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How do within-person changes due to aging affect job performance?

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ABSTRACT

As the mean age of the workforce in industrialized countries trends upward, increasing attention has been paid to *group-level* differences between younger and older workers in terms of job performance. The present article takes an alternative perspective by examining *within-person changes* that occur with aging and how the process of aging affects employees' workplace behavior. We begin by highlighting five areas in which we observe major within-person changes related to aging: (1) cognitive capacity, (2) personality, (3) goal orientation, (4) social-emotional experience, and (5) health. Then, we demonstrate why and how these within-person changes due to aging affect core task performance, citizenship behavior, and counterproductive work behavior across the lifespan.

1. Introduction

Current workforce participation trends suggest that the mean age of the workforce is increasing in industrialized countries. Americans who are 55 and older will comprise 25% of the US workforce by the year 2020 (Toossi, 2009, 2012); similar trends have been observed in the UK (Taylor & Urwin, 1999) and other European countries as well (Anxo, Ericson, & Jolivet, 2012). These trends have sparked increased academic research on the effects of age on job performance. While previous reviews have identified group differences in job performance between older and younger workers (e.g., McEvoy & Cascio, 1989; Ng & Feldman, 2008; Sturman, 2003; Waldman & Avolio, 1986), the present review addresses the role age plays, in organizational life, in two new ways.

First, instead of examining group differences between older and younger adults, we focus on *within-person changes that occur with aging over time*. We examine five major areas where we expect these within-person changes to occur: (1) cognitive capacity, (2) personality, (3) goal orientation, (4) socio-emotional experience, and (5) health. Second, while core task performance has been the predominant focus of much of the prior research investigating age differences in job performance (e.g., Ng & Feldman, 2008; Sturman, 2003), the present review addresses how age-related within-person changes affect three equally-important components of job performance, namely, core task performance, citizenship behaviors, and counterproductive work behaviors (Bennett & Robinson, 2000; Hunt, 1996; Organ, 1988; Rotundo & Sackett, 2002; Welbourne, Johnson, & Erez, 1998).

Addressing the age-performance link from a within-person change perspective and from a multi-dimensional performance angle is important for both theoretical and practical reasons. From a theory development standpoint, we believe that age research should move beyond providing evidence of performance differences between younger and older workers (e.g., Ng & Feldman, 2008; Sturman, 2003) to investigating how those differences emerge in the first place. Ployhart and Vandenberg (2010) observe that most organizational theories imply co-variation among *changes* in variables. Regrettably, all too often that co-variation is not

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examined in practice. Their observation is especially germane to the study of aging, as the very meaning of the term itself signals the need for such an approach. Only through investigating how changes due to aging lead to changes in performance can we truly understand the role of age in organizational life (Ng & Feldman, 2008).

This research is important for practical reasons as well. A deeper understanding of the sources and the performance consequences of aging can improve HR strategies for dealing with an older workforce (Kunze, Boehm, & Bruch, 2011; Li, Chu, Lam, & Liao, 2011). For instance, there is empirical evidence suggesting that older workers who are victims of negative age stereotypes are more likely to withdraw from the workforce altogether (Dedrick & Dobbins, 1991; Gaillard & Desmette, 2010) and to have a lower quality of life (Palacios, Torres, & Mena, 2009; Wheeler & Petty, 2001). More importantly, steady exposure to negative age stereotypes may lead older workers to engage in self-defeating cycles of behavior at work (Ng & Feldman, 2012; Von Hippel, Kalokerinos, & Henry, 2013). Victims of stereotypes also do more poorly on tasks in which they have been negatively stereotyped as weak performers (Nadler & Clark, 2011), try to avoid tasks in which they have a poor reputation as performers (Rivardo, Rhodes, Camaione, & Legg, 2011), and become both more risk-averse in their behavior (Carr & Steele, 2010). Independent of the loss of valuable human capital associated with these dynamics (Finkelstein, Burke, & Raju, 1995; Perry & Finkelstein, 1999), ineffective management of older workers also leads to greater litigation costs associated with claims of age discrimination (Chao & Willaby, 2007).

2. Older workers and older adults

Following the ADEA (U.S. Age Discrimination in Employment Act of 1967), Ng and Feldman (2008) used age 40 as the cutoff to be considered an older worker. In addition, to try to capture nuanced effects of aging across the lifespan, several researchers have made a distinction between the "young–old" and the "old–old." For example, Feifel and Strack (1987) define the "young–old" as 65 to 74 years old and the "old–old" as age 75 or greater. Using a lower threshold, Gruhn, Gilet, Studer, and Labouvie-Vief (2011) view employees ages 60 to 69 as the young–old and employees age 70 and above as the old-old.

Taking these various definitions together, we refer to older workers as those employees who are 40 or above. Next, we refer to individuals who are 60–74 as the "young–old" and individuals who are age 75 or above as the "old–old." The findings pertaining to the young–old will be particularly relevant to us here because they are the individuals who are most likely to still be participating in the labor force.

3. Within-person changes associated with aging

We pay particular attention to five broad categories of within-person change which occur with aging. These categories are: (1) cognitive capacity, (2) personality, (3) goal orientation, (4) social-emotional experience, and (5) health. While there are certainly some other changes which occur with aging, we chose these five because they have obvious relevance and connection to job performance at all life stages. In order to perform a job well, individuals must have the willingness to do well (personality and goal orientation), the ability to do well (cognitive capacity and health), and a work context which fosters productivity and personal growth (socio-emotional experience). Our focus on multiple dimensions of within-person change is also consistent with previous research that suggests successful aging requires individuals to cope well with changes in multiple life domains (Ko, Berg, Butner, Uchino, & Smith, 2007). Although some of the evidence presented below is drawn from cross-sectional studies on the topic, the underlying premise of those articles, too, is that within-person changes due to aging drive the observed differences between older and younger adults. These within-person changes are summarized in Table 1.

4. Changes in cognitive capacity

The most studied area in aging research is the change in cognitive capacity across the lifespan (e.g., Deary, Allerland, & Der, 2009; Ebner, Riediger, & Lindenberger, 2009). These changes include decreases in memory and information retrieval ability (e.g., Dodson, Bawa, & Krueger, 2007; Erber & Danker, 1995), verbal ability (e.g., Rast, 2011; Sliwinski & Buschke, 1999), spatial ability (e.g., Finkel, Reynolds, McArdle, & Pedersen, 2007), and learning capacity (e.g., Dunlosky & Hertzog, 2000; Rast, 2011). In the present review we focus on two issues of particular relevance to the workplace, namely, changes in *information processing speed* and *experience-based judgment*.

4.1. Information processing speed

We consider declines in information processing speed here because they underlie many of the deficits in cognitive capacity (such as poorer working memory and reasoning ability) observed among older adults (Salthouse & Babcock, 1991; Salthouse, Fristoe, McGuthry, & Hambrick, 1998). The "processing speed theory of cognitive aging" (Salthouse, 1996) posits two mechanisms to explain these declines. First, older workers are less successful in completing cognitive tasks under time pressure ("the limited time mechanism"). Second, aging makes it more difficult for older workers to retrieve information from early stages of cognitive task performance for use in later stages of cognitive task performance ("the simultaneity mechanism"). Aging makes it more difficult for older workers to use previously-acquired and recently-received information simultaneously.

Providing empirical support for this theory, Finkel et al. (2007) found, in a sample of participants ages 50–88, that the "old–old" have lower information processing speed than the "young–old," who in turn have lower processing speed than middle-aged

Table 1
Age-related within-person changes and their effects on job performance.

Age-related within-person changes	Effects on job performance
1. Some aspects of cognitive capacity do decline with age, especially the ability to process information quickly, to multitask effectively, and to complete cognitive tasks under time pressure. Increases in experience-based judgment which occur in the aging process help counteract some of these declines.	1. Declines in information-processing speed may adversely affect older workers' core task performance. The growth in experience-based judgment over time may compensate for some of this decline in information-processing speed. Increases in experience-based judgment which occur with aging also promote greater citizenship behavior and reduce counterproductive work behavior.
2. Some personality traits, such as conscientiousness and agreeableness, are likely to increase over the course of adulthood, whereas extraversion and openness to experience are more likely to decrease through adulthood. Self-esteem and neuroticism are more likely to be stable and are less likely to change dramatically during individuals' time in the workforce.	2. Because both conscientiousness and agreeableness tend to increase throughout adulthood, they are likely to contribute to greater core task performance, greater citizenship behavior, and less counterproductive work behavior across the life span.
3. There is strong evidence that, as one ages, there is a shift in goal orientation from striving to maximize gains to striving to preserve resources and minimize future losses of those resources.	3. The shift in goal orientation from gain maximization to loss prevention does adversely affect core task performance across time, particularly in terms of pursuit of skill development. In contrast, this shift in goal orientation tends to increase citizenship behavior (especially mentoring activity) across the lifespan and decrease the likelihood of counterproductive work behavior.
4. As people age, they are more likely to seek out positive social relationships and emotional experiences, to react less negatively to aversive interpersonal situations, and to linger longer over positive memories than negative ones.	4. Desires for more positive emotional experiences and social relationships that increase with aging promote job performance in all three areas.
5. Older adults use various selection, optimization, and compensation strategies to maintain their physical and mental health as they age. Most individuals are able to use these strategies to maintain sufficient health to remain in the workforce until normal retirement age, after which the probability of experiencing a major physical health problem increases.	5. Because most people do not experience significant declines in physical or mental health while still in the workforce, changes in health which occur with aging tend not to hamper job performance during one's career. At any one point in time, though, poorer health is likely to be associated with poorer core task performance, poorer citizenship behavior, and greater counterproductive work behavior.

workers. Henninger, Madden, and Heuttel (2010) found similar results when they compared the "young–old" (mean age = 71) with young adults (mean age = 25). There is also considerable evidence suggesting that the ability to multitask significantly declines with age (Verhaeghen, Steitz, Sliwinski, & Cerella, 2003). Moreover, the ability to multitask is especially likely to decline when older adults are asked to perform cognitive operations under time pressure (Erber & Danker, 1995; Zimprich & Martin, 2002). Thus, the evidence at hand provides robust support for the hypothesis that information processing speed declines among older adults and that these declines are especially observable when cognitive tasks require quick recall of information, multi-tasking, and/or decision-making under time pressure (e.g., Byran & Luszcz, 1996; Finkel et al., 2007; Henninger et al., 2010; Verhaeghen & Salthouse, 1997).

4.2. Experience-based judgment

We consider increases in experienced-based judgment here because they can compensate for potential declines in cognitive capacity. While information processing speed appears to decline with age, there is also some evidence that individuals' work and life experiences, accumulated across the lifespan, enhance older individuals' abilities to make better decisions requiring judgment (Masunaga & Horn, 2001).

As people age, they accumulate a greater variety of experiences and a more nuanced understanding of their environments; in turn, this richer base of experiences helps older workers exhibit greater common sense and wisdom in decision-making (Cornelius & Caspi, 1987). Supporting this hypothesis, several empirical researchers have found that experience partially compensates for age-related declines in cognitive task performance (P. B. Baltes, Staudinger, Maercker, & Smith, 1995; Morrow, Leirer, Altieri, & Fitzsimmons, 1994). Similarly, Colonia-Willner (1998) found that tacit knowledge test scores did not decrease as chronological age increased — although scores on other cognitive reasoning tests did decrease. That study also found that scores on tacit knowledge tests were significant predictors of managerial skill, but scores on cognitive reasoning tests were not.

Beyond simply compensating for declines in other components of cognitive capacity, there is also evidence that experience-based judgment is a positive predictor of domain performance in its own right. Supporting this hypothesis, Hess and Auman (2001) found that, in a sample of subjects between ages 20 and 80, older adults were more adept at forming accurate impressions of others, were better able to read others' honesty and intelligence, and were better able to assess others' likeability. Along the same lines, in an experimental study, Aristico, Cervone, and Pezzuti (2003) found that the young-old (65–75 years old) outperformed young adults (20–29 years old) in problems that were representative of their daily challenges. Taken together, these findings suggest that positive within-person changes in experience-based judgment can enhance performance in a variety of life domains.

5. Changes in personality

Although genetics play an important role in shaping an individual's personality, the external environment also plays an equally important role. While early personality research suggested that "the bough was bent" by the end of adolescence, most

scholars now believe that personality traits start developing in childhood yet change throughout adulthood as well, especially as adults face new and challenging experiences (Helson & Soto, 2005; Soto, John, Gosling, & Potter, 2011; Viken, Rose, Kaprio, & Koskenvuo, 1994). Because the "Big Five" traits are prominently discussed within the personality literature, we first address within-person changes in those traits which are due to aging. We then consider within-person changes in trait self-esteem because it is a dispositional trait which also has strong relevance to a variety of work outcomes (Tharenou, 1979).

5.1. Big Five traits

Empirical research provides substantial evidence that Big Five traits do increase or decrease in strength over the course of a lifetime. For instance, Wortman, Lucas, and Donnellan (2012) found that three of the Big Five traits – extraversion, neuroticism, and openness to new experience – declined across the life span. That is, the mean level of these traits across 14 age groups (15–19 years old being the youngest cohort and 80–84 years old being the oldest cohort) declined across life stages. In contrast, Wortman et al. (2012) found that the mean level of conscientiousness increased in cohorts of increasing mean age, only declining in cohorts age 80 or older. Wortman et al. (2012) posit that these increases in conscientiousness and agreeableness – and the decrease in neuroticism – are consistent with the "maturity principle" (Caspi, Roberts, & Shiner, 2005). That is, individuals become more conscientious and agreeable over time because doing so allows them to more successfully fulfill different social roles as they age.

Other researchers have found similar change patterns in these five personality traits (Soto et al., 2011; Srivastava, John, Gosling, & Potter, 2003). For instance, consistent with the findings discussed above, Specht, Egloff, and Schmukle (2011) also found that openness to new experience and conscientiousness are likely to change as the result of aging. However, these authors found curvilinear (rather than linear) patterns of change. In the case of openness to new experience, the authors found a curvilinear decline over time. That is, there is a marked downward trend in openness to experience between ages 30 and 60, after which point there is not much further decline. In the case of conscientiousness, the authors found it increased from adolescence up to age 40 and then remained rather steady between ages 40 and 60.

Similar change trajectories in personality traits were also found by Lucas and Donnellan (2011) in their study of more than 20,000 German citizens. They found that mean levels of extraversion and openness to experience declined steadily across the life span; the mean levels of these two traits were highest for respondents around age 20 and lowest for respondents around age 80. In contrast, agreeableness steadily increased over the course of a lifetime, especially after age 70. Conscientiousness increased through young adulthood (20–30 years old), remained steady in middle adulthood (30–60 years old), but decreased gradually as individuals entered old age (60+ years old). Neuroticism demonstrated little change across the lifespan, with only a slight increase between age 40 and age 70 and a slight decrease after age 70.

Taken together, these various studies suggest that personality traits do change as one ages. In addition, each of the Big Five traits demonstrates a unique pattern of change. The mean levels of conscientiousness and agreeableness are likely to increase over time; the mean levels of extraversion and openness to experience are likely to decline across the lifespan. Changes in neuroticism appear to be smaller in magnitude and be less systematic across the lifespan.

5.2. Self-esteem

Researchers have long viewed high levels of self-esteem as both a sign of a good mental health and as an indicator of successful aging (Sargent-Cox, Anstey, & Luszcz, 2012). The weight of the evidence suggests that trait self-esteem is rather steady during most of individuals' work lives, but is more likely to decline in old age (Wagner, Ludtke, Jonkmann, & Trautwein, 2013). For example, in a large-scale study of twins, researchers found that people's self-concepts tended to crystallize in early adulthood and remain steady thereafter (McGue, Hirsch, & Lykken, 1993).

The reason that self-esteem appears to be fairly consistent across the lifespan is that individuals change the strategies they use to preserve their positive self-concepts over time (Heckhausen & Brim, 1997; Rice & Pasupathi, 2010). For example, Brandstadter and Renner (1990) observed that younger adults try to change their external environments to match their own personal preferences (i.e., assimilative coping) whereas older adults are more likely to try to adjust their personal preferences to situational constraints (i.e., accommodative coping). By redefining or scaling down their goals over time, older workers are better able to preserve positive self-images and self-perceptions of being in control over their environments (Brandstadter & Rothermund, 1994; Eizenman, Nesselroade, Featherman, & Rowe, 1997).

Nonetheless, declines in self-esteem are more likely to occur as individuals enter the "young–old period" (that is, 60–74 years old). For instance, Robins, Trzesniewski, and their colleagues found that self-esteem continued to increase in young and middle adulthood, reached its peak at around 50 to 60 years of age, but declined thereafter (Orth, Robins, & Trzesniewski, 2012; Orth, Trzesniewski, & Robins, 2010; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002). By and large, though, the self-esteem of individuals who are still in the workforce is likely to be quite stable across their careers.

6. Changes in goal orientation

During the aging process, individuals' goal orientations change as well. Socioemotional selectivity theory, posited by Carstensen (1991), is particularly relevant in explaining these changes. Carstensen (1991) argues that individuals' goal orientations change as people consciously and subconsciously monitor how much time they have left in life. As individuals age,

their time horizons narrow from almost limitless to highly limited (Cate & John, 2007; Lewin, 1939). That is, older adults are likely to feel that time is running out and perceive greater limitations on their future options (Fung, Lai, & Ng, 2001). As a result, as people age they tend to change their focus from maximizing gains to minimizing losses. Supporting this theory, Ebner, Freund, and Baltes (2006) found that young adults focus more on growth-oriented goals, while older adults place greater emphasis on preventing resource losses. Further, Ebner et al. (2006) found that this change in orientation was positively related to older adults' well-being; that is, a shift in goal orientation from striving for additional resources to striving to prevent resource losses is a functional adaptation to aging.

This heightened predilection to minimize losses is also manifested in declines in risk-taking across the life span. For instance, Chaubey (1974) observed that adults ages 45 and older are noticeably more risk-adverse than younger colleagues. Researchers have also found that older adults (ages 59–86) display a greater avoidance of losses than do younger adults (18–23 years old) in decision-making tasks (Mather et al., 2012). Along the same lines, researchers observe that older individuals with Type B profiles (e.g., relaxed about goal attainment) are likely to age more successfully than their Type A counterparts (e.g., high achievement-orientation) (Strube, Berry, Goza, & Fennimore, 1985).

7. Changes in socio-emotional experiences

In addition to positing changes in goal orientation, Carstensen (1991) suggests that the nature and sources of positive socio-emotional experience are likely to change, too. Specifically, socio-emotional selectivity theory suggests that individuals are more likely to strive for positive emotional experiences – and are more likely to try to avoid negative emotional experiences – as they age. This change in preference for positive socio-emotional experience can also be explained by how much longer individuals perceive they will live (Carstensen & Tuck-Charles, 1994). When individuals perceive their future time to be almost limitless, they are highly motivated to acquire new knowledge, to learn new skills and experience new environments, and to push for career advancement. In contrast, because older workers view their remaining time to be more finite, they want to spend more energy trying to find meaning in life, maintaining close relationships, and remaining part of a supportive community. These changing preferences are addressed in greater detail below.

7.1. Social relationships

Socioemotional selectivity theory predicts that, as individuals age, they will expend more effort in maintaining high-quality relationships with family members and significant others to fulfill increasingly salient social needs. Indeed, Carstensen (1992) found that, after adults turn 30, they tend to decrease their contacts with casual acquaintances and with people they had primarily cultivated for instrumental purposes (such as career advancement). In contrast, after adults turned 30, they were more likely to seek out interactions with close friends and family members because such individuals were perceived as better able to provide positive affirmation and social support.

Other research has yielded similar findings. Lansford, Sherman, and Autonucci (1998) found that that older adults obtain greater satisfaction from interactions with familiar social partners than from expanding their social networks with new contacts. Wrzus, Hanel, Wagner, and Neyer (2013) also found that the network size of young adults increased until age 30 but declined thereafter. Along the same lines, Charles and Piazza (2007) found that older adults (56–88 years old) experienced higher levels of positive emotional intensity with family members and long-time friends but lower levels of positive emotional intensity with new friends; the pattern was reversed for younger adults ages 18–36. In a sample of subjects aged 25 to 74 years old, Birditt, Fingerman, and Almeida (2005) found that, compared to younger adults, older adults reported less interpersonal tension with others, were less likely to argue with colleagues, and were more likely to do nothing in response to interpersonal tension.

7.2. Emotional experiences

Compared to young adults, older adults are more likely to experience positive emotions and are less likely to experience negative emotions. When time is perceived as limited, older adults want to maximize the number of positive emotional experiences they have and minimize the number of negative ones (Carstensen, 1992). For instance, in a sample of subjects ranging in age from 25 to 74, Mroczek and Kolarz (1998) found that age tended to be curvilinearly related to positive affect; positive affect increased at a faster rate in later life stages. Chapman and Hayslip (2006) found that, compared to young adults (mean age = 20), older adults (mean age = 49) were more likely to use optimism as a strategy to regulate their emotions. Compared to young adults (below age 39), older adults (age 62 or above) are also likely to recall more positive information than negative information (Lockenhoff & Carstensen, 2007). Thomas and Hasher (2006) found similar results. Compared to young adults (ages 18–28), individuals age 60 and older were more likely to remember positive information and forget negative information over time. Thus, not only do older workers seek out more positive emotional experiences, but also their positive memories are likely to linger longer (Carstensen, Pasupathi, Mayr, & Nesselroade, 2000).

The evidence is equally strong that older adults try to minimize negative emotional experiences (Shallcross, Ford, Floerke, & Mauss, 2013). Researchers have found that levels of negative affect (including anger, sadness, and fear) tend to decrease with age (Charles, Reynolds, & Gatz, 2001; Gross, Carstensen, Tsai, Skorpen, & Hsu, 1997). In general, older subjects tend to have greater emotional control, emotional stability, and emotional maturity (Gross et al., 1997; Lawton, Kleban, Rajagopal, & Dean, 1992).

These results have also been indirectly supported by brain imaging research. For instance, Wood and Kisley (2006) found that extreme negative images cause much stronger brain activity in young adults (aged 19–21) than do extreme positive images.

While the above research suggests that there is a linear relationship between age and the desire for positive emotional experience, Teachman (2006) has argued that the relationship between age and negative affect is curvilinear in nature. Teachman's (2006) thesis is that levels of negative affect increase in early adulthood as individuals face a series of challenging developmental tasks. However, as people enter their 30s and 40s, levels of negative affect decline because adults are in a particularly positive stage of their careers (the establishment stage). Then, as individuals reach late adulthood, levels of negative affect start increasing again because older workers start experiencing more physical declines and more taxing psychological pressures. Supporting this thesis, Teachman (2006) found, in a sample of respondents ages 18 to 93, that age and negative affect did display a curvilinear relationship. Specifically, mean levels of negative affect increased until individuals reached their mid-30s, then decreased slowly until they were "old-old" (age 75), after which point they started to rise again.

8. Changes in health

8.1. Physical health

Old age is often accompanied by declining physical health, including diminished hearing (e.g., Murphy, Daneman, & Schneider, 2006), increased insomnia (Buman, Hekler, Bliwise, & King, 2011), loss of fine motor control (Vieluf, Mahmoodi, Godde, Reuter, & Voelcker-Rehage, 2012), propensity to cardiovascular disease (e.g., Hawkley, Thisted, Masi, & Cacioppo, 2010), and worse overall fitness (Johnson, Deary, McGue, & Christensen, 2009).

However, while there is an overall negative relationship between age and physical health, the onset of serious disease is more likely to occur after people leave the workforce (e.g., Asakawa, Senthiselvan, Feeny, Johnson, & Rolfson, 2012; Henchoz, Cavalli, & Girardin, 2008; Jette, 1996; Johnson, Corley, Starr, & Deary, 2011; Steinhagen-Thiessen & Borchelt, 1999). That is, the "young–old" are generally able to maintain their health well enough to remain in the labor market until normal retirement age. For instance, Pinquart (2001) found that subjective physical health did decline with age, but the decline was most likely to occur when people were 75 years or older and out of the workforce.

The selection, optimization, and compensation (SOC) model is particularly helpful in shedding light on how older workers maintain their health (Freund & Baltes, 1998; Schulz & Heckhausen, 1996). Selection, optimization, and compensation represent three different types of coping strategies older workers utilize to deal with physical and emotional threats to their well-being (B. B. Baltes & Dickson, 2001; Freund & Baltes, 1998, 2002).

Selection refers to the individual's identification of his/her most important goals and the choice to devote more resources to those high priority goals. For example, older workers may choose to retire because they have hobbies or entrepreneurial activities to which they want to devote more time. Optimization refers to how individuals marshal their resources to attain valued goals (Yeung & Fung, 2009). Examples of optimization include learning or practicing new skills, imitating successful role models, and using time and energy more efficiently. For instance, older adults may stop working a second job or cut back on the number of shifts they work on their main job to conserve their energy. Compensation refers to the utilization of technology or external sources of assistance to maintain acceptable levels of functioning when previously-used means of achieving goals are no longer effective. Such strategies might include getting hearing aids or walkers to compensate for the loss of some physical ability or hiring help to maintain the residence as older individuals lose the energy or physical stamina for that activity. Taken together, these SOC strategies help older workers sustain sufficient physical health to remain active members of the workforce (Ng & Feldman, 2013).

8.2. Mental health

Positive mental health is important in old age because it has a self-reinforcing effect. Individuals who maintain positive self-images live an average of 7.5 years longer than those with less positive self-images (Levy, Slade, Kunkel, & Kasl, 2002). Moreover, declines in physical health and declines in mental health tend to co-vary (Gana et al., 2013; Kunzmann, Little, & Smith, 2000). Declines in physical health are likely to lead to increases in depression, for example, while declines in mental health (such as increased anxiety) can contribute to chronic physical health problems like high blood pressure or loss of sleep.

The same pattern we found between aging and physical health occurs in the relationship between aging and mental health. That is, it is mainly among the "old–old" that we see declines in feelings of loss of control (Lachman, 1986; Sargent-Cox, Anstey, & Luszcz, 2010). For instance, Teachman (2006) found that symptoms of depression decline between the mid-30s and the mid-70s, after which symptoms of depression start to re-occur. In a sample of subjects ages 23 to 82, researchers found older adults were more successful in handling regret than younger adults were. This finding is supported by other research on how people strive to find ways to come to terms with greater constraints in their environments as they age (Torges, Stewart, & Nolen-Hoeksema, 2008). Similarly, the relationship between age and the belief in the benevolence (goodness) of the world is stronger among older adults than among young adults, again suggesting that decreasing focus on negative emotions is a widely-used and effective coping strategy to deal with aging (Poulin & Silver, 2008).

Previous research on life satisfaction and work satisfaction, other indicators of positive mental health, has yielded very similar results. Mroczek and Spiro (2005) found that, over a period of 22 years, men experienced curvilinear changes in their levels of life satisfaction. Life satisfaction increased through adulthood, peaked at age 65, and then declined gradually afterwards. In multiple

samples of managers ages 20–72, Siu, Spector, Cooper, and Donald (2001) also found that age was positively related to job satisfaction and mental health; older managers also reported fewer sources of stress, more effective coping with work-related stress, and greater internal locus of control. These findings are consistent with the SOC model's prediction that, as they age, adults change their selection, optimization, and compensation strategies to increase or preserve control over their lives (B. B. Baltes & Heydens-Gahir, 2003; B. B. Baltes, Zhdanova, & Clark, 2011; Yeung & Fung, 2009).

9. Within-person changes and job performance

We turn now to examine how each of these five within-person changes impacts job performance. These impacts are summarized in Table 1.

10. Changes in cognitive capacity

In previous research on the relationship between age and job performance, considerable attention has been given to the role which declines in cognitive capacity might play in limiting performance. This research stream has particularly examined the decline in information processing speed across the life span and how it detracts from core task performance (Salthouse, 1996; Salthouse, Hambrick, Lukas, & Dell, 1996; Taylor, 1975), especially when employees hold managerial jobs or other positions which are cognitively demanding.

Fortunately, at least some of those losses in information processing speed which occur with aging are offset by concomitant increases in experience-based judgment. Indeed, Saks and Waldman (1998) found that the negative relationship between age and core task performance was eliminated when researchers controlled for the amount of employees' prior work experience. In part, older employees are often able to leverage their greater work experience to enhance core task performance (Giniger, Dispenzieri, & Eisenberg, 1983; McDaniel, Schmidt, & Hunter, 1988). For instance, Hunter and Thatcher (2007) observed that older workers are more successful in identifying and resolving roadblocks to task completion because they are better able to handle a wide variety of problems, conflicts, clients, and customers. Bradley (2007) also observed that "new-start" teachers reported greater strain than experienced teachers because they had not yet developed the knowledge and skill needed to deal with challenges at work. In fact, Avolio, Waldman, and McDaniel (1990) found that job experience predicted core task performance over and above the effects of age.

There are no obvious reasons why potential declines in information processing speed should detract older workers from performing citizenship behaviors. In fact, some researchers have found that those with greater work experience tend to engage in greater amounts of civic virtue (Kegans, McCamey, & Hammond, 2012). One potential explanation here is that older employees with greater work experience may be more attuned to when citizenship contributions are needed from them. Another potential explanation is that older employees with more experience are likely to have greater confidence in their abilities to perform citizenship behaviors effectively — and are therefore more likely to volunteer their services. There is also no reason why potential declines in information processing speed should lead to more counterproductive work behavior. If anything, the growth in experience-based judgment associated with aging would make individuals more aware of the negative consequences of such behavior, both for their employers and for themselves.

11. Changes in personality

As noted earlier, conscientiousness and agreeableness are likely to increase across the life span. As such, they help older workers in all dimensions of job performance as people age. Conscientiousness has been identified in multiple studies as one of the most important personality correlates of core task performance (Barrick & Mount, 1991; Barrick, Stewart, & Piotrowski, 2002; Dudley, Orvis, Lebiecki, & Cortina, 2006; Tett, Jackson, & Rothstein, 1991). Thoresen, Bradley, Bliese, and Thoresen (2004) note that the relationship between conscientiousness and core task performance is particularly strong in the maintenance career stage, that is, after individuals have mastered all the skills necessary to their jobs and have worked in the same position or organization for a long time. People who are highly conscientious have also been found to engage in greater citizenship behavior (LePine & Van Dyne, 2001) and to engage in less counterproductive work behavior (Marcus, Lee, & Ashton, 2007; Sackett, Berry, & Laczo, 2006). In effect, the same attributes of conscientiousness which lead to greater core task performance – such as self-discipline and dependability – should also lead employees to engage in less counterproductive work behavior.

We expect to see much the same pattern in the relationship between agreeableness and job performance. The strongest relationship is likely to be the one between aging and core task performance, particularly when those jobs entail a high level of social contact with others (Barrick & Mount, 1991). It would be in these kinds of jobs that age-related changes in agreeableness would most likely enhance the quality of core task performance. We also expect that increases in agreeableness would be related to increases in citizenship behavior (Hurtz & Donovan, 2000) and decreases in counterproductive work behavior (Sackett et al., 2006) across the life span, as agreeable individuals are more likely to look after the interests of others.

Finally, two interesting findings about conscientiousness and agreeableness are worth noting here. First, LePine and Van Dyne (2001) found that both conscientiousness and agreeableness are better predictors of citizenship behavior than of core task performance. These findings have been supported by Ng and Feldman (2008), who also found that the contribution of older workers to organizational productivity is more evident in citizenship behavior than in core task performance. Second, Witt, Burke,

Barrick, and Mount (2002) found that conscientiousness and agreeableness interact positively to influence core task performance; conscientious individuals who are also agreeable demonstrate especially high core task performance.

As noted earlier, self-esteem is likely to remain relatively stable throughout most of adulthood (Twenge & Campbell, 2001). Therefore, we do not expect significant changes in job performance due to age-related changes in self-esteem. Previous research, though, does suggest that self-esteem is positively related to core task performance at any one point in time (Ferris, Lian, Brown, Pang, & Keeping, 2010). For example, in their meta-analysis, Judge and Bono (2001) found that self-esteem was related to core task performance at .26. There is much less empirical evidence available on how self-esteem affects citizenship and counterproductive work behavior, although preliminary data suggest that self-esteem is positively related to the former and negatively related to the latter (Baumeister, Campbell, Krueger, & Vohs, 2003).

12. Changes in goal orientation

Individuals tend to shift their priorities from gain maximization to loss prevention as they age. That is, they become more inclined to look for ways to *maintain* their productivity — but become less inclined to find ways to further *enhance* their productivity (De Lange, Van Yperen, Van der Heijden, & Bal, 2010). As a result, they become less interested in training and career advancement because they have less time in which to recoup their investments in skill development (Bertolino, Truxillo, & Fraccaroli, 2011; Maurer, 2001; Maurer, Weiss, & Barbeite, 2003).

Unfortunately, this avoidance orientation can impede core task performance in particular. Zacher and his colleagues found that older workers were less likely than younger workers to focus on future opportunities at work, which in turn negatively affected their core task performance (Zacher & Frese, 2011; Zacher, Heusner, Schmitz, Zwierzanska, & Frese, 2010). This change in goal orientation also damages older workers' reputation in the eyes of colleagues, who are more likely to perceive older workers as coasting or declining in job performance (Ferris, Yates, Gilmore, & Rowland, 1985; Hassell & Perrewe, 1995). In short, the dominance of loss prevention goals, more common among older workers, can dampen their ability to compete effectively with their younger colleagues in terms of core task performance.

However, this change in goal orientation across the life span may actually lead to increases in citizenship behavior. For example, some researchers have found that a limited future time perspective is associated with greater "generativity" motives, that is, a stronger desire to teach and train the next generation (Kooij & Van De Voorde, 2011). Thus, it appears that as people age they may stop investing as much energy into their own skill development, but instead devote that energy into performing citizenship behaviors for the benefit of others. Further, because people place a higher priority on loss prevention as they age, they are especially likely to be wary of engaging in any behaviors that would undermine their reputation, status, and security at work. Therefore, older employees are likely to decrease counterproductive work behaviors as their proclivity for loss prevention becomes more salient.

13. Changes in socio-emotional experience

In general, previous research suggests that the increased proclivity to seek out positive socio-emotional experiences as one ages is likely to lead to increases in core task performance (e.g., Chiaburu & Harrison, 2008; Gerstner & Day, 1997). One mechanism underlying these positive changes is the development of interpersonal trust over time (Lau & Cobb, 2010). As individuals age and seek out (and remember) more positive emotional experiences, they are also more likely to develop strong, trusting relationships with supervisors and colleagues. In turn, these high-trust relationships motivate employees to perform their work more diligently because they are more cognizant about how much others are relying upon them.

Another reason why aging can positively affect core task performance is that increases in positive emotional experiences and decreases in negative emotional experiences are likely to enhance decision-making quality (Staw & Barsade, 1993). Positive emotions also help buffer individuals from the job stress they experience when faced with obstacles at work (Janssen, Lam, & Huang, 2010; Kluemper, Little, & DeGroot, 2009).

We expect that these changes in socio-emotional experiences will be related to positive changes in citizenship behavior as well (Rioux & Penner, 2001; Walumbwa, Cropanzano, & Goldman, 2011). As people age, they may increase their citizenship behavior because they are more likely to make external positive attributions about those who ask for their help (e.g., their colleagues are temporarily swamped) than stable, negative attributions (e.g., their colleagues are slackers). Within-person changes in positive emotions can also fuel greater citizenship behavior because employees have increasingly warm feelings towards their colleagues and supervisors (Dalal, Lam, Weiss, Welch, & Hulin, 2009; Wright & Staw, 1999).

Last here, we expect that the increased desire for positive socio-emotional experiences will lead employees to engage in less counterproductive work behavior as they age. First, over time, people become more tolerant of the mistakes their partners in social relationships might make (Bal, De Lange, Jansen, & Van Der Velde, 2013). In other words, over time individuals view their psychological contracts with supervisors as more malleable, more relational, and longer-term in nature (Ng & Feldman, 2010). Second, researchers have found that "relationship stressors" are key factors in motivating employees to engage in counterproductive work behavior (e.g., Bruk-Lee & Spector, 2006; Holtz & Harold, 2013; Schyns & Schilling, 2013; Shoss, Eisenberger, Restubog, & Zagenczyk, 2013). Because older workers are less likely to react strongly to disappointments in their relationships with others, they are also less likely to engage in counterproductive work behavior to retaliate for those disappointments. Third, to the extent that negative emotions predict counterproductive work behavior (Lee & Allen, 2002; Yang &

Diefendorff, 2009), we expect that the declines in negative emotion which occur with aging would also result in less counterproductive work behavior.

14. Changes in health

We noted above that neither physical nor mental health typically declines substantially during people's work lives (before age 65). Because older workers do not have significantly more health problems than younger workers do, we expect that aging does not lead to major changes in performance across the course of a career. That is, we do not expect changes in health to be an impediment in job performance as workers age, nor do we expect the strength of the relationship between health and performance to vary across the course of a career.

At any given age, though, we do expect that health and performance will be positively related. When individuals are healthy, they are equipped with more energy to invest in the work domain. They are better able to concentrate on their core tasks and are less likely to be distracted by pain or discomfort in the performance of their duties. This relationship is supported by a recent meta-analysis of the effects of physical and mental health on indicators of productivity (Ford, Cerasoli, Higgins, & Decesare, 2011). Healthy individuals are also more physically and emotionally energized to engage in citizenship behavior (Cropanzano, Rupp, & Byrne, 2003; Schat & Frone, 2011). As Bolino and Turnley (2005) suggest, while employees' extra-role behaviors contribute to organizational productivity, they often consume employees' physical and emotional energy to engage in those behaviors. Not surprisingly, poorer mental health is associated with greater counterproductive behavior on the job (Aube, Rousseau, Mama, & Morin, 2009), as individuals with poorer mental health tend to have less impulse control and less empathy.

Both conservation of resources (COR) theory and the SOC model help explain why the positive relationship between health and job performance is likely to persist across an individual's career (Ghorpade, Lackritz, & Singh, 2009; Halbesleben, 2006; Smith & Freedy, 2000). COR theory (Hobfoll, 1989, 2002) predicts that individuals are motivated to create situations which are pleasurable, to avoid situations which would lead to the loss of valued resources, and to accrue excess resources to offset any resource losses in the future (Brotheridge & Lee, 2002; Wright & Hobfoll, 2004). In turn, as people age, they change their selection, optimization, and compensation strategies in order to cope with the changes in physical and mental health they experience (Freund & Baltes, 1998, 2002). In effect, as people age, they are more motivated to conserve resources to perform their jobs well — and are more likely to utilize SOC strategies regarding health maintenance to that end.

15. Conclusion

In the most recent review of age differences in job performance, Ng and Feldman (2008) observed that there are not significant age differences between younger and older workers in terms of core task performance. The current review extends that review in two key ways. First, instead of simply identifying the performance differences between older and younger workers, the current review attempts to locate the sources of those differences. This perspective redresses some of the imbalance in previous research which has tended to ignore the effects of within-person changes related to aging on performance. The within-person perspective is very germane here because aging is a continuous process that unfolds over the course of a life.

Second, the present review addresses how age can contribute to job performance beyond the execution of core task duties. Ng and Feldman's (2008) review found that age was not significantly related to core task performance but was related positively to citizenship behavior and negatively to counterproductive work behavior. This paper provides more detailed explanations for those findings. In the case of core task performance, we suggest that declines in information-processing speed are frequently counteracted by increases in experience-based judgment, resulting in smaller and less consistent decrements in core task performance over time.

Perhaps more importantly, we were able to identify several reasons why the aging process is likely to enhance citizenship behavior and decrease counterproductive work behavior. First, workers' conscientiousness and agreeableness appear to steadily increase throughout adulthood — and these two traits are key predictors of (greater) citizenship behavior and (lower) counterproductive work behavior. Second, as people age, they are more likely to seek out positive social relationships and emotional experiences and to make positive attributions about the trustworthiness and likeability of their colleagues. Consequently, they are more likely to extend themselves for the benefit of others and to transfer energy from advancing their own careers to helping others advance their careers. Third, as people age they are less likely to be offended by breaches of psychological contract breaches and are less likely to experience negative emotions (Ng & Feldman, 2009). As a result, older workers are less likely to be highly agitated by contract breaches and are less likely to retaliate to them with counterproductive behavior.

In brief, given the dominant role that older workers currently play in the labor market and will continue to play over the next two decades, it is critical that we understand how to shape employment relationships to take advantage of their talents and to minimize the challenges they face on the job. In this article, we present evidence that older workers are as capable as younger workers to contribute to organizational productivity. We particularly hope that future researchers can address *why* older workers may or may not perform at the same level as the younger workers, not only *that* they are better or worse performers. Such research has the potential to improve both the work environments of older employees and the productivity of organizations themselves.

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