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A lifespan perspective on job design: Fitting the job and the worker to promote job satisfaction, engagement, and performance

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Abstract
The workforce in most industrialized countries is aging. However, the role of age in job design has largely been ignored. In the present paper, we apply lifespan development perspectives to the interaction between job characteristics and age. Specifically, we examine the possible joint effects of age and job characteristics on job satisfaction, engagement, and performance, developing a series of propositions to guide future research. We also discuss possible boundary conditions, mediating mechanisms, and future research challenges.

Keywords
job characteristics, job design, older workers, lifespan aging theories

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The population of older workers (55–64) in Europe is expected to grow by up to 60% by 2050 (Carone & Costello, 2006), and by 2018, about one quarter of the U.S. workforce will be age 55 or older (Toossi, 2009). With increased life expectancies, employees may be physically able to work longer than they once did. People will also need to work longer because retirement systems will not be able to financially support expanding numbers of retirees. Thus, many countries in Europe and North America are increasing the retirement age. As part of its "Year for Active Ageing" (which is 2012), the European Commission notes that society must encourage older workers to stay employed, and it recommends adapting jobs to fit the needs of older workers.

In response, there has been a blossoming of research interest in how age relates to issues such as work motivation (e.g., Kanfer & Ackerman, 2004), job performance (Ng & Feldman, 2008), and job attitudes (Ng & Feldman, 2010b). Unfortunately, there has been less work on how to design jobs for people at different life stages so that they can continue to work productively. As a result, we are only beginning to learn how to design jobs for workers across the lifespan to promote their satisfaction, engagement, and productivity.

In this paper, we expand on previous work on age and job design (Truxillo, Cadiz, & Rineer, 2012), providing detailed theoretical explanations, developing specific research propositions regarding outcomes, and describing possible mediating mechanisms and boundary conditions. Specifically, our goal is to examine job design from the perspective of human development and lifespan aging approaches (e.g., P. B. Baltes & Baltes, 1990; Carstensen, Isaacowitz, & Charles, 1999). Our goal is to increase understanding of how to enhance workers' satisfaction, work engagement, and performance (see Figure 1), three outcome variables of keen importance to both organizations and workers. We start by defining these three key worker outcomes, discuss the chronological age concept and its correlates, and show how job characteristics and age may affect worker attitudes and behaviors. We follow with an overview of relevant lifespan development theories and develop a series of research propositions on how age may moderate the effects of specific job characteristics on worker attitudes and performance. We conclude by discussing possible moderators and boundary conditions, mediating mechanisms, and future research challenges.

Job satisfaction, engagement, and performance

We focus our attention on job satisfaction, work engagement, and performance because of their importance at all work life stages. Job satisfaction and work engagement are two important positive dimensions of work-related well-being (Rothmann, 2008). Job satisfaction can be defined as "the extent to which people like (satisfaction) or dislike (dissatisfaction) their jobs" (Spector, 1997, p. 2). Thus, job satisfaction is an affective reaction that individuals have about their job in general or regarding different facets (e.g., job conditions, pay, coworkers, supervisor). Although some characterizations of work engagement define it simply as the opposite of burnout (Maslach & Leiter, 1997, 2008), others define it as "a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption" (Schaufeli, Salanova, González-Romá, & Bakker, 2002, p. 74), or "the simultaneous employment and expression of a person's 'preferred self' in task behaviors that promote connections to work and to others, personal presence (physical, cognitive, and emotional) and active, full performances" (Kahn, 1990, p. 700). Job satisfaction and work engagement are conceptually distinct constructs with different antecedents and outcomes (Christian, Garza, & Slaughter, 2011). Whereas job satisfaction is focused on the affective aspects of work, "an evaluative description of job conditions or characteristics" (Christian et al., 2011, p. 97), work engagement is focused on physical, emotional, and cognitive aspects of

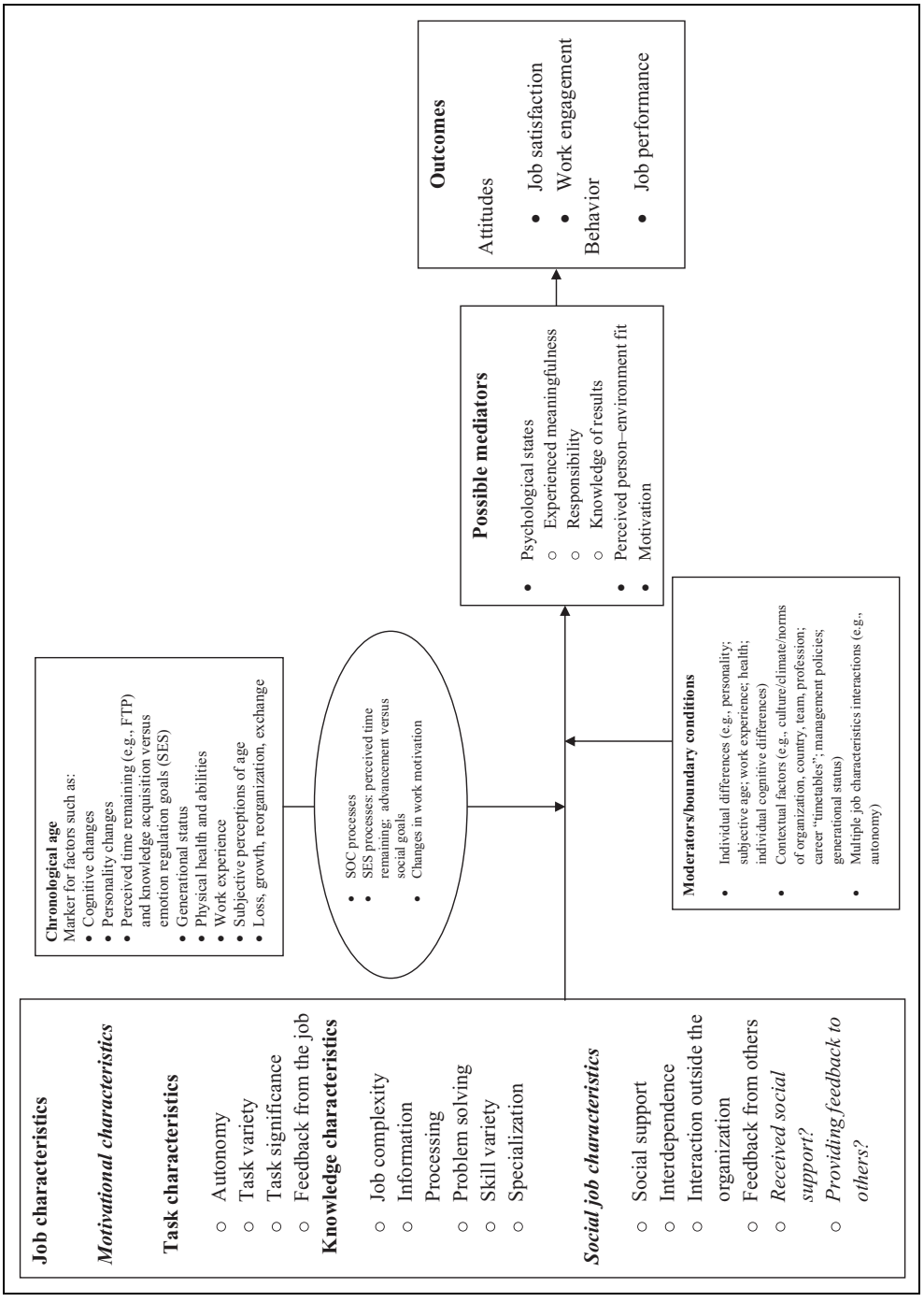

Figure 1. Age as a moderator in the relationship between task, knowledge, and social job characteristics and individual and organizational outcomes.

involvement with the job, "a description of an individual's experiences resulting from work" (Christian et al., 2011, p. 97).

Job performance can be divided into many dimensions, including task and contextual performance (Borman & Motowidlo, 1993). Task or in-role performance is defined as "the effectiveness with which job incumbents perform activities that contribute to the organization's technical core" (Borman & Motowidlo, 1997, p. 99). It involves behaviors that are directly related to performing duties required by the job, that is, as defined in job descriptions (Williams & Anderson, 1991) or contributing to providing products or services (Rotundo & Sackett, 2002). In contrast, contextual performance is defined as individual behaviors that contribute to facilitation of the social and psychological context of the organization not directly related to the core task function (Borman & Motowidlo, 1997). Organizational citizenship behavior (OCB) is one conceptualization of contextual performance (Podsakoff, MacKenzie, Paine, & Bachrach, 2000) and is defined as "individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate promotes the effective functioning of the organization" (Organ, 1988, p. 4). It is often broken down into OCBs supporting the organization (OCBOs) and OCBs supporting individual coworkers (OCBIs). We will focus on task performance, OCBOs, and OCBIs as our performance measures because of their centrality in the I/O psychology literature.

Chronological age and its correlates

Chronological age is not only the most widely used index of age in research, but is also extensively used in public policy (Settersten & Mayer, 1997). The use of chronological age is not surprising because it is easily measured, objective, and a universal component in human life (Neugarten & Hagestad, 1976). However, we acknowledge that chronological age covaries with other variables, such as fluid and crystallized cognitive skills, physical abilities, work experience, health (e.g., Kanfer & Ackerman, 2004; Kooij, de Lange, Jansen, & Dikkers, 2008), personality (Roberts, Walton, & Viechtbauer, 2006), self-perceptions of age ("subjective age"; e.g., Barak, 1987), and generational cohort (Twenge, Campbell, Hoffman, & Lance, 2010). To varying degrees, each of these factors is difficult to disentangle from the chronological age construct. Further, although these variables may change over time within individuals, there is still substantial between-individual variability. For instance, while conscientiousness tends to increase as a person ages (e.g., Roberts et al., 2006), there is still substantial between-individual variability in conscientiousness among people of the same age, and many younger people are higher in conscientiousness than their older counterparts. In the end, there are a number of factors that covary with chronological age, including people's perceptions of their age. Acknowledging these issues, we focus in this paper on chronological age because of its usefulness as an observable heuristic for organizations and policy-makers.

Potential effects of job design on performance and attitudes

Job design relates to a wide range of important individual, group, and organizational outcomes (Morgeson & Campion, 2003; Morgeson & Humphrey, 2006) such as job satisfaction, task performance, and organizational citizenship behaviors. Current definitions of job design are multifaceted, and incorporate many aspects of employees' work:

> [Job design is] the study, creation, and modification of the composition, content, structure, and environment within which jobs and roles are enacted. As such, it concerns who is doing the work, what is done at work, the interrelationship of different work elements, and the interplay of job and role enactment with the

> broader task, social, physical, and organizational context. (Morgeson & Humphrey, 2008, p. 47)

Earlier conceptualizations of job design were much narrower and focused on relatively limited aspects of the job. (For a comprehensive review see Grant, Fried, & Juillerat, 2010.) Frederick Taylor's (1911) concept of scientific management advocated the de-skilling of work, assuming that productivity could be best increased by making work as mechanistic and segmented as possible to reduce human error. Research conducted at the Western Electric Company at Hawthorne Plant in the 1920s, however, showed that paying attention to workers' environment and needs actually increased productivity (Barling & Griffiths, 2011). Accordingly, Trist and Bamforth (1951) found that when coal miners' work changed from a whole-task, skilled, autonomous system to a mechanized, fractured system with isolated workers, miners experienced higher levels of anxiety, depression, and anger. Sociotechnical systems theory emerged from this work, with its emphasis on the interaction between people and technology.

According to Herzberg's two-factor theory (Herzberg, 1966), motivation factors—intrinsic aspects of the job itself such as recognition, challenge, and responsibility—lead to job satisfaction (motivation factors), while absence of hygiene factors—extrinsic factors such as pay and work conditions—lead to job dissatisfaction. Although largely discredited, Herzberg's theory had a significant impact on subsequent job design theory, which focused on increasing the motivation factors present in the job. To this end, Hackman and Oldham's job characteristics model (JCM; 1975) focused on five intrinsic job characteristics: autonomy, skill variety, task identity, task significance, and feedback from the job itself. The enrichment of these five characteristics was thought to lead to three critical psychological states—experienced meaningfulness, responsibility, and knowledge of results—which should in turn lead to outcomes such as increased job satisfaction and performance. The JCM became one of the pivotal theories of job design and is still utilized today. A few years later, Karasek's job demands-control (JD-C) model (1979) took a somewhat different approach by focusing more on job stressors rather than specific job characteristics, arguing that jobs high in demand and low in control (decision latitude) lead to high strain and low job satisfaction.

The most comprehensive measure of job design available is Morgeson and Humphrey's Work Design Questionnaire (WDQ; 2006). The WDQ utilizes 21 work characteristics, integrating both motivational (task and knowledge characteristics), as well as social and work context characteristics, and acknowledges both the job itself and the link between jobs and the broader environment. *Motivational work characteristics* include both *task characteristics* (e.g., autonomy and task significance) and *knowledge characteristics* (e.g., skill variety and specialization). *Social characteristics* include features such as interdependence and social support, while contextual characteristics include elements such as ergonomics and work conditions. In validating the WDQ, Morgeson and Humphrey found that the different categories of job characteristics were differentially related to outcomes. Subsequently, Humphrey, Nahrgang, and Morgeson (2007) demonstrated meta-analytically that job characteristics as outlined in the WDQ affect a wide variety of worker attitudes and behaviors, and that these effects are largely mediated by the psychological states.

Because of the comprehensive nature of the WDQ and its ability to predict a variety of important work-related outcomes, we will focus on the WDQ's task, knowledge, and social characteristics in our discussion. However, we will not examine the "work context" characteristics (ergonomics, physical demands, equipment use, work conditions), as these describe the physical requirements of work, which are well established to be affected by worker age.

Moreover, recent research indicates that the share of physically demanding jobs in the USA decreased by nearly 20% between 1971 and 2006 to only 7% of the U.S. workforce (Johnson, Mermin, & Resseger, 2011). Thus, although older workers face a number of challenges at work, such as the increase in cognitively demanding jobs, physically demanding work may not be as great an obstacle for older workers as it once was (Johnson et al., 2011).

Age, attitudes, and performance

Ng and Feldman's (2010b) meta-analysis found that age was related to most job attitudes—with older workers having more positive job attitudes—most notably for the present discussion, to job satisfaction and to job involvement. Basing their interpretation in socioemotional selectivity (SES) theory (Carstensen et al., 1999), Ng and Feldman observe that because of their perceived time limitations, older adults focus on emotionally fulfilling activities more than knowledge acquisition, and thus are more likely to focus on positive experiences and attitudes. Similarly, research in developmental psychology (Sullivan, Mikels, & Carstensen, 2010) has found that older adults have more positive attitudes. With regard to work performance, Ng and Feldman (2008) found that age was positively related to outcomes including OCBs and safety performance. Although age was not related to task performance, the authors noted that a number of moderators could be at work in the age–task performance relationship. For instance, they found that job complexity acted as a moderator, again suggesting that a job's design may affect the relationship between age and outcomes.

Lifespan development approaches

Lifespan development perspectives assume that patterns of change occur throughout the lifespan, and that development involves several adaptive processes including acquisition, maintenance, transformation, and attrition that are implemented throughout a person's life (Baltes, Staudinger, & Lindenberger, 1999). These theories assume that adaptation is a proactive process involving self-regulation by individuals applying life management strategies to cope with changes in their environment, loss or gain of resources, and success or failure in the achievement of goals. A lifespan perspective is useful for examining the interplay between age and work characteristics because adults spend a significant part of their lifespan at work, where they have ample opportunity to display these adaptive processes (see Truxillo et al., 2012). The three approaches described in what follows are not necessarily conflicting; rather, each is useful for building our propositions that age and specific job characteristics interact to affect job satisfaction, engagement, and performance. For example, the social goals processes described by socioemotional selectivity theory (Carstensen et al., 1990) are especially useful developing propositions about social job characteristics.

Selective optimization and compensation (SOC). SOC is a lifespan theory that identifies three adaptive strategies people use to fit their current resources to resource demands throughout the aging process (P. B. Baltes & Baltes, 1990). *Selection* broadly involves making decisions about what goals and outcomes to pursue, for instance, recognizing when one lacks the personal resources to maintain peak performance across work domains, and thus choosing goals and outcomes to successfully match one's resources to demands. People then allocate their efforts and resources to *optimize* their performance in those selected domains. Finally, in order to offset age-related declines, people search for *compensation* strategies to maintain a certain level of performance. Therefore, SOC processes explain the strategies people use to adapt to age-related changes, as well as dynamic changes occurring in the workplace (B. B. Baltes & Dickson, 2001). SOC has been used as the theoretical argument for the link

between age and job characteristics (e.g., Zacher & Frese, 2011), as different job characteristics will differentially help workers adapt to age-related changes.

Socioemotional selectivity (SES) theory. While SOC theory describes processes that influence adaptation, SES theory primarily focuses on the selection process and argues that people's perception of time is essential in the selection and pursuit of social goals (Carstesen et al., 1999). SES theory proposes two types of social goals—those related to *knowledge acquisition* and those related to *emotion regulation*. The fundamental proposition of SES is that when time is perceived as being more open-ended—such as among younger workers—knowledge-related goals are given a higher priority. When time is perceived as limited—such as among older workers—the person takes a more present-oriented perspective and emotional goals are given a higher priority (Carstensen et al., 1999). Thus, SES would predict that younger workers will prefer job characteristics that help them advance in their careers, while older workers will focus on characteristics that lead to affective rewards at work. In their recent meta-analysis, Ng and Feldman (2010b) rely on SES to explain the positive relationship found between age and most job attitudes (Ng & Feldman, 2010b).

Kanfer and Ackerman's lifespan work motivation framework. Kanfer and Ackerman (2004) used lifespan approaches to propose an age-focused framework for understanding changes in work motivation over the lifespan. Rooted in research that supports chronological age as a predictor of fluid and crystallized cognitive ability, personality, affect, vocational interests, values, and self-concept, the researchers identify four distinct patterns of development that affect work motivation. *Loss* describes the negative relationship between age and abilities as a result of decreases in fluid intelligence (e.g., working memory, attention; Cattell, 1971). *Growth* describes the positive relationship between age and resources which stems from increases in experiential knowledge or crystallized intelligence with age (Cattell, 1971). Kanfer and Ackerman note that, as predicted by SOC (P. B. Baltes & Baltes, 1990), workers may choose jobs and roles that allow them to best apply their skills. *Reorganization* represents the changes in the organization and structure of nonability traits across adulthood; as an example, Kanfer and Ackerman point to SES theory's predictions that goal structures change over the lifespan. The final theme, *exchange*, describes the changing strength of action tendencies throughout the lifespan. For instance, research has found that both emotional stability and self-esteem gradually increase in adulthood (Roberts et al., 2006; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002), perhaps affecting work motivation. Similarly, generativity motives, focused on caring for others and giving back to society and future generations, seem to arise in midlife (e.g., McAdams, de St. Aubin, & Logan, 1993).

Research on the job characteristics–age interaction

There have been recent calls for research on the influence of individual differences on behavioral and attitudinal reactions to job characteristics (e.g., Grant et al., 2010), although empirical studies that examine age and job characteristics are limited. Through a series of studies, Zacher, Frese, and colleagues demonstrated the interaction of age and job complexity on a motivation- and performance-related outcome, namely, future perceived opportunities at work. Zacher and Frese (2009) found that while age was negatively related to perceived opportunities at work, this effect was reduced when job complexity and control were higher, a result echoed in subsequent studies by Zacher and colleagues (Zacher & Frese, 2011; Zacher, Heusner, Schmitz, Zwierzanska, & Frese, 2010). As

explanation, these researchers posit that high-complexity jobs allow older workers the possibility to capitalize on increased work-related knowledge (e.g., P. B. Baltes & Baltes, 1990) and experience, and that low-complexity jobs may require physical skills that are less available to older workers. Zaniboni, Truxillo, Fraccaroli, McCune, and Bertolino (2011) found that age moderates the relationship between job characteristics (task variety and interaction outside the organization) and both job satisfaction and engagement. In addition, Ng and Feldman (2008) found that job complexity moderated the positive effects of age on OCBs, although in the opposite direction—the relationship between age and OCB was stronger in low-complexity jobs. Finally, a longitudinal study by de Lange et al. (2010) suggests that age-related differences in job control experienced by middle-aged workers may explain their higher levels of learning-related behavior. In short, these studies show that workers may react differently to the same work environment factors depending on age.

Research propositions: The combined effects of job characteristics and age

The WDQ (Morgeson & Humphrey, 2006) provides a comprehensive job design model which encompasses earlier models of work design (e.g., Campion & McClelland, 1991; Hackman & Oldham, 1976; Karasek et al., 1998) and describes a wide range of job attribute categories. The breadth of the WDQ model provides a good platform from which to discuss how the design of jobs might affect people of different ages and thus to stimulate research (see Truxillo et al., 2012). Enrichment may improve outcomes of all workers, younger and older alike (Humphrey et al., 2007). Our propositions below focus on those job characteristics that may lead to enhanced outcomes for one age group more than for another. That is, we make propositions for those WDQ elements (other than the more physical "work context" characteristics) which we believe are likely to interact with worker age. We build propositions regarding each of our outcomes—satisfaction, engagement, and performance—using lifespan development perspectives.

Task characteristics

Morgeson and Humphrey (2006) describe task characteristics as motivational characteristics, "concerned with how the work itself is accomplished and the range and nature of tasks associated with a particular job" (2006, p. 1323). We see autonomy, task variety, task significance, and feedback from the job as especially deserving of study in the context of age.

Autonomy. Morgeson and Humphrey (2006) break down autonomy into autonomy regarding work scheduling, decision making, and work methods. Autonomy has been found to relate to both job satisfaction and performance (Humphrey et al., 2007). Older workers may be able to work autonomously given their greater work experience and crystallized intelligence, while younger workers may need less autonomy as they accumulate needed job skills and crystallized intellectual abilities (Cattell, 1971; Kanfer & Ackerman, 2004). SOC theory would also suggest that autonomy would allow older workers to craft their jobs and choose roles to fit their strengths. Thus, increased autonomy should lead to increased satisfaction, engagement, and performance for older workers, compared to younger workers who may need the support provided by more direction.

> Proposition 1: Autonomy will relate more positively to the satisfaction, engagement, and performance of older workers.

Task variety. Task variety is the degree to which the job demands a wide range of tasks, and is

conceptually similar to job enlargement (Morgeson & Humphrey, 2006). Task variety is positively related to satisfaction and is also related to some measures of performance (Humphrey et al., 2007). While some variety in job tasks is probably attractive to most workers, both SOC and SES would suggest that task variety is most useful to younger workers for whom it provides accumulation of the increased job skills that they need to advance in their careers (Carstensen et al., 1999). Moreover, very high levels of task variety may be detrimental to older workers because it would require high levels of fluid intellectual abilities (Kanfer & Ackerman, 2004). Older workers may view high levels of task variety (as opposed to skill variety, discussed in what follows) as just doing "more stuff" because of its association with job enlargement. This possibility is supported by research which has shown that task variety predicts the job satisfaction and engagement of younger workers more than older workers (Zaniboni et al., 2011). In short, we believe that task variety will be of greatest benefit to workers who are earlier in their careers, and at high levels may actually be detrimental to older workers, affecting satisfaction, engagement, and performance.

> Proposition 2: Task variety will lead to more positive outcomes for younger workers in terms of satisfaction, engagement, and performance.

Task significance. Task significance is the degree to which one's job influences the lives and work of others. It is likely to lead to experienced meaningfulness (Hackman & Oldham, 1975). Task significance has been shown to relate to both job performance (Grant, 2008) and job satisfaction (Humphrey et al., 2007). Although task significance will be important to all workers, it should be particularly attractive to workers in their middle and late careers. Generativity motives begin to develop in midcareer (Kanfer & Ackerman, 2004; McAdams et al., 1993), and SES theory would predict that older workers are more focused on meaning in their work rather than gaining job skills or career advancement (Kanfer & Ackerman, 2004). Further, current younger generations may be more focused on extrinsic rather than the intrinsic rewards valued by baby boomers (Twenge et al., 2010), suggesting that jobs with task significance will lead to particularly positive outcomes for today's older workers.

> Proposition 3: Task significance will have a more positive relationship with satisfaction, engagement, and performance of older workers.

Feedback from the job. Feedback from the job is the degree to which an employee gets information about job performance from the job itself (Hackman & Oldham, 1976; Morgeson & Humphrey, 2006). It is associated with increased job satisfaction and also has a weak relationship with performance (Humphrey et al., 2007). While feedback from the job is important for all workers, it may be especially satisfying and motivating for younger workers who need increased job knowledge (Kanfer & Ackerman, 2004). Moreover, SES theory would predict that younger workers will seek such feedback to advance their careers (Carstensen et al., 1999; Kanfer & Ackerman, 2004).

> Proposition 4: Feedback from the job will be more positively related to the satisfaction, engagement, and performance of younger workers.

Knowledge characteristics

Similar to task characteristics, knowledge characteristics are considered motivational characteristics and represent the kinds of knowledge, skills, and abilities that are required of employees as a function of their jobs.

Increased age is often associated with a general decline in cognitive function; however, this overly generalized view likely does not represent the actual experience of older workers. As noted by Kanfer and Ackerman (2004), while older adults often experience a decline in fluid intelligence, they also experience an increase in crystallized intellectual abilities (Cattell, 1971). Therefore, Morgeson and Humphrey's (2006) knowledge characteristics likely have differential interactions with age, depending on the extent to which they require fluid versus crystallized intelligence.

Job complexity, information processing, and problem solving. *Job complexity* refers to the extent to which the tasks on a job are complex and difficult to perform (Morgeson & Humphrey, 2006). Most authors focus on the "positive" aspect of complexity, conceptualizing it as challenging and stimulating, rather than the downside of overly complex, mentally taxing work. The opposite of complexity is task simplicity. *Information processing* refers to the degree to which a job requires attending to and processing data or other information (Morgeson & Humphrey, 2006). *Problem solving* reflects the degree to which a job requires unique ideas or solutions and reflects the more active cognitive processing requirements of a job. It also involves generating unique or innovative ideas or solutions, diagnosing and solving nonroutine problems, and preventing or recovering from errors, and is conceptually related to the creativity demands of work (Morgeson & Humphrey, 2006). We discuss these three knowledge characteristics together because, depending on the job, they may require varying levels of fluid or crystallized intellectual abilities. They may also allow for differential application of accumulated abilities and skills. Thus, they should lead to higher levels of satisfaction, engagement, and performance for older and younger workers.

As an example, certain types of information processing require working memory, abstract reasoning, and attention (i.e., fluid intelligence). These fluid intellectual ability requirements may have a negative impact on the job satisfaction, engagement, and performance of older workers. Moreover, SOC theory (Baltes & Baltes, 1990) would posit that older workers would be less likely to select job characteristics associated with high fluid intelligence demands because they would not allow them to optimize their performance. Further, if older workers are unable to perform as well as younger workers in jobs requiring a significant amount of information processing, recognition of this decreased performance may lead to stress (Griffiths, 2000) and decreased self-efficacy. This would likely lead to decreased job satisfaction and engagement, as older workers may feel they are unable to participate in their work activities at an optimal level.

> Proposition 5a: Job complexity, information-processing, and problem-solving characteristics requiring fluid intellectual abilities should lead to decreased satisfaction, engagement, and performance of older workers.

In addition, though, these job characteristics may also allow workers to accumulate needed job skills for career development, a factor that, according to SES theory (Carstensen et al., 1999) should lead to increased satisfaction and engagement for younger workers.

> Proposition 5b: Job complexity, information-processing, and problem-solving characteristics that allow workers to accumulate job skills should lead to increased satisfaction and engagement of younger workers.

On the other hand, to the extent that these job characteristics allow workers to apply their accumulated knowledge and skills, SOC theory would posit that they should lead to increased satisfaction, engagement, and performance for older workers. For instance, Zacher and colleagues (Zacher & Frese, 2009, 2011; Zacher et al., 2010) showed that complex jobs can

allow older workers to take advantage of age-related gains in experiential knowledge: To the extent that complex jobs allow older workers to perform to their fullest by capitalizing on their crystallized knowledge, such complexity should relate to increased engagement.

> Proposition 5c: Job complexity, information-processing, and problem-solving characteristics that allow workers to apply their accumulated knowledge and skill should lead to increased satisfaction and engagement for older workers.

Skill variety. Skill variety reflects the extent to which a job requires an individual to use a variety of different skills to complete the work (Morgeson & Humphrey, 2006). We think it is important to differentiate skill variety from task variety. Task variety, which requires workers to perform a range of tasks, may be more attractive to younger workers needing to accumulate job experience to further their careers (SES theory; Carstensen et al., 1999). On the other hand, because skill variety allows older workers to draw upon their years of experience and accumulated knowledge, SOC theory (P. B. Baltes & Baltes, 1990) would posit that skill variety allows older workers the satisfaction of applying their accumulated, optimized job knowledge. It might also allow them to pass this knowledge on to others, thus satisfying generativity motives (McAdams et al., 1993). Therefore, skill variety may lead to increased engagement and satisfaction for older workers. This is consistent with the recommendation of Zacher and Frese (2011), who suggested that organizations can support their older workers by providing them the opportunity to utilize and share their skills.

> Proposition 6: Skill variety should lead to more positive satisfaction and engagement for older workers.

Specialization. Specialization reflects the extent to which a job involves performing specialized tasks or possessing specialized knowledge and skill (Morgeson & Humphrey, 2006). Because specialization reflects a depth of knowledge and skill in a particular area, it is likely to lead to positive outcomes for older workers more so than for younger workers, because they have had the time and experience to allow them to become experts in their particular area. This is likely to increase self-efficacy, which has been shown to positively relate to performance and job satisfaction (Judge & Bono, 2001). Specialization should support the optimization and compensation component of SOC theory for older workers since it can allow them to focus on a single specialty in which they have gained deep expertise. This suggests that specialization may not only lead to increased performance and job satisfaction for older employees, but increased engagement as well.

> Proposition 7: Specialization should lead to more positive satisfaction, engagement, and performance for older workers.

Social characteristics

Social or relational characteristics of work have not received the same level of research attention as other categories of job characteristics (Humphrey et al., 2007), but this is changing. There is an increased research emphasis on the social aspects of work because of the trend toward team-oriented organization structures (Grant & Parker, 2009; Humphrey et al., 2007), which raises the importance of interpersonal interactions in one's job. Meta-analytic results support the value of social characteristics of work beyond motivational task characteristics alone (Humphrey et al., 2007). Morgeson and Humphrey (2006) identified four social work characteristics including social support, interdependence, interaction outside the organization, and feedback from others. SES theory seems most appropriately applied to the social characteristics because of its

differential implications about which social activities and behaviors will be most useful and attractive to people of different ages and career stages.

Social support. Social support is the degree to which the job provides opportunities for advice and assistance from others (Morgeson & Humphrey, 2006). Research supports the positive effects of social support on job satisfaction, but the relationship with performance is mixed (Humphrey et al., 2007). It is harder to make an argument for age-related effects for receiving social support. On the one hand, SES theory (Carstensen et al., 1999) would suggest that the relational aspects of receiving social support should be especially attractive to older workers. On the other hand, receiving social support should provide a positive way to cope with difficult work situations, no matter what a person's age. On balance then, receiving social support—the way this work characteristic is generally defined—would be beneficial for workers across the age continuum.

However, a distinction between social support that is given versus that which is received is generally not made when discussing this characteristic. We believe that such a distinction is important in predicting age effects at work, as giving social support may be more salient to and preferable to older workers. First, SES theory argues that as people perceive decreasing amounts of time to live, they place higher priority on emotional goals (Carstensen et al., 1999). Therefore, as workers age, they may value giving social support more than their younger counterparts because they are more motivated by emotionally related goals like maintaining social relationships. Moreover, increasing opportunities to give social support could potentially fulfill the generative need that begins with middle age (Kanfer & Ackerman, 2004; McAdams et al., 1993). Therefore, we propose that jobs designed to have increased opportunities to give social support would be more beneficial to older workers. Further, increases in the social interactions with close colleagues and increased sense of belonging to the group may be particularly beneficial to the contextual performance of older workers.

> Proposition 8: Social support, particularly giving support, should lead to more positive outcomes for older workers in terms of job satisfaction, engagement, and contextual performance.

Interdependence. Interdependence—both initiated and received—reflects how connected one's job is to others' jobs (Morgeson & Humphrey, 2006) and has been observed to be positively related to job satisfaction (Humphrey et al., 2007). Interdependence may create a more motivating job because it requires increased interactions with coworkers (Kiggundu, 1983). Such interdependence may be more appealing to older workers. First, it allows them to select their accumulated, optimized skills (SOC theory; P. B. Baltes & Baltes, 1990), and may allow them to fulfill their increasing drive to utilize generative behaviors (Kanfer & Ackerman, 2004; McAdams et al., 1993). Moreover, from a SES perspective, the increased social interactions required as a part of interdependence could be more attractive to older workers to the extent that interdependence makes the job more relational and not simply dependent on others for work, thus fulfilling the desire for emotional intimacy and to feel more socially embedded within the organization (Carstensen et al., 1999). However, SES would also support the argument that younger workers would enjoy increased required interactions because this would fulfill their desire to strive to build knowledge (Carstensen et al., 1999). Therefore, although we expect that interdependence may have a positive effect for all workers, we would expect a stronger effect for older workers compared to younger workers. These effects should be greatest on affective outcomes such as job satisfaction and engagement. Moreover, the

increased sense of belonging from such interdependence should affect contextual performance.

> Proposition 9: Interdependence—to the extent that it leads to more relational jobs—should lead to increased satisfaction, engagement, and contextual performance for older workers.

Interaction outside the organization. Interaction outside the organization reflects the amount of interaction that the job requires with people external to the organization (Morgeson & Humphrey, 2006). SES theory suggests that younger workers have a more future-oriented time perspective, and therefore would place greater priority on seeking knowledge from social relationships (Carstensen et al., 1999). Increased external interactions could allow for investment in more relationships. In contrast, SES theory would predict that older workers would have less need and desire to have such a broad range of relationships and would rather focus their priorities on strengthening and building on established relationships. One study by Zaniboni et al. (2011) found such results, with outside social interaction leading to higher levels of job satisfaction and engagement for younger workers. Therefore, we propose a positive relationship between interactions outside the organization and job satisfaction and engagement for younger workers.

> Proposition 10: Interaction outside the organization should lead to more satisfaction and engagement for younger workers.

Feedback from others. Feedback from others captures the extent to which others provide information about performance (Morgeson & Humphrey, 2006) and has a positive effect on job performance and job satisfaction (Humphrey et al., 2007). SES theory (P. B. Baltes & Baltes, 1990) would posit that feedback from others would be especially important to younger workers who focus their social interactions on career growth and development. Such feedback would be less valued by older workers who not only would have already achieved higher levels of job skills (Kanfer & Ackerman, 2004), but who would want to focus their social interactions less on job advancement.

> Proposition 11: Feedback from others should lead to more positive satisfaction and engagement for younger workers.

Furthermore, we note that an additional feedback-related job characteristic not included in the WDQ model could be considered as well: *Providing feedback to others*. The ability to provide such feedback could fulfill the generativity needs of older workers (Kanfer & Ackerman, 2004; McAdams et al., 1993), being particularly satisfying and engaging for them.

> Proposition 12: Providing feedback to others should lead to more positive satisfaction and engagement for younger workers.

Moderators and explanatory variables

In addition to age, other potential moderators of the job characteristics–outcomes relationship may be at play. In other words, there is likely more going on than the simple two-way interaction between age and job characteristics. Moreover, research should directly examine explanatory variables and mechanisms in the age–job characteristics interaction.

Additional moderators and boundary conditions

Additional moderators besides age may also affect the relationships between job characteristics and work outcomes: individual differences such as personality, contextual factors, leadership and management policies,

and other job characteristics themselves. In other words, we argue that our proposed age effects are taking place in the context of a number of other individual and environmental factors which would act as boundary conditions for our propositions.

Individual differences. Individual differences such as personality could also moderate the relationship between job characteristics and performance and job attitudes. For instance, conscientiousness and extroversion have been shown to interact with autonomy (e.g., Barrick, Mount, & Strauss, 1993), and Chung-Yan and Butler (2011) found that job complexity was more positively related to demands–abilities fit and job satisfaction for highly proactive workers. Moreover, the effects of work experience—particularly for the knowledge and task characteristics—need to be disentangled from the moderating effects of age.

Further, because of the importance of self-perceptions in behavior (Bandura, 1986), ''subjective age'' measures, tapping a person's perceptions of aging, have been developed; these include ideal age (the age one desires to be), morale age (one's attitude toward one's current age), identity age (the age group one feels the most affiliation with), comparative age (the age one feels relative to others in a specific context), felt age (the age one feels), personal age (personal experience with aging), and cognitive age (the age one's looks, feels, acts, and interests are affiliated with; Barak, 1987). While correlated with chronological age, these subjective age measures each provide information about how the individual perceives the characteristics of his or her job.

Contextual factors. Contextual factors such as group and professional membership, organizational culture and climate (i.e., its level of support for people in different age groups), and workplace norms regarding the roles of older workers in the organization and in particular jobs (e.g., Perry & Finkelstein, 1999) may act as an additional moderator in the relationship between job characteristics and work outcomes. Norms associated with ''career timetables'' (Lawrence, 1988) about at what level a person should be at a given age (''behind schedule,'' ''ahead of schedule,'' or ''on schedule'') may affect the meaning of certain job characteristics for different age groups. Furthermore, organizational age culture and management policies need further attention, as they may play a role in whether age and job characteristics affect performance and job attitudes. For example, policies that encourage job crafting may allow workers of different age groups to adapt their work to their particular skills and needs. Finally, research regarding generational differences (Twenge et al., 2010) suggests differences across the generations on leisure values, work centrality, extrinsic values, altruistic values, and social values. These generational differences could affect how a worker reacts to different job characteristics as much as the biological changes associated with chronological age.

Multiple job characteristics interactions. Individual job characteristics may interact with each other to affect job outcomes. For example, considering the job demands–control approaches to job design (e.g., Karasek, 1979), increased autonomy may allow older workers additional control to adapt their jobs to enhance their performance. Or from a job-crafting perspective, such autonomy might allow workers to craft their jobs so that other job characteristics fit their needs.

Mediating variables and mechanisms

There are a number of implied explanatory mechanisms for the effects of a job characteristics–age interaction, including those suggested by the job design literature (psychological states;

Table 1. Critical future research challenges.

1.	Longitudinal studies that examine intraindividual differences in preferred job characteristics over time.
2.	Effects of allowing workers to craft their jobs as they age.
3.	The social environment such as organizational age climate (cf. McKay et al., 2007) or job–age stereotypes (e.g., Perry, Kulik, & Bourhis, 1996).
4.	Whether similarly aged workers in different professions or industries experience the characteristics of their jobs differently.
5.	Effects of other moderators (e.g., personality) that may work with age.
6.	Effects of multiple job characteristics (e.g., Autonomy x Job Complexity) with age.
7.	Possible curvilinear relationships between job characteristics and outcomes for different age groups.
8.	Consider objective measures of job dimensions.
9.	Desired versus actual job characteristics of older and younger workers (a type of fit; e.g., Perry et al., 2012).
10.	Constructs associated with particular lifespan development approaches (e.g., measures of SOC; future time perspective (FTP) for SES theory.).
11.	Disentangle factors that covary with chronological age (e.g., health, cognitive functioning, work experience, generational status).
12.	Additional moderators and boundary conditions.

e.g., Humphrey et al., 2007). In their meta-analysis, Humphrey et al. (2007) show that the psychological states proposed by the job characteristic model (Hackman & Oldham, 1976)—particularly experienced meaningfulness and responsibility—mediate the relationship between job characteristics and attitudes and behavior. Thus, these psychological states should be examined for their mediating role between the job characteristics–age interaction and attitudinal and behavioral outcomes.

Perry, Dokko, and Golom (2012) have argued that person–environment fit (P–E fit) is another perspective from which to view aging at work. P–E fit theory (e.g., Edwards, Cable, Williamson, Lambert, & Shipp, 2006) suggests that the level of compatibility between people and their work environment affects their attitudes and behaviors, and Perry et al. (2012) suggest that an individual's fit with their job and work context can change as they age. Of particular interest to the study of aging and job design would be person–job (P–J), person–person (P–P), and person–group (P–G) fit, as the three types of fit align with Morgeson and Humphrey's (2006) work design framework. For instance, P–J fit is defined as the compatibility between a person's knowledge, skills, and abilities and what is required by the job. Therefore, P–J fit would be particularly useful in examining the knowledge and task-related characteristics and age, whereas P–P and P–G fit may be more associated with the social characteristics of the job. In addition, the fit framework could provide the explanation as to how the lifespan adaptive processes described by SES and SOC theories are triggered. In other words, P–E misfit could be the impetus for an individual's implementation of SOC and SES processes.

Future research challenges

To address the propositions described in this model, a number of critical research issues must be attended to (see Table 1). Longitudinal studies that examine intraindividual differences are needed to examine how a person's preferred job characteristics change over time. Although such research would be a challenge, it should provide the deepest understanding of how age and job characteristics interact. Second, if workers need different job characteristics at different life stages, future work should examine how certain jobs may allow workers to craft their jobs as they age. For instance, job crafting might allow workers of different ages to change the characteristics of their jobs as they perceive misfit (Perry et al., 2012) and then select more

appropriate roles as suggested by SOC (P. B. Baltes & Baltes, 1990). Accordingly, age might even act to affect how workers perceive their jobs. Moreover, the effects of the social environment, such as the age culture (cf. McKay et al., 2007) within the organization or the job–age stereotype (e.g., Perry, Kulik, & Bourhis, 1996) should be taken into account, as these could affect how both the worker and their coworkers perceive the fit between the worker and their job.

Different jobs and professions require very different levels of job characteristics, and research should examine whether similarly aged workers in different professions or industries may experience their jobs differently. For example, what is complex to workers in one profession may not be complex to workers in another profession. Similarly, because there is considerable variability within age groups, the role of other individual differences (e.g., personality) should be considered in conjunction with age. Moreover, the interaction of multiple job characteristics (e.g., autonomy) with age should be examined. We believe that it is important to consider curvilinear relationships between job characteristics and outcomes (cf. Warr's vitamin model [1987]), and that worker age may shift the asymptote in the relationship between job characteristics and outcomes upwards or downward. This is also similar to models that see curvilinear relationships between age and performance (Sturman, 2003). Future research may also bring in more objective measures of job dimensions, namely, those identified through job analysis models such as the O*Net (Peterson et al., 2001). Further, P–E fit perspectives on age and work (e.g., Perry et al., 2012) suggest an examination of the desired versus actual job characteristics of older and younger workers and how this might affect job attitudes and performance. Measures associated with particular lifespan development approaches (e.g., measures of SOC; Freund & Baltes, 2002; measures associated with SES such as future time perspective or FTP; Cate & John, 2007; Zacher & Frese, 2009) should be incorporated into future research. Disentangling the multiple issues that covary with chronological age—health, cognitive functioning, work experience (see Ng & Feldman, 2010a, 2010b), generational status, and nonwork variables, to name a few—is needed to fully understand the age–job design interplay. Finally, a key research issue is the role of additional moderators so as to understand the boundary conditions to our proposed model.

Implications for practice

Considering job design from a lifespan perspective could be an opportunity to improve work performance, as well as the satisfaction and engagement of workers in organizational settings. For example, it may be important to provide feedback to younger workers, especially during the work entry phase, early assignments, and during the organizational socialization process. On the other hand, there could be a competitive advantage for organizations who utilize the experience and competencies of older workers. The transfer of knowledge and skills from older workers to their younger colleagues could be facilitated through mentoring and coaching programs—programs that may be useful to younger workers and attractive to older workers. Moreover, the design of jobs with an explicit consideration of age could provide support for preparing people for transitional roles such as retirement and bridge employment. One key suggestion is that organizations work to support job crafting among older workers who have the knowledge of the organization and the job skills needed to redesign their jobs to fit their needs and abilities.

Conclusion

Job design is often been considered a generic issue, with little recent attention to factors which might moderate the effects of job

characteristics. However, the increasing age diversity of the modern workforce suggests that worker age should be considered as a factor which could impact design strategies. In this paper, we have illustrated how lifespan aging approaches may be a useful lens through which to view job design, suggesting some paths for future research. Such an approach could enhance our understanding of both job design and how to address increasing age differences at work.

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