Job design and autonomy: A task-level approach

Working paper

Version May 31st 2020

Laura Nurski[1] and Seth Maenen[1,2]

[1] Workitects, center of expertise in organizational design

[2] University College Leuven-Limburg

Abstract

We develop and test a task-level theory of job design, autonomy and wellbeing at work. We build our theory on three main insights from several influential, but separate, strands of work design theory: (1) the distinction between job demands and control; (2) a separation of task-level and person-level dimensions; and (3) the recognition that distinct task-level dimensions cause distinct outcomes for workers. We propose three types of autonomy: engaging autonomy (type 1); stress-reducing autonomy (type 2); and a third type of autonomy which imposes a hindering burden of responsibility on job incumbents and could be both engaging and stressful. We test our theory on a sample of 1697 residential care workers in Belgium. We confirm the hypotheses that task-level measures of job design are ontologically different from person-level measures and that the three types of autonomy constitute empirically separate dimensions of job control. Finally, we largely confirm their distinct effects on mental outcomes of job incumbents.

Keywords: Job design, Work design, Autonomy, Task, Engagement, Stress, Exhaustion

Introduction

Autonomy is central in most theoretical accounts of work design, including Sociotechnical Systems Theory (STS), the Job Characteristics Model (JCM), the Job Demands - Control model (JD-C) and the Job Demands - Resources theory (JD-R) (see Parker et al. 2017a for an overview). In the past, influential contributions to the field made straightforward statements about "the desirability of high autonomy and high experienced responsibility for achieving beneficial work outcomes" (Hackman and Oldham, 1976: 272-273). A host of studies have subsequently supported the idea that autonomy boosts motivation and protects job incumbents from stress at work (e.g. Karasek, 1979; Kahn, 1990; Grant and Parker, 2009; Humphrey et al., 2007; Parker et al., 2019). The benefits of autonomy for worker outcomes have been emphasized so often that Humphrey et al. in their meta-analytic review felt that a 'case closed' was declared on the motivational effects of autonomy in the late 1980s and onwards (Humphrey et al., 2007: 1332). Today, this 'case closed' statement appears premature. Parker et al. (2017a) describe the current field of work design studies as vibrant, with an increasing number of recent studies and conceptual contributions delving into work design and autonomy (Andrei et al., 2019; Parker et al., 2017a, 2017b; Parker et al., 2019; Sonnentag, 2017).

The resurging interest in work design has come along with the growing realization that we lack a valid integral account to explain which type of autonomy bears what kind of repercussions for job incumbents. Since "substantial differences exist in the affective processes associated with various types of work tasks" (Sonnentag, 2017: 13), doubts have arisen as to whether some types of autonomy, like scheduling autonomy lead to more engagement or job satisfaction (see Humphrey et al., 2007). Previous research has also demonstrated that skill discretion is a particular type of control, that correlates only weakly with decision authority in general (Schmidt and Diestel, 2011). Studies drawing on JD-R theory furthermore raised questions about the extent to which job resources like autonomy help to avoid work stress and exhaustion, since the interaction effect between job demands and job resources is regularly not found in studies (Brough et al., 2013. de Jonge et al., 2014; Häusser et al. 2010; Schulz et al., 2019). In addition, scholars have recently coined the concept of hindrance demands (Podsakoff et al., 2007; Tims et al., 2013; Schulz et al., 2019), which are considered to be particularly burdensome aspects of jobs, for which it remains unclear whether autonomy can be an effective counterforce to reduce employees' stress (Van den Broeck et al., 2010).

We aspire to make two contributions to work design research. First, we propose a refined definition of autonomy by identifying different facets of job control. We demonstrate empirically that these facets yield important explanatory power in terms of workers' mental states, and are a promising way forward for making sense of some of the disparate findings regarding autonomy in earlier studies. Second, we adopt a job design perspective instead of a person-level perspective for explaining outcomes at the level of job incumbents. In doing so, we help overcome some unresolved issues in JD-R and JCM research, and provide a linking pin between worker level wellbeing and organizational level work design. To achieve both goals, we suggest that a task-level account of autonomy is needed. We concur with Sonnentag's statement that "the job-design literature in general and the engagement literature in particular mainly looked at average levels of certain task characteristics within a job, but largely ignored the characteristics of specific tasks at the task level" (Sonnentag 2017: 12). Using a task-level perspective we identify different facets of autonomy with unique relationships to worker

outcomes, and we provide measures of job autonomy that can be used across a wide range of work contexts. We submit that our approach improves our understanding of autonomy and allows to make generalizable statements that bridge the gap between wellbeing research and work design theory at the organization level.

Overview of theories and concepts on work design and autonomy

Earlier contributions have provided excellent overviews of the literature on organizational, team and job design in relation to job incumbents' mental states and behavioral outcomes (e.g. Andrei and Parker, 2018; Humphrey and Aime, 2014; Humphrey et al., 2007; Parker et al., 2017a; Parker et al., 2017b; Grant and Parker, 2009; Raveendran et al., 2020; Bakker and Demerouti, 2017). Table 1 summarizes the conceptual focus of influential theoretical accounts on organization and work design. The aim of this table is not to be exhaustive. Instead, we summarize key concepts of influential publications and show that autonomy has been approached from different levels of analysis, i.e. as a characteristic of organizations, teams, jobs or individuals. Choosing an appropriate level of analysis for theorizing and measuring autonomy is highly consequential.

Based on their overview of 100 years of research on work design, Parker et al. (2017a) call for research "that is broader, more contextualized and team-oriented". These authors make a case for bridging the more individualist approaches, such as JCM, JD-C and JD-R, and more team and system level approaches like STS and autonomous work groups. Indeed, there are at least two reasons why expanding our conceptual perspective on work design from an individualist to a more system-level perspective is important. Firstly, concepts that exceed the person-level allow us to generalize inferences across different work contexts and organizations. Secondly, the mental consequences of work design for job incumbents at the person-level are to a considerable extent caused by variables that pertain to the organizational level. Job demands, like workload or time pressure, and job resources, like autonomy or social support, are at least in part the result of choices made on the departmental division of work and overall organizational priorities. Focusing too exclusively on person-level variables may therefore shed light on the symptoms but not on the causes of health-impairing job designs.

This section provides an overview of the most important theories on work design and autonomy. Based on this synthesis, we conclude that work design theory can benefit from insights offered by several existing theories that have as yet been scarcely integrated. We will argue in the next section that further progress will depend on a better understanding of the task-level characteristics of jobs.

Table 1 Conceptual focus of influential theoretical accounts on organization and work design

	Psychological states or needs of job incumbents	Work design		Behavioral outcomes of job incumbents
		Organization and team level	Job-level (mix of person-level and task-level)	
Sociotechnical systems theory (Trist and Bamforth, 1951; Cummings, 1978)		Autonomous work groups	Task differentiation, Task control, Boundary control	Motivation
Information-processing view of organization design (Galbraith, 1974)	Assumption of cognitive limits (bounded rationality)	Uncertainty and information processing	Self-contained tasks by a reduced division of labor in conditions of high uncertainty	
Recent theorizing on organization design (Raveendran et al., 2020; Puranam, 2018; Ethiraj and Levinthal, 2004)	Assumption of cognitive limits (bounded rationality) and incentive structures	Contingency approach: optimal design depends on the type of work	Various conceptions of interdependence (goal, task, knowledge, epistemic)	
Job characteristics model (Hackman and Oldham, 1976; Morgeson and Humphrey, 2006)	Experienced meaningfulness Experienced responsibility Knowledge of the actual results		Skill variety, task significance, task identity, autonomy, feedback, complexity, information processing, …	Motivation, satisfaction, absenteeism, turnover
Job demand-control model (Karasek, 1979)			Job demands, job decision latitude	Depression, exhaustion, pill consumption, job and life dissatisfaction, absenteeism
Job demands-resources theory (Demerouti et al., 2001; Bakker et al., 2005)			Job demands (work overload, emotional demands, …) and job resources (autonomy, social support, …)	Burnout, exhaustion, disengagement
Self-determination theory (Gagné and Deci, 2005, Deci et al., 2017)	Emphasis on desirability: the need to feel autonomous, competent and related.	Autonomy supportive organizational environments	Autonomous and controlled motivation; Heuristic vs. algorithmic tasks; Uninteresting vs. interesting tasks	Well-being, organizational trust and commitment, job satisfaction
Conservation of resources theory (Hobfoll, 1989)	Emphasis on undesirability: (Threats to) a net loss of resources, a lack of resource gain		Resource replacement. Resource appraisal (shifting the focus of attention, reevaluating resources)	Stress

***Organization-level design theories*: autonomy as an outcome of organization and team design**

For decades since the 1960s, classic organization design theories have been dominated by Sociotechnical Systems Theory (see Parker et al., 2017a). STS argued that an autonomous work group should be granted the autonomy to control a differentiated cluster of tasks, that could be controlled by a work group largely independent from hierarchal interference and with clearly defined boundaries in relation to the tasks done by other work groups (Cummings, 1978). The core idea in STS is that workers should be given substantial task control as this would foster motivation and improve performance (Trist and Bamforth, 1951; Cummings, 1978). Differing from STS, contingency theories on organization design have not regarded autonomous working groups as the default design choice, and have instead emphasized the conditions that may be fitting to different sorts of work designs. Most prominently, Galbraith (1974) drew attention to process uncertainty as a primary variable that determines the need for information-processing and serves as a basis to design fitting organizational structures.

Interestingly, more recent organization-level design theories have continued on this contingency approach, but have simultaneously promoted a microstructural approach to organization design (Puranam, 2018). This involves detailing various conceptions of interdependence (Puranam, 2018; Ethiraj and Levinthal, 2004), including goal, task and knowledge interdependence (Raveendran et al., 2020). Interdependence is in turn a key concept in team design (Humphrey and Aime, 2014): what does a work unit depend on to get its work done and to achieve its goals? If design choices are based on considerations of interdependence at the organization level, then these choices bear direct repercussions on the job resources and controls that are available to job incumbents within a work unit. Even though there are obvious reasons to assume that organization design cascades into individual-level job design, most organization-level theories have paid scarce attention to job incumbents mental outcomes. STS is an exception, as this theory argues that autonomy simultaneously promotes better personal outcomes for workers as well as better organizational performance (Cummings, 1978).

***Job Characteristics model (JCM)*: autonomy as motivating job enrichment**

The JCM expressly sets out to explain motivation at the level of workers. JCM took the line of reasoning of STS one step further by showing that the mental states of job incumbents are positively altered by job enrichment and autonomy (Hackman and Oldham, 1976; Humphrey et al., 2007). JCM can be read as a protest against jobs that are demeaning to workers and that offer little opportunity for self-realization and pride. Job enrichment is highly pertinent in contexts where Tayloristic, bureaucratic organizations lead to job simplification, which until today is often the default mode for organization design (Parker et al., 2019). Hackman and Oldham therefore deliberately chose to deal "only with aspects of jobs that can be altered to create *positive* motivational incentives for the job incumbent" (1976, 277 – original emphasis). They purposefully set out to find the "reasons why 'enriched' work sometimes leads to positive outcomes for workers" (1976: 272-273).

The primary idea of JCM has thus become that more autonomy, more task variety and more job complexity improve the quality of working life (Humphrey et al., 2007). Many scholars have followed through on this idea. For example, Habe and Tement (2016) showed that skill variety was positively related to absorption at work, which was even more the case when job autonomy was high. Shalley et al. (2004) argue in favor of job complexity because "complex jobs should enhance individuals' excitement about their work activities and their interest in completing these activities, and this excitement should foster creativity". Many influential studies since the pathbreaking publications by Hackman and Oldham have supported and built on similar propositions (e.g. Kahn, 1990). The 'more is better' assumption with regard to autonomy in work design has consequently become dominant in the work design literature (see Grant and Parker, 2009; Parker et al., 2019).

Job Demands-Control model (JD-C): autonomy to offset stressful job demands

In comparison with JCM, Karasek's JD-C model introduced two innovations to work design theory. Firstly, Karasek argued that the utility of a job design theory hinges on the separation of demands and decision latitude (Karasek, 1979: 288). Whereas studies using the JCM framework regard job complexity and skill variety as job characteristics that are expected to be beneficial to job incumbents, the JD-C perspective begs the question whether such job characteristics are to be understood as a demand (a stressor) or a control (which is expected to be stress-reducing). Secondly, whereas JCM is exclusively concerned with the motivational aspects of work design, Karasek choose negative outcomes like exhaustion and depression as outcomes.

Notwithstanding these differences with JCM, Karasek expressly supported JCM's anti-Tayloristic work design guidelines and argued that using intellectual skill or making decisions "enhances the individual's feelings of efficacy and ability to cope with the environment; it is not a source of stress" (1979: 303). Karasek's main assertion was thus that autonomy can offset the stressful effects of burdensome job demands. He further argued that low-status blue collar workers are the group "that is most affected by problems of strain and related feelings of dissatisfaction, and should be the focus of job redesign programs" (1979: 302).

Job Demands-Resources model (JD-R): autonomy as a resource or demand?

Whereas both JCM and JD-C make a strong case for job enrichment and increasing autonomy, JD-R takes a more conceptually agnostic perspective on the appropriateness of such work design interventions. More particularly, JD-R suggests that exhaustion and engagement result from distinct causal pathways (Demerouti et al., 2001; Bakker & Demerouti, 2017). A first pathway leads to exhaustion, as a result of "constant overtaxing by job demands". A second pathway leads to withdrawal behavior as a result of a lack of resources (Demerouti et al., 2001; Schaufeli and Bakker, 2004). Since, as Konze et al. (2017) note, "coping with job control can also be effortful", JD-R studies are open to the hypothesis that redesigning work for job enrichment may increase the risk of burn-out. This conceptual openness is reflected in the

definition of the foundational concepts of the model. Job demands are generally defined as "those physical, social, or organizational aspects of the job that require sustained physical and or/psychological effort on the part of the employees", whereas job resources are "those physical, psychological, social or organizational aspects of the job that (a) reduce job demands and the associated physiological and psychological costs, (b) are functional in achieving work goals, or (c) stimulate personal growth, learning and development" (Demerouti et al., 2001).

Bakker and Demerouti admit that these are "heuristic and flexible" definitions that leave it open "whether a specific job characteristic represents a demand or a resource, or whether an outcome is of a health-related or motivational nature" (2017: 278). As a result, and in contrast to the JCM and JD-C, JD-R theory does not provide generalizable recommendations regarding autonomy in work design. Compared to JCM and JD-C, JD-R studies have focused less on the task-level features of autonomy and have instead adopted "broad and distal measures of control or composite measures which also encompass aspects of skill discretion, task variety and learning opportunities" (Schmidt and Diestel, 2011). For example, Bakker et al.'s influential paper (2005) used a limiting three items scale on autonomy referring solely to 'decision authority'. In another seminal paper within the JD-R tradition, Schaufeli and Bakker (2004) autonomy was not included at all as a measure of job control.

***Self-Determination Theory (SDT)*: autonomy as a basic psychological need that drives motivation**

Self-determination theory focuses on "what facilitates high-quality, sustainable motivation and what brings out volitional engagement in employees and customers" (Deci et al., 2017: 20). Much in line with STS and JCM, SDT is primarily interested in the extent to which task characteristics promote desirable outcomes for employees, like well-being, commitment, trust and job satisfaction. SDT maintains that workers' motivations are driven by three basic psychological needs: the needs for competence or effectance, relatedness or belongingness and autonomy or self-determination (Gagné and Deci, 2005; Deci et al., 2017; Van den Broeck et al., 2008). Compared to JD-R, the concept of autonomy thus figures much more prominently in SDT.

In contrast to most other work design theories, SDT provides conceptual arguments relating to all levels of analysis in table 1. Although the organization-level perspective of SDT remains limited to pointing out the importance of "autonomy supportive organizational environments" (Gagné and Deci, 2005), the interconnectedness of the different levels of analysis is explicitly recognized in SDT. Another key insight provided by SDT is that different types of tasks (e.g. heuristic and algorithmic) have distinct repercussions for job incumbents' mental outcomes. The task-related differences are described on a continuum with on the one end tasks that are inherently interesting and bring about intrinsic motivation in workers, and on the other end tasks that are less inspiring, in which case motivation can only by invoked by externally controlled modes. Hence, SDT explicitly acknowledges that the general concept of autonomy should be broken down to the task-level. Only then the possibility that autonomy relating to different types of tasks lead to different types and degrees of motivation for workers can be accounted for.

***Conservation of Resources theory (COR)*: autonomy to avoid undesirable states**

Whereas desirable job characteristics are of primary concern in SDT, COR theory is focused on the idea of 'undesirability' and the concept of loss in order to explain the occurrence of stress (Hobfoll, 1989). The core idea is that humans are motivated to protect their current resources and to acquire new resources (Halbesleben et al., 2014). Even though COR is thus framed as a theory of motivation, this motivation is largely driven by the stress of loss or the pain of an unattained gain, a pain that increases with the extent that an individual makes more resource investments. Hobfoll (1989) therefore explicitly chose stress as the primary dependent variable of his theory. This focus on stress as the dependent variable is in line with Karasek's original formulation of JD-C.

The COR perspective is in many ways complementary to the abovementioned theoretical accounts (Dawson et al., 2016; Bakker and Demerouti, 2017). Whereas SDT draws attention to the job design features that promote desirable outcomes such as intrinsic motivation and feelings of competence, COR points to potentially undesirable outcomes, notably the adverse sentiments provoked by an experience of loss or failure to accomplish a gain. Furthermore, whereas Karasek maintained that decision latitude buffers the stressful impact of job demands, COR specifies the more concrete psychological conditions why and for which types of autonomy this might be so. Even though COR theory does not provide particular predictions on job design, it does suggest that types of autonomy that grant workers access to compensating mechanisms such as resources replacement or resource appraisal (Hobfoll, 1989) are needed in order to avoid stress for job incumbents.

Synthesis

Though work design theory started out from a motivational perspective (STS, JCM), later contributions also considered stressful effects of work design for job incumbents. Important in this development was the conceptual separation of job demands and job control (JD-C). Furthermore, attention was drawn to the distinct causal pathways from job demands to exhaustion on the one hand and job resources to engagement on the other hand (JD-R). Motivation theories (SDT) and stress theories (COR) further substantiate these distinct mechanisms present in JD-R, highlighting motivation in terms of achieving particular desired mental states and defining stress as the inability to avoid undesired mental states. In the next section we discuss three takeaways from our reading of the literature and lay the foundation for a task-level theory of work design.

Three takeaways contributing to a task-level perspective on work design

From the above synthesis of the work design literature, we discuss three important insights relevant to a task-level theory of work design in general and autonomy in particular: (1) the distinction between

job demands and job autonomy; (2) a separation of task-level and person-level dimensions of autonomy, both conceptually and empirically; and (3) the recognition that distinct task-level dimensions cause distinct mental outcomes for workers. We thus build on the main contributions of several influential strands of work design theory and use these three building blocks as the foundation of our task-level theory of work design.

Takeaway 1: distinction between job demands and job autonomy

JCM studies have convincingly shown that autonomy and other task-level variables like job complexity and skill variety matter significantly for job incumbents' mental outcomes. However, these studies have focused on the motivating effects of autonomy, and did not set out to explain negative affect, such as exhaustion or cognitive overload, that job incumbents might experience (Hackman and Oldham, 1976). Therefore, job demands, defined as the stressful characteristics of jobs (Bakker and Demerouti, 2017), are regarded as out of scope of the JCM. The exclusive emphasis on the motivational effects of work design explains why the original formulation of JCM nor more recent contributions within this tradition have made a distinction between job demands and job resources. For example, Morgeson and Humphrey's (2006) work design questionnaire (WDQ) did not adopt a systematic measurement of job demands. Their WDQ moreover included no measures that could illuminate negative mental outcomes for workers, such as cognitive overload, exhaustion or job strain, and instead included only job satisfaction, training requirements and compensation requirements as the dependent variables.

Altogether, JD-R and JD-C studies have shown that JCM's approach of paying attention only to the antecedents of motivation is a somewhat lopsided approach to work design. The lack of distinction between job demands and job resources led to research findings that are difficult to explain within STS and JCM thinking. For example, Humphrey et al.'s meta-analysis showed that "job complexity and task variety were strongly related to overload" (2007: 1347). Arguably, job complexity and task variety are constructs that mainly capture the demanding aspects of job design, and such outcomes might therefore be better explained by more rigorously distinguishing between demands and resources in job design measures. We therefore concur with Karasek's argument that the utility of a job design theory depends on the separation of job demands and job decision latitude (Karasek, 1979: 288). The inclusion of independent measures on respectively the demand and resource characteristics of work design, as well as indicators of both motivation and work stress as independent variables, is crucial to advance our understanding of job design.

Takeaway 2: separation of task-level and person-level dimensions of autonomy

Karasek (1979) took the stance that the individual level of analysis should not be prematurely introduced when explaining mental strain: "attention should first be directed to other types of environmental variables which can moderate job stressors, such as decision latitude, and then to the moderating effects of individual capabilities or perceptions (1979: 287). Likewise, Hackman and Oldham

(1976) explicitly attempt to disentangle the relationships "between job characteristics and individual responses to the work" (1976: 255). Later theories have been less rigorous in making this distinction. As Parker et al. (2017b) noted, the term 'work design' has increasingly been used instead of 'job design' to capture the idea that work design is not only about assigned tasks and responsibilities but also about how individuals or groups self-select or 'craft' their work. As a result of this conflation of person-level and task-level variables, little progress has been made in studying how specific task-level job design choices relate to worker outcomes.

Whilst this conflation has also somewhat occurred within JD-R studies, it is more common in JD-R studies that the individual level is emphasized at the expense of job-level variables (Bakker and Demerouti, 2017: 280). This emphasis on person-level variables in effect implies a move way from a job design theory that aspires to be generalizable across different work contexts and organizations (Schaufeli & Taris, 2014). The predominant person-level focus in JD-R has moreover led to a number of important unresolved issues in JD-R research. If job demands and resources are person-level variables, then the distinction between demands and resources depends on the personal experiences of the job incumbent and can only by appraised in the eye of the beholder. As a consequence, the JD-R approach does not provide a clear-cut conceptual distinction between demands and resources (see Parker et al., 2017a).

We instead suggest distinguishing more rigorously between task-level and person-level autonomy, and in this respect we propose a return to the foundational approaches of JD-C and JCM. From a *task-level* perspective, autonomy can be viewed as a concept that pertains primarily to the design of the job, regardless of the individual doing the work. By contrast, in a *person-level* approach, autonomy can be regarded as a concept that describes behavior, as the degree to which an individual assumes responsibility and takes decisions, regardless of the organizational context in which this behavior takes place. In the former meaning, autonomy is seen as a function of the work design, as the cluster of tasks and the degree of decision latitude that is granted to individuals by a given organizational structure. In the latter meaning, autonomy is a result of individual choices that are seen as a function of person-level characteristics and/or person-level job crafting.

Proposition 1 states that the task-level perspective of work design and the person-level perspective are ontologically different. We hypothesize that task-level variables represent a reality of job design that is independent from person-level variables. While person-level variables are mainly driven by the workers who occupy a job, task-level variables are characteristics of the job, not the job incumbent. Empirically, we therefore expect job incumbents to agree more about variables such as task-level demands and autonomy than about person-level variables such as emotional support.

Proposition 1: Task-level work design and person-level work design is ontologically different.

Takeaway 3: distinct pathways from task-level characteristics to worker outcomes

Although JCM and JD-C, in contrast to JD-R, have made more rigorous conceptual distinctions between the person-level and the job-level, both approaches have failed to theorize the more specific task-level

characteristics that explain job incumbents' different sorts of mental outcomes (Sonnentag, 2017). The state-of-the-art in research to date does not provide clear answers as to whether the *type* of autonomy matters when explaining various kinds of outcomes for job incumbents. For example, whereas Humphrey et al.'s meta-analytic review of JCM-research (2007) found that work methods autonomy and decision-making autonomy are strongly related to job satisfaction, no statistically significant relationship was found between job satisfaction and work scheduling autonomy. A more recent meta-analysis even found a negative effect of scheduling autonomy on work motivation (Muecke and Iseke, 2019).

Important job design questions have thus remained unanswered. Is autonomy unequivocally beneficial to job incumbents? Is skill discretion a more engaging type of autonomy, whereas scheduling autonomy is rather exhausting? Or can a single type of autonomy be at the same time engaging and exhausting? To find answers, work design theory has to face the challenge to disentangle different facets of autonomy at the level of jobs and how they explain exhaustion and engagement at the level of workers. JCM nor JD-R have adopted precise task-level measures of job design, and have instead used overarching measures at the overall level of job characteristics (Schmidt and Diestel, 2011; Sonnentag, 2017). More recent approaches, like SDT and COR theory, support the argument that explaining worker outcomes requires a more specific understanding of task configurations in job design.

Improving the conceptualization of demands and resources through a task-level perspective might also help overcome recent doubts on the moderating or buffering effect of job resources like autonomy on work stress (Brough et al., 2013.; de Jonge and Dorman, 2006; de Jonge et al., 2014; Häusser et al. 2010; Schulz et al., 2019). de Jonge & Dormann (2006) proposed that resources could buffer strain caused by stressors, but only when they were properly matched along three job dimensions: physical, emotional and cognitive. They found most significant interactions between stressors and resources along the physical and emotional dimensions. However, their cognitive dimension is conceptually very broad and encompasses many different task-level and person-level characteristics. On the cognitive stressors side, the items gauge the level of complexity and degree to which the work is mentally exacting. On the cognitive resources side, the items of the scale refer to worker's latitude in choosing work methods and setting work goals. The authors state themselves that "The scale includes items that refer to the worker's opportunities to determine *a variety of task aspects*" (de Jonge & Dormann, 2006: 1362, emphasis added). It is then not surprising that no significant interactions between stressors and resources were found on the cognitive dimension. A possible way forward is to break down the broad concept of 'cognitive job demands and resources' into more specific task-level facets of job demands and autonomy.

A research model of a task-level theory of work design

We advance a task-level framework on the concept of autonomy and its ramifications for job incumbents, both at the level of engagement and exhaustion. In particular, we propose that at least four task-level dimensions should be taken into: knowledge-intensity, information-processing, planning execution and scheduling decisions.

Knowledge-intensity is a first task-level dimension that is likely to be important for workers' mental outcomes. The importance of knowledge-intensity of tasks has been central to virtually all theoretical accounts of job design. Hackman and Lawler (1971) posited that an individual experiences positive affect to the extent that he learns, as learning is assumed to set in motion a "reinforcing state of affairs" and "a self-perpetuating cycle of positive work motivation" (Hackman and Oldham, 1976: 256). In a similar vein, Karasek argued that a job design that grants workers "the opportunity to use skill and make decisions *reduces* the undesirable effects of job demands" (1979: 286 – original emphasis). Humphrey et al.'s meta-analytic review on JCM-studies pointed out that skill variety contributes to "experienced meaningfulness", which is in turn considered to be "the best mediator between motivational characteristics and work outcomes" (2007: 1346). The importance of knowledge-intensity is also emphasized by self-determination theory (SDT) (Deci et al., 2017). SDT considers competence development as a basic psychological need, and intrinsic motivation is therefore expected to be particularly important for "tasks requiring creativity, cognitive flexibility, and conceptual understanding" (Gagné and Deci, 2005: 337). Since, "prototypically autonomous' behavior is intrinsically motivated behavior that is propelled by interest in the activity itself" (Gagné and Deci, 2005: 334), the knowledge-intensity of tasks is accordingly a critically important facet of job design.

Information-processing is a second dimension that is indispensable for a task-level theory on job design. The hypothesis that enriched job designs are beneficial for workers' mental outcomes rests on the argument that job design should enable workers to actively collect and process the information they need to get their work done and to cope with operational uncertainty that comes along with doing the work (Parker et al., 2017b). Grant and Parker (2009: 344) state that task ambiguity triggers employees' desires to reduce uncertainty, and the need for information-processing is therefore expected to be particularly high for jobs with high levels of operational uncertainty. The concept of information-processing has therefore been widely adopted in work design studies, and has been shown to yield significant explanatory power (Humphrey et al., 2007; Morgeson and Humphrey, 2006). An additional argument for including information-processing in our model is that this concept opens up opportunities for cross-level theory building. Information-processing as a task-level concept links job-design theory to design theories at the level of teams as well as at the level of organizations. Approaching teams as "information-processing systems" has been proposed as a crucial way to better understand the performance of teams (Schippers et al., 2014; Sunstein and Hastie, 2015). At the organizational level, the idea that organizational structures determine the information-processing capability of organizations has been a central idea in organizational design theory for decades, and information-processing has been regarded by some as the foundational reason of existence for organizational design-theory (Galbraith, 1974).

Thirdly, the inconsistent findings regarding work scheduling autonomy in previous work design research (Humphrey et al., 2007; Morgeson and Humphrey, 2006; De Spiegelaere et al., 2016; Muecke and Iseke, 2019) justifies a revised conceptualization and measurement of the work scheduling dimension. Such inconsistent findings are particularly disturbing, because there are obvious theoretical reasons why work scheduling autonomy is important for enabling job incumbents to cope with a high or volatile workload. We argue that previous overarching conceptualizations of work scheduling autonomy have

conflated two facets of scheduling autonomy that ought to be distinguished. In particular, the overall concept of scheduling autonomy encompasses both the prioritizing of work in terms of *planning-decisions*, and the autonomy to regulate the sequence and pace of work in terms of *planning-execution*. However, planning-decisions and planning-execution are two fundamentally different facets of work scheduling. Whereas planning decisions pertain to choosing *what work* ought to be done within a given time frame, planning execution is about *how* the sequence and pace of work is organized once priorities have been rank-ordered by planning-decisions. We therefore argue that *planning-decisions* and *planning-execution* constitute distinct task-level facets of job design.

Proposition 2 states that the above-mentioned task-level characteristics constitute empirically separate dimensions of autonomy and job demands. We hypothesize that knowledge-intensity, information-processing, planning execution and planning decision facets of autonomy are conceptually too different to be reasonably captured within one overarching concept of autonomy or decision latitude. Instead, they represent separate aspects of job control that can be empirically distinguished from each other and that taken together pinpoint distinct task-level facets of job's design. Whereas previous studies have measured decision-making autonomy as a monolithic concept, we propose to break decision-making down into these four task-level facets of decision-making. These four task-level facets pertain respectively to what work should be done (information-processing to deal with operational uncertainty), with which priorities (planning decisions), how the work should be done (knowledge intensity), and in what sequence and pace (planning execution). We therefore expect that they do not load on one single factor, but that they each load on a separate factor in the data.

Proposition 2: Task-level facets constitute empirically separate dimensions of autonomy and job demands.

Finally, our goal is to understand which facets of autonomy are either engaging or stressful for job incumbents. We hypothesize that the above-mentioned four facets of autonomy have different consequences for job incumbents' mental outcomes. We accordingly postulate research propositions 3 to 5 by relating the above-mentioned task-level facets to worker outcomes in terms of engagement and exhaustion. Figure 1 visualizes the hypothesized relationships between the task level variables at the level of jobs and mental outcomes at the level of job incumbents. The propositions are elaborated below.
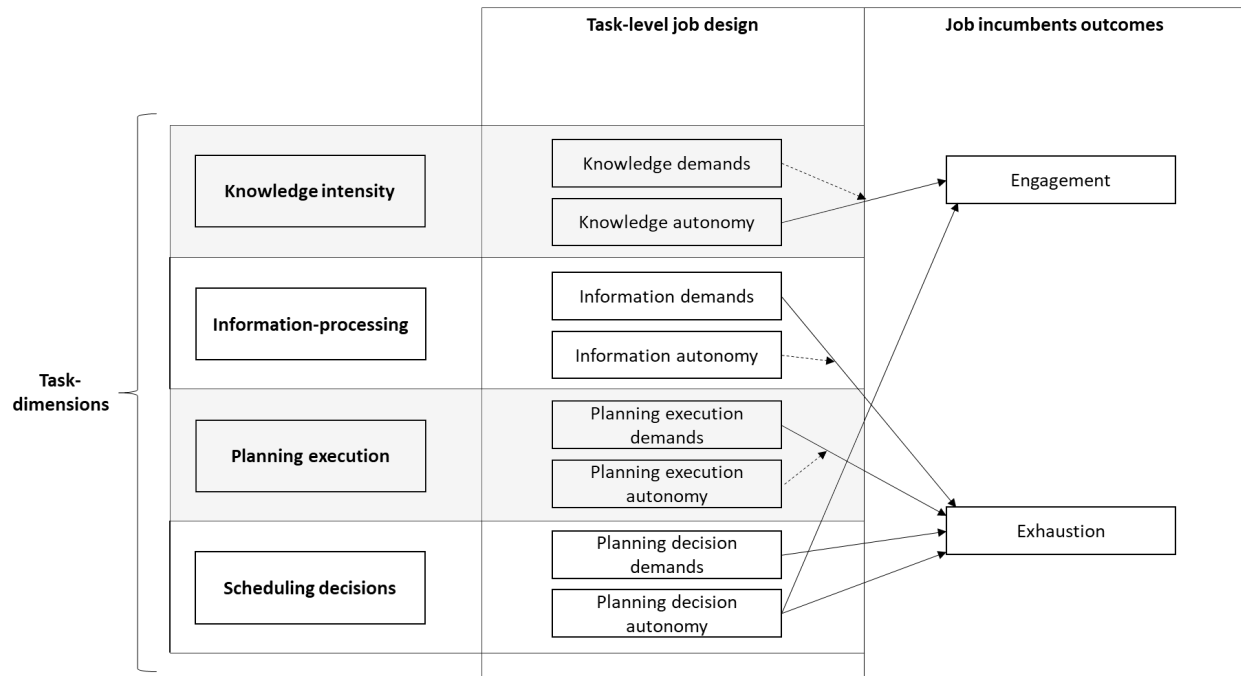
Figure 1: Research model on task level job design and worker outcomes

Autonomy type 1: Autonomy that is engaging and motivating

The job enrichment thesis has mainly been based on the idea that autonomy increases experienced meaningfulness. In accordance, we propose that autonomy that allows workers to develop their knowledge is a particularly engaging type of autonomy. This proposition follows both JCM and JD-R theory. In addition, self-determination theory (SDT) suggests that the autonomy to acquire new knowledge or to develop skills will be experienced as particularly motivating (Deci et al., 2017). Autonomy that enables workers to achieve mastery or that is supportive for skill development is likely to have an engaging effect because it leads to self-realization and increased self-efficacy.

Proposition 3 is inherent to the motivational perspective on job design and holds that knowledge autonomy is engaging. Knowledge autonomy has a stronger effect on engagement than other types of autonomy, which is also in accordance with self-determination theory.

Proposition 3: Knowledge autonomy is engaging.

Autonomy type 2: Autonomy that buffers against the straining impact of job demands

Whereas SDT and JCM have focused on job and task characteristics that enable workers to attain desirable mental states like experienced meaningfulness, we posit that not all kinds of autonomy directly contribute to such states. As Gagné and Deci noted, "many activities in work organizations are not intrinsically motivating" (2005: 333). Some task dimensions, like planning execution and information-

processing, are more indirectly related to achievements. As they represent no immediate contribution to work goals, they are less likely to directly provoke desirable mental states. Nonetheless, they may be important to avoid undesirable mental outcomes. The idea of avoiding 'undesirability' is central to the conservation of resources theory (COR) (Hobfoll, 1989), which suggests that work design should be helpful to avoid the threat of potential or actual loss of resources. This perspective directs attention to facets of autonomy that enable workers to avoid unpleasant work situations.

The COR perspective aligns well with Karasek's original line of reasoning that regards autonomy as a shield that protects or 'buffers' workers from the stressful impact of job demands. Whereas previous studies have casted doubts on this moderating or buffering effect (Brough et al., 2013. de Jonge et al., 2014; Häusser et al. 2010; Schulz et al., 2019), we propose that the buffering hypothesis may hold for indirect tasks, such as information-processing autonomy and planning execution autonomy. We posit that information-processing and planning execution autonomy are task dimensions that are valued by job incumbents, not because these tasks are intrinsically motivating in themselves as is implied by SDT, but rather because they serve as investments that are expected to lead to a future return (avoidance of loss or acquiring extra resources) as suggested by COR theory. Autonomy regarding these indirect task-dimensions provide workers with protective mechanisms, thereby avoiding work stress, while not necessarily contributing to desirable mental outcomes such as experienced meaningfulness.

Proposition 4 therefore states that information and planning execution autonomy are stress-reducing, but non-engaging. We hypothesize that the autonomy to collect and process information has a buffering effect on exhaustion: when job demands for information collection and processing are high, information autonomy helps to keep exhaustion low. A similar proposition is stated for planning autonomy in the execution of work: when the timing of tasks is frequently disturbed, planning execution autonomy is an essential condition to keep work stress low. However, since information and planning execution autonomy do not directly contribute to any of the mental processes implied by self-determination theory, we expect no effect from either facet of autonomy on engagement.

Proposition 4a: Information autonomy is stress-reducing but does not spur engagement.

Proposition 4b: Planning execution autonomy is stress-reducing but does not spur engagement.

Autonomy type 3: Autonomy that imposes a hindering burden of responsibility on job incumbents

Finally, we consider the possibility that some forms of autonomy are simultaneously engaging *and* stressful. Several scholars have made a distinction between hindering versus challenging job demands (Podsakoff et al., 2007; Parker et al., 2017; Tims et al., 2013; Schulz et al., 2019; Van den Broeck et al., 2010). "Job hindrances" such as role ambiguity, job insecurity, constraints, and interpersonal conflicts are defined as threatening constraints, "which deplete employees' energy and elicit an emotion-focused coping style" (Van den Broeck et al., 2010: 738, 741). From a task-level perspective, given resource-constrained organizations, we hypothesize that the responsibility for planning-decisions may constitute a "job hindrance". In conditions of resource- and time-scarcity, planning-decisions may go hand in hand

with an obligation to make thorny decisions or deal with social dilemmas at the workplace. Rather than being stress-reducing, planning-decision autonomy may instead come with a burdening responsibility to make trade-offs or to get caught up in conflict-ridden interpersonal relations.

At the same time, the responsibility for making planning-decisions gives individuals the power to assign priorities to different demands, and to rank-order tasks according to their own judgment. Planning-decision autonomy differs in the sense that rank-ordering tasks is likely to be consequential to others who depend on the completion of such tasks. Assigning planning priorities to tasks is therefore an exertion of power over others. This feeling of power of others is likely to have an engaging effect. Following Aime et al. (2014), we expect that individuals whose job design grants them the autonomy, and thus the power, to make planning-decisions "will psychologically experience a greater propensity towards action and thus engage in more interpersonal power expressions."

Proposition 5 accordingly states that planning decision autonomy is both stressful and engaging. Since planning decisions have direct and highly visible repercussions for goal attainment, the autonomy in planning decisions puts a burden of responsibility on the shoulders of job incumbents. Planning decision autonomy is therefore simultaneously a source of stress and engagement.

Proposition 5: planning decision autonomy is both stressful and engaging.

Method

Measures and measure development strategy

Measure development strategy Our goal of measuring autonomy at the task-level led to the development of a new questionnaire, which went through one major and one minor revision over a two-year period. Starting from many commonly used measures of job design, the first version included several additional types of autonomy and job demands other than the final four, such as complexity, variety in work methods, task and goal uncertainty, task and goal interdependence. This version was tested with 230 workers in two industrial and two service organizations. In the first major revision, these additional dimensions were dropped for several reasons, including psychometric ones, but mainly for substantive considerations. Some of these concepts proved hard to either categorize as a job demand or control. Others tended to conflate person-level and task-level concepts. After the first major revision we ended up with three dimensions for autonomy that had corresponding job demands at the task-level: knowledge-intensity, information-processing and planning.

This second version was tested with 111 industrial workers in two organizations (one with 44 machine workers and one with 67 manual and machine workers). This second version showed much better internal consistencies as well as better results on the exploratory and confirmatory factor analyses. The knowledge and information dimensions of job demands and autonomy were final in this version, but the planning dimension showed unsatisfactory internal consistency. After studying the item loadings as well as

discussing the results with the participating organizations, we concluded that the planning dimension was in fact capturing two subdimensions: day-to-day planning execution, including planning disturbances and shifting tasks back and forth, as well as longer term planning decisions, including prioritizing and forecasting. In a minor revision, we separated these two constructs and developed two new scales, recuperating items from the previous overarching planning scale.

The third version is the version presented in this paper and has been tested with 1697 workers in the residential care sector (see section *Sample and procedure*). Even though the first two versions were (mainly) tested with industrial and service workers, this third version shows excellent diagnostic and predictive properties in a very different setting (see section *Results*). This shows that our task-level facets of autonomy and job demands are generalizable across sectors of the economy, achieving the goal we aimed for. Our final measures consist of 2-item scales for each of the four facets of autonomy and job demands, leading to 8 items measuring autonomy and 8 items measuring job demands. The items were constructed in Dutch and we worked with language simplification advisors to make the items as concise and clear as possible so that they could be used in a diverse range of settings and for a diverse range of educational levels.

Task-level job demands and resources The final variables are defined and measured as follows. *Knowledge demand* is defined as the need to regularly acquire new knowledge and skills and measured with statements such as 'I regularly need new knowledge in my job.' *Knowledge autonomy* is defined as the opportunity for on-the-job learning and measured with statements such as 'My day-to-day tasks allow me to learn new skills in my job.' *Information demand* is defined as the need to regularly acquire new and different kinds of information and measured with items such as 'I need many different types of information in my job.' *Information autonomy* is defined as having access to sources of recent information and measured with items such as 'I can access all the sources of information I need.' *Planning execution demand* is defined as the occurrence of unexpected events and disturbances during a working day and measured with items such as 'My work is often disrupted by unexpected events.' *Planning execution autonomy* is defined as the decision latitude for (re)scheduling tasks within the timeframe of a working day and measured with items such as 'Within a working day I can change the order of my tasks myself.' *Planning decision demand* is defined as the difficulty of prioritizing and planning tasks on a timeframe of larger than one day and measured with items such as 'The work that I do is difficult to plan.' *Planning decision autonomy* is defined as the decision latitude for assigning priorities to tasks and measured with items such 'I decide myself which tasks are most urgent.' All items were scored on a five-point rating scale ranging from 1 ('completely disagree) to 5 ('completely agree).

Job incumbents' mental outcomes In contrast with our newly developed job design measures, we decided to stay close to existing measures for worker's mental outcomes. *Engagement* was assessed with an abbreviated version of the Utrecht Work Engagement Scale (UWES; Schaufeli et al., 2002). The four selected items covered the three subdimensions of the UBES engagement scale (vigor, dedication and absorption) and included with items such as 'When I get up in the morning, I feel like working.' and 'I am enthusiastic about my work.' All items were scored on a five-point rating scale ranging from 1 ('completely

disagree) to 5 ('completely agree). *Exhaustion* was measured with an abbreviated version of the 'need for recovery' scale (van Veldhoven & Broersen 2003) which operationalizes the (early symptoms of) fatigue at work. The four selected items included 'By the end of the working day, I feel really worn out.' and 'I find it difficult to relax at the end of a working day.' While the original response scale is dichotomous (yes/no), we used the same five-point rating scale as for engagement and job characteristics to simplify the process for respondents.[1]

Data collection procedure and final sample

Procedure. As part of larger research project on organizational design in the Flemish residential care sector, online surveys were sent to 20 nursing homes. The nursing homes varied in size between 52 and 192 employees, with an average of 110 employees. They were a mixture of publicly owned (7), privately owned non-profit (12), and privately owned for-profit (1) nursing homes. In order to categorize participants into occupations, we composed an exhaustive list of 13 common jobs in the residential care sector. This list was validated with input from a panel of experts on the residential care sector. We asked an HR manager or staff member from each nursing home to select a single job title for each employee from the list. We provided additional information or more specific job titles that would fall in each occupational category. For example, we explained that the category 'Logistics' includes all jobs that physically support the care taking process, while the category 'Maintenance' includes all jobs that technically support the organization's functioning. In addition, we differentiated between 'Head nurses' and non-nursing 'Supervisors' (e.g. supervisors of staff functions or supporting departments). Finally, we asked that all supportive administrative functions such as quality, personnel, … be grouped in the 'Staff' category. 1697 out of 2203 employees filled out the survey, averaging a response rate of 77% which varied across the occupational groups between 69% (for 'Kitchen' staff) and 97% (for 'Head nurses'). Table 2 shows for each occupational group the number of employees and their response rate. Response rate was uncorrelated with occupational group at the 1% level.

Sample. The final sample consisted of 1697 employees across 13 occupational groups and 20 nursing homes. The largest groups are care assistants (584) and nurses (276), followed by cleaning (226) and kitchen staff (114). The sample also includes other care support occupations, such as logistics (75), ergotherapists (62), animators (53) and physiotherapists (49), as well as technical maintenance (46). Finally, staff (106), head nurses (64), non-care supervisors (54) and management (36) completed the sample. Participants were on average 43 years old and almost half of them (46%) had worked in their

---

[1] In the robustness checks, we also use three scales to measure emotional strain and emotional support from colleagues and supervisors. Emotional strain was measured using a scale from the *NOVA-WEBA* questionnaire, while emotional support from coworkers and supervisors are based on the 'Supervisor Social Support' and 'Coworker Social Support' from the Job Content Questionnaire (Karasek et al 1998).

current organization for more than 10 years. This suggests that incumbents were experienced enough to evaluate the characteristics of their job. 90 % were women and 58% worked shifts.

Table 2: Incumbent population by occupation

Occupation	Response			Sample demographics			
	Invited	Participated	Response rate (%)	Age mean (years)	Age SD (years)	Gender (% female)	Shift work (%)
Care assistant	827	584	0.71	39	12.0	94	93
Nurse	363	276	0.76	45	11.1	94	93
Cleaning	226	178	0.79	47	9.6	93	16
Kitchen	164	114	0.69	46	11.5	82	61
Staff	118	106	0.90	45	10.5	88	0
Logistics	97	75	0.77	44	13.1	96	64
Ergotherapist	68	62	0.91	34	10.1	95	6
Head nurse	66	64	0.97	45	10.4	80	19
Animator	63	53	0.84	44	11.4	92	11
Supervisor	61	54	0.89	48	7.8	87	13
Physiotherapist	57	49	0.86	44	11.0	76	8
Maintenance	55	46	0.84	49	10.9	50	26
Management	38	36	0.95	50	7.0	56	6
Total	**2203**	**1697**	**0.77**	**43**	**11.7**	**90**	**58**

Results

Reliability, validity and agreement of study measures

Internal consistency. Table 3 presents the descriptive and psychometric statistics for all study measures (worker outcome measures and job characteristic measures). The scales demonstrate good variability, as

evidenced by the means and standard deviations in the first two columns. Internal consistency reliability (Cronbach's α, column 3) is consistently high, averaging at 0.82 across the scales. 8 out of 10 scales score higher than 0.8, with only planning execution autonomy dropping below 0.7.

Incumbents as raters of jobs. The occupational encoding of each respondent gives us a unique opportunity to test whether different incumbents of the same occupation agree about the task-level demands and autonomy in their job. Since the encoding was not done by the incumbents themselves, but by local HR officials in each nursing home, this provides us with exogenous variation in occupational categories. We investigate to which extent our measures capture the task-level realities of respondents in two ways: (1) by comparing the variation of the measures within occupational groups with the variation between occupational groups (*interrater reliability*) and (2) by comparing the observed variation of the measures within occupational groups with the variation that would be expected when the groups were allocated at random, as if there were no different occupations (*interrater agreement*).

Interrater reliability. Interrater reliability defined as intra-class correlations or ICC[2] (Bliese, 2000) captures the ratio of mean squares between groups (MSB) and mean squares within groups (MSW) as (MSB-MSW)/MSB. If the rating of task-level job demands and autonomy by incumbents were unrelated to the objective work environment, then the variation of our job measures within groups and the variation between groups would be about the same, and the ICC[2] would approach zero. Alternatively, if the variation between groups is much larger than the variation within groups, the ICC[2] approaches 1. The fourth column in Table 3 presents the Interrater reliability (ICC[2]) for all study measures. The average interrater reliability of our measures of task-level autonomy and job demands is 0.93. This means effectively that the variance of our measures between occupations is 10 times higher than the variance within occupations, suggesting that the measures are substantially capable of detecting an objective reality. The average interrater reliability for our outcome measures is 16 percentage points lower at 0.77. This is still quite high, but much lower than the job characteristics measures, suggesting that the variance in outcomes between occupational groups is about 4 times higher than the variance within groups. Since we expect outcomes to be significantly impacted by job characteristics, but also by personal characteristics, we do indeed expect ICC[2] for outcome measures to be high, but less so than for job characteristics measures.

Comparing our results for interrater reliability with Morgeson and Humphrey (2006)'s measures of the Work Design Questionnaire, we find much higher interrater reliability scores. We attribute this difference not only to the task-level specificity of our measures, but also to the characteristics of our sample: (1) all incumbents work in the same sector of residential care; (2) the residential care sector is heavily regulated in Flanders, leading to highly specified jobs with often unique and non-overlapping tasks; (3) all incumbents work in similar types of organizations regarding resident population, size, location, etc.; (4) the allocation of incumbents to occupations was carefully guided by sector and organizational experts as well as the organization's own local HR officials ensuring that incumbents ended up in the right occupational category.

Interrater agreement. As a final measure for reliability we consider Interrater agreement, defined as r_{wg} (James, Demaree & Wolf, 1984). This measure indicates the extent to which incumbents of the same occupational group make similar mean-level ratings and is calculated as 1-(observed group variance/expected random variance). If the groups were allocated at random across the incumbents (as if there were no actual different occupations), then the observed variance of job measures within groups would equal the expected random variance and the r_{wg} would approach zero. Alternatively, if the occupational groups represent real differences in job demands and autonomy, then the observed variance of job measures within groups will be much smaller than the expected random variance and the r_{wg} will approach 1. The fifth column in Table 3 shows the Interrater agreement for all study measures, which averages around 0.7 for both the job characteristics measures and the outcome measures. This level of agreement indicates that the variance in measures within occupational groups is less than a third of the variance that would be expected if the occupations were randomly allocated across incumbents. Again, this is a strong indicator that our job characteristics measures succeed in capturing the task-level reality of the occupation held by the incumbent.

Discriminant validity Table 4 displays the correlation matrix of the study measures. Although most scales are significantly correlated (indicating that job characteristics 'bunch' somewhat around job types), the absolute levels of correlation are low (indicating that the strength of the co-movement is small), which allows the characteristics to be separately identified. The median off-diagonal correlation between the job characteristics range from 0.14 (for planning decision autonomy) to 0.25 (for information demand). Overall, the relationships between the job characteristics are relatively small, showing good discriminant validity.

Table 3: Means, Standard Deviations, Reliability and Agreement Statistics

				Analysis of variance across jobs	
Construct	M	SD	Internal consistency (Cronbach's alpha)	Interrater Reliability (ICC[2])	Interrater Agreement (rwg)
Worker outcomes					
Engagement	4.0	0.65	0.83	0.73	0.81
Exhaustion	2.8	0.90	0.85	0.80	0.61
Autonomy					
Knowledge_Autonomy	3.6	0.79	0.82	0.89	0.72
Information_Autonomy	3.3	0.83	0.85	0.83	0.64
PlanningExecution_Autonomy	3.7	0.77	0.64	0.95	0.76
PlanningDecision_Autonomy	3.7	0.88	0.91	0.93	0.63
Demand					
Knowledge_Demand	3.5	0.79	0.76	0.96	0.73
Information_Demand	3.7	0.77	0.85	0.97	0.78
PlanningExecution_Demand	3.6	0.95	0.85	0.95	0.63
PlanningDecision_Demand	3.2	0.95	0.81	0.94	0.58
Emotional					
Emotional demands	4.0	0.76	0.78	0.98	0.77
Emotional support colleagues	3.9	0.71	0.88	0.79	0.75
Emotional support manager	3.7	0.92	0.94	0.31	0.63

Table 4: Correlations Among Study Variables

	1	2	3	4	5	6	7	8	9	10	11	12
1 Engagement												
2 Exhaustion	-0.34 **											
3 Knowledge_Autonomy	0.38 **	-0.22 **										
4 Information_Autonomy	0.30 **	-0.22 **	0.35 **									
5 PlanningExecution_Autonomy	0.21 **	-0.14 **	0.17 **	0.14 **								
6 PlanningDecision_Autonomy	0.23 **	-0.14 **	0.19 **	0.21 **	0.60 **							
7 Knowledge_Demand	0.14 **	0.04	0.32 **	0.08 **	0.15 **	0.11 **						
8 Information_Demand	0.16 **	0.02	0.29 **	0.18 **	0.16 **	0.14 **	0.52 **					
9 PlanningExecution_Demand	-0.12 **	0.28 **	-0.01	-0.09 **	0.21 **	0.12 **	0.27 **	0.29 **				
10 PlanningDecision_Demand	-0.13 **	0.30 **	-0.03	-0.12 **	0.18 **	0.09 **	0.25 **	0.25 **	0.70 **			
11 Emotional demands	-0.05 *	0.22 **	0.03	-0.06 *	0.03	0.08 **	0.21 **	0.24 **	0.31 **	0.31 **		
12 Emotional support colleagues	0.30 **	-0.18 **	0.23 **	0.18 **	0.15 **	0.17 **	0.05 *	0.09 **	-0.01	-0.06 *	0.14 **	
13 Emotional support manager	0.37 **	-0.24 **	0.32 **	0.32 **	0.13 **	0.16 **	0.06 *	0.08 **	-0.17 **	-0.21 **	-0.03	0.46 **

Note: * p<0.05, ** p<0.01

Task-level versus person-level variables of work design: a test of proposition 1

Differences in reliability statistics. Proposition 1 stated that task-level work design and person-level work design are ontologically different. We hypothesized that task-level variables represent a reality of job design that is independent from person-level variables and we therefore expected job incumbents that hold the same job to agree more about task-level variables than about person-level variables. To test this proposition, we compare the reliability statistics of the task-level variables with those of the person-level variables. While internal consistency is as high for the task-level variables as the person-level variables, we do see interesting differences in the interrater reliability scores. While job incumbents agree to the same high degree about the emotional demands of the job (ICC[2] of 0.98, comparable to the mean ICC[2] of the task-level job demands), they agree substantially less about the emotional support they receive from coworkers (ICC[2] of 0.79) and especially from supervisors (ICC[2] of 0.31). Mean interrater reliabilities across job characteristics thus range from 0.96 for job demands, over 0.90 for task-level autonomy to 0.55 for emotional support of coworkers and supervisors. This confirms that task-level variables are characteristics of the job, while emotional support depends on the specific relationships between job incumbents and the people they come into contact with. In our sample, emotional demands are as much a characteristic of the job as task-level demands, since these emotional demands are driven by the nature of care work that is specific to each occupation.

It is interesting to see that job incumbents agree almost as much about task-level autonomy as they do about task-level job demands. Since we defined both job demands and autonomy at the task-level, our measures of autonomy are not mainly driven by individual behavior or the degree to which an individual assumes responsibility and takes decisions, as is the case for more person-level perspective of autonomy. Similar observations were obtained in Morgeson and Humphrey (2006)'s Work Design Questionnaire: job incumbents agreed most about the Work context (average ICC[2] of 0.49), next about Knowledge and Task characteristics (average ICC[2] of 0.37 and 0.33 respectively) and agreed least about Social characteristics (average ICC[2] of 0.28).

Occupational distribution of composite job demands and autonomy. As a final validity test, we investigate how our task-level autonomy and job demands succeed in identifying known groups of occupations in the dataset, each with presumed differences in demands and autonomy. We plot the 13 occupational groups on two axes of composite measures of autonomy and job demands[2]. Figure 2 shows that the composite measures succeed in separating the occupational groups in meaningful ways. At the lower end of job demands, we find kitchen jobs and logistic jobs with low autonomy, signaling more

---

[2] As composite measures of autonomy and job demands we use the higher order latent variables of the *Hierarchical D-C model* of Table 5, which can be viewed as a weighted average of the four underlying latent variables representing the dimensions of knowledge, information, planning execution and planning decision in both autonomy and job demands.

'passive' jobs (Karasek, 1979). At the same level of demands, but with significant and substantially higher autonomy, we find the cleaning staff, who's job enables them to independently carry out their job. Comparing the two main care taking occupations (care assistants and nurses), we see that nurses (who are more educated than care assistants), have more job demands and more autonomy, moving them into a more 'active' direction. In the care support functions, physiotherapists report the highest level of autonomy, animators the lowest level and ergotherapists in between. Finally, supervising and management functions are consistently in the upper right quadrant, where each step in the hierarchy is associated with a higher level of demands and autonomy.

Figure 2: Occupational distribution of composite job demands and autonomy
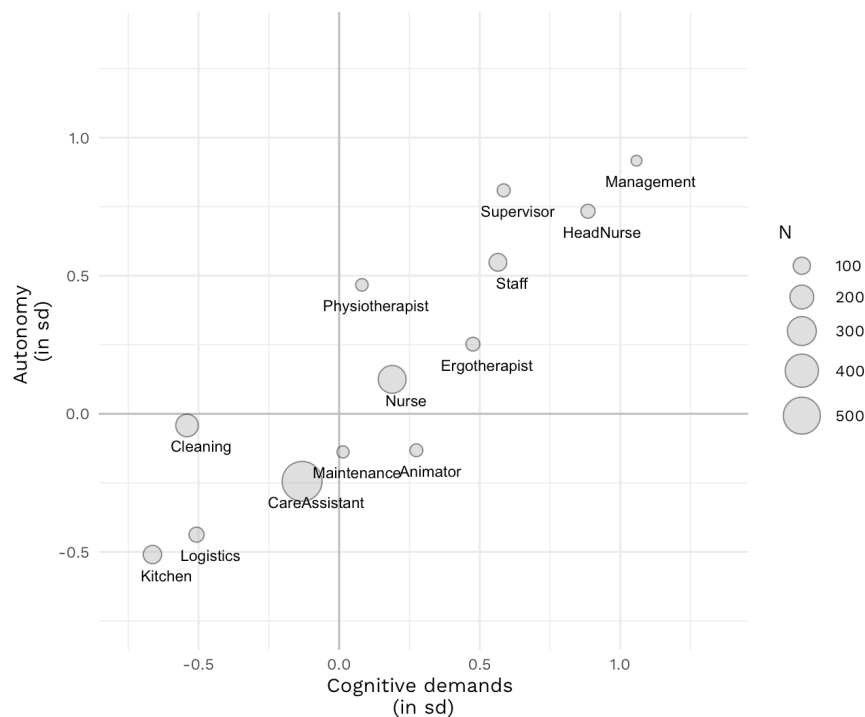
Factor structure of task-level autonomy and job demands: a test of proposition 2

In Proposition 2, we postulated that task-level job demands and controls, such as knowledge, information, planning execution and planning decision, *are empirically separate dimensions of job demands and autonomy*. To test this hypothesis, we establish the dimensionality of the task-level job demands and autonomy by comparing several plausible models. In the *Proposed model* we test an 8-factor model where each of the four types of demands and four types of autonomy are separate factors, consistent with our theory. We then test two models that each include second-order factors underlying the 8 first-order factors. In the *Hierarchical D-C model*, one second-order factor covers the four task-level job demand factors and one covers the four task-level autonomy factors. This model assumes that there

is one general type of job demand that underlies the four more specific task-level job demands and one general type of autonomy that underlies the four task-level facets of autonomy. In the *Hierarchical KIPP model*, four second-order factors are introduced: each one underlying one of the four task-level facets (knowledge, information, planning execution and planning decision). This model assumes there is a general 'knowledge' factor that underlies both the knowledge demand and the knowledge facet of autonomy, and similarly for the other three facets of information, planning execution and planning decision.

Next, we test several models that collapse the dimensions into a reduced number of factors. In the *Collapsed D-C model* there are only two factors: one demand factor and one control factor, each containing all four facets. This model assumes there are no further task-level distinctions to be made within the concepts of job demands and autonomy. In the *Collapsed KIPP model* there are four factors: one for each of the task-level dimensions (knowledge, information, planning execution and planning decision). This model assumes that task dimensions do exist, but that within such a dimension there is no distinction between a job demand and autonomy. Finally, in the *Collapsed Planning model* we test whether the separation into decision and execution (explained in the *Measure development strategy* paragraph) is justified, by collapsing the planning execution and planning decision demand dimensions in one general type of planning demand and collapsing the planning execution and planning decision autonomy dimensions in one general form of planning autonomy.

Table 5: Indices of overall fit for alternative factor structures

Model	chisq	df	p-value	GFI	CFI	NFI	IFI	rmsea	srmr
Proposed	**223**	**76**	**0.00**	**0.98**	**0.99**	**0.98**	**0.99**	**0.034**	**0.026**
Hierarchical D-C	1227	95	0.00	0.91	0.91	0.91	0.91	0.084	0.108
Hierarchical KIPP	1367	90	0.00	0.91	0.90	0.90	0.90	0.091	0.105
Collapsed D-C	5736	103	0.00	0.67	0.57	0.57	0.57	0.180	0.152
Collapsed KIPP	6099	98	0.00	0.68	0.54	0.54	0.55	0.190	0.160
Collapsed Planning	614	89	0.00	0.95	0.96	0.95	0.96	0.059	0.040
Null	13293	120	0.00						

Note:
Sample size is 1697. The proposed model contains 8 factors (4 types of demands and 4 types of autonomy). The hierarchical and collapsed models either add second-order factors or collapse the first-order factors into fewer factors.

Table 5 displays the result of the confirmatory factor analyses. The Proposed model with 8 factors (4 types of task-level job demands and 4 facets of task-level autonomy) provides an excellent fit to the data. Four fit indices (GFI, CFI, NFI, IFI) are higher than 0.98 and the RMSEA and SRMR are 0.03. Furthermore, the Proposed model consistently fits better than all alternative models, both in absolute and relative fit measures. Finally, the closer the alternative model reflects the proposed model, the better the fit. First, adding second-order factors (hierarchical models) fits the data better than ignoring dimensionality of demands and autonomy (collapsed models). Second, collapsing only the planning execution and planning decision into one planning dimension (but keeping separate demand and autonomy factors) is the best fitting alternative model. However, the Proposed model still fits better than the Collapsed planning model, confirming that we are indeed measuring two types of planning demands and autonomy as we discovered during the development phase of the survey. Overall, Table 5 confirms Proposition 2 that task-level facets constitute empirically separate dimensions of autonomy and job demands. All items loaded significantly (p<0.001) on the predicted factors. Figure 3 displays the factor loadings and variances. Covariances between latent variables are estimated but are emitted from the figure for expositional purposes.
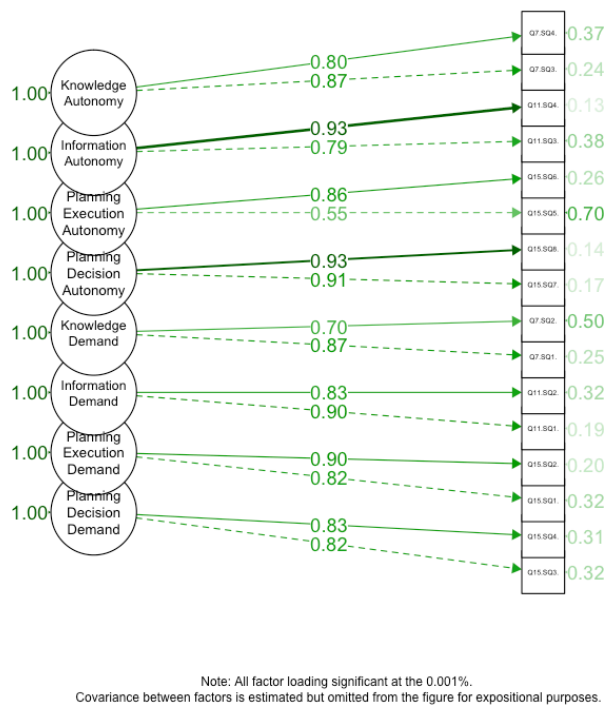

Note: All factor loading significant at the 0.001%.
Covariance between factors is estimated but omitted from the figure for expositional purposes.

Figure 3: Standardized solution of confirmatory factor analysis

Task-level autonomy, job demands and worker outcomes: tests of propositions 3-5

We fit a structural equation model (SEM) in the open-source R 'lavaan' package (Rosseel, 2012) to simultaneously estimate the effects of task-level facets of autonomy and job demands on exhaustion and engagement. The model includes the four facets of autonomy, the four corresponding task-level job

demands as well as two demographic control variables (age and gender). Table 6 shows the results of the analysis. The hypothesized model fits the data very well, with fit measures (CFI) above 0.95 and RMSEA/SRMR below 0.05. The fitted model explains 31% and 27% of the variance in engagement and exhaustion respectively. To control for individual differences in engagement and exhaustion, we include age and gender in both regressions. Age has a significant positive effect on both engagement and exhaustion, while gender is only barely significant in the exhaustion regression. The effect of age on exhaustion can be expressed as 0.09 per standard deviation of age with SD of age being 11.7 years.

displays the standardized solution of our structural model, discarding the control variables and showing only the paths that are at least significant at the 5% level.

Table 6: Structural equations of baseline model

	Engagement				Exhaustion			
	B	SE	Pval	beta	B	SE	Pval	beta
Demographic								
Age	0.01	0.00	0.00 ***	0.12	0.01	0.00	0.00 ***	0.09
Gender	0.02	0.05	0.60	0.01	0.14	0.06	0.02 *	0.05
Demand								
Knowledge	-0.00	0.03	0.91	-0.00	0.04	0.05	0.44	0.03
Information	0.06	0.03	0.06	0.07	-0.00	0.04	0.98	-0.00
PlanningExecution	-0.09	0.05	0.04 *	-0.13	0.12	0.06	0.05	0.12
PlanningDecision	-0.05	0.05	0.25	-0.07	0.26	0.06	0.00 ***	0.28
Autonomy								
Knowledge	0.29	0.03	0.00 ***	0.35	-0.17	0.04	0.00 ***	-0.16
Information	0.12	0.03	0.00 ***	0.13	-0.09	0.03	0.01 **	-0.08
PlanningExecution	0.09	0.07	0.20	0.07	-0.50	0.10	0.00 ***	-0.30
PlanningDecision	0.07	0.04	0.04 *	0.10	0.07	0.05	0.19	0.07

Note:
* p<0.05, ** p<0.01, *** p<0.001. Fit measures: cfi = 0.96, rmsea = 0.05, srmr = 0.04
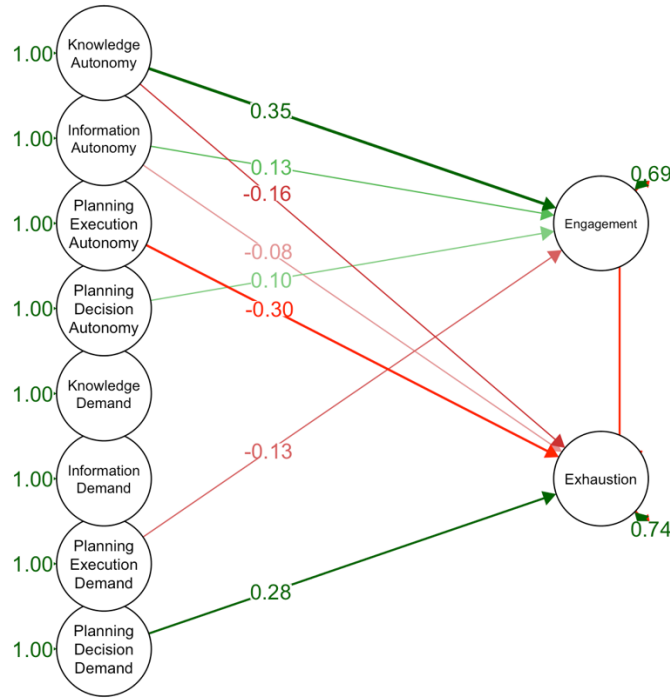
Note: Showing only significant paths in the structural model (p-value <0.05)
Covariance between factors is estimated but omitted from the figure for expositional purposes.

Figure 4: Standardized solution of the structural equations of the baseline model

Using the estimates of the fitted model, we test our previously stated propositions. *Proposition 3a* stated that *knowledge autonomy is engaging*. As expected, we find a large and statistically significant effect of knowledge autonomy on engagement. In fact, the standardized coefficient (0.35) is the largest and most significant of all structural estimates. Relatively speaking, it is thus the most engaging facet of task-level autonomy that we encounter in the model.

Propositions 4a and 4b stated that *information autonomy and planning execution autonomy are stress-reducing but do not spur engagement*. Indeed, we find significant effects of both facets of autonomy on exhaustion. Especially the estimated coefficient on planning execution autonomy is very large in absolute terms (-0.30). It is the second largest standardized coefficient in the fitted model. In the engagement regression, we find the expected result for planning execution autonomy, whose estimated coefficient is not significantly different from zero. For information autonomy, we do find a significant effect in the engagement regression (standardized coefficient of 0.13). However, compared to the effect of knowledge autonomy, the engaging effect of information autonomy is only a third in size (0.13 vs 0.35). We therefore confirm *proposition 4a* (regarding information autonomy) partially, and *proposition 4b* (regarding planning execution autonomy) completely.

Proposition 5 stated that *planning decision autonomy is both stressful and engaging.* We indeed find a significant effect of planning decision autonomy on engagement (standardized coefficient of 0.10).

Although we find a positive point estimate of the planning decision in the exhaustion regression (standardized coefficient of 0.07), it is not significant. However, it is telling that planning decision is the only facet of autonomy for which we do not find a stress-reducing effect. We therefore partially confirm proposition 5.

Robustness checks

To test for the robustness of the estimates of our fitted model, we test several variations of our baseline model. The results of the alternative models are presented in Table 7, with the baseline model ('*Model Demo-TL*) in bold. This baseline model is the one presented in Table 6 and

 and includes age, gender, four task-level job demands and four task-level facets of autonomy. The baseline model has the best fit with the data and explains 31% and 26% of engagement and exhaustion respectively.

Additional demographic and contractual variables First, we test a model ('*Model Demo*') that does not include any job characteristics, but adds more demographic (education) and contractual variables (shift work, temporary work, part time work) to the baseline demographics of age and gender. This model fits the data relatively well, but only explains 4% and 6% of engagement and exhaustion respectively. Significant effects on engagement are found in relation to age, shift work and permanent work, while exhaustion is only significantly correlated with age and shift work.

Emotional job demands and support Next, we test the significance of emotional demands and support with two alternative models. The first ('*Model Demo-Emo*') fits a regression of engagement and exhaustion on age, gender, emotional demands, emotional support from colleagues and emotional support from supervisors, but does not include any task-level facets of autonomy or job demands. This model fits the data slightly worse than the baseline model and explains about 10 percentage points fewer variation in both engagement and exhaustion or two-thirds of the baseline model (21% and 16% respectively). The second ('*Model Demo-TL-Emo*') fits both the emotional and the task-level job characteristics. It fits the data about as well as the previous alternative model and it explains about 6 percentage points of additional variation in both engagement and exhaustion compared to the baseline model. We find significant positive effects of both support measures on engagement, with the estimate of support from colleagues being 50% larger than the estimate of support from supervisor. Exhaustion significantly increases with emotional demands and decreases with emotional support from colleagues. Important to note, is that the inclusion of the emotional dimensions does not change the significance of the reported effects of the task-level facets of autonomy and job demands and barely changes the size of the estimated coefficients. The task-level variables thus have their own distinct effects on workers' mental outcomes separate from the person-level emotional job characteristics.

Occupational control variables The final alternative model (Model *Demo-TL-Dum*) adds dummy variables for occupational categories to the baseline model. The estimates reveal that some occupations (such as head nurses, staff and physiotherapists) experience significantly less exhaustion compared with

the base group of care assistants. Again, the inclusion of these occupation dummies does not change the size or significance of the estimated effects of the autonomy and job demands variables on exhaustion and engagement. Furthermore, the inclusion of occupational dummies does not increase the explained variance in engagement (32%) and only slightly increases the explained variance in exhaustion (31%).

Table 7: Robustness checks of the structural model

Model	Control var.	Task-level Job Char.	Emotional Job Char.	Job Dummies	Engage-ment	Exhaus-tion	CFI	RMSEA	SRMR
		Variables in regression			Explained variance of outcomes		Fit measures		
Demo	6*	No	No	No	0.02	0.06	0.91	0.07	0.04
Demo-Emo	2°	No	Yes	No	0.21	0.16	0.94	0.06	0.05
Demo-TL (base)	**2°**	**Yes**	**No**	**No**	**0.31**	**0.26**	**0.96**	**0.05**	**0.04**
Demo-TL-Emo	2°	Yes	Yes	No	0.37	0.29	0.94	0.06	0.05
Demo-TL-Dum	2°	Yes	No	Yes	0.32	0.31	0.91	0.05	0.05

Note: Sample size is 1697. Base model in bold.
*Age, Gender, Education, Shift, Permanent contract, Part Time.
° Age, Gender

A test of the matching hypothesis

In takeaway number 3 above, we stated that a task-level conceptualization of job demands and control might lend support to the matching hypothesis, which states that buffering effects of autonomy on stress can only be found when resources are "matched" to job demands. To explore this idea, we estimate additional models in which we include matching and non-matching interactions between the four task-level facets of autonomy and corresponding job demands. There are four matching interactions and twelve non-matching interactions, each one added to the exhaustion and engagement regression, leading to 2x16 interaction terms in total to be estimated.[3] Encouragingly, we find that three out of eight matching

---

[3] Adding all these interaction terms to the model at once proved too much for estimation, so we decided to split the analysis in a similar way to de Jonge & Dormann (2006), by estimating the base model with the matching interactions in one model and the base model with the non-matching interactions in two separate models. Table 8

interactions are highly significant (p<0.05) and two more are bordering on significance (p<0.1). Among the non-matching interactions however, we find no significant terms at all (all but one p-value > 0.2). This is an indication that the task-level perspective is an interesting avenue to explore the matching hypothesis of the JD-C/R framework. The three significant matching interaction terms can be found on the knowledge facet in both the engagement and exhaustion regression and on the planning execution facet in the engagement regression.[4]

Planning execution (PE) and engagement The significant interaction effect on the matched interaction of PE autonomy and PE job demands in the engagement regression is visualized in Figure 5. It shows that with low PE autonomy, PE demands (i.e. the occurrence of unexpected disturbances in the daily planning) are demotivating. However, with high PE autonomy (i.e. the decision latitude for rescheduling tasks within a working day), this effect disappears and there is no demotivating effect of PE demands. Indeed, there is no motivating effect either. So even though we did not find a main effect of PE demands, we do find one for workers with low PE autonomy. In the absence of autonomy, the PE demands strongly decrease engagement. Conversely, PE autonomy buffers this negative impact on engagement, but it never becomes an engaging demand. Since planning execution does not contribute to any of the mental processes implied by self-determination theory, we indeed do not expect any motivating effect of PE autonomy on engagement.

Knowledge, engagement and exhaustion The significant interaction effect on the matched interaction of knowledge autonomy and knowledge demands in the engagement regression is shown in Figure 6. It shows that with low knowledge autonomy, the knowledge demand (i.e. the need to regularly require new skills and knowledge) is demotivating. Workers cannot fulfil their knowledge need and this reduces their engagement. However, with high knowledge autonomy (i.e. the opportunity for on-the-job learning), the knowledge demand becomes motivating, increasing workers' engagement. These effects are almost symmetrical, explaining why we did not find a main effect of the knowledge demand without the interaction term. For the interaction effect in the exhaustion regression, Figure 7 shows that with low knowledge autonomy, the knowledge demand is exhausting. However, with high knowledge autonomy, this effect disappears and there is no exhausting effect of the knowledge demand. These graphs confirm that knowledge demands are motivating when paired with high knowledge autonomy, but demotivating and exhausting when the autonomy to address this demand is missing.


(in appendix) can be read as follows: in step 1 we start from the baseline model already presented in Table 6. In three parallel steps we alternatively add four matching interactions to both regressions (step 2a), the first six non-matching interactions (step 2b) and the final six non-matching interactions (step 2c).

[4] Unexpectedly, we did not find an interaction effect on the information dimension of demands and autonomy, even though we suspect that information autonomy is of the stress-reducing type in the face of high information demand, rather than an engagement-boosting type of autonomy. There may be methodological reasons why this suspicion finds only modest support in the results, which we discuss in the next section.

Figure 5: Effect of planning execution (PE) demand on engagement, moderated by PE autonomy

Non-significant slopes are dashed
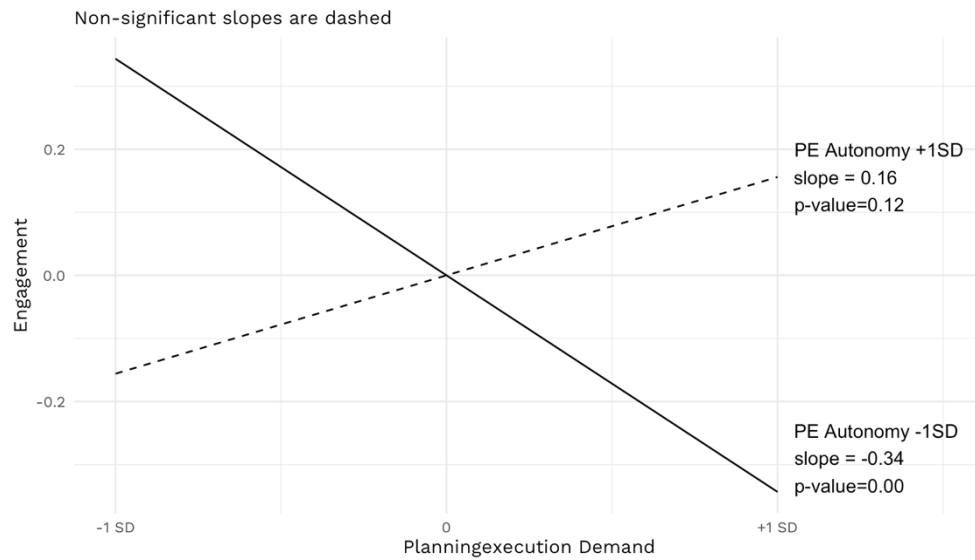
Figure 6: Effect of knowledge demand on engagement, moderated by knowledge autonomy

Non-significant slopes are dashed
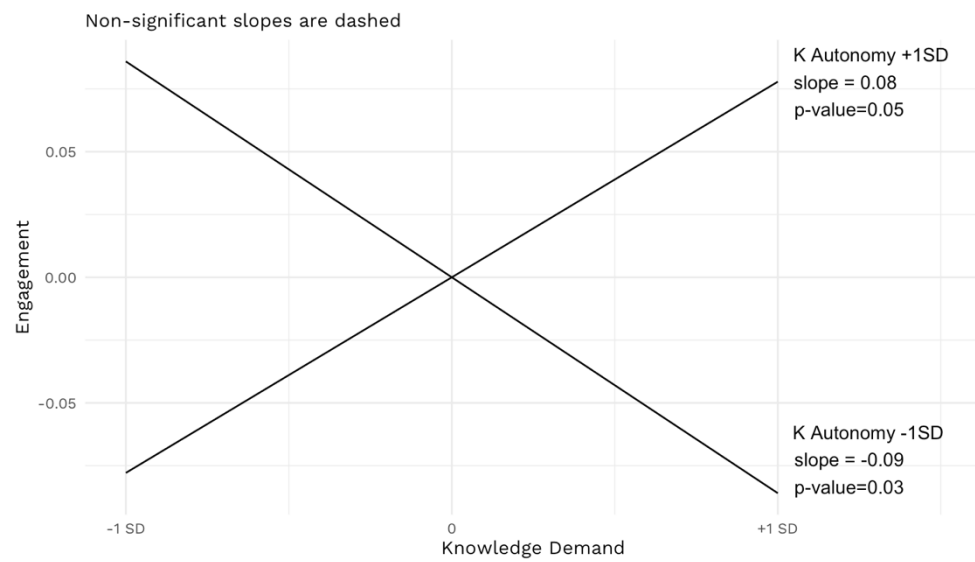
Figure 7: Effect of knowledge demand on exhaustion, moderated by knowledge autonomy
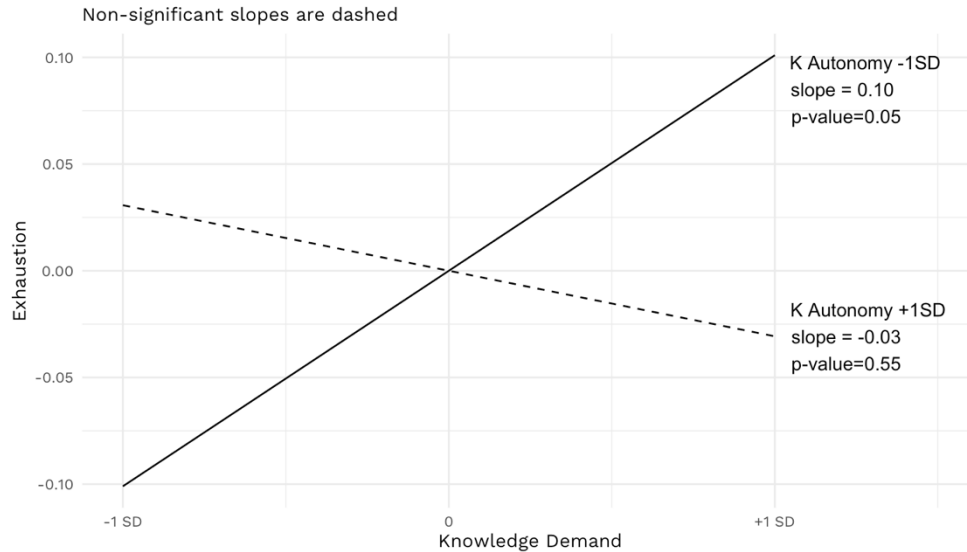
Discussion

Our study reaffirms several previously hypothesized beneficial effects of autonomy for job incumbents, but specifies in more detail how distinct facets of autonomy account for respectively stress-reducing and engaging psychological effects. Our findings do not support the claim that all types of autonomy are to a similar extent engaging, or in equivalent ways exhausting for workers.

Knowledge autonomy relates to engagement and exhaustion in ways that are expected in classic theoretical accounts on job design like JCM and JD-C. In jobs with high knowledge autonomy job demands spur engagement. In contrast, when paired with low autonomy, knowledge demands are disengaging. Similarly, we found that knowledge demands are exhausting in jobs with low knowledge autonomy, but are unrelated to exhaustion when paired with high autonomy. These results provide strong support for the SDT perspective on knowledge autonomy as a particularly engaging and intrinsically motivating type of autonomy, and furthermore supports the JD-C proposition that knowledge autonomy buffers the exhausting and disengaging effect of knowledge demands.

Planning execution autonomy behaves differently: it has a strong stress-reducing effect, but no significant standalone effect on engagement. We suggest that planning execution autonomy is best understood from a COR perspective. The absence of a moderating effect indicates that lacking planning execution autonomy in itself provokes exhaustion, regardless of whether job demands are high or low. Being unable to control even one's short term planning decisions is a severe form of autonomy deprivation, as every hour of one's working day may be determined by events and circumstances beyond

one's control. Even if those circumstances are not turbulent or particularly demanding, this lack of control appears to arouse feelings of exhaustion. Interestingly, we did find an interaction effect in the engagement model: in jobs with limited planning execution autonomy, planning disturbances lead to a significant decrease in engagement. Yet, high planning execution autonomy does not make a challenging schedule engaging. In other words, whereas planning execution autonomy in itself reduces exhaustion regardless of job demands, it also protects against disengagement in the face of high job demands. As disengagement is an important driver of burn-out, this interaction effect supports our proposition that planning execution-autonomy is a stress-reducing type of autonomy that is particularly important for job incumbents' well-being.

The interpretation of our results on information autonomy is less straightforward. Theoretically, we expected information autonomy to have a negative effect on exhaustion, which was confirmed, but we did not expect a relation between information autonomy and engagement to come up as significantly as it did. Furthermore, we did not find any interaction effect in relation to information autonomy, even though we expected a moderating effect of information autonomy on the relation between information demands and exhaustion. Methodological reasons may explain this inconsistency. Our measures of information demands and information autonomy might not be sufficiently accurate to empirically capture the meaning of these concepts in the sense that was implied by the theory. We proposed that information autonomy would clear out role ambiguity and remove operational uncertainty for job incumbents. However, not all information demands provoke role ambiguity, and not all types of information autonomy are likely to clear out operational uncertainty. Our measures on the information-processing dimensions leave it up to the respondent to assess which kind or degree of information is relevant. Given this generality, we are unsure whether the matching logic could be validly assessed, and would therefore not claim that the absence of interaction effects defies the theoretical propositions. Nonetheless, our measurement instrument has enabled us to capture information-processing as a task dimension that is different from knowledge-intensity or planning dimensions. Given that we still find significant relationships on information autonomy, we would recommend that future research continues to explore the information-processing dimension further, albeit with more refined measures that distinguish more clearly between different types of information. We consider this a particularly important endeavor, since information-processing is a concept with relevance to both job-level and organization-level design theories.

Finally, planning decision autonomy is a peculiar facet of autonomy. While planning decision demands are a strong driver of exhaustion, planning decision autonomy is the only facet of autonomy that does not reduce exhaustion, even though it does provoke engagement. The lack of a significant interaction effect furthermore suggests that planning decision autonomy does not buffer against the exhausting effects of planning decision demands. We suspect that the social sensitivity of planning decisions is the reason for this. Setting planning priorities has consequences that extend beyond the job incumbent and might bear repercussions for others. Job incumbents realize that their prioritization of tasks is socially consequential, which contributes to their experienced meaningfulness and thus engagement, but they also realize that they risk social penalties and loss of resources (in the form of co-worker support), which explains the

exhausting effects. This combined effect makes planning decision autonomy less effective as a protective force against exhaustion, compared to the other facets of job autonomy. We therefore suggest considering planning decision-autonomy as a potentially hindering type of autonomy: a type of autonomy that is engaging, but that is less useful in offsetting the stressful impact of the corresponding planning decision-demands.

Implications for work design theory

The current study has at least three important implications for job design theory. First, our findings call for a more nuanced approach to job enrichment as a strategy to improve worker wellbeing. One of the key job design principles advanced by Hackman and Oldham was task identity, defined as "the degree to which the job requires completion of a 'whole' and identifiable piece of work; that is doing a job from beginning to end with a visible outcome" (1976: 257). This emphasis on the wholeness of tasks is also present in STS theory, which advices that work groups should be assigned a "whole task" (Cummings: 1978: 625). Both job design theories assumed that the wholeness of tasks is a prerequisite for well-being. Instead, our results call for more nuance and do not support 'wholeness' as generally beneficial for job incumbents. Rather, we suggest that jobs should be designed to involve at least some degree of stretch knowledge demands in order to be engaging, as long as these demands are matched by the requisite autonomy. Information-processing and planning-execution tasks can be added without jeopardizing the mental health of workers when paired with sufficient autonomy, but these facets of autonomy contribute at best only modestly to work engagement. These results are in line with recent research by Gabriel et al. (2015) who found in the nursing profession that activities with direct involvement in patient care and central to "the nursing ethos" yield better job satisfaction than tasks that are more "peripheral" and less critical to the work.

Second, this study has demonstrated the relevance of a task-level approach to job design and delivers a more accurate and full account of the mental effects of autonomy. Autonomy from an individualist approach is by definition fluid and context-specific, which renders research findings hard to generalize. Autonomy from a task-level perspective may be studied across a wide range of work contexts. An additional advantage of this is that organization-level design choices can be connected to task-level variation at the job level, which provides the linking pin between macro-level organization design and mental outcomes for job incumbents at a more micro-level. The fact that recent organization design approaches have moved on to a microstructural perspective (e.g. Puranam, 2018) offers promising opportunities for a more integral account of work design. Future research that studies the causal links between person, job, team and organization level design decisions would be very valuable. We hope and believe that a task-level lens increases the prospect for future research to make such links. Note that we do not argue that the person-level perspective is in any way less relevant than task-level variables. By disentangling task-level and person-level dimensions, research can do justice to the explanatory power of both these units of analysis, as for design variables at higher levels of analysis.

Third, the task-level approach adopted in the current study provides a valuable way forward for a matching approach to job design, by considering job demands and job autonomy in parallel along matching job dimensions. In previous contributions, scholars have doubted the relevance of operationalizing demands and controls along matching dimensions, based on the argument that one would need to conceptualize "very specific matching hypotheses" that "are less useful across jobs" (Dawson et al., 2016). By contrast, this study has demonstrated that generic task-level concepts do prove useful across jobs. The task level dimensions operationalized in the current study are generic and can be easily applied across jobs, organizations and even sectors. More research, including longitudinal case studies and additional survey studies, is welcomed to further validate and improve the task-level perspective to work design advanced in this paper.

Managerial implications

Our findings have important ramifications for the practice of job design. While the call for intrinsically motivating work design has not lost any of its relevance, one of the most prominent questions in the field of management and organization studies today is how work design can help manage the complexity that is inherent to the challenging performance requirements of todays' economy. In order to avoid mental overload, we advise to no longer adopt a generalized job enrichment guideline as the default intervention strategy for work design, except perhaps for work organizations that are devised according to classic Tayloristic principles. In many contemporary organizations, and particularly in organizations that are rife with exhaustion and burn-out risks, the solution may not be to simply add more autonomy, but rather to restore the balance by carefully reconfiguring demands and autonomy along distinct task-dimensions. Depending on whether the goal is to increase engagement or to reduce exhaustion, redesigning jobs will require different types of interventions. When engagement is the objective of the redesign, knowledge autonomy is of crucial importance, when preventing exhaustion is critical, planning execution autonomy should be considered. In addition, the possible existence of hindering types of autonomy should incite job designers to be particularly mindful when redesigning jobs. Some types of autonomy, in particular planning decision autonomy, may be engaging without offering any protection against exhaustion. Job designers should be aware that these types of autonomy can insidiously intervene in the well-being of job incumbents, as it entices workers' motivation to engage in tasks that are exhausting and perilous to their health in the long run.

Conclusion

To conclude, we argue along with Grant and Parker (2009) that work design theory has now entered an era where a more granular account of job design theory is needed. Times have changed since the original formulations of the job characteristics model and job demands-control model. While Tayloristic bureaucratic organizations with a strict functional division of work have been taken-for-granted organization designs for decades, such design principles are today no longer promoted as the default

mode for work design in business schools or popular management outlets. Even though bureaucratic and Tayloristic design principles appear quite impervious and persist in many organizations today, much more variety in organizational designs has emerged over the last decades.

Work design theory must evolve accordingly. This study has shown that a task-level approach to job design is theoretically and empirically relevant. We revealed three types of autonomy that each bear strong but different repercussions on exhaustion and engagement. In the future, we hope that more studies will contribute to task-level theory on job design, as we believe this to be essential for a better understanding of work design and worker well-being. This avenue of theorizing and empirical study will be valuable to practitioners as it helps to connect job design theory to organization-level design theories. Without this connection, work design theories will remain to a large extent restricted to the study of symptoms at the person-level without getting traction on the causes of health-impairing jobs that are related to job-level and organization-level design decisions. Many of the causes of work stress and disengagement are to be found further upstream the causal chain. A task-level approach takes work design research a step closer to these root causes, and to the managerial decision-makers whose design decisions work design scholars ultimately hope to improve.

References

Aime, F., Humphrey, S., DeRue, D. S., & Paul, J. B. (2014). The riddle of heterarchy: Power transitions in cross-functional teams. *Academy of Management Journal*, *57*(2), 327-352.

Andrei, D. M., Van den Broeck, A., & Parker, S. K. (2019). Good work, poor work? We need to go far beyond capitalism to answer this question. *Industrial and Organizational Psychology*, *12*(4), 463-468.

Andrei, D., & Parker, S. (2018). Work Design for Performance: Expanding the Criterion Domain. In *The SAGE Handbook of Industrial, Work & Organizational Psychology (2nd edition)* (Vol. 2, pp. 357-377). SAGE.

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of occupational health psychology*, *10*(2), 170.

Bakker, A. B., & Demerouti, E. (2017). Job demands–resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273.

Bliese, P. D. (2000). Within-group agreement, non-independence, and reliability: Implications for data aggregation and analysis. In Klein, K. J. & Kozlowski, S. W. J. (Eds.), *Multilevel theory: research and methods in organizations*, San Francisco: Jossey-Bass, 349-381

Brough, P., Timms, C., Siu, O. L., Kalliath, T., O'Driscoll, M. P., Sit, C. H., ... & Lu, C. Q. (2013). Validation of the Job Demands-Resources model in cross-national samples: Cross-sectional and longitudinal predictions of psychological strain and work engagement. *Human Relations*, *66*(10), 1311-1335.

Cummings, T. G. (1978). Self-regulating work groups: A socio-technical synthesis. *Academy of management Review*, *3*(3), 625-634.

Dawson, K. M., O'Brien, K. E., & Beehr, T. A. (2016). The role of hindrance stressors in the job demand–control–support model of occupational stress: A proposed theory revision. *Journal of Organizational Behavior*, *37*(3), 397-415.

Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*, 19-43.

Demerouti, E., Bakker, A. B., Nachreiner, F., & (, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied psychology*, *86*(3), 499.

De Jonge, J., & Dormann, C. (2006). Stressors, resources, and strain at work: A longitudinal test of the triple-match principle. *Journal of applied psychology*, *91*(6), 1359.

de Jonge, J., Gevers, J., & Dollard, M. (2014). Managing employee creativity and health in nursing homes: The moderating role of matching job resources and matching occupational rewards. *International Journal of Stress Management*, *21*(4), 361.

De Spiegelaere, S., Van Gyes, G., & Van Hootegem, G. (2016). Not all autonomy is the same. Different dimensions of job autonomy and their relation to work engagement & innovative work behavior. *Human Factors and Ergonomics in Manufacturing & Service Industries*, *26*(4), 515-527.

Ethiraj, S. K., & Levinthal, D. (2004). Bounded rationality and the search for organizational architecture: An evolutionary perspective on the design of organizations and their evolvability. *Administrative Science Quarterly*, *49*(3), 404-437.

Fila, M. J., Paik, L. S., Griffeth, R. W., & Allen, D. (2014). Disaggregating job satisfaction: Effects of perceived demands, control, and support. *Journal of Business and Psychology*, *29*(4), 639-649.

Gabriel, A. S., Diefendorff, J. M., & Erickson, R. J. (2011). The relations of daily task accomplishment satisfaction with changes in affect: A multilevel study in nurses. *Journal of Applied Psychology*, *96*(5), 1095.

Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. *Journal of Organizational behavior*, *26*(4), 331-362.

Galbraith, J. R. (1974). Organization design: An information processing view. *Interfaces*, *4*(3), 28-36.

Grant, A. M., & Parker, S. K. (2009). 7 redesigning work design theories: the rise of relational and proactive perspectives. *The Academy of Management Annals*, *3*(1), 317-375.

Habe, K., & Tement, S. (2016). Flow among higher education teachers: A job demands-resources perspective. *Horiz. Psychol*, *25*, 29-37.

Hackman, J. R., & Lawler, E. E. (1971). Employee reactions to job characteristics. *Journal of applied psychology*, *55*(3), 259.

Hackman, J. Richard, and Greg R. Oldham. "Motivation through the design of work: Test of a theory." *Organizational behavior and human performance* 16.2 (1976): 250-279.

Halbesleben, J. R., Neveu, J. P., Paustian-Underdahl, S. C., & Westman, M. (2014). Getting to the "COR" understanding the role of resources in conservation of resources theory. *Journal of Management*, *40*(5), 1334-1364.

Häusser, J. A., Mojzisch, A., Niesel, M., & Schulz-Hardt, S. (2010). Ten years on: A review of recent research on the Job Demand–Control (-Support) model and psychological well-being. *Work & Stress*, *24*(1), 1-35.

Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: a meta-analytic summary and theoretical extension of the work design literature. *Journal of applied psychology*, *92*(5), 1332.

Humphrey, S. E., & Aime, F. (2014). Team microdynamics: Toward an organizing approach to teamwork. *The Academy of Management Annals*, *8*(1), 443-503.

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American psychologist*, *44*(3), 513.

James, L. R.; Demaree, R. G. & Wolf, G.(1984). Estimating within-group interrater reliability with and without response bias. *Journal of applied psychology*, 69 , 85

Kahn, W. A. (1990). Psychological conditions of personal engagement and disengagement at work. *Academy of management journal*, *33*(4), 692-724.

Karasek, R. A. (1979) Job demands, job decision latitude, and mental strain: Implications for job redesign, *Administrative science quarterly,* 285-308

Karasek, R.; Brisson, C.; Kawakami, N.; Houtman, I. & Bongers, P. (1998) The Job Content Questionnaire (JCQ): An Instrument for Internationally Comparative Assessments of Psychosocial Job Characteristics, *Journal of Occupational Health Psychology, 3*, 322-355

Konze, A. K., Rivkin, W., & Schmidt, K. H. (2017). Is job control a double-edged sword? A cross-lagged panel study on the interplay of quantitative workload, emotional dissonance, and job control on emotional exhaustion. *International journal of environmental research and public health*, *14*(12), 1608.

Lavoie-Tremblay, M., Trépanier, S. G., Fernet, C., & Bonneville-Roussy, A. (2014). Testing and extending the triple match principle in the nursing profession: A generational perspective on job demands, job resources and strain at work. *Journal of advanced nursing*, *70*(2), 310-322.

Morgeson, F. P., & Humphrey, S. E. (2006). The Work Design Questionnaire (WDQ): developing and validating a comprehensive measure for assessing job design and the nature of work. *Journal of applied psychology*, *91*(6), 1321.

Muecke, S., & Iseke, A. (2019, July). How Does Job Autonomy Influence Job Performance? A Meta-analytic Test of Theoretical Mechanisms. In *Academy of Management Proceedings* (Vol. 2019, No. 1, p. 14632). Briarcliff Manor, NY 10510: Academy of Management.

Parker, Sharon K., Frederick P. Morgeson, and Gary Johns (2017a). "One hundred years of work design research: Looking back and looking forward." *Journal of applied psychology* 102 (3), 403.

Parker, S. K., Van den Broeck, A., & Holman, D. (2017b). Work design influences: A synthesis of multilevel factors that affect the design of jobs. *Academy of Management Annals*, *11*(1), 267-308.

Parker, S. K., Andrei, D. M., & Van den Broeck, A. (2019). Poor work design begets poor work design: Capacity and willingness antecedents of individual work design behavior. *Journal of Applied Psychology*.

Podsakoff, N.P., LePine, J.A. & LePine, M.A. (2007). Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover and withdrawal behavior: A metaanalysis. *Journal of Applied Psychology*, 92, 438_454.

Puranam, P. (2018). *The microstructure of organizations*. Oxford University Press.

Raveendran, M., Silvestri, L., & Gulati, R. (2020). The Role of Interdependence in the Microfoundations of Organization Design: Task, Goal, and Knowledge Interdependence. *Academy of Management Annals*, (ja).

Rosseel, Yves (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, 48(2), 1-36. URL http://www.jstatsoft.org/v48/i02/

Schaufeli, W., Salanova, M., González-romá, V. & Bakker, A. (2002). The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach. *Journal of Happiness Studies*, 3 , 71-92

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: A multi-sample study. *Journal of Organizational Behavior: The International Journal of Industrial, Occupational and Organizational Psychology and Behavior*, *25*(3), 293-315.

Schaufeli, W. B., & Taris, T. W. (2014). A critical review of the job demands-resources model: Implications for improving work and health. In *Bridging occupational, organizational and public health* (pp. 43-68). Springer, Dordrecht.

Schippers, M. C., Edmondson, A. C., & West, M. A. (2014). Team reflexivity as an antidote to team information-processing failures. *Small Group Research*, *45*(6), 731-769.

Schmidt, K. H., & Diestel, S. (2011). Differential effects of decision latitude and control on the job demands–strain relationship: A cross-sectional survey study among elderly care nursing staff. *International Journal of Nursing Studies*, *48*(3), 307-317.

Schulz, A. D., Schöllgen, I., & Fay, D. (2019). The role of resources in the stressor–detachment model. *International Journal of Stress Management*, *26*(3), 306. Siggelkow, N. (2011). Firms as systems of interdependent choices. *Journal of Management Studies*, *48*(5), 1126-1140.

Shalley, C. E., Zhou, J., & Oldham, G. R. (2004). The effects of personal and contextual characteristics on creativity: Where should we go from here? *Journal of management*, *30*(6), 933-958.

Sonnentag, Sabine. "A task-level perspective on work engagement: A new approach that helps to differentiate the concepts of engagement and burnout." *Burnout Research* 5 (2017): 12-20.

Sunstein, C. R., & Hastie, R. (2015). *Wiser: Getting beyond groupthink to make groups smarter*. Harvard Business Press.

Tims, M., Bakker, A. B., & Derks, D. (2013). The impact of job crafting on job demands, job resources, and well-being. *Journal of occupational health psychology*, *18*(2), 230.

Trist, E. L., & Bamforth, K. W. (1951). Some social and psychological consequences of the longwall method of coal-getting: An examination of the psychological situation and defences of a work group in relation to the social structure and technological content of the work system. *Human relations*, *4*(1), 3-38.

Van den Broeck, A., Vansteenkiste, M., De Witte, H., & Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & stress*, *22*(3), 277-294.

Van den Broeck, A., De Cuyper, N., De Witte, H., & Vansteenkiste, M. (2010). Not all job demands are equal: Differentiating job hindrances and job challenges in the Job Demands–Resources model. *European journal of work and organizational psychology*, 19(6), 735-759.

van Veldhoven, M. & Broersen, S.(2003). Measurement quality and validity of the "need for recovery scale", *Occupational and Environmental Medicine*, 60, i3

Appendix

Table 8: Structural equations with matching and non-matching interactions

	Engagement				Exhaustion			
	B	SE	Pval	beta	B	SE	Pval	beta
Step 1: Base model - see Table 6								
Step 2a: Matching interactions								
Knowledge	0.08	0.03	0.00 **	0.10	-0.07	0.03	0.05 *	-0.06
Information	-0.04	0.03	0.17	-0.04	0.07	0.04	0.07	0.06
PlanningExecution	0.25	0.07	0.00 ***	0.16	-0.15	0.09	0.10	-0.08
PlanningDecision	-0.04	0.03	0.27	-0.05	0.01	0.04	0.89	0.01
Step 2b: Non-matching interactions - part 1								
KI	-0.01	0.03	0.77	-0.01	-0.01	0.04	0.88	-0.00
IK	-0.05	0.04	0.22	-0.04	0.06	0.05	0.23	0.04
KPe	-0.06	0.12	0.61	-0.07	-0.21	0.17	0.20	-0.18
PeK	0.31	0.18	0.09	0.17	0.19	0.23	0.41	0.08
KPd	0.10	0.11	0.37	0.12	0.12	0.14	0.40	0.12
PdK	-0.11	0.10	0.28	-0.11	-0.11	0.13	0.42	-0.08
Step 2c: Non-matching interactions - part 2								
IPe	0.78	0.99	0.43	0.82	0.36	0.82	0.66	0.29
PeI	-0.73	1.04	0.49	-0.34	-0.23	0.85	0.79	-0.08
IPd	-0.68	0.87	0.44	-0.76	-0.34	0.72	0.64	-0.30
PdI	0.48	0.66	0.46	0.41	0.23	0.54	0.67	0.15
PePd	0.61	0.57	0.29	0.38	0.19	0.47	0.69	0.09
PdPe	-0.26	0.37	0.49	-0.28	-0.22	0.30	0.47	-0.19