007). Specifically, as workload is a job demand that requires employees to increase their level of effort, activity, and assertiveness to be effective, workload is likely to instigate aspects of extraverted behaviour such as agency and assertiveness. In addition, to help cope with a high workload, job design perspectives suggest that a common response is to seek social support from others and instigate other outgoing social behaviours (Carver, Scheier, & Weintraub, 1989; Dewe, O'Driscoll, & Cooper, 2010; Fisher, Croxson, Ashdown, & Hobbs, 2017; Gilstrap & Bernier, 2017; Latack & Havlovic, 1992). By definition, such social behaviours are extraverted in nature and reflect the core aspects of extraversion associated with increased sociability. Overall, this means that a high workload may stimulate the two main features of extraverted behaviour, agency and sociability, such that the prolonged exposure to a high workload is likely to increase in extraversion. Supportive evidence comes from Sutin and Costa (2010) who found psychologically demanding work to be associated with increases in extraversion.

Hypothesis 1a. Higher workload will be associated with increases in extraversion.

Conscientiousness. High workloads require diligent, accurate, timely, and sustained action to perform effectively. Thus, high workloads may cue conscientiousness-related behaviours such as planning, dutifulness, and dependability (Tett & Burnett, 2003). In addition, research on job demands suggests that employees may invoke conscientious-related behaviours as a means of dealing with a high workload. For example, Parasuraman and Cleek (1984) found that leaders responded to higher workloads by increased use of planning, organizing, and prioritizing. As such, when employees frequently and consistently face high workloads, it is expected that their conscientiousness will increase. Wu (2016) found that increases in time demands resulted in increases in conscientiousness, providing some support for this proposition.

Hypothesis 1b. Higher workload will be associated with increases in conscientiousness.

Openness. Having a high workload often means working on varied and challenging tasks (Cavanaugh, Boswell, Roehling, & Boudreau, 2000; Holman, 2013). From a trait activation perspective, this type of situation is likely to introduce workers to novel ideas and approaches and to cue for curious, open, and imaginative styles of thinking. In addition, job design perspectives suggest that high workloads can instigate employees' use of problem-solving and behaviours that enable the development of creative and innovative solutions to enhance performance and manage stress (Binnewies & Wörnlein, 2011; Ekvall & Ryhammar, 1999; Ren & Zhang, 2015; Skinner, Edge, Altman, & Sherwood, 2003). For example, Bunce and West (1994) reported that employees with a high workload instigated creative and innovative activities to manage workplace stressors and Janssen (2000) found that high workload was related to greater use of creative and innovative work behaviours. Overall, this suggests that a high workload may stimulate engagement in creative thinking and innovative behaviours, such that prolonged exposure to a high workload may induce increases in openness. Longitudinal evidence concerning markers of workload and changes in openness is mixed. Whereas some studies find no effects (e.g., Sutin & Costa, 2010; Wu, 2016), in a targeted investigation, Nieß and Zacher (2015) found that employee openness predicted upward job changes into managerial positions and that those upward job changes (which among other changes, likely involved increased responsibilities and workload) predicted subsequent increases in openness.

Hypothesis 1c. Higher workload will be associated with increases in openness.

Neuroticism. The job demands-resources model posits that high workloads induce stressful reactions (Podsakoff, LePine, & LePine, 2007). Consequently, the continued exposure to high workloads may increase negative affect and anxious behaviour indicative of neuroticism. However, Wu (2016) found that high workload decreased neuroticism, whereas Kohn and Schooler (1982) and Sutin and Costa (2010) found no association between them. This suggests that the effects of workload on neuroticism are not direct but contingent upon the ability of an employee to regulate stressful reactions to workload. Thus, we make no directional hypothesis and expect no significant association between workload and changes in neuroticism.

Agreeableness. With regard to trait-relevant cues, high workloads would not seem to trigger any notable aspects of agreeableness. However, job design perspectives suggest that a common response to high workloads is to seek social support and others' assistance (Carver et al., 1989; Dewe et al., 2010), which, due to social exchange norms, often result in a felt obligation to reciprocate with similar supportive behaviours (Buunk, 1990; Uehara, 1995). As such, high workloads might foster a degree of compliance and helpfulness, both of which are important aspects of agreeableness. Thus, we expect that higher workloads will increase agreeableness.

Hypothesis 1d. Higher workload will be associated with increases in agreeableness.

Job discretion

Jobs with high levels of discretion allow employees to exercise control over their working environment, the nature of work tasks, and the manner and order in which work tasks are approached (Parker & Wall, 1998). Although it is possible that high job discretion will allow employees to behave in line with their traits and therefore drive little personality development, trait activation theory suggests that job discretion may also provide a number of trait-relevant cues that align with conscientiousness and openness.

Conscientiousness. A trait activation perspective suggests that the lack of task structure inherent in tasks with high discretion is a cue that greater self-discipline, responsibility, and dutifulness are required, all of which are aspects of conscientiousness (Judge & Zapata, 2015). The job design literature also suggests that job discretion will foster conscientiousness-related behaviour. For example, the job demands-resources models asserts that job discretion is intrinsically motivating because it is functional in helping to achieve work goals and hence promotes more effortful work behaviour (Demerouti, Bakker, Nachreiner & Schaufeli, 2001). The job design literature also suggests that high job discretion increases an employee's responsibility for task completion, makes individual actions more visible and, as a result, employees need to be more disciplined in planning and organizing their work to succeed (Bredehöft, Dettmers, Hoppe, & Janneck, 2015; Höge, 2011; Sturdy, Fleming, & Delbridge, 2010). Job design perspectives therefore imply that job discretion will stimulate conscientiousness-related behaviours such as diligence, achievement striving, planning, and self-discipline. Some existing longitudinal evidence supports the argument that job discretion will increase conscientiousness. Specifically, Kohn and Schooler (1982) found that men who engaged in more autonomous work tended to increase in self-directed orientation (similar to conscientiousness) and Wu (2016) found that increases in job control were related to increases in conscientiousness. Thus, we propose that high job discretion will be related to increases in conscientiousness.

Hypothesis 1e. Job discretion will be associated with increases in conscientiousness.

Openness to experience. Trait-activation theory suggests that tasks with high job discretion cue for and require varied and often novel (to the individual) work behaviours, whereas tasks with low job discretion cue for more repetitive and rule following work behaviour. Trait activation theory therefore suggests that high job discretion should cue for openness-related behaviours such as enacting novel working and the need to engage in abstract cognitive exploration. Similarly, the job demands-resources model asserts that job discretion promotes learning and knowledge development because employees have freedom to try out new problem-solving strategies (Holman & Wall, 2002). Furthermore, employees with greater task knowledge are better able to take different perspectives and thus engage in more complex and open forms of cognition (Axtell et al., 2007; Parker & Axtell, 2001). Job discretion should therefore promote openness-related behaviours such as cognitive complexity and perspective taking such that the long-term exposure to job discretion should increase openness to experience. Empirical evidence also supports this transformative effect, with three longitudinal studies reporting job discretion to be

associated with increases in openness (Kohn & Schooler, 1982; Nieß & Zacher, 2015; Wu, 2016).

Hypothesis 1f. Job discretion will be associated with increases in openness to experience.

Extraversion, agreeableness, neuroticism. From a trait-activation perspective, there are two possible ways by which job discretion might transform extraversion. First, job discretion affords employees control over their work and thus may cue for assertive and agentic behaviours, which are constituents of extraversion. However, it is also possible that job discretion might provide cues for independent working such that extraversion might decrease because of reduced opportunities to socialize (Tett & Burnett, 2003). These different possibilities combined with limited empirical evidence mean that a clear hypothesis cannot be set.

There are also few strong theoretical reasons to assume job discretion will affect neuroticism or agreeableness (Tett & Burnett, 2003). For example, job discretion may enable employees to shape their job role so that it evokes less stress but, equally, job discretion may provide added pressure to make decisions, which might trigger aspects of neuroticism. Indeed, Sutin and Costa (2010) and Wu (2016) found that job discretion was unrelated to changes in neuroticism. Similarly, job discretion does not appear to provide any particular cues that might trigger agreeableness (Tett & Burnett, 2003) and empirical evidence is ambivalent (c.f. Sutin & Costa, 2010; Wu, 2016). Thus, we do not propose a hypothesis for the relationship between job discretion and either agreeableness or neuroticism.

Manipulation hypotheses: How personality manipulates employee job discretion and workload

The core premise of manipulation transactions is that personality shapes the way that employees craft their work environment. To provide the theoretical grounding for manipulation transactions between the Big-Five and job characteristics, we draw on the theory of purposeful work behaviour (PWB; Barrick et al., 2013)¹. PWB theory asserts that personality traits play a central role in initiating four types of goal striving (i.e., communion striving, status striving, autonomy striving, and achievement striving) and that employees will try to craft their job characteristics to facilitate goal attainment in accordance with these strivings (Barrick et al., 2013; Bipp & Demerouti, 2015; Wrzesniewski & Dutton, 2001). We now provide more detail on this theory as we apply it to the relationship between the Big-Five and both job discretion and workload.

Extraversion. PWB theory posits that, because employees with high extraversion are typically energetic and ambitious, they tend to strive for both autonomy and status within the workplace (Barrick et al., 2013). These strivings lead extraverts to take on varied and significant work tasks and roles that facilitate the exercise of autonomy and social influence, and to seek status and tangible rewards such as pay rises and promotions

¹ We recognize that the main aim of PWB theory is to explain the joint and synergistic effects of Big-Five personality traits and job characteristics on work outcomes. However, we focus on that part of PWB theory concerned with the direct effect of personality traits on job characteristics given its relevance to this study.

(Barrick et al., 2013; Judge, Bono, Ilies, & Gerhardt, 2002). This suggests that extraverted employees will try to shape their working environment so that that can take charge of work tasks, which is likely to increase their level of job discretion and workload. A number of studies have found theoretically consistent positive relationships between extraversion and job discretion or workload (e.g., Acuña et al., 2009; Ng et al., 2008; Sutin & Costa, 2010; Törnroos et al., 2013; Zacher & Frese, 2009) although the study by Wu (2016) found no relationship between extraversion and these job characteristics. Thus, theoretical rationales and some empirical evidence suggest that extraverts tend to transform their work experiences by seeking and receiving greater job discretion and more work.

Hypothesis 2a. Extraversion will be associated with increases in job discretion and workload.

Conscientiousness. According to PWB theory, because conscientious employees are hardworking, diligent, and self-disciplined, they tend to have an achievement striving motivation that is associated with a need to feel competent and accomplished. Conscientious employees are therefore likely to seek out demanding tasks that allow them to demonstrate their competence and gain a sense of accomplishment and to seek tasks with high job discretion that allow them to clearly identify how their contribution relates to task accomplishment. Conscientious employees should therefore transform their role in ways that increases workload and job discretion. Empirical evidence supports this notion with regard to job discretion (Kohn & Schooler, 1982), with Sutin and Costa (2010) reporting that conscientiousness predicted increases in job discretion over a ten years period. In sum, theoretical rationale and empirical evidence suggest that conscientious employees will transform their job in a manner that results in greater job discretion and workload.

Hypothesis 2b. Conscientiousness will be associated with increases in job discretion and workload.

Openness to experience. PWB theory asserts that employees high on openness strive for autonomy because working autonomously allows open individuals the freedom to engage in the exploration and complex thinking that is central to this trait (Barrick et al., 2013; Mount, Barrick, Scullen, & Rounds, 2005). Employees with high openness are therefore likely to alter their job in ways that achieve greater job discretion, which is supported by empirical evidence (Clausen & Gilens, 1990; Kohn & Schooler, 1982; Nieß & Zacher, 2015; Sutin & Costa, 2010; Wu, 2016). Furthermore, striving for autonomy and variety may also increase workload, as it would be difficult in most jobs to increase task variety without increasing overall load. This argument is supported by longitudinal evidence demonstrating that openness positively predicted increases in workplace timing demands (Wu, 2016).

Hypothesis 2c. Openness to experience will be associated with increases in job discretion and workload.

Neuroticism. Although PWB theory does not posit a relationship between neuroticism and job discretion, it does propose that those who are emotionally stable (low neuroticism) are likely to seek communion and social support. Seeking closer ties with others may reduce latitude for action and hence reduce job discretion. In contrast, neurotic employees may build fewer ties because they tend to be anxious and be reluctant to interact with unfamiliar others. By extension, this implies that neurotic employees may reduce interdependencies with others and thereby increase their job discretion over time, which is supported by empirical findings (Sutin & Costa, 2010; Wu, 2016). Turning to workload, PWB theory argues that, as employees higher in neuroticism lack confidence, they are typically motivated by the need to avoid failure (Barrick, Stewart, & Piotrowski, 2002; Mount et al., 2005) and as such tend to avoid taking on extra or more complex work. Thus, even though employees with high neuroticism may report higher levels of workload (Grant & Langan-Fox, 2007; Judge et al., 2002; Törnroos et al., 2013), over time they are likely to craft their job in ways that reduces workload.

Hypothesis 2d. Neuroticism will be associated with decreases in job discretion and workload.

Agreeableness. PWB theory posits that agreeableness is related to communion striving, such that agreeable employees tend to seek out opportunities to engage in interdependent work and offer social support to colleagues. Agreeable employees may therefore be more likely to work interdependently within dense social networks (Fang et al., 2015) and, as a result, have lower levels of job discretion. Empirical support for this assertion was found by Wu (2016), who found that agreeable employees reported lower levels of job discretion over time. Equally, agreeable individuals are empathic and altruistic, which motivates them to try to please others and place others' needs above their own (Hughes & Evans, 2016; Hughes, Kratsiotis, Niven, & Holman, 2020). The likely result of this pro-social behaviour is an increase in workload, though existing empirical evidence typically suggests no substantial relationship between agreeableness and markers of workload (e.g., Sutin & Costa, 2010; Törnroos et al., 2013; Wu, 2016; Zacher & Frese, 2009).

Hypothesis 2e. Agreeableness will be associated with decreases in job discretion and increases in workload.

Reciprocal effects

The combination of transformation and manipulation transactions suggests that there may be reciprocal effects between Big-Five personality traits and job characteristics, for example, that a Big-Five personality trait at Time 1 increases a job characteristic at Time 2, and this increase in a job characteristic leads to a subsequent change in that Big-Five personality trait at Time 3. Such reciprocal effects are suggested by structuration theory (Giddens, 1984) which posits a mutual influence between organizational structure and employee agency. However, our theoretical arguments do not suggest reciprocal relationships between all Big-Five traits, job discretion and workload. For example, we propose manipulation but not transformation transactions between neuroticism and job

characteristics. Thus, by combining the theoretical arguments for our previous manipulation and transformation hypotheses, we propose the following reciprocal hypotheses.

Hypothesis 3a. There will be reciprocal relationships between job discretion and conscientiousness and openness.

Hypothesis 3b. There will be reciprocal relationships between workload and conscientiousness, extraversion, openness, and agreeableness.

Method

Sample and procedure

Secondary analysis was performed on data drawn from the Midlife in the United States (MIDUS) study, a longitudinal study of ageing in which a self-completed questionnaire was administered to a national probability sample of English-speaking adults between 25 and 74 years old in 1994–1995 ($N = 7,108$), 2004–2006 ($N = 4,963$), and 2013–2014 ($N = 3,294$) (Ryff et al., 2016). The number of participants who were in employment across all three surveys ($N = 1,575$) and who provided job characteristics and personality information was $N = 1,049$. In this sample, 47.8% were female, the average age at baseline was $M = 40.96$ ($SD = 8.76$), the average years of employment at the baseline was 23.54 ($SD = 9.23$), and the proportion in service occupations at each time point was $T1 = 81.3\%$, $T2 = 85.6\%$ and $T3 = 87.5\%$.

Measures

Job characteristics

The MIDUS survey includes five items on job discretion and five on workload (Karasek & Theorell, 1990). Based on our analysis (see Supporting Information), one item from each measure was removed to ensure acceptable model fit and model convergence. These changes did not unduly affect the findings. The job discretion scale had four items covering the extent to which employees had; a choice in deciding how to do work tasks and what work tasks to do; a say in decisions about work; and, a say in planning the work environment. The workload scale had four items covering the extent to which employees had; demands that were hard to combine; too many demands; a lot of interruptions; and did not have enough time to get everything done. Items were recoded so that high scores indicate high job discretion and workload (1 = Never, 5 = All of the Time). Cronbach alphas for job discretion and workload were high (see Table 1).

Big-Five personality traits

Big-Five traits are measured in MIDUS using the Midlife Development Inventory (MIDI; Lachman & Weaver, 1997) of 30 adjectives selected from existing personality inventories (e.g., Goldberg, 1992). Participants responded on a five-point scale (1 = Never 5 = All of the Time). Based on our analysis (see Supporting Information), to ensure acceptable model fit, extraversion was split into two subfacets, and two items were removed from the openness measure. These changes did not unduly affect our findings. The final measures were *openness to experience* (five items: intelligent, curious, broadminded,

Table 1. Means, standard deviations, correlations, and reliabilities of the main study variables

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1. Job discretion T1	3.72	.86																										
2. Job discretion T2	3.84	.82	.44**																									
3. Job discretion T3	3.78	.89	.36**	.50**																								
4. Workload T1	2.94	.71	.17**	.12**	.03																							
5. Workload T2	2.86	.68	.03	.06	-.02	.43**																						
6. Workload T3	2.65	.72	-.02	-.02	-.02	.34**	.46**																					
7. Extraversion (A) T1	2.77	.67	.25**	.16**	.17**	.07	.01	.01	.84																			
8. Extraversion (A) T2	2.71	.67	.20**	.18**	.17**	.07	.05	.00	.72**	.78																		
9. Extraversion (A) T3	2.68	.69	.17**	.15**	.21**	.04	.02	.02	.69**	.75**	.79																	
10. Extraversion (S) T1	3.18	.56	.15**	.11**	.15**	-.04	-.03	.00	.54**	.43**	.41**																	
11. Extraversion (S) T2	3.08	.56	.14**	.12**	.12**	.02	-.01	-.02	.45**	.52**	.42**	.71**																
12. Extraversion (S) T3	3.06	.57	.11**	.09**	.16**	-.01	-.03	-.02	.42**	.43**	.53**	.67**	.75**															
13. Agreeableness T1	3.42	.49	.10**	.08**	.08**	.01	-.01	-.05	.06*	.03	.05	.48**	.38**	.35**	.79													
14. Agreeableness T2	3.37	.52	.04	.04	.01	.00	-.04	-.05	.02	.04	.01	.31**	.50**	.34**	.66**	.89												
15. Agreeableness T3	3.38	.52	.00	.01	.03	.03	.05	.00	.01	.03	.08*	.31**	.39**	.48**	.64**	.69**	.76											
16. Conscientiousness T1	3.47	.42	.08**	.10**	.09**	.00	.03	.02	.26**	.18**	.21**	.22**	.15**	.16**	.21**	.17**	.17**	.55										
17. Conscientiousness T2	3.51	.41	.03	.09**	.05	.02	.02	.02	.19**	.28**	.23**	.23**	.16**	.20**	.14**	.20**	.17**	.61**	.58									
18. Conscientiousness T3	3.51	.45	.02	.07**	.09**	.01	.02	.01	.18**	.21**	.31**	.31**	.16**	.18**	.13**	.14**	.25**	.58**	.63**	.60								
19. Neuroticism T1	2.22	.64	-.12**	-.08**	-.10**	.18**	.19**	.21**	-.19**	-.10**	-.11**	-.11**	-.12**	-.10**	-.02	-.06	-.03	-.13*	-.08*	.72								
20. Neuroticism T2	2.05	.61	-.09**	-.06	-.12**	.09**	.20**	.23**	-.11**	-.14**	-.15**	-.15**	-.10**	-.17**	-.05	-.15**	-.11**	-.09*	-.12**	-.05	.73							
21. Neuroticism T3	2.05	.62	-.12**	-.09**	-.08**	.06	.16**	.25**	-.15**	-.17**	-.15**	-.15**	-.10**	-.16**	.01	-.05*	-.06	.10**	-.13**	-.12**	-.05	.66**						
22. Openness T1	3.04	.49	.24**	.15**	.17**	.08**	.03	.03	.45**	.37**	.39**	.49**	.38**	.32**	.18**	.32**	.18**	.17**	.24**	.13**	.16**	.15**	.15**	.13**	.16**	.11**	.67	
23. Openness T2	2.94	.53	.21**	.17**	.17**	.12**	.05	.00	.40**	.48**	.43**	.43**	.34**	.48**	.20**	.28**	.24**	.21**	.18**	.19**	.18**	.16**	.16**	.16**	.19**	.16**	.69	
24. Openness T3	2.91	.55	.17**	.13**	.15**	.07*	.03	.02	.36**	.40**	.50**	.50**	.34**	.38**	.21**	.19**	.31**	.23**	.18**	.24**	.16**	.24**	.23**	.18**	.24**	.19**	.61**	

Note. Cronbach alpha in parentheses. Extraversion (A) is Extraversion-Agency, Extraversion (S) is Extraversion-Sociability. * $p < .05$; ** $p < .01$.

sophisticated, and adventurous), *neuroticism* (four items: moody, worrying, nervous, and calm [reverse scored]), *agreeableness* (five items: helpful, warm, caring, soft-hearted, and sympathetic), *conscientiousness* (four items: responsible, organized, hardworking, and careless [reverse scored]) and two facets of extraversion, namely *extraversion-agency* (four items: forceful, assertive, outspoken, and dominant) and *extraversion-sociability* (five items: outgoing, friendly, lively, active, and talkative). Cronbach alphas were high (see Table 1) except for conscientiousness, which we took into account when evaluating the findings.

Controls

Age and gender were included as they can influence the development of personality and job characteristics (Caspi, Roberts, & Shiner, 2005; Eurofound, 2015; Wrzus & Roberts, 2017). We also included employment status (self-employed or employed) and occupational group, as the development of job characteristics may have varied between employment status and between occupations in the last 30 years (Autor, Levy, & Murnane, 2003; Holman & Rafferty, 2018). In the MIDUS survey, the classification of occupations is based on the US Census Standard Occupational Classification. This classification changed between Time 1 and Time 3 of the survey (Scopp, 2003) such that jobs could be classified across all three time points according to five broad occupational groups: managerial and professional, administration, sales, service work, and manual occupations. Dummy variables were created for each occupational group. Lastly, we controlled for the proportion of time spent in employment in the 10 years before each survey to account for differences in exposure to job characteristics.

Analysis procedure

Our analysis procedure had three main steps. In Step 1, we tested construct validity by conducting CFAs for each measure at each measurement occasion (See Supporting Information for more detail). In Step 2, we tested the longitudinal configural, metric, and scalar measurement invariance of each measure (see Supporting Information for more detail). In Step 3, we used latent change score (LCS) analysis to test the study hypotheses (McArdle, 2009; McArdle & Hamagami, 2001). LCS analysis is a general framework for examining intraindividual change in which a key feature is the modelling of latent change between two time points, for example, the change in job characteristics from T1 to T2, from T2 to T3 etc. (Eschleman & LaHuis, 2014). Crucially, the modelling of latent change in LCS analysis enables the testing of cross-lagged relationships and reciprocal relationships. A bivariate LSC model is depicted in Figure 2. For each variable, the model contains an intercept, a slope (representing a constant linear level of change), a latent variable at each time point, and a latent change variable (at each time point except the first) that represents the change in the latent variables from T1-T2 and T2-T3. Furthermore, the latent change variable is modelled by the slope (α), the autoregressive effect (or proportional change coefficient) of the latent variable at the previous time point (β), and the effect of the other latent variable at the previous time point (γ). The coefficient γ is called the *crossed-path* and represents the cross-lagged effect of one latent variable on the change in another latent variable, for example, the effect of personality T1 on the change in job characteristics T1-T2. Crossed-path coefficients from the same variable (e.g., personality γ_1) are constrained to be equal when there is no reason to expect differences across time. However, these paths can be freed to test whether cross-lagged

effects vary over time. Reciprocal effects are assumed to occur when the crossed-path coefficients from both variables are significant, for example, both personality γ and job characteristics γ .

Our hypotheses predicted lagged and reciprocal effects and we tested them by constructing a series of bivariate LCS structural equation models, with each model containing one personality variable and one job characteristic. The cross-lagged paths were held to be equal, as we had no reason to expect differences over time. Model fit was assessed using standard cut-off criteria for the comparative fit index (CFI, $>.90$), the Tucker–Lewis index (TLI, $>.90$), and the root-mean-square error of approximation (RMSEA, $<.08$) (Browne & Cudeck, 1993; Hu & Bentler, 1999) but as in recent longitudinal organizational research we did not use SRMR (Li, Fay, Frese, Harms, & Gao, 2014). The controls are not shown in Figure 2 but we regressed the time-invariant controls (i.e., age, gender) on the intercept and slope of each variable, and we regressed the time-variant controls (i.e., employment status, occupation, proportion of time in work in previous 10 years) on the appropriate latent variable at each time point, for example, T1 employment status on T1 workload, T2 employment status on T2 workload, etc. (Curran, Obeidat, & Losardo, 2010). We also correlated the time-invariant controls within time, for example, T1 employment status with T1 occupation. In models with measures displaying scalar non-invariance (i.e., those with conscientiousness or neuroticism), following recommendations by Newsome (2015) and Cheung (2008), we freed relevant intercept parameter constraints in the LSC model (See supplementary analysis) and report the results of these partially invariant models (which do not differ substantially from the fully invariant LCS models).

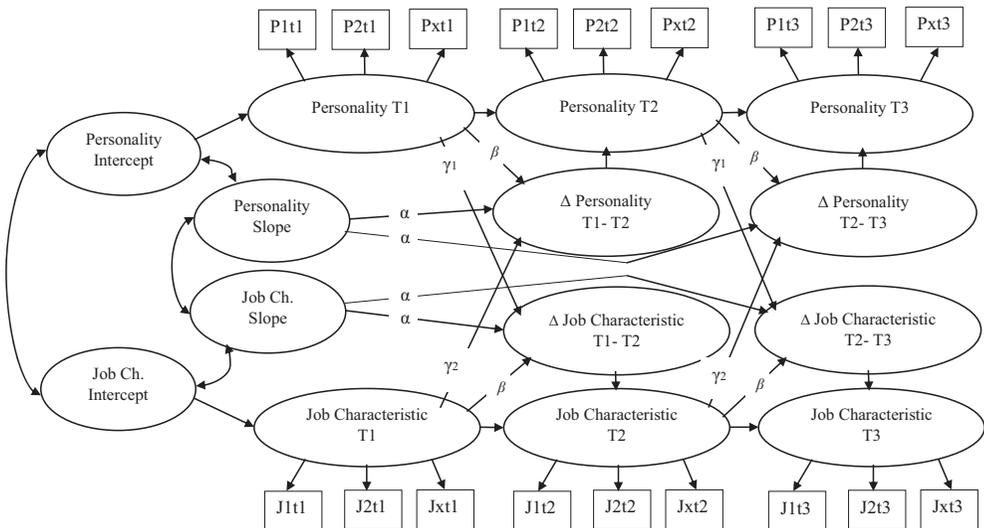


Figure 2. A bivariate latent change score model for personality and job characteristics. Note: A simplified bivariate LCS model is shown. Effects of slope on latent change (α), latent variable T_n on latent variable T_{n+1} , and latent change T_n on latent variable T_n fixed to 1. The autoregressive effects β , crossed paths γ , and measurement error variances are constrained to be equal across time points. Job Ch. refers to job characteristic.

Results

Our initial analysis of construct validity and measurement invariance demonstrated that the measures used to test our hypotheses had adequate psychometric properties (see Supporting Information for full results).

Mean-level and rank-order changes

The mean scores, standard deviations, and correlations of the main study variables are shown in Table 1. Inspecting mean-level changes and rank-order changes (i.e., test–retest correlations) provides information on the level of change and stability in the sample as a whole (Li et al., 2014; Roberts, Wood, & Caspi, 2008). With regard to mean-level changes, repeated-measures ANOVAs of the job characteristic variables revealed a significant increase in job discretion from T1–T2 ($\eta^2 = .01, p < .01$) but not T2–T3, and a significant decrease in workload from T1–T2 ($\eta^2 = .01, p < .01$) and from T2–T3 ($\eta^2 = .08, p < .01$). For the personality variables, extraversion-agency decreased from T1–T2 ($\eta^2 = .02, p < .01$) and from T2–T3 ($\eta^2 = .004, p < .05$), extraversion-sociability decreased from T1–T2 ($\eta^2 = .05, p < .01$) and from T2–T3 ($\eta^2 = .004, p < .05$), agreeableness decreased from T1–T2 ($\eta^2 = .01, p < .01$), conscientiousness increased from T1–T2 ($\eta^2 = .01, p < .01$), neuroticism decreased from T1–T2 ($\eta^2 = .10, p < .01$), and openness to experience decreased from T1–T2 ($\eta^2 = .06, p < .01$) and from T2–T3 ($\eta^2 = .004, p < .05$). The general direction of change in personality is in keeping with that found in the wider MIDUS sample (Stephan, Sutin, & Terracciano, 2015).

An inspection of rank-order changes in Table 1 shows that personality variables had moderate to high stability across time, as indicated by test–retest correlations ranging from $r = .58$ to $.75$, while job characteristics variables had lower and more moderate levels of stability, as indicated by test–retest correlations ranging from $r = .34$ to $.50$ (Roberts & DelVecchio, 2000). For the personality variables, extraversion-agency showed the most stability across time (test–retest correlations ranging from $r = .69$ to $.75$), while conscientiousness showed the lowest stability across time (test–retest correlations ranging from $r = .58$ to $.62$). The levels of stability in personality are similar to that found in studies of other adults (Roberts & DelVecchio, 2000). Overall, the analysis of mean and rank-order changes indicates a degree of stability in the study variables across time, particularly for personality variables, but also that there is a degree of change in personality and job characteristics across time.

Bivariate LCS modelling: Hypothesis testing

The results of the bivariate LCS analysis to test the study hypotheses are shown in Table 2, which shows that all models reached acceptable levels of fit. With regard to the lagged effects of job characteristics on the Big-Five (H1a–f), three hypotheses concerning the effects of workload on the Big-Five were supported. In particular, our results supported Hypothesis 1a–d, as they show that workload is related to an increase in extraversion-agency (extraversion-agency, $\gamma = .64, p < .05$; extraversion-sociability, $\gamma = .39, p < .05$), openness to experience ($\gamma = .54, p < .05$), and agreeableness ($\gamma = .56, p < .05$). We found no significant relationship between workload and a change in conscientiousness or neuroticism, and no significant relationships between job discretion and change in any of the personality variables. With regard to the lagged effects of Big-Five personality traits on job characteristics (H2a–e), our results support Hypothesis 2b, as they show that

Table 2. Structural models: Model fit and parameter estimates for latent change score models with job characteristics and personality

	Model fit				Parameter estimates									
	χ^2 (df)	CFI	TFI	RMSEA	Crossed-path		Personality		Job characteristics					
					Job charac. on personality γ	Personality on job charact. γ	Slope mean	Intercept	Slope mean	Intercept				
Job Discretion														
Extraversion (A)	2,278.76 (836)	.89	.89	.04	-.21	.81	0.80	2.79**	0.19	4.65**				
Extraversion (S)	2,251.42 (836)	.89	.89	.04	.28	.02	-1.07	2.80**	0.57	4.46**				
Conscientiousness	1,452.65 (703)	.91	.91	.03	-.02	.25*	-0.19	2.79**	-0.25	4.55**				
Openness	1,713.81 (836)	.92	.92	.03	-.16	.13	0.42	3.41**	0.73	4.58**				
Neuroticism	1,623.43 (698)	.91	.90	.04	.19	1.37*	-0.84	2.40**	-3.54*	4.56**				
Agreeableness	1,777.29 (836)	.92	.92	.04	.12	-.02	-0.47	3.10**	0.48	4.50**				
Workload														
Extraversion (A)	2,020.93 (836)	.90	.89	.04	.64*	-.07	-1.35*	2.81**	0.89	2.20**				
Extraversion (S)	2,036.86 (836)	.88	.88	.04	.39*	-.05	-0.95*	2.85**	0.87	2.18**				
Conscientiousness	1,277.59 (703)	.91	.91	.03	-.01	.07	-0.07	2.80**	0.51	2.22**				
Openness	1,459.02 (836)	.93	.93	.03	.54*	.07	-1.07*	3.42**	0.48	2.15**				
Neuroticism	1,479.26 (699)	.91	.90	.04	-.30	-.18	0.60	2.32**	0.86	2.23**				
Agreeableness	1,539.18 (836)	.93	.92	.03	.56*	.52	-1.09*	3.08**	-0.99	2.15**				

Note. Job Charac. = Job Characteristics, Extraversion (A) is Extraversion-Agency, Extraversion (S) is Extraversion-Sociability. * $p < .05$, ** $p < .01$

conscientiousness is related to an increase in job discretion ($\gamma = .25, p < .05$). Contrary to Hypothesis 2d, neuroticism is significantly related to an increase in job discretion ($\gamma = 1.37, p < .05$). None of the other Big-Five personality variables are related to a change in job discretion, and no Big-Five personality variables are related to a change in workload. Lastly, none of the hypotheses concerning reciprocal effects are supported (H3a–b).

We then conducted exploratory analyses to examine whether the cross-lagged coefficients differed over time (i.e., significant from T1 to T2 but not from T2 to T3). This involved removing the equality constraints on the cross-lagged coefficients in each model. The results indicated that the crossed-path coefficients do not substantially differ over time, except for conscientiousness. In particular, for the significant paths reported above, the cross-lagged effect of: workload on extraversion-agency was $\gamma = .73$ ($p < .05$) between T1 and T2 and $\gamma = .72$ ($p < .05$) between T2 and T3; workload on extraversion-sociability was $\gamma = .43$ ($p < .05$) between T1 and T2 and $\gamma = .47$ ($p < .05$) between T2 and T3; workload on agreeableness was $\gamma = .53$ ($p < .05$) between T1 and T2 and $\gamma = .69$ ($p < .05$) between T2 and T3; workload on openness to experience was $\gamma = .56$ ($p < .05$) between T1 and T2, and $\gamma = .60$ ($p < .05$) between T2 and T3; and neuroticism on job discretion was $\gamma = 1.14$ ($p < .05$) between T1 and T2 and $\gamma = 1.02$ ($p < .05$) between T2 and T3. The cross-lagged path from conscientiousness on job discretion was only significant between T1 and T2 ($\gamma = .31, p < .05$) and not between T2 and T3 ($\gamma = .18, ns$). Overall, this suggests that the strength of the cross-lagged effects was relatively consistent across the 20 years studied except for conscientiousness. A further exploratory analysis was performed to examine whether the inclusion of occupational controls was too restrictive, as their inclusion may have removed some of the effects of personality on job characteristics that are achieved through occupational selection. Our findings from this analysis indicated that removing occupational controls from the models did not substantively alter the results.

Discussion

Drawing on the ASTMA model, we proposed and examined transformation and manipulation transactions between Big-Five personality traits and the core job characteristics of job discretion and workload. We also drew on trait activation theory and job design theory to provide more detailed theoretical explanations for transformational transactions, and the theory of purposeful work behaviour to provide more detailed explanations for manipulations transactions. Our results provide support for some transformation transactions whereby workload appears to have transformative effects on employees' Big-Five personality traits. However, we found no support for transformation transactions concerning job discretion, limited support for manipulation transactions, and no support for reciprocal relationships. The major contributions of this paper are to develop theoretically derived accounts of transactions between Big-Five personality traits and job characteristics that extend existing models of personality–environment transactions (Roberts, 2006; Woods et al., 2019) and to test those theoretical accounts using data spanning a 20-year period of adult working lives. We now discuss our empirical findings and their theoretical implications in more depth.

Theoretical implications

With regard to transformation transactions, high workload was related to an increase in openness to experience, agreeableness, and two aspects of extraversion, namely, extraversion-agency and extraversion-sociability. The transformational effects of workload were consistent across a 20-year time span and independent of occupational type or change. In other words, employees who consistently experience high workloads tend to incur developmental increases in traits that are more outgoing, assertive and sociable, more curious and broadminded, as well as more helpful and sympathetic. Situating these findings within the broad theoretical account of transformation transactions provided by the ASTMA model suggests that these changes in personality occur because employees faced with repeated and prolonged exposure to high levels of workload tend to engage in relatively more extraverted, open, and agreeable behaviours which, over time, become ingrained as trait-level change (Roberts, 2006; Wrzus & Roberts, 2017). However, theoretical discussion of the precise nature of these transformation transactions must be regarded as tentative because it is not possible from our results to ascertain the mechanisms through which these changes occurred. Both trait activation theory and the job demands-resources model suggest that employees will enact behaviours in response to situational demands, and many of the situation behaviour/trait linkages are similar across both approaches. However, they do suggest different mechanisms that drive change. Trait activation theory suggests that personality change is driven by employees reading cues embedded in the task situation which then activate personality-driven behaviours. For instance, workload may cue for increased energy and activity, as these are required for success in such situations, and hence activate extraverted behaviour associated with increased activity such as agency and assertiveness. In contrast, job design theory suggests that situational demands trigger coping strategies and other adaptive behaviours. For example, a high workload may foster openness-related behaviours such as creativity and perspective taking, as these behaviours enable the employee to develop new and workable solutions to managing and reducing a high workload (Frese & Zapf, 1994). These different perspectives therefore propose two contrasting mechanisms for transformational transactions that can be labelled, respectively, cue-based and coping-based mechanisms. Other types of mechanism might also explain how transformation transactions occur, such as those based on affective reactions to job characteristics. Wu (2016), for example, found that timing demands increased job stress, which in turn increased neuroticism and decreased agreeableness. Thus, our study suggests that there is a need to develop a more integrated theoretical understanding of mechanisms underlying transformational transactions between job characteristics and the Big-Five. In light of this, an important direction for future research is to test the relative effects of these different mechanisms with cue-based mechanisms assessed by establishing the extent to which employees read task characteristic cues in consistent ways (Mischel, 1977), coping-based mechanisms assessed by examining coping and learning behaviours (Carver et al., 1989), and affect-based mechanisms tested by examining the mediating role of positive and negative affect (Wu, 2016).

Although the results from this and other longitudinal studies provide evidence that workload and job demands shape personality development, there is considerable variability in the strength of relationships observed within these studies (Li et al., 2014; Sutin & Costa, 2010; Wu, 2016). In particular, whereas this study found workload to be related to extraversion, openness, and agreeableness, Sutin and Costa (2010) found workload to be related only to extraversion, and Wu (2016) reported that timing demands (a marker of workload) were related to conscientiousness and neuroticism but not

extraversion, openness, or agreeableness. Such variability is also present in the longitudinal evidence for transformation transactions between job discretion and personality. This study and Sutin and Costa's (2010) did not find any effects of job discretion on personality, and while this may indicate that job discretion is a weak situation with few cues on how to behave, others have reported job discretion to be associated with increases in conscientiousness (Kohn & Schooler, 1982; Wu, 2016) openness (Kohn & Schooler, 1982), and agreeableness (Wu, 2016). There may be a number of reasons why the effect of job characteristics on personality varies in strength across studies and, hence, why our results differ from other studies.

First, studies differ in the length of time between survey administration, which was ten years in this study and Sutin and Costa's (2010), and one year in Wu's (2016) study. It is possible that different findings may emerge if some personality traits are slower to change (such that changes will only be detected over longer time frames) or if some personality traits are more mutable (such that changes may only be detectable over shorter time frames). Equally, changes in job roles and their associated characteristics are not always linear. It is possible that employees gain more job discretion as they perform well in their role but when promoted have less job discretion until they become familiar and begin to succeed in their new role.

Second, measures of Big-Five traits and job characteristics vary across studies. For example, this study and Wu's (2016) used short-form personality measures with similar but not identical items, whereas Sutin and Costa (2010) used the 240-item NEO. Inconsistent findings across studies may therefore partly reflect differences in personality measurement and their relative sensitivity to detecting personality change.

Third, variation between study results might be due to unaccounted contextual features that counteract the effects of job characteristics on personality (e.g., a stressful personal life counteracting the effects of job discretion on neuroticism) or moderate the effects of job characteristics on personality. Indeed, an important theoretical implication of this study is the need for theoretical accounts of transformation transactions to better articulate contextual boundary conditions. Although many aspects of the context might moderate transformation transactions, according to trait activation theory, one important contextual feature is situational strength (Judge & Zapata, 2015; Mischel, 1977). Strong situations have clear and uniform signals on what is expected and provide relevant incentives for meeting those expectations and include, for example, organizational cultures with strong norms and widely shared values (O'Reilly & Chatman, 1996). A strong bureaucratic or task-orientated organizational culture may therefore enhance the effects of workload on conscientiousness by making cues about planning and dutifulness more salient but decrease the effects of workload on openness by restricting creative and curiosity-driven behaviours.

Turning to the results for manipulation transactions, we found very limited evidence of personality-induced changes in job characteristics. Our analysis of the effects of personality on workload found no significant relationships and this pattern is consistent with the two other longitudinal studies that examine similar effects (Sutin & Costa, 2010; Wu, 2016). For the effects of personality on job discretion, a more nuanced picture emerges. Our analysis found two significant relationships relating to conscientiousness and neuroticism. Specifically, conscientiousness was positively related to an increase in job discretion as hypothesized. This is in keeping with previous findings (Sutin & Costa, 2010) but the effect was only significant in the first 10-year period. The lack of an effect in the latter 10-year period may be due to a ceiling effect. The significant positive effect of neuroticism on job discretion was contrary to our hypothesis. PWB theory suggests that

this might occur because neurotic individuals may be difficult to work with and find it harder to form social ties, which results in greater independent working and autonomy by default (Barrick et al., 2013). These result can be contrasted with those from other longitudinal studies showing neuroticism (Sutin & Costa, 2010; Wu, 2016) and agreeableness (Wu, 2016) to be associated with a decrease in job discretion (Sutin & Costa, 2010; Wu, 2016), and openness (Sutin & Costa, 2010; Wu, 2016) and extraversion (Sutin & Costa, 2010) to be associated with an increase in job discretion. Thus, our findings and those from other longitudinal studies provide limited and inconsistent empirical support for manipulation transactions in which employees personality traits (operationalized by the Big-Five) lead to stable and consistent changes in and workload and job discretion.

There may be a number of reasons for the lack of strong empirical support for manipulation transactions. One reason is model misspecification. With regard to our modelling of personality, manipulation transactions may only be evident at the facet level. Indeed, as facets are more nuanced and typically provide greater prediction of workplace outcomes than broad factors, they may show more consistent relationships with job characteristics (Hughes & Batey, 2017; Tett & Burnett, 2003). Alternatively, manipulation transactions may only be evident for certain personality profiles, that is, combinations of traits or facets (Semeijn, Van der Heijden, & De Beuckelaer, 2020). For example, individuals with personality profiles that combine high extraversion and conscientiousness are likely to be more energetic, persistent, and proactive (Bateman & Crant, 1993) and thus more successful in their efforts to craft their job than those who are high in extraversion or conscientiousness alone (Rudolph et al., 2017). We also failed to specify contextual boundary conditions. Indeed, manipulation transactions might only be evident when combined with prolonged exposure to particular contexts, which the job design literature suggests are those that 'match' the personality of the employee (Daniels & De Jonge, 2010). For instance, the effect of agreeableness on job discretion may only occur when employees work in contexts that 'match' the needs of agreeable employees, such as working with other 'agreeable' employees. Another reason for the failure to find strong empirical support for manipulation transactions is that they may be difficult to detect over long time periods. This is because any personality-driven change in job characteristics, which may have taken months to develop, could be quickly negated by an externally imposed change in job tasks that is outside the control of the employee. Manipulation transactions may also be difficult to detect because the effects of Big-Five traits on job characteristics are relatively distal and linked by number of intervening variables. For example, according to the PWB theory, traits shape motives, which affect job crafting behaviour, which in turn affect job characteristics, (Barrack et al., 2013). Overall, this means that manipulation transactions between the Big-Five and job characteristics may be more easily and consistently observed through improved modelling of personality, causal mechanisms and contextual boundary conditions, and by examining their relationships over the short term and/or in contexts that are fairly stable (Li et al., 2014).

Reciprocal relationships were also proposed between the Big-Five and job characteristics, as this is a logical implication of hypothesizing transformation and manipulation transformations. We found no evidence for reciprocal effects, which is a similar conclusion to Wu (2016) and Sutin and Costa (2010). One reason for a lack of evidence for reciprocal effects this is that transformation and manipulation transactions may have different temporal patterns, such that the survey methodologies employed in these studies are unable to detect both types of transaction. Another reason is that employees might typically find themselves in organizational contexts that favour one type of

transaction over another. For example, a strong culture with clear requirements and rewards may favour transformation transactions because such environments are strong and will encourage employees to 'fit in' and restrict personality-driven attempts to craft job characteristics. Indeed, reciprocal effects between the Big-Five and job characteristics may be relatively rare because the contexts that favour transformation transactions may also inhibit manipulation transactions and vice versa. Thus, although reciprocal relationship is an important feature of models of the work environment and personality such as the ASTMA (Roberts, 2006) and DATA models (Woods et al., 2019), there is little evidence for reciprocal effects between the Big-Five and job characteristics. Consequently, an important future direction for research in this area is to gain a better theoretical and empirical understanding of the broader contextual conditions that affect the relative strength of transformation and manipulation transactions between the Big-Five and job characteristics.

Limitations

Despite the many strengths of this study (e.g., longitudinal data, LCS analysis), the nature of the secondary data is such that there are important limitations to consider. First, our sample did not include employees aged from 16 to 25 at the baseline. Other studies suggest that personality is more malleable in early than late adulthood (Roberts, & Mroczek, 2008), so the transformation effects of job characteristics on personality may be underestimated. Second, the data set limited the range and nature of measures that could be used. For example, we could not examine personality at the facet level (which as noted may produce more consistent relationships). The data also precluded measurement of task content or activities, which may provide a more accurate indicator of the trait-relevant cues in a job (Woods et al., 2019). Indicators of task content may be derived from taxonomies of jobs (e.g., O*NET) although such taxonomies often fail to capture variability between similar job types or change over time, and maybe specific to national economies. In addition, all our data are self-report and the relationship between personality and subjective perceptions of job characteristics as opposed to objective job characteristics might vary between individuals. However, as our analysis examines intraindividual change, such interindividual differences in subjective reporting are unlikely to affect our results unless there are major changes in how individuals in our sample experience job characteristics over time (which is unlikely given measurement invariance over time) and unless an individual's perception of job characteristics has little grounding in objective working conditions (which also seems unlikely). A further restriction of the data set was that all variables were measured over 20 years at ten-year intervals. While this provided new insights on Big-Five trait-job characteristics transactions across a longer time frame than previous research, we were unable to assess or detect changes that may have occurred over shorter time frames, particularly the effects of personality on job characteristics. Future research could therefore collect personality and job characteristics data over long time frames with more frequent measurement intervals and then compare short- and long-term effects. Third, as noted earlier, we did not test the mechanisms through which transformation and manipulation transactions occur and therefore theoretical conclusions drawn about the precise nature of these transactions must be regarded as highly tentative, nor did our study not examine contextual boundary conditions that moderate the strength of personality–job characteristic transactions.

Conclusion

In conclusion, understanding the relationship between the individual and work environment is a core concern of organizational research (Tasselli et al., 2018). Our study advances understanding of this concern by developing theoretically informed accounts of transactions between Big-Five personality traits and job characteristics, by highlighting the important role that work demands play in ‘transforming’ the personality of employees, and by providing further empirical support for models of personality change in organizations (Roberts & Nickel, 2017; Woods et al., 2018). When considered alongside the findings from other studies, the evidence points to the need for a better understanding of the exact mechanisms through which transactions between personality and job characteristics occur, the role of contextual factors in moderating these transactions, and the differences in the temporal evolution of these transactions.

Conflicts of interest

All authors declare no conflict of interest.

Author contributions

David Holman (Conceptualization; Data curation; Formal analysis; Methodology; Writing – original draft; Writing – review & editing) David J Hughes (Conceptualization; Data curation; Formal analysis; Methodology; Writing – original draft; Writing – review & editing)

Data availability statement

The data used in this study are publically available at <http://midus.wisc.edu/index.php>

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Supporting Information

The following supporting information may be found in the online edition of the article:

Supinfo Construct validity and measurement invariance.