Chapter 8

An overdue overhaul: Revamping work design theory from a time perspective

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Introduction

Regardless of whether conscious, choices are made about which tasks to group together to form a job, the extent to which job holders have to follow rigid procedures in completing those tasks, how a job is supervised, and other such aspects concerning the content and structure of tasks, activities, and responsibilities. These choices are the topic of work design. Important aspects of work design are typically referred to as "job characteristics" or "work characteristics", such as the level of task autonomy or task variety in one's job or role. Work design theory is particularly concerned with understanding when, how, and why particular work characteristics affect employee outcomes such as job satisfaction and job performance, as well as how they affect higher-level outcomes like team performance or organizational productivity.

In this chapter, we systematically consider the role of time in relation to work design, an issue that has been neglected (Parker, Wall, & Cordery, 2001). Changes in the economic and social environment have made time one of the most valuable and scarce resources, have blurred the boundary between home and work, and have resulted in work often being carried virtually out across multiple nations with teams making use of different time zones to meet deadlines. These,

and other such changes, mean that it is timely to look at time. We focus here on timing issues

related to the core relationship between work characteristics and outcomes. Because of space

constraints, we leave timing aspects related to other issues (such as the antecedents of work design,

or the processes involved in work redesign) for another article. The chapter is structured in two

parts. In Part 1, we consider work design constructs that are themselves related to time, and in Part

2 we consider time-related processes. Figure 8.1 depicts the extensions to the literature that we

cover in this article.

Next we briefly recap on key theories of work design (for full reviews see Grant & Parker,

2009; Parker & Wall, 1998). Given that teamwork is covered in a separate chapter in this book, our

focus is primarily on individual-level work design. **[Insert Figure 8.1 about here]**

About work design

Work design is concerned with the content and organization of individual and/or group tasks,

activities, relationships, and responsibilities (Parker, in press). The topic became of interest as a

result of the deskilled and simplified way that work was organized within factories during the

Industrial Revolution. As evidence surfaced of the negative consequences of narrow job designs for

both individuals and organizations, job "redesigns" began to emerge. At the group level,

autonomous work groups became of interest, and at the individual level, job redesigns included job

rotation, job enlargement, and job enrichment.

Job enrichment was particularly spurred by the Job Characteristics Model (JCM; Hackman

& Oldham, 1976), which is one of the most dominant theories of work design. The JCM proposed

that five "core" job characteristics (skill variety, autonomy, job feedback, task significance, and

task identity) drive internal motivation, job satisfaction, reduced turnover, and performance as a result of their effect on three critical psychological states (experienced meaningfulness, feelings of responsibility for one's outcomes, and knowledge of results of one's efforts). Considerable evidence has supported the core elements of this model, including meta-analyses showing that job characteristics predict attitudinal outcomes like job satisfaction and organizational commitment (Humphrey, Nahrgang, & Morgeson, 2007), and including longitudinal and quasi-experimental studies (e.g., Griffin, 1991). The evidence is slightly more mixed for the effect of work design on performance (Parker et al., 2001), suggesting moderators play a role.

Several extensions have been made to the JCM to make it more applicable given changes occurring in the nature of the work and the workforce, including a broader range of work characteristics, outcomes, moderators, mechanisms, and antecedents of work design (see Morgeson & Humphrey, 2006; Parker et al., 2001). A relational approach that focuses on changing the structure of relationships at work, such as by connecting workers with their beneficiaries or end-users, has also gathered interest in recent times (Grant & Parker, 2009). A further major perspective on work design comes from considering the stress-related implications of work. Most important in this respect is the demand-control model of strain, which proposes that demands and control affect strain, either as main effects or in interaction with each other. A further dimension that was added to this model is social support (Karasek & Theorell, 1990) (see Chapter 5 for more detail on the demand-control model).

Part 1: Time-related constructs in work design

One key way of considering time is to focus on time-related constructs (Sonnentag, 2012). In this part of the chapter, we consider time-related contextual aspects, time-related work characteristics, time-related work design outcomes, time-related moderators of the relationship between work characteristics and outcomes, and time-related contextual forces.

Time-related contextual characteristics with implications for work design

Changes occurring in the broader work context not only have affected the amount of time individuals spend working but also have qualitatively changed characteristics of this time, such as the pace of work (White, Hill, McGovern, Mills, & Smeaton, 2003). For example, high-performance management practices focus on generating more voluntary effort from employees, which can translate into time pressure. A decline in union power can mean greater negotiation power for employers, allowing them to demand more from employees. More generally, there has been a growth in knowledge or professional work, which is more task-oriented than time-oriented (Elsbach & Hargadon, 2006) yet does not encourage overtime payment. At the same time, the rapid increase in women in the workplace means more dual career couples, with complexities associated with juggling home and work demands. Other time issues at work arise from: the operation of systems "24/7" across a global market and value chain; a growing service economy in which the needs of the client and the service need to come together in time; a growth in flexible working; and increasingly mobile work (Eurofound, 2012). All of these forces (and more) act to shape time-related work design constructs and processes.

Two contextual changes are especially important – increased virtuality of work and a rise in temporary contracts. We discuss how these changes affect work design issues to illustrate how context can shape work design issues.

Virtuality of work

Work increasingly spans temporal, spatial, or organizational boundaries, leading to interest in workplace virtuality. Geographic virtuality refers to those situations in which work spans spatial or organizational boundaries and is carried out from different locations, such as occurs with telecommuting. A meta-analysis by Gajendran and Harrison (2007) showed that telecommuting has small but positive effects on job control, work-family conflict, and the quality of workplace relationships, as well as effects on the more distal outcomes of decreased stress and turnover, increased satisfaction, and performance. Most of these distal effects are mediated by increased job control (ibid.), suggesting that the positive effects might be attributable to timing control. As well as telework affecting job autonomy, one could imagine how telework also moderates the effects of other work characteristics. For example, the strain and work-family conflict associated with high levels of role overload might be mitigated with telework.

Temporal virtuality involves working across temporal boundaries (Cummings, Espinosa, & Pickering, 2009), such as a team working together with members who are located in different parts of the world, with members working asynchronously across time zones to perform the same or interdependent tasks (Watson-Manheim, Chudoba, & Crowston, 2002). When the entire team works asynchronously, working can span over the entire day, meaning that the "waking" week takes over the "working" week (Parker et al., 2001). The positive side of this is that organizations can link together different time zones, increasing productivity and reducing development or

production time. A downside, however, includes the need for increased costs for coordination (Cummings et al., 2009). Coordination difficulties are generated not only by the lack of synchronicity in working hours (when one team member works, the other might be asleep) but also by cultural differences, such as specific national holydays and differences in values, such as different temporal perspectives.

Evidence is equivocal regarding the consideration of working across time zones. Negative, positive, and null results have been reported for variables such as performance, satisfaction, or innovation (Gibson et al., 2011). Overall, variables like time-zone span per se likely explain very little of the variance in team outcomes directly, but rather exert their effects via interpersonal team processes (Edwards & Sridhar, 2005). Therefore, future work design solutions may need to focus on how the work of globally distributed teams can be organized so that the interpersonal team processes are not negatively affected. Evidence in the area of temporal coordination paints a similar picture. Temporal coordination, or the mechanisms teams use in order to overcome temporal discontinuity such as scheduling, synchronization, and allocation of time resources, affects interaction behaviors in global virtual teams, which in turn affect performance (Massey, Montoya-Weiss, & Hung, 2003).

One challenge in this area is that it is difficult to differentiate the effects of temporal virtuality from geographical virtuality (Cummings et al., 2009). For example, having the flexibility to work from different locations allows employees to adapt their working schedules to accommodate other time demands. One of the few studies attempting to consider temporal and geographical virtuality separately showed that spatial and temporal boundaries do not by themselves directly influence performance, but rather they affect important processes like coordination (ibid.). Moreover, when there is a minimal overlap in working hours, employees

working in different time zones can more easily take advantage of communication technologies in order to reduce coordination delays. But when there is no overlap, communication technology becomes less useful in bridging time zones (ibid.). This finding suggests that, in the case of completely temporally separated teams, other solutions have to be found to help coordination. Such alternative solutions might lie within the organization of work itself (routines, procedures, etc.).

Altogether, overcoming temporal discontinuities in distributed teams likely lies in managing the interpersonal processes that can be hindered by this type of virtuality. From a work design perspective, this means not only trying to understand how work characteristics are affected by virtuality but also actively shaping work characteristics to facilitate processes that overcome the challenges of virtual working. In this vein, Kirkman, Rosen, Tesluk, and Gibson (2004) showed that team empowerment predicted virtual team performance among sales and service virtual teams in a high-technology organization. Interestingly, team empowerment was a stronger predictor for effectiveness for teams that met face-to-face less frequently, rather than more frequently, which the authors attributed to the importance of team empowerment in facilitating the learning needed in virtual teams.

Temporary contracts

Increased environmental complexity, along with economic challenges, has created pressures for flexibility. One way that organizations react to these pressures is to more heavily rely on temporary workers. Temporary work implies no guarantees for an ongoing employment relationship and/or nonsystematic variations in the minimum amount of time worked for the employer. Traditionally, commentators have assumed negative outcomes for temporary work. Temporary workers are seen to be even more vulnerable to usual work stressors than permanent workers, and more prone to

perceive a lack of balance between their efforts and the rewards, resulting in negative behaviors, negative attitudes, and poor well-being (De Cuyper, De Jong, De Witte, & Isaksson, 2008). However, empirical evidence is inconclusive, with both positive and negative outcomes being highlighted, with large variations in effects depending upon the specific form of temporary employment, the country, and other particularities (Parker, Griffin, Sprigg, & Wall, 2002).

One way to look at these results is to shift the interest from direct effects of temporary contracts to understanding how these contracts affect work design characteristics. For example, Parker et al. (2002) showed that individuals on temporary contracts experienced lower job security and lower participation in decision-making, but also lower role overload, than their permanent counterparts. These mixed work design effects meant no net negative effect on job strain. Other scholars have similarly shown mixed effects of temporary work on job characteristics, including both positive effects (reduced home-work conflict) and negative effects (reduced social support) (e.g., De Cuyper & De Witte, 2007). Altogether, these results indicate the need to further investigate how temporary work affects work characteristics, taking into account the many variations in type of temporary contract.

Time-related work characteristics

Work design questions relevant to time that one can ask (and the associated work characteristics) include: how much time do people spend at work (hours of work)?; do people have enough time for performing their tasks and how fast do they need to work (time pressure/workload)?; are individuals allowed to have a say about when, for how long, and in which order they do their work (timing control)?; do employees have enough time for things other than work (work-family

balance)?; and do individuals have the latitude to decide their work hours (autonomy over work hours)?

Working hours

A lively debate exists as to whether contemporary employees work longer hours. Even though advancements in industrial economies were expected to reduce the average hours of work, some scholars have argued that on average employees work more hours than in the past (Hochschild, 1997). As observed in the 5th European Working Conditions Survey (Eurofound, 2012), the average level of work intensity of jobs has increased over the past two decades, with almost one-third of jobs being identified as having poor working time quality (ibid.). However, considerable variation in work hours has been found across countries and job types. For example, professionals and managers tend to work overtime in order to deal with increased work demands (Spurgeon, Harrington, & Cooper, 1997). Indeed, in the Eurofound study, some people want to reduce their work hours (29%), whereas another 14% (mostly on lower incomes) would like to work more hours, raising the number of people who report not being happy with the overall number of hours they work to be almost half (43%).

Scholars have increasingly replaced the question about whether individuals work more hours in contemporary organizations with a question about whether the work hours are optimal. Research shows that when work hours are above the optimal level for employees, there are downsides, including negative effects on psychological and physical well-being (Spurgeon et al., 1997; see also Chapter 5). Performance and safety can also be impaired. For example, in industries like health care in which work hours have escalated in the past few decades, an increase in the length of the shifts beyond 12 hours, overtime, or workweeks longer than 40 hours lead to more

errors and near-errors (Rogers, Hwang, Scott, Aiken, & Dingers, 2004) and higher injury rates (Dembe, Erickson, Delbos, & Banks, 2005). Other effects of long work hours include increased absenteeism and impaired efficiency of the organization (Spurgeon et al., 1997). Organizational, cultural, and personal factors can influence these relationships, but overall evidence suggests that excessive hours put both the individual and the organization at risk.

One issue with this research is that it has focused on the effects of severe overtime, rather than moderate overtime (Spurgeon et al., 1997) and overlooked different types of overtime, such as mandatory and voluntary. Flexible working hours are often advocated as a solution to long work hours, and there has been an increase in forms of employment contracts that are designed to give employees more flexibility to schedule their work (e.g., Eurofound, 2012). The use of such alternative contracts can be positive (e.g., Kelly, Moen, & Tranby, 2011), but flexibility can be used for and against the people who have it, as it allows both for arranging more convenient work schedules but also for working more hours (White et al., 2003).

Workload and time pressure

Workload and time pressure have increased in many jobs. For example, 62% of the 44,000 workers surveyed in the 2012 European Working Conditions Survey reported working to tight deadlines at least a quarter of the time, and 59% reported working at high speed at least a quarter of the time (Eurofound, 2012). It is almost common sense to expect negative effects of high workload and time pressure on strain and performance. However, empirical evidence shows a more complex picture (see also Chapter 5). A meta-analysis identified positive, negative, and null effects of workload on various outcomes, which the authors explained according to whether the demands are considered as a "challenge" that enables individuals to learn and develop, or the demands are experienced as a

"hindrance" or an obstacle in the way of optimal performance (LePine, Podsakoff, & LePine, 2005). Supporting this line of thinking, but including an assessment of how demands are appraised, Ohly and Fritz (2010) showed that time pressure (and job control) can be appraised as a challenge, which leads to creativity and proactivity.

Beyond this framework, other explanations for the inconsistent consequences of time pressure abound. One explanation is that different concepts and different measures of concepts have been used, across different studies. Studies have also often failed to consider different subdimensions of workload such as quantitative versus qualitative overload, as well as differences in the cause of time pressure. A further differentiation relates to the type of activities for which time is scarce. For example, employees might not feel time-pressured overall in their jobs, but still they might feel they are left insufficient time for creative tasks or activities (Baer & Oldham, 2006). The permanence of time pressure also appears to shape its impact. Thus, long periods of working under high time pressure can lead to a complete depletion of resources such that, under these conditions, any positive effects of time pressure will not be maintained (Sonnentag, Binnewies, & Mojza, 2010). As we discuss later (Part 2) the effects of workload and time pressure might also have different effects over the short term versus the long term.

The mixed effects of time pressure have also been explained in terms of levels of activation (Gardner, 1986): any work-related demand gives rise to a certain level of stress, which can be potentially motivating for the employees. Under certain circumstances (such as a high level of job control), this stress energy can be transformed into a positive energy, or energy of action, but when these circumstances are not present, the negative effects of stress will manifest. In line with this argument, much attention has been given to the buffering role of job control, yet evidence for it is mixed (for example, see Chapter 5). Conceptually, the matching hypothesis (de Jonge & Dormann,

2006) is that job control will buffer the effects of specific job demands only if control is provided on exactly the same type of physical, emotional, or cognitive components (e.g., time pressure will be buffered only by timing control). A further conceptual nuance is co-occurrence, such as the idea that job control will qualify the relationship between time pressure and positive outcomes only if it is provided in the same days that are characterized by high time pressure. Various methodological complexities in relation to testing the buffering role of control have been identified (Sonnentag & Frese, 2003). Thus the jury is still out regarding the importance of autonomy/control as a buffer against role overload and time pressure.

A further important process that influences the health effects of workload and time pressure is recovery. Demanding jobs make us spend more of our personal time thinking about work, anticipating problems and things to be done. Sonnentag and Fritz (2007) identified four distinct recovery experiences: psychological detachment, relaxation, mastery, and control. Time pressure was associated with lower psychological detachment, and social support was positively associated with relaxation. All of the recovery experiences related positively to well-being outcomes, although psychological detachment was the most strongly and consistently related.

Although psychological detachment has positive effects in buffering high job demands, it seems that the higher the daily work hours and chronic time pressure, the more difficult it is to detach from work issues during off-work time. On the other hand, the positive effects of psychological detachment on fatigue are particularly strong after days in which we experience high time pressure (Sonnentag & Bayer, 2005). The same authors also found the expected positive effect of physical activities on well-being at both within- and between-person levels. Despite the importance of psychological detachment for recovery, relatively little is known on how exactly detachment can be facilitated.

Work-family conflict

Maintaining the sometimes fragile balance between the demands of home and work is a problem that almost all working parents face and is a recognized challenge for organizations. Time-based home-work conflict refers to the situation in which the amount of time spent in one role makes participation and performance in the other role more difficult (Greenhaus & Beutell, 1985). As discussed in Chapter 5, home-work conflict is increased when work hours are long and workload is high, and it can cause stress-related outcomes, as well as impaired family relationships and reduced performance. These outcomes tend to be greater for women than for men, as women are increasing their participation in work at a higher rate than men are increasing their participation in family roles (Hochschild, 1997).

Organizations try to improve work-life balance by designing jobs with flexible working schedules that allow employees to organize their own working hours in order to better integrate different demands on their time. For example, Kelly et al. (2011) showed how the introduction of increased scheduling control improved family-work balance. Nevertheless, these efforts are constructive only when flexibility meets the real needs of the employees and their particular life conditions (Pitt-Catsouphes & Matz-Costa, 2008). A further strategy is to attend to how individuals recover outside of work, as discussed earlier.

Timing-related job autonomy

Job autonomy, or job control, refers to the discretion that an employee has in deciding or influencing different aspects of his/her work, including both his/her own actions and the environment in which s/he acts (Frese, 1989). Many factors shape the level of job autonomy. For example, blue-collar workers tend to have less autonomy than knowledge workers due to the fact

that their activity is more dependent upon the technology and production processes used. Other influencing factors include centralization, management practices, and leadership style (see Parker et al., 2001).

Research has identified positive effects of job control and autonomy, such as for internal motivation (Prooijen, 2009), job performance (Bond & Flaxman, 2006), lowered turnover intentions (Sajeva, 2007), proactive behavior (Parker, Wall, & Jackson, 1997), and creativity (Binnewies & Wornlein, 2011). A meta-analysis conducted by Humphrey et al. (2007) showed autonomy is a core motivational work characteristic, linking positively to outcomes like job satisfaction, internal work motivation, and performance, and negatively to outcomes like absenteeism, role ambiguity, and role conflict. Due to its protective quality in the face of different demands, control has been related to strain outcomes such as burnout, anxiety and stress, and alcohol consumption (Terry & Jimmieson, 1999), and better physical conditions like coronary heart health (Bosma et al., 1997) and improved well-being (Holman, Axtell, Sprigg, Totterdell, & Wall, 2010). Only very occasionally has job control been shown to have negative effects, such as a study showing that autonomy enhances personal counterproductive behaviors as a reaction to conflict (Fox, Spector, & Miles, 2001). Studies also show that individual differences mitigate the positive effects of job control (Fernet, Guay, & Senecal, 2004), as can contextual factors (see Parker et al., 2001, for a review).

Multiple mechanisms have been put forward to explain the positive effects of autonomy, including that autonomy promotes positive psychological states like feelings of responsibility (Hackman & Oldham, 1976), meaningfulness (Humphrey et al., 2007), and self-efficacy (Parker, 1998); allows the effective and speedy management of demands (Karasek & Theorell, 1990); and promotes learning (Parker & Wall, 1998). It is also important to recognize that the relationship

between job autonomy and outcomes can be dynamic; for example, job control predicts personal initiative, which in turn predicts job control (Frese, Garst, & Fay, 2007). This latter point highlights how levels of autonomy and job control can be enhanced through individual action, such as crafting, i-deals and job-role negotiation.

Autonomy might also allow individuals to actively manage demands via a form of crafting. For example, Elsbach and Hargadon (2006) proposed that individuals should schedule some routine, easy tasks into each workday in order to release the pressure and to provide a sense of control. Likewise, job control might allow individuals to alternate high time-pressure with low time-pressure periods or days so they can regenerate their resources (Kühnel, Sonnentag, & Bledow, 2012). Consistent with these arguments, Binnewies, Sonnentag, and Mojza (2009) showed that job control moderated the link between recovery and performance, suggesting that control allows people to take advantage of times when they are feeling recovered and to avoid becoming depleted of resources, thus maintaining performance over the day.

There are different elements of work that one can have more or less control over (Frese, 1989), resulting in scholars identifying different dimensions of control (Breaugh, 1999). Scholars have differentiated timing autonomy (control over scheduling, order and timing of work), work method autonomy (control over work procedures and methods), and work criteria autonomy (control over methods and criteria used to evaluate performance). Existing research, although limited, supports the distinctiveness of these measures (ibid.), but there is relatively little evidence that different facets operate in different ways. For example, in their meta-analysis, Humphrey et al. (2007) found sufficient studies examining different facets only in relation to job satisfaction as an outcome. Decision-making autonomy had the strongest relationship with job satisfaction, followed by work methods autonomy, while the confidence interval for scheduling autonomy (timing

Commented [AuQ1]: I have changed i-deals to ideals. Okay?

Commented [P2R1]: They were two separate things – crafting, i-deals and job role negotiation. I-deals is a term used to mean "idiosyncratic deals" and in work design field it means the collaborative negotiation of job design that potentially meets the needs of both organization and individuals.

control) included the zero value. One explanation of this finding is that scheduling autonomy can be used to *increase* the amount of time worked (White et al., 2003), which might lead to overload and dissatisfaction. It might also be that timing control matters most when there is time pressure, consistent with the matching principle referred to earlier. It is also likely that the effects of timing control depend on other changes occurring. For example, lean production initiatives often involve removing "wasted time", resulting in reduced timing control (Jackson & Mullarkey, 2000). Whether this reduction in timing autonomy has a negative effect might depend on whether other motivating characteristics also co-occur, and whether the context is enabling or coercive (Parker, in press). We recommend more research that systematically assesses the distinct outcomes of different facets of job autonomy, if indeed there are distinct outcomes.

Interdependence

Interdependence refers to the degree in which work roles are interconnected (Morgeson & Humphrey, 2006), and it is reflected in how much interaction is needed from people working to complete assigned tasks. Interdependence has become a more salient characteristic of contemporary organizations that depend on teamwork or interconnected teams (Wageman, 1995). In terms of time, interdependence is indirectly related to time due to the temporal aspects implied by coordination with others. In particular, sequential interdependence is closely related to time because an employee's work is temporally dependent on the other's work.

Task interdependence tends to be positively related to subjective assessment of performance, satisfaction, commitment, job involvement, and internal work motivation, and negatively associated to turnover intentions and stress (Humphrey et al., 2007). There are conflicting results regarding the mechanisms by which these effects of interdependence are

produced, but one area of consensus is that interdependence interacts with other work characteristics in determining results. One of the most complex but important interactions is that between interdependence and autonomy. Some evidence indicates that the best results are obtained when the level of task autonomy is matched with the level of task interdependence (Evans & Fischer, 1992). However, there are also varying findings, especially when considering team-level issues (Langfred, 2005). For example, when task interdependence increases within the team, team autonomy is a protective factor because teams can use autonomy to better coordinate around tasks. At the individual level, though, when task interdependence increases, individual autonomy might prevent employees from taking the right actions in order to coordinate with other colleagues (Langfred, 2005). Interdependence can also constrain autonomy. For example, Janz, Colquitt, and Noe (1997) showed that team interdependence can result in reduced timing autonomy. Also, it has been argued that the effect of interdependence depends upon the type of interdependency under consideration (Grant & Parker, 2009). More research is needed in order to fully understand the complex interactions at the interdependence and autonomy facet level.

Time-related outcomes of work design

All work design outcomes have some degree of a timing element. For example, ill health effects of work design inevitably take time to occur. In this section, we focus on outcomes that: are defined in terms of time (e.g., absenteeism), that occur only as a result of considerable time (e.g., burnout, personal development), that relate to the experience of time (e.g., flow); or that relate to time-related behaviors (e.g., procrastination).

Absenteeism

Absenteeism is defined as a retreat/withdrawal behavior, or time not spent at work. Absence is usually measured in terms of absence duration (total length of time being absent), absence frequency (number of times a person has been absent), or both. There are different pathways by which work design might affect absenteeism (e.g., Bakker, Demerouti, De Boer, & Schaufeli, 2003). First, similar to the prediction of the Job Characteristics Model, employees might not attend work as a compensation, or reaction to, aversive or negative work circumstances. A second process is one in which absenteeism is a response to the stress caused by job characteristics like excess workload or monotony. From this perspective, individuals don't come to work because their health is impaired or they feel unable to perform the work. Bakker et al. (2003) investigated these two processes in a production-oriented organization. They showed that the frequency of absence spells was predicted by a lack of job resources and the associated negative impact on commitment to the job. In contrast, job demands predicted absenteeism duration via mechanisms such as burnout, relating to the process that absence arises as a result of strain.

More generally, studies support a link between work characteristics and outcomes, although the link tends to be more consistent for job resources than job demands. For example, Rentsch and Steel (1998) showed that job resources predicted both absence frequency and total time lost. Likewise, Nielsen et al. (2004) showed that decision authority was associated with lower absence for men. Smulders and Nijhuis (1999) showed that high job control was associated with lower absence, although interestingly, high job demands were associated with lower absence. These authors suggested that a high level of job demands might operate as a pressure to attend. In contrast de Jonge, Reuvers, Houtman, Bongers, and Kompier (2000) reported that low demands were associated with lower absence, as was high job control and high social support. It is likely that the

effects of "demands" on absence might depend on the type of demand and perhaps other factors like absence norms.

Burnout

Burnout represents a work syndrome characterized by emotional exhaustion, depersonalization, and reduced personal accomplishment (Maslach, 1982). Employees high on burnout feel they have lost all their emotional resources, and because of that they are trying to stay as far away as possible from others and the pressures that might come from them. Also, they feel they are not so competent anymore at work; therefore a negative assessment of the self occurs. Burnout translates into more severe health problems over time, reduces organizational commitment, and results in turnover (Schaufeli & Bakker, 2004)

Burnout develops gradually, over time, as an unfolding process in which both work and individual characteristics are involved. Work and individual characteristics interact with each other, giving rise to a cycle in which an employee's resources are continually drained (Shirom, Melamed, Toker, Berliner, & Shapira, 2005). Work characteristics such as role overload, role ambiguity, and role conflict are key antecedents of burnout (Janssen, Schaufeli, & Houkes, 1999). A lack of important work resources, including insufficient autonomy, is also related to burnout (Schaufeli & Bakker, 2004). Nevertheless, the effects of these and other work characteristics are moderated by individual differences such as individual vulnerability to burnout (Langelaan, Bakker, Van Doornen, & Schaufeli, 2006), individual preferences for certain working hours, and factors such as one's spouse's working time (Halbesleben & Buckley, 2004).

In addition, although the antecedents and outcomes of burnout have been extensively investigated, less attention has been given to the process and patterns in which burnout unfolds over time, a point we revisit in Part 2 of this chapter.

Career development

The topic of career development bridges research on work characteristics and time (Fried, Grant, Levi, Hadani, & Slowik, 2007). Objectively, career development concerns observable changes within a job, position, or level of income over time, or changes between jobs, positions, and income throughout the work life of individuals. Contemporary careers have moved from the traditional linear long-life career cycle to be replaced by more short-time career cycles, with a special emphasis on learning throughout the course of different roles (Hall & Chandler, 2005). Shortening successive career cycles means shorter time cycles for the particular roles throughout the individual career. Parker (in press; see also Hall & Las Heras, 2010) argued that work design might be a powerful vehicle for promoting learning within a job, as well as shaping individuals' identity and self-concepts, which in turn are important for career progression in today's contemporary organizations. For example, as career alternatives and transitions are more frequent in contemporary careers, people need to become more proactive in relation to their career and choices. Parker (in press) argued that enriched jobs have the potential to foster a longer time perspective, which in turn can promote the necessary proactive career behavior. Future research is needed in order to understand how shorter time cycles interact with work characteristics in determining learning and other outcomes. Later we consider how career stage can moderate the effects of work characteristics on outcomes, such as how future career expectations might shape how individuals react to current job characteristics.

Flow

Work design can affect the experience of flow, which is a positive state of consciousness in which people are fully goal-oriented and internally motivated by what they are doing (Csikszentmihalyi, 1997). During flow, a high level of immersion in the activity means that individuals do not sense the passing of time, which is similar to the experience of time passing quickly when people are fully engaged in their work (absorption) (Schaufeli, Salanova, Roma, & Bakker, 2002). Absorption and flow have been shown to be highly related to each other in several studies (Bakker, Demerouti, & ten Brummelhuis, 2011), although it is generally argued that flow is a momentary/short-term experience (Bakker, 2008), whereas engagement is assumed to be more enduring over time (Schaufeli et al., 2002).

Flow and absorption can be a remedy for the negative influences of demanding work environments (Bakker et al., 2011). When in flow, employees become more involved in the activity, and derive positive emotions from it (Bindl & Parker, 2010). Positive emotions, in turn, can broaden employees' thoughts and actions and make them more open to new experiences (Bakker et al., 2011). Flow also predicts outcomes like job satisfaction and job involvement (Bakker, 2008) and, for conscientious employees, task and contextual performance (Demerouti, 2006). Nevertheless, engagement and flow can also give rise to costs for employees, such as greater challenges balancing work and nonwork demands (Bakker et al., 2011).

Work characteristics, and more specifically job resources such as autonomy and social support, have been identified as key antecedents of engagement and flow (Bakker, 2008). Interestingly, job demands are also important for flow (Bakker & Geurts, 2004), likely because flow needs an adequate level of arousal that comes from having some pressure. Kühnel et al. (2012)

showed that employees were engaged only in those days in which they experienced time pressure and also had high control over their work. This matching between pressure and control is consistent with the idea that flow occurs when demands/challenges and skills/personal resources are balanced (Csikszentmihalyi, 1997). Scholars have suggested that flow interacts with resources such that flow enhances organizational and personal resources, which then enhance flow, in an upward positive spiral (Salanova, Bakker, & Llorens, 2006), although other data indicates that change in job resources and work-related flow occur simultaneously rather than at separate points (Mäkikangas, Bakker, Aunola, & Demerouti, 2010).

The emphasis on loss of consciousness and distortion of time associated with flow appears almost opposite to the concept of mindfulness, which involves attention to and awareness of present events and experience (Brown & Ryan, 2003). Like flow, mindfulness can facilitate positive outcomes such as well-being (ibid.), emotional regulation and job satisfaction (Hülsheger, Alberts, Feinholdt, & Lang, 2012), and work family balance (Allen & Kiburz, 2012). Mindfulness has also been shown to boost the positive effects of job autonomy (Bond & Bunce, 2000). How can it be that both flow and mindfulness, seemingly opposite in their degree of awareness of the present moment, relate to well-being? Levinthal and Rerup (2006) argued that the consciousness of mindfulness enables people to deal with novel stimuli and environmental uncertainties, but people still need conserve their attentional resources and accumulate knowledge from previous experiences. Flow can allow people to focus their attention on specific tasks and to utilize knowledge and skills. In this sense, flow may be more routine-driven. Another explanation is that the processes actually co-occur: when individuals are engaged in challenging and stimulating tasks, they are fully present and focused on the moment (mindful), and hence do not sense the passing of

time (flow). Future research could identify conditions under which these elements complement each other and also conditions under which they counteract each other.

Procrastination

Procrastination, either trait or state, refers to "voluntarily delay[ing] an intended course of action despite expecting to be worse off for the delay" (Steel, 2007, p. 66). In a meta-analysis, Steel (2007) identified antecedents of procrastination as including task aversiveness, task delay, impulsiveness, self-efficacy, and conscientiousness. The meta-analysis also showed that putting off work can be dysfunctional: there was a negative correlation between procrastination and performance. Given prior evidence that job enrichment enhances task enjoyment and promotes self-efficacy, one would predict that enriched jobs will be associated with lower procrastination. Nevertheless, in some jobs, there might be a high number of aversive tasks, despite enrichment. As such in some situations autonomy might be insufficient, and perhaps even negative, since individuals could "choose" to not do the aversive tasks. Selecting individuals who are low in impulsiveness and high in conscientiousness might be important in such situations. High autonomy can also lead to paralysis in decision-making, which is associated with procrastination, because there are too many decisions to make (Grant & Schwartz, 2011).

Speedy decision-making

Changes in the complexity and uncertainty of the environment, along with increased competition, highlight the need for organizations to react quickly to external and internal changes. In such a context, making important decisions quickly and making them at the right time might be an important competitive advantage. This association is supported by the literature, which has shown a

link between the speed of decision-making and the overall performance of an organization (Baum & Wally, 2003). Work design was recognized as playing a role in speedy decision-making in early writings on sociotechnical systems theory that argued controlling variances at the source results in faster decisions. Wall and Jackson (1995) referred to this as a "quick response" mechanism. Wally and Baum (1994), in an analysis of factors that increase the speed of decision-making, similarly identified the inhibiting effects of authority centralization, complexity, and formalization due to their negative influence on nonprogrammable decisions. Centralization of strategic management and decentralization of operational management also speed up information process and employee involvement, and hence result in faster decisions (Baum & Wally, 2003). Indeed, speedy decision-making could be part of the explanation as to why job autonomy is most effective in uncertain, changing, and volatile contexts. It is exactly in this kind of organization that speed of decision-making is important for organizational performance.

Time-related moderators (individual differences)

In this section, we consider how individual difference variables related to time moderate work design effects, including both personality variables/traits (e.g., temporal focus) and demographic variables (e.g., career stage).

Perceived value of time-/-time urgency-/-polychronicity

The value that individuals attribute to time is an important influence on the relationship between work characteristics and outcomes. Changes in income are associated with changes in perceived time pressure, suggesting that the greater the economic value of our time, the more time feels scarce (DeVoe & Pfeffer, 2011). Related to this belief, some individuals have an inward sense of

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time, which results in them being highly aware of the passing of time, prioritizing, scheduling

tasks, and setting and monitoring deadlines, but also imposing more tasks within the same

deadlines and doing many things at once (Rastegary & Landy, 1993). As such, time-urgent people

are more comfortable working under time pressure (Waller, Conte, Gibson, & Carpenter, 2011). A

related individual difference variable is polychronicity, or the degree to which people prefer to

perform their work simultaneously versus sequentially (Slocombe & Bluedorn, 1999). Individuals

who are time urgent, or high in polychronicity, should therefore react less negatively to time

pressure and role overload. Indeed, Hecht and Allen (2005) found that when there was a fit between

people's polychronicity and relevant job demands (such as the need to juggle multiple tasks),

individuals experienced higher well-being.

An interesting question to pursue is whether those high in time urgency or polychronicity,

while preferring time-pressured work, perhaps nevertheless suffer physiological effects of excess

workload and pressure in the long term. In some situations, work performance might also be

impaired, such as when individuals take on too many tasks or work too quickly and compromise

work quality as a result. The effect of polychronicity on demand-outcome associations might

depend on other individual differences like time management skills and conscientiousness.

Temporal focus-/ temporal perspectives

Individuals vary in their temporal focus, or "the extent to which people devote their attention to the

past, present, and future" (Shipp, Edwards, & Lambert, 2009, p. 4). Shipp et al. (2009) found

significant interaction effectss between dimensions of temporal focus and corresponding

characteristics of individuals' past job, current job, and expected future job onin their job attitudes.

For instance, for people with high levels of future focus, there were positive correlations between

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expected job characteristics and job satisfaction. Opposite patterns of results were observed for those with low levels of future focus. Temporal perspectives, or whether individuals have a long-term versus short-term orientation, are a related concept. For example, Bearden, Money, and Nevins (2006) developed the concept of "long-term" orientation, and Strathman, Gleicher, Boninger, and Edwards (1994) focused on "consideration of future consequences". Individuals high in these aspects prefer to focus on distal consequences rather than immediate consequences of their actions, with their behavior then being shaped by these considerations. One might predict that people with long-term orientation would respond less negatively to adverse or unstimulating jobs, because they may expect that their jobs will become more stimulating in the future (see ahead for similar arguments in relation to career stage).

Psychological flexibility-/-mindfulness

Psychological flexibility refers to being open and curious regarding the present moment (mindfulness) and, depending on what the situation affords, acting in accordance with one's chosen values (Bond & Flaxman, 2006). Instead of trying to *control* inner experience, people who are more psychologically flexible are better able to observe in a nonjudgmental way their internal experiences. Bond, Flaxman, and Bunce (2008) have shown that individuals with higher psychological flexibility are better able to respond to goal-related opportunities at work because they are more sensitive to context. As a result, these scholars showed that the effects on employee mental health and absence of a work redesign intervention to enhance job control were most pronounced for employees who were high on psychological flexibility.

Career stage-/-age

Researchers have theorized that the effects of work characteristics on work outcomes, such as job performance and job attitudes, differ for people at distinct career stages (Fried et al., 2007) and at different ages/life stages (Truxillo, Cadiz, Rineer, Zaniboni, & Fraccaroli, 2012). Fried et al. (2007) proposed that a lack of stimulating work characteristics may be responded to favorably for employees at an early career stage, because those employees may expect that, as their careers progress, their work will become more challenging. Employees at an early career stage also tend to engage in job crafting to make their work more stimulating. Employees at a later career stage might respond more favorably to task significance, rather than job complexity, skill variety, and task variety. Those propositions are in alignment with a theory of life-span development (Baltes, 1997) emphasizing three processes: selection, optimization, and compensation. During early career stages, employees may need to select specific career goals and then devote their time and effort to hone their skills to further increase their self-efficacy and functioning. In later career stages, employee might face constraints in terms of abilities, time, and energy and hence might focus on taking compensatory steps (e.g., using external help) (Fried et al., 2007; Truxillo et al., 2012). Consequently it is reasonable to expect that career stage will shape responses to one's work characteristics, although thus far empirical research on this topic is scarce.

Career stage is difficult to operationalize, but researchers have examined the effects of chronological age on reactions to work design. Zacher, Heusner, Schmitz, Zwierzanska, and Frese (2010) showed that, with increasing age, individuals in complex and high control jobs perceive more future opportunities at work than their counterparts in low control and low complexity jobs, suggesting enriched jobs may be a positive way of maintaining opportunities for people as they age. One cautionary note is that this study (and other studies like it) is not longitudinal, and thus

findings do not necessarily reflect longitudinal effects of age or career stage. Longitudinal studies

are needed to unpack the dynamics of work characteristics and work outcomes across the life span.

Part 2: Timing and pattern of effects including dynamic processes

There is no single time lag or pattern by which work design affects outcomes because these

processes depend on many factors, such as which work characteristics/outcomes are being

considered, the assumed theoretical processes linking these variables, the amount of exposure to the

work characteristic, and whether changes in work characteristics have occurred. Our intention

therefore is to be illustrative in our analysis rather than exhaustive. We first consider time lags

between work design and outcomes, considering theory and then evidence. Second we consider

patterns of effects, and finally we discuss reciprocal processes.

Time lags between work design and outcomes: Theoretical expectations

Let us assume a relatively simple relationship in which work characteristics cause outcomes, and in

which the impact of a work characteristic increases with exposure time while a decrease in the

work characteristic means the same effect reversed. One initial consideration concerns the time

period over which work characteristics have their effects – whether the effects are relatively fast-

acting or whether they occur over the very long term. Often related to speed, although theoretically

distinct, is how enduring/reversible are these effects. A useful approach here is Nesselroade's

(1991) conceptualization of two types of within-person psychological change: intra-individual

variability involving quite rapid, potentially reversible change (state change); and intra-individual change involving slower change (trait change), often reflecting developmental type processes that are not easily reversed. Similarly, physical and physiological changes can be fast-acting and reversible (such as a short-term increase in heart rate) or slower and more enduring (such as a change in one's immune system functioning). This distinction relates to the difference between a "stress-reaction model", in which stressors cause a relatively immediate reaction, and a "stressor-strain trend model", in which long-term change in one stressor relates to corresponding long-term change in strain variables (Frese & Zapf, 1988).

Although timing processes have rarely been explicitly considered in work design theory, one can speculate on the timing by focusing on the theoretical mechanisms underpinning how work design affects outcomes. Consider the JCM. This model proposes that work characteristics affect psychological states, which then affect outcomes. The effects of work characteristics on psychological states are partly assumed to operate because individuals have basic needs that have to be met for effective functioning. A need fulfillment mechanism might be a relatively fast-acting effect. For example, once an individual perceives that he or she has sufficient autonomy, this fulfills his or her need for autonomy, which should rather immediately enhance one's level of job satisfaction. Of course, in some cases, it might require time for an individual to perceive a high level of autonomy – such as when they have a new leader and they have not yet had a chance to "test out" how much latitude they have. Other motivational processes that have been argued to explain why work design affects outcomes might occur over a longer period. For example, job enrichment promotes self-efficacy, but this is theorized to occur because (for example) enriched jobs give individuals the chance to try new activities, learn new skills, and develop enactive mastery. One would assume this process takes place over months rather than days. An even longer-

term process – closer to Nesselroade's (1991) "trait effect" – might occur when a deskilled job over a long period of time results in adaption, such that an individual's need for control is suppressed or their aspiration for learning is reduced. Several scholars have argued for such longer-term or developmental effects. For example, Frese (1989) argued that a low aspiration for control might be a defensive reaction to low control in which a person tries to keep his or her aspirations down. We revisit this developmental perspective later.

In relation to psychological states or motivation affecting subsequent outcomes, this process might also occur over different time periods. In the case of motivating states affecting job satisfaction, this might be a rather speedy effect. In contrast, the timing of any effect on performance will depend on what type of performance is considered and how it is operationalized. For example, feeling motivated might encourage a salesperson to persist at making sales (which would be captured in assessments of effort), but this might take some time to translate into an actual sale (such as might be assessed via an objective performance measure).

In a similar vein, the timing of work characteristics affecting strain outcomes likely depends on which variables and relationships are being considered, as well as the theorized mechanism. As an example, Frese (1989) identified several mechanisms by which job control might shape employees' mental and physical health. First, individuals might have a need for control, the lack of fulfillment of which causes strain, perhaps rather quickly. Second, a stressor reduction mechanism occurs when an individual makes use of the control to reduce/abolish job demands. This mechanism could also operate quite speedily (such as an individual choosing to work at home for one day per week to avoid the distraction of the telephone) or quite slowly (such as an individual using his or her job control to gradually craft a less demanding job). Third, job control might reduce the stressful impact of demands, via a safety signal process: that is, job control provides a

person with the possibility to change his or her situation if needed, even if he or she doesn't actually exercise this control, thereby lessening the effect of demanding work characteristics stress appraisals. Such an effect is likely to be relatively fast-acting, as well as rather enduring. Job control might also reduce stressful impact of demands via a fitting process (Frese, 1989) in which individuals use job control to fit the environment to their preferences, such as choosing to carry out one's most demanding tasks when one is most alert in the mornings. A persistence process occurs when job control promotes individual's likelihood of persisting with changing the stressor (via stressor reduction) or of coping with the stressor (via fitting). A fitting process could occur quite quickly, although it likely also requires some trial and error, learning to identify how to control stressors in the environment, and therefore could also require time. Similarly, the persistence mechanism almost implies a longer-term process.

Work design can also affect health via physiological processes that vary in their speed. The physiological effects of demands have long been discussed (e.g., Karasek & Theorell, 1990). More recently, researchers proposed a physiological pathway between positive work social interactions and work outcomes (Heaphy & Dutton, 2008). Work characteristics can promote physiological reactions almost instantaneously. For instance, both positive and negative work events can affect blood pressure, heart rates, and release of hormones (e.g., cortisol). Other physiological effects might occur much more slowly. For instance, prolonged exposure to stressors may cause hyperactivity of cortisol accretion, which in turn may generate physiological disease (McEwen, 2007).

As well as motivation, performance, and health, attention has been given in the literature to how work design affects learning and development. For example, Karasek and Theorell (1990) proposed two learning processes by which work design affects strain. First, an active job has

learning opportunities that, over time, lead an individual to feel an increased sense of mastery and confidence and also promote learning, which, in turn, helps the person to cope with the further job demands. The second, a negative behavioral spiral, results from a combination of high job demands and low decision latitude, which leads to reduced mastery and poorer coping, followed by higher residual strain levels, and so on. More recently, Parker (in press) summarized literature suggesting that work design can affect cognitive, identity, and moral processes in the short term and, over the longer term, give rise to developmental changes in these elements. Related to this, and a further example of Nesselroade's trait effect, is the idea that work characteristics can affect personality. For example, research on personality development suggests that, as people invest in their work roles, they generalize and internalize their successful fulfillment of their role requirements to the self, thus leading to change in personality (Kohn & Schooler, 1982).

Time lags between work design and outcomes: Empirical evidence

Earlier we suggested various time lags between work characteristics and outcomes that can be identified theoretically. But what is the empirical evidence? Overall, consistent with the multiple mechanisms proposed earlier, studies suggest that work design can have effects over vastly different time periods. De Lange, Taris, Kompier, Houtman, and Bongers (2003) reviewed 45 longitudinal studies examining the demand-control model of strain. A complete panel design (see ahead) was used in 25 of these studies, with 16 of these having two waves and 9 having three waves. Frequently no theoretical justification was provided for the different time lags chosen, and the time lags varied from 28 days to 12 years. All in all, 19 studies were judged to be "high quality". Of these, 84% of studies provided evidence of main effects of either job demands, job

control, or social support (and often more than one of these) on a range of strain indicators such as well-being, absence, cardiovascular functioning, and lifestyle factors. Only eight of these provided support for interaction effects between demand and control (and sometimes support) in predicting strain-related outcomes. In terms of time lags, some consistent evidence showed that social support affected job satisfaction with different time lags of one month and one year; and the effects of work characteristics on strain outcomes like well-being, burnout, and anxiety appeared to be quite consistent over a one-year period.

As well as longitudinal studies such as these, insight into timing comes from two other major types of studies: quasi-experimental field studies in which the effects of a work redesign are compared to a control group and diary/experience sampling method (ESM) studies. For example, Griffin (1991) investigated the longitudinal effects of job enrichment on multiple outcomes. Griffin measured all these variables four times: 4 months before job enrichment, and 6, 24, and 48 months after job enrichment. Intrinsic motivation increased after job enrichment and stayed high. Job attitudes such increased to begin with, but over time, dropped to a level similar to that before job enrichment. The authors suggested that individuals might have adapted to the improved work design, resulting in them no longer getting a satisfaction benefit from the job redesign. Job performance showed no significant change six months after job enrichment, but significantly improved in the latter two occasions, consistent with a possible learning mechanism. Similarly, Wall, Jackson, Mullarkey, and Parker (1996) examined effects of the practice of autonomous work groups on job satisfaction, motivation, and job performance measured three times (6, 18, and 30 months later), reporting a lasting effect only for intrinsic job satisfaction. Unfortunately there are too few of these types of longitudinal studies to really draw any firm conclusions about timing of effects.

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Experience sampling research on work characteristics also shows that there can be almost immediate or very short-term effects of work design. These studies tend to examine the effects of momentary or daily effects of work characteristics on work outcomes such as momentary/daily employee well-being, proactive behavior, and work engagement, and other outcomes. The work characteristics that have received most research attention in ESM research are work challenge, work hindrance, and work resources. For example, researchers found that daily time pressure and daily job control (Ohly & Fritz, 2010), as well as daily constraints (Fritz & Sonnentag, 2009) were associated with daily self-report personal initiative behaviors. Likewise, van Gelderen, Heuven, van Veldhoven, Zeelenberg, and Croon, (2007) observed significant relationships between employees' daily emotional labor demands and psychological strain.

Similar to classical work design research, ESM research on work design has also investigated moderators and mediators in the relationship between momentary work characteristics and momentary work outcomes. For example, with respect to moderators, Kühnel et al. (2012) found significant interaction between daily specific job control and time pressure on work engagement: time pressure promoted (inhibited) daily work engagement when job control was high (low). As an example of mediating variables, Xanthopoulou, Bakker, Demerouti, and Schaufeli (2009b) found that daily personal resources such as self-efficacy mediated the effects of daily job resources on work engagement.

Although ESM research has extended work design research by testing propositions at the within-person level, these studies are not without limitations. According to affective events theory (AET, Weiss & Cropanzano, 1996), events in the work environment affect employees' affective reactions, which, in turn, shape work outcomes. ESM work design studies have mainly examined relationships between perceived work characteristics and work outcomes, and thus the potential

mediating role of affective reactions has been relatively overlooked, and using perceived work characteristics cannot be regarded as a strict examination of AET. Future research should try to assess work characteristics objectively. For example, quasi-experimental studies could be combined with ESM research to probe the effects of objective work redesign practices on employees' momentary affective reactions, well-being, and performance. Many ESM research studies also focus on concurrent relationships between work characteristics and work outcomes rather than lagged effects (e.g., Kühnel et al. 2012). Note that researchers have begun to adopt more stringent methodology – for example, using non–self-report outcome measures (e.g., Xanthopoulou et al., 2009b), examining lagged effects of work characteristics on outcomes assessed on a subsequent occasion (e.g., Fritz & Sonnentag, 2009), and controlling for outcome variables captured at a previous occasion (e.g., Daniels, Boocock, Glover, Hartley, & Holland, 2009).

Patterns by which work design affects outcomes

As well as effects operating over different time spans, there are a number of ways these effects can vary according to how stable or changeable the effects are, as well as how stable or changeable work characteristics and outcomes are. As noted by Mitchell and James (2001), it is not always a simple case that X causes Y, with this effect being stable over time. Instead, X can cause Y with Y changing over time; X causes Y but over repeated exposure to X, Y changes; and changes in X can cause change in Y and so on. The effect of work characteristics on outcomes can change over time in various ways as a result of adaption, learning, accumulation processes, development, changes to one's biological system, and so on. For example, Frese and Zapf (1988) referred to the "adjustment" model as one in which there is some initial dysfunction as a result of demanding work

characteristics, but this effect lessens over time as a result of the individual adopting coping strategies.

Likewise, an individual might adapt to the level of job control, initially responding positively, but then these positive effects decay (as in the Griffin, 1991, study reported earlier). Hedonic adaptation (Frederick & Loewenstein, 1999) theory suggests that effects of objective work changes on work characteristics might decay as time passes, and therefore their effects on job attitudes and performance will also diminish. Hedonic adaptation typically refers to the phenomena that following a positive or negative change in life people's satisfaction returns to a set point (Lucas, 2007). Such an adaptation process is functional because it protects people from prolonged elevated or decreased psychological or physiological states. In addition, it also enables people to direct their attention and resources to novel stimuli. Consistent with this theory, Parker and Wall (1998) proposed that individuals can adapt to work redesign over time, and therefore that work design should be treated as a continuous process. For example, as their skills and confidence grow, individuals might require more challenging tasks to experience the same level of task variety. Of course, this adaptation process might also depend on the work characteristic being considered. For example, enriched jobs may provide people with a high level of opportunities to engage in novel tasks that require various distinct skills over a period of time. In essence, job autonomy might allow individuals to continue to stretch and craft their jobs as they adapt and as their skills develop. Given work characteristics (e.g., skill variety) are generally molar work features, their perceptions may be formed on the basis of task-level activities. Thus if task-level components change frequently, due to either work redesign practices or job crafting, people's perceptions of molar work characteristics could be maintained across a long period of time.

Another pattern is a sleeper effect or an accumulation model in which work characteristics don't have an immediate effect but incubate over time (Frese & Zapf, 1988). This effect could be a long-term lagged effect of a stressor that appears later, such as social stressors that lead to hostile attitudes to colleagues, which then trigger later depression. Alternatively it might be a post-traumatic effect type process where the effects are initially suppressed and surface only after time. Or one might see an accumulation model in which there is a threshold effect, such as reaching a "breaking point" with shift work (Frese & Okonek, 1984). Under this model, even when the work characteristic is changed, its effects remain. For example, excess workload might cause ill health, which causes a weakened immune system, thereby resulting in increased strain even when workload is reduced. Another effect might be a fluctuating or on/off effect. For example, as noted earlier, individuals might have a need for control, the lack of fulfillment of which causes strain. The need for control might be particularly strong in the presence of demands or feelings of distress, so although fulfilling this need is likely to have a relatively speedy effect (as noted earlier), it might not have a stable effect over time but rather fluctuate as demands change or new demands emerge.

As to the evidence, understanding the pattern of effects requires a highly rigorous design with ideally more than two waves (see ahead). One of the most impressive longitudinal studies in the field of work design and strain is that by Garst, Frese, and Molenaar (2000). These authors identified and tested a series of models using six waves of data over five years during East German reunification. Using latent growth curve modeling, they were able to systematically test several different patterns of effect. There was quite a high degree of stability in strain levels over time, although nevertheless some change. There was no support for a sleeper effect model. There was good evidence for a stressor-strain trend model in which long-term changes in one stressor lead to corresponding long-term changes in strain (the trait-like process referred to earlier). Thus social

work demands and role ambiguity/role overload slopes had strong correlations with most strain slopes, and time pressure and organizational problems related to some strain slopes, supporting the stressor-strain trend model, although this was not so for job insecurity (note that this model cannot be interpreted causally because it's a correlation between the slopes with no time order tests). There was also evidence for a short-term reaction model (the state-like process referred to earlier), especially for the effect of time pressure on worry. Finally, there was marginal evidence of reverse causation (which we discuss ahead).

Failure to consider the pattern of effects might explain the inconsistent evidence for an interaction between demand and control. If it takes time to learn to effectively adjust to demands (the adjustment model), then one would observe a correlation between demands and strain even though job control is present (Frese, 1989). On the other hand, when job control is lacking, one would also observe a correlation between demands and control. This would mean the moderating effect of control would only occasionally show up in the data. Such a scenario is further complicated by the fact that stressors are not constant.

Reciprocal~/~recursive effects in which outcomes affect work design

Work characteristics can be caused by outcomes (reverse causal relationships), or the relationship between work characteristics and outcomes can go in both directions via different processes (reciprocal causal relationships). One explanation of a reverse relationship is that an individual's motivational or strain state changes his or her perception of the same job over time. For example, a "gloomy perception" mechanism involves an individual who is experiencing negative affect, perceiving the work as more demanding, whereas a "rosy perception" mechanism would involve a

healthy, happy worker interpreting his or her job more positively (Dalgard et al., 2009). From the perspective of social information processing theory (Salancik & Pfeffer, 1978), people's perceptions of their work are subject to social and personal influences. As such, it seems likely that employees' past work behaviors and attitudes may color their perceptions of work characteristics.

A further explanation is that – as a result of motivation or well-being – objective work characteristics can change. An upward selection mechanism means healthy workers are more likely to be promoted to more challenging jobs, or allocated more complex tasks (Frese, 1989), whereas a "drift mechanism" occurs when unhealthy workers tend to end up in poorer-quality jobs.

Another possibility, increasingly recognized in the literature, is that individuals high in motivation, health, and associated outcomes actively change their job characteristics. This tends to be proposed as a recursive effect, or positive spiral. Work design scholars have long argued for dynamic effects in which work characteristics cause particular outcomes that in turn shape work characteristics (e.g., Karasek & Theorell, 1990; Parker & Wall, 1998). For example, work characteristics like autonomy promote proactive states such as self-efficacy and a flexible role orientation (Parker, 1998), which in turn stimulate proactive behaviors that can change one's own job design (Grant & Parker, 2009). Job crafting theory (Wrzesniewski & Dutton, 2001) suggests that when employees' needs are not satisfied at work, they tend to modify their task and relationship boundaries via cognitive and behavioral crafting to obtain higher levels of person-job fit and greater meaning. In other words, individuals not only react or respond to work characteristics but also shape them, giving rise to dynamic spirals between job characteristics, individual processes, and outcomes.

In a similar vein, conservation of resources theory (Hobfoll, 2002) postulates that people have innate needs to build, retain, and protect various kinds of personal, work, and social resources.

Thus if people lack the resources to deal with stress in the first place, the ensuing consequences tend to exacerbate their situation by leading to further decrease of resources. Essentially, this theory proposes that there can be loss spirals in which detrimental effects of work resources on work outcomes will render further decrease in work resources, or there can be gain spirals in which positive effects of work resources on outcomes lead to yet more resources, and so on.

All of these mechanisms imply that "people with good jobs tend to get better ones, and people with bad ones tend to get worse". This reasoning is consistent with the gravitational hypothesis, as well as empirical research (Wilk, Desmarais, & Sackett, 1995), which suggests that people with different levels of individual characteristics tend to gravitate toward jobs with commensurate features. Occupational choice theories have also suggested the pivotal role of individual differences in people's job choice. In addition, Schneider's attraction-selection-attrition model (Schneider, Goldstein, & Smith, 1995) has delineated mechanisms through which individuals are attracted to and selected by organizations with congruent characteristics. Indeed, empirical research has found that proactive people tend to define their jobs more broadly (Parker, Williams, & Turner, 2006), and that people with high levels of core self-evaluations tend to work on more complex jobs (Judge, Bono, & Locke, 2000). The opposite "refuge" model or selection mechanism is when individuals high in strain seek out new jobs or tasks to alleviate their strain. Interestingly, in Garst et al.'s (2000) study, the small reciprocal effect that existed suggested that strain resulted in more positive work characteristics, consistent with the refuge model.

Relevant to the reciprocal link between work design and outcome is the emerging interactionist perspective of personality development. Specifically, the corresponsive principle (Roberts, Caspi, & Moffitt, 2003) postulates that life experiences are likely to strengthen individual characteristics that bring people to such life experiences in the first place, essentially suggesting a

reciprocal relationship between life experiences and individual difference variables. Indeed, Roberts et al. (2003) found a reciprocal relationship between job control and social potency, a personality trait emphasizing taking charge. Similarly, Helson, Roberts, and Agronick (1995) observed that occupational requirements for creativity predicted increase in creative personality. Further, Sutin and Costa Jr. (2010) reported that middle-aged employees with high levels of job demands became more extraverted, while initial extraversion, openness, emotional stability, and conscientiousness appeared to be associated with an increase in job control. The corresponsive principle is in alignment with the sociological study conducted by Kohn and Schooler (1982), who reported a reciprocal relationship between a measure of openness and job complexity across ten years for males. Organizational research has begun to adopt this perspective, such as a study linking overall work experiences and change of personality traits (Wu & Griffin, 2012), but more studies are needed to unpack what types of work experiences are more influential and what personality traits are more sensitive to change.

In contrast to Garst et al.'s (2000) study, which showed very small reverse causal effects (strain causing more positive work characteristics), other studies show that poor mental health or strain outcomes predict later poor-quality work designs (Dalgard et al., 2009; Kohn & Schooler, 1982). Again, however, oftentimes these studies utilize incomplete panel designs, and sometimes, even when a complete panel design is used, a regression approach is often used that does not include in it the time ~~two~~2 work characteristic, which effectively renders the design as incomplete. Another issue is that if the time lag assessed is too long, it does not make sense to examine lagged effects, and therefore the best one can do is examine contemporaneous effects. Bakker, Schaufeli, Sixma, Bosveld, and Van Dierendonck (2000) used a complete panel design (tested via SEM) with two waves over five years. However, rather than looking at lagged effects of work characteristics

> **Commented [AuQ9]:** Do you mean "time 2"? Please revise if so.

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on outcomes they showed that, at both time periods, demands predict lack of reciprocity, which predicts burnout. As another example, Kohn and Schooler (1982) examined contemporaneous effects of job conditions on ideational flexibility, and then separately lagged effects (it was not possible to look at both at once in their study). They showed contemporaneous effects (complex work predicts ideational flexibility), some small lagged effects albeit without contemporaneous effects in the model (e.g., routinization is associated ideational flexibility ten years later), and some reverse effects (strong effects of ideational flexibility on job design ten years later).

In a two-wave longitudinal study using cross-lagged analyses, Wong, Hui, and Law (1998) found reciprocal relationships between a composite measure of job characteristics and job satisfaction across a time span of two years. Similar reciprocal relationships between distinct types of job resources and work engagement were observed in other two-wave longitudinal studies over three years using cross-lagged analyses (over three years, see Hakanen, Perhoniemi, & Toppinen-Tanner, 2008; over one and a half years, see Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2009a). De Lange et al. (2010) also found significant reciprocal relationships of job control with job satisfaction and active problem solving in three-wave (over three years) and four-wave (over three years) longitudinal studies using cross-lagged analyses. Frese et al. (2007) examined reciprocal relationships among job characteristics, control orientations, and personal initiative behaviors in a four-wave longitudinal study across four years. Results show that work characteristics affected personal initiative via a control orientation; control orientation and personal initiative exerted effects on later work characteristics.

However, significant reciprocal relationships have not been observed in all studies. For example, in a three-year study using multivariate cross-lagged analyses, Boyd et al. (2011) found significant lagged effects of job resources on psychological strain and organizational commitment

whereas the effects of work outcomes on job resources were not significant. Similarly, in de Jonge et al.'s (2001) study across one year, cross-lagged modeling revealed that job demands had lagged effect on job satisfaction while emotional exhaustion also affected job demands (including both qualitative and quantitative demands). The other side of the reciprocal relationships was not significant.

Altogether, results of studies testing reciprocal relationships between work characteristics and work outcomes are mixed. Future studies need to further tackle reasons for the mixed results. It is of course also important to get the time lag right.

Methodological recommendations for examining timing processes

It is highly likely there are multiple pathways by which work characteristics affect outcomes, and that there are effects that operate over different time periods with different patterns and stability. An obvious implication of this point is that we need more multiwave studies that are designed to capture causal effects as well as multiwave studies that assess multiple mechanisms. A common design in the literature (that is often inappropriately referred to as "longitudinal") is one in which work characteristics are assessed at time 1 and outcomes are assessed at time 2. This research design has few advantages for teasing out causality beyond a cross-sectional research design (although it does help to address the issue of common method variance). Even if the outcome is assessed at both times, this design is also limited. For example, in a two-wave study over two years, Mauno, Kinnunen, and Ruokolainen (2007) found that, after controlling for initial work engagement, initial job control predicted the later work engagement. This research design is an improvement on a two-wave design in which job control is measured initially and work

engagement at a later time, but the research design is similar to what Zapf, Knorz, and Kulla (1996) referred to as an "incomplete panel design" in so far as work characteristics were assessed only at one time period, which means that possible third variable and reverse causation effects are not ruled out. As a further example, Rentsch and Steel (19982006) tracked the influences of the five core job characteristics on employee absenteeism across six years and found that certain work features (e.g., skill variety) predicted frequency of absenteeism up to six years after job characteristics were measured, and time lost up to four years later. This study is an advance on research that focuses only on absence at one point in time, but, again, work characteristics were assessed only at one time period.

In recent times, researchers have begun to adopt more sophisticated analytic techniques, such as cross-lagged modeling (e.g., Wong et al., 1998), and to use multiwave panel designs in which all time-varying independent variables and time-varying dependent variables are assessed in each wave (e.g., Garst et al., 2000). Cross-lagged analyses can examine lagged effects of work characteristics on outcomes with outcome variables at a previous occasion controlled. Three-wave (or more) lagged modeling is useful because it can also enable ruling out the possibility that work characteristics may be spuriously related to outcomes because they are both affected by the same measured variable. Multiwave panel designs also allow for testing different time lags, which reduces the risk of making an inappropriate conclusion due to the choice of time lag. Ideally, researchers should design studies with multiple follow-up measures that are both evenly and unevenly spaced (recognizing, of course, the trade-off this might have in terms of a reduced response rate). By using evenly spaced time lags, time-variant effects such as seasonal effects can be controlled; by using unevenly spaced time lags, researchers can explore different effects of work characteristics over time. Of course, in examining the impact of work characteristics on outcomes,

the effects of across-time change in job characteristics must also be considered (Landsbergis &

Theorell, 2000) and reverse causal/reciprocal processes should be routinely tested. Future research

can also adopt other approaches in modeling longitudinal data, such as latent growth modeling

(e.g., Mäkikangas et al., 2010) to examine, for instance, whether change in work characteristics is

associated with change in work outcomes. It is important in such studies to consider the possibility

of beta and gamma change, and to try to rule out this change as a rival explanation to the findings

(Golembiewski, Billingsley, & Yeager, 1976). For example, as a result of their experiences,

individuals can develop different conceptualizations of their work characteristics (gamma change),

which in turn will shape how individuals respond to their objective work design.

De Lange et al. (2003) made several time-related recommendations, all of which continue to

be relevant, including more research on: the effects of stable and changing work characteristics, the

impact of different time lags, and reversed and reciprocal causation. We particularly reiterate the

importance of examining the consequences of *changes* in work characteristics, such as an increase

in job control when a person takes up a new job, or the gradual erosion of opportunities for skill

development. Changes in actual and perceived work characteristics might be reacted to rather

differently than responding to a static work characteristic. Such research is scarce (for exceptions,

see de Lange, Taris, Kompier, Houtman, & Bongers, 2005), yet this type of analysis is helpful not

only theoretically but also practically in terms of understanding the effects of work redesign.

A further important issue to consider in these studies is the appropriate unit of analysis.

Work design has typically been considered at the "job" level, and occasionally at the task level. Yet

work design could be considered at the level of momentary tasks and activities, at the daily level, at

the job level, or even over a career. Adopting different timescales when considering what is "well-

designed" work has implications for redesigning that work. For example, for portfolio workers who

engage in a variety of different projects, it might make sense to consider the effects of a well-designed project rather than a job per se.

Summary and future directions

In the first part of this article, we examined core work design constructs from the perspective of time. To set the scene, we examined how broader contextual and technological time-related forces can directly affect work design. Importantly, we argued that attending to work characteristics might even enhance the positive consequences of contextual changes (if work design facilitates interpersonal processes like trust, then the performance effects of virtual work will be enhanced). We then examined timing-related work characteristics and, for example, recommended investigating different types of time pressure, and going beyond categorizing some demands as challenge and some as hindrances to explicitly consider how demands are appraised. We proposed developing a deeper understanding about how recovery processes can be facilitated, including more fine-grained attention to timing control specifically and addressing the need to resolve mixed consequences of flexibility over work schedules.

We considered timing-related outcomes. Work design can affect the time that people spend at work, such as their level of absence, as well as their experience of time at work. More enriched jobs likely also change how individuals manage their time, with poorer-quality jobs that have aversive tasks or that generate low self-efficacy being associated with procrastination and poor time management. We discussed how work design can enhance the speed of decision-making, and considered outcomes of work design that occur over a long period of time: on the positive side,

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career development, and on the negative side, burnout. Some of these time-related outcomes are well researched, such as burnout and absenteeism, whereas others have had very little attention.

In terms of moderators, we anticipate, with time pressure becoming more salient in many jobs, that the moderating influence of polychronicity, time urgency, temporal perspectives, psychological flexibility, and other such individual differences will assume greater significance in work design research. For example, cultivating greater psychological flexibility might help individuals use their autonomy to manage time demands. The role of career stage and age as influences on work design, and as moderators of the effect of work design, has been theorized but not empirically examined.

In the second part of this article, we reviewed theoretical perspectives on work design that suggest it has effects on outcomes over multiple time periods and in varying patterns. While there is room for theoretical development, perhaps even more important are empirical studies. Only a handful of studies give any real insight into timing effects and patterns of work design effects. We urged more: quasi-experimental designs that track the effects of work redesign interventions; multiwave longitudinal studies that assess time-varying independent variables and dependent variables at each time wave; and experience sampling studies that assess both contemporaneous and lagged effects. We also called for multiwave longitudinal studies that examine effects over very long periods, and that examine reciprocal effects between work environments and individual differences from a life-span perspective. Such research designs are required to capture relationships among the person, agentic behaviors, and work environments, such as individual adaption to the ever-changing work environment or the development of personality. Finally, we encouraged work design researchers to consider job design using different units of analysis (e.g., "day" level instead of whole job).

All together, for work design theory to be most useful in today's dynamic and changing work context, it will need to better incorporate consideration of time-related constructs and timing processes. We hope some useful directions are spurred by this article.

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Figure 8.1. Individual-level work design model showing time-oriented extensions.