

Job Performance and the Aging Worker

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Abstract

This chapter begins by discussing commonly held stereotypes people have about older workers. To gauge whether these stereotypes are accurate, we review the physical, sensory, and cognitive changes occurring as a normal part of aging. Using the cognitive aging literature as a framework, we then summarize the age/job performance literature. Generally, age effects are small and non-linear, but are likely masked by the fact that most researchers have yet to sample truly older (i.e., 50 years plus) workers. Most likely, an inverted U-shaped relationship exists between age and job performance. The effects, however, are probably moderated by job complexity and whether experience with specific job content can buffer against expected age-related physical and cognitive decline. We end with tentative conclusions for practitioners and researchers in the field.

Keywords: aging, job performance, older worker

*And you know that you're over the hill
When your mind makes a promise that your body can't fill*
—“Old Folks Boogie,” Little Feat (1977). From the album *Time Loves a Hero*

This chapter examines the research evidence concerning aging workers and job performance. Our chapter begins with a review of commonly held stereotypes concerning the job performance of older workers. Next, we review selected literature on physical, sensory, and cognitive changes that occur as workers age, and that are relevant to job performance. We then detail the research concerning age and job performance. This is followed by a discussion of the factors that increase the complexity of drawing inferences about the job performance of older workers. We end the chapter with conclusions concerning the job performance of older workers.

Age Stereotypes and Job Performance

As is the case with many demographic subgroups, stereotypes exist concerning older employees (see Chapter 16, this book). Posthuma and Campion

(2009) summarized much of the literature specific to older workers and job performance. They noted that older workers are often assumed to be less productive on the job than are younger workers. This stereotype is related to beliefs that, relative to younger workers, older workers have lower mental (Raza & Carpenter, 1987) and physical abilities, less energy (Parson & Mayne, 2001), less competence (Kite, Stockdale, Whitley, & Johnson, 2005), and more stress.

Belief that older adults are resistant to change also helps fuel stereotypes about aging and job performance. For example, employment interviewers (Britton & Thomas, 1973) and employers in general (Rosen & Jerdee, 1977) believe that older workers are more difficult to train. Older adults are also perceived as being less adaptable and flexible (Chiu, Chan, Snape, & Redman, 2001; Rosen & Jerdee, 1977; Weiss & Maurer, 2004) and as having

lower future potential (Avolio & Barrett, 1987). The latter stereotype may be widely held due to a belief that the causes of poor performance in older workers are resistant to remediation (Dedrick & Dobbins, 1991).

In contrast to the negative stereotypes above, there are also common beliefs suggesting that older workers may have higher levels of job performance relative to younger workers (Posthuma & Campion, 2009). Specifically, older workers are viewed as more dependable, stable, and honest. Thus, one would expect older workers to be less likely to engage in counterproductive work behavior, such as theft. Likewise, they would be expected to have less avoidable absenteeism and would be less likely to quit.

Developmental Changes Affecting Older Adult Job Performance

Stereotypes stem from beliefs people have about cognitive and physical declines that occur with age. Understanding whether the stereotypes are accurate is critical to interpreting research on older workers and job performance. This understanding is aided by Maertens, Putter, Chen, Diehl, and Huang (2010; Chapter 12 in this volume), who provided a detailed analysis of the job-related physical and health characteristics of older workers. Likewise, Rizzuto, Cherry, and LeDoux (2010; Chapter 13 in this volume) provided a review of the cognitive characteristics that covary with age. Our focus here is narrower. We highlight those changes with age (e.g., speed of mental processing) that would probably affect performance in almost any job, while focusing less on changes (e.g., decreased sensitivity to the color blue) that would affect only some narrow subset of jobs. Although the discussion centers on cognitive aging, we also address job-related physical and sensory changes that occur with age.

Some notes of caution are in order when attempting to generalize the cognitive aging literature to the performance of working older adults. First, many of the changes described here are most pronounced in late life. That a 90-year-old might experience serious hearing problems is likely irrelevant to the job performance literature. Unfortunately, relatively less research has been conducted on middle-aged or working older adults (see Finch, 2009, for a recent exception). Appealing to the general cognitive aging literature probably overstates performance declines that could be expected among older adults still working.

Second, results and conclusions tend to vary with the type of experimental design the researcher

employs. Cross-sectional designs (data collection occurs one time, by comparing separate groups of younger and older adults) generally show the steepest declines in performance (Abrams, 2009; Salthouse, 2009a, 2009b). Longitudinal designs (data collection occurs at multiple times, by following the same participants as they age) typically produce small or no age differences (Nilsson, Sternang, Ronnlund, & Nyberg, 2009; Schaie, 2009). A recurrent but unresolved theme in this literature revolves around which type of design provides the clearest picture of aging (Salthouse, 2009a; Schaie, 2009).

Third, results and conclusions also vary with the content domain being studied. In areas where performance depends on over-learned information (e.g., multiplication facts; Allen, Ashcraft, & Weber, 1992; Pesta, Sanders, & Nemeč, 1996), or general world knowledge (e.g., vocabulary; Long & Shaw, 2000), older adults tend to do best (for a review, see Deary et al., 2009). In areas where performance depends on cognitive speed or information-processing capacity, large differences appear that favor younger adults (for a review, see Salthouse, 2004). The above represents the classic distinction between the effects of aging on crystallized (i.e., accumulated knowledge) versus fluid (i.e., speed and memory capacity) intelligence (see, e.g., Horn & Cattell, 1967).

More recently, however, a consensus has emerged regarding the hierarchical structure of human intelligence (i.e., the Cattell-Horn-Carroll model; McGrew, 2009). Here, crystallized and fluid intelligence no longer appear at the apex of mental ability. Instead, these are subsumed and influenced by a higher-order, domain-general factor (i.e., general mental ability [GMA], also known as Spearman's *g*). General mental ability is thought to influence performance on any cognitive task. Hence, it is not true that crystallized and fluid intelligence represent independent facets, or types of "multiple intelligences." Instead, both are subservient to some degree on GMA (Jensen, 1998; McGrew, 2009). We return to this theme in the section "Age \times Complexity," as we believe it provides a relatively parsimonious account of the age/job performance literature, while also explaining why age differences are smaller on crystallized versus fluid tasks, even though a common mechanism (GMA) influences performance in both domains.

Fourth, on every variable we review, the performance distributions of older and younger adults overlap. This is true even with the largest effects of age on performance (i.e., reaction time differences). It would therefore be trivially easy to find a given

older adult who processes information faster than a given younger adult, despite large group differences in the opposite direction. Paradoxically, even with the ease of finding exceptions to a general rule, group differences would still meaningfully affect the productivity of a work unit. The situation is analogous to using top-down selection based on a valid selection method. Though individual exceptions will exist (e.g., a high-scoring applicant nonetheless does poorly when hired), differences in groups of high- and low-scoring applicants will be practically significant. Also, differences between groups of younger and older adults on the variables we examine would likely have significant practical effects on work performance.

With these caveats in mind, managers should use the review below as a frame of reference for what might be expected, but then assess individual employees on a case-by-case basis. What matters most is not the worker's age, but whether he or she currently possesses the knowledge, skills, and abilities needed to perform the essential functions of a job. Nothing in this review is meant to imply that age should be considered as a factor when deciding on a worker's terms or conditions of employment.

Physical Change

Maertens et al. (2010; Chapter 12 in this volume) provided a comprehensive summary of age-related physical change. Examples include changes in bone structure and stature, declines in muscle mass, physical strength, aerobic capacity and metabolism rates, and increases in susceptibility to disease, plus the time it takes to recover from either disease or physical injury (Maertens et al., 2010; Chapter 12 in this volume).

We add that physical and cognitive changes typically covary (Johnson, Deary, McGue, & Christensen, 2009). An emerging field of research—cognitive epidemiology—shows reasonably strong relationships between level of general mental ability and a host of health-related, physical, and biological outcomes (Deary, 2009, provides an overview of this area in a special issue of the journal *Intelligence*). Cognitive epidemiology focuses on the possible causal role GMA plays in determining an individual's overall level of physical and mental health. The clearest example of this link is a phenomenon known as terminal drop—in late life, sudden declines in GMA predict death (Rabbitt, Lunn, & Wong, 2008). More generally, GMA and physical health are surprisingly correlated such that lower levels of the former predict lower levels of the

latter. Recent examples include GMA as a predictor of (1) heart disease (Singh-Manoux et al., 2009); (2) all-cause mortality (Gallacher et al., 2009; Leon, Lawlor, Clark, Batty, & Macintyre, 2009); (3) metabolic syndrome (Richards et al., 2009); (4) global health outcomes (Arden et al., 2009; Der, Batty, & Deary, 2009; Pesta, McDaniel, & Bertsch, 2010); (5) psychological distress (Gale, Hatch, Batty, & Deary, 2009); (6) substance abuse (Johnson, Hicks, McGue, & Iacono, 2009); and (7) persisting with medication (Deary et al., 2009). An explanatory theme running through this literature is that high levels of GMA may create a buffer that shields older people from some of the more negative effects of age on mental and physical well-being.

The underlying causes of physical change in older adults may also affect job performance in non-obvious ways. Consider, for example, loss of muscle mass and physical strength as a function of normal aging. The obvious link to job performance is for those areas where strength is an essential function. The loss of muscle mass, however, is partly caused by a decline in testosterone levels (which also moderate cognitive performance) occurring as people age. In men, testosterone levels start to decline by around age 40 (Travison et al., 2007). Lower testosterone levels lead to both physical (e.g., loss of muscle mass; Maertens et al., 2010; Chapter 12 in this volume) and cognitive (e.g., memory loss, spatial ability; Hampson, 1995; Hogervorst, Bandelow, Combrinck, & Smith 2004) impairments. Although hormonal effects are often complicated (Moffat & Hampson, 1996), testosterone levels seem to strongly influence performance on math and spatial tasks (Kimura, 2000). Therefore, physical change within persons, via links to cognitive change, may influence performance in jobs where physical fitness *per se* seems irrelevant (e.g., engineers, architects).

Sensory and Perceptual Change

Sensation involves converting or “transducing” physical energy (light or sound waves) into a neural code. Identifying what the neural code represents in the physical world (e.g., a dog, a car, your mother-in-law) entails perception (Coren, Ward, & Enns, 2004). Sensation thus requires translating energy into a language the brain understands, whereas perception requires attaching meaning to the translation by labeling, naming, or otherwise recognizing what is being sensed.

The literature on sensory decline with age is enormous (for reviews, see Corso, 1971, 1981; Lindenberger & Ghisletta, 2009). The largest effects

appear among the very old, although measurable sensory decline may begin in one's twenties, as a normal part of aging (Coren et al., 2004). By far the most studied sensory system is vision. Developmental changes here that are most likely to affect job performance (see Coren et al., 2004,) are significant declines in (1) the amount of light reaching the retina (the back portion of the eye, where transduction takes place), (2) depth perception, and (3) visual acuity (the ability of the eye to resolve details, as assessed by the Snellen eye chart, ubiquitous in doctors' offices).

These visual declines begin to occur as early as age 40. Perhaps the most salient example is the need for reading glasses as one approaches middle age (presbyopia, or far-sightedness with age, caused by a less-flexible lens and weak ciliary muscles; Glasser & Campbell, 1998). Some jobs exist where depth perception and visual acuity are essential functions (drivers, pilots, radiologists). Fortunately, however, age-related visual declines can be mitigated to the point of irrelevance for most jobs via devices like glasses, corrective surgery, or designing worksites following general ergonomic principles (e.g., light levels, glare).

The sensory system receiving the second largest amount of research attention is audition. Many of the specific age effects on hearing (e.g., loss of flexibility for bones in the middle ear; decreased sensitivity of cochlear hair cells, which transduce sound; Coren et al., 2004) translate to an increase in the threshold, or "limen" (the minimum amount of sound energy that a person still reports hearing), for the perception of sound. This increase is especially pronounced for high- versus low-frequency tones, and age declines in this area occur surprisingly early in life (Corso, 1981). Though hearing aids probably work less well for auditory problems than do glasses for vision problems (the former tend to amplify noise as much as relevant sounds), it is unlikely that normal, age-related hearing declines would be a concern for performance in most jobs. The real concern with regard to work and hearing loss, however, would be potential injury due to prolonged exposure to loud sounds (Clark & Bohne, 1999). Serious and permanent hearing damage to long-service (and hence older) employees should be protected against in any job where exposure to loud sounds is routine.

Mitigating the effects of age-related sensory decline would seem to be relatively easy. Note, however, that general mental ability is also correlated with sensory/sensory-motor developmental change (see Li & Lindenberger, 2002, for a review).

Consistent with our review of physical changes above, noticeable sensory decline within persons may covary with cognitive decline, which could affect performance across a much wider range of jobs.

Attention and Working Memory

The mechanism that intervenes between sensation and perception is attention (for an overview of the human information-processing system, see Eysenck & Keane, 2010). This mental process probably takes place in the working memory system, which is thought to be the "seat of consciousness." Attention, awareness, and thought are all products of mental operations in working memory. So, balancing a checkbook, typing an email, or remembering a recently encoded phone number all depend on attentional and rehearsal processes occurring there. Critical to the efficiency of these processes is the size or capacity of working memory. Larger capacity translates into faster and/or more efficient information processing (Cowan, 2005). Indeed, individual differences in working memory capacity predict performance across a vast array of cognitive tasks (Jensen, 1998), and some believe that working memory is a key component of (or actually is) GMA as measured by traditional IQ tests (Colom et al., 2004).

Working memory capacity tends to decline significantly with age (Oberauer, Wendland, & Kliegl, 2003). The decline would probably affect performance in any job where processing lots of information rapidly is key (e.g., air traffic controllers). This is especially true when the work situation requires processing new information, as the older worker would be less able to rely on an over-learned repertoire, or richly structured knowledge base, as a buffer against declines in working memory capacity. The older adult faced with new and complex learning would display performance declines relative to his or her younger counterparts, and relative to when he or she was a younger worker (Oberauer et al., 2003; Salthouse, 1994).

Long-Term Memory and Expertise

How researchers study long-term memory differs considerably by the type of information demanded in a learning situation. Memories of personally experienced events would be stored in episodic long-term memory, whereas memory for general world knowledge (like vocabulary) would be stored in semantic long-term memory (for an overview, see Eysenck & Keane, 2010). A key distinction between these memory systems is that episodic memories require a "time stamp" to be useful (e.g., finding

where you parked your car today vs. where you parked it yesterday). With semantic memories, time of encoding is irrelevant (e.g., we can define the word “truck” without having to remember the first time we encountered and encoded the word in memory, together with its definition).

Researchers generally study episodic memory by having participants encode novel information (a list of words) and by then assessing memory accuracy using a traditional recall or recognition test. Research on semantic memory, on the other hand, focuses more on how knowledge is organized in long-term memory, for rapid retrieval into working memory, when needed. Generally, concepts are tightly organized in semantic memory based on relatedness (i.e., associative strength). This allows exposure to one concept (a dog) to trigger the automatic retrieval of relevant facts about that concept (dogs sometimes bite).

With episodic memories, time is critical; with semantic memories; relatedness is key. Aging generally produces larger deficits in episodic memory (measured by recall or recognition tests) and small to no differences in semantic memory (measured by general knowledge tests, or tasks like “sentence verification;” see, e.g., Allen, Sliwinski, & Bowie, 2002; Foos & Sarno, 1998). The difference here is probably due to the fact that episodic memories require more processing resources than do semantic memories. Typically, one has to focus more attention to form an episodic memory, and encoding may also depend on the efficiency of rehearsal operations conducted in working memory. Semantic memories, on the other hand, are likely vastly over-learned, and can be retrieved relatively automatically. Indeed, a key finding in the literature is that age differences are considerably larger on effortful (those requiring attention and/or working memory capacity, as in an episodic learning scenario) versus automatic (those requiring relatively no attention, as with retrieving a basic multiplication fact from semantic memory) processes (Hasher & Zacks, 1979; Salthouse, 1991). In other words, new learning is more dependent on GMA than is retrieval of over-learned information.

The distinction is important for older workers, as a well-developed semantic memory system for job-relevant concepts can help the older adult buffer against declines in the process-dependent episodic memory system. This effect is clearly displayed in the literature on expertise and aging (Charness & Tuffiash, 2008; Horton, Baker, & Shorer, 2008). Episodic memory decline is less relevant to the older worker who possesses a rich network of job facts

acquired through decades of experience. Therefore, aging may have little effect (or even beneficial effects) in areas where expert knowledge systems are required for successful job performance. Lawyers, doctors, college professors—jobs where performance requires some level of expertise in domain-specific areas—would be examples.

Experts presumably possess a network of highly organized, domain-specific knowledge, accumulated throughout a lifetime of study and stored efficiently in long-term memory. Retrieval from the network (a relatively automatic process) serves as a script or template for processing and acting on familiar information as needed to perform well in a job (Charness & Bosman, 1990). In sum, in jobs where one can rely on expert knowledge, or perform over-learned/automatic tasks, age should show small or even positive effects on job performance. In jobs where processing new, complex information fast is essential, large age differences would exist favoring younger adults. We believe these effects are best characterized by appeal to the age \times complexity hypothesis, discussed next.

Age \times Complexity

As a rule, age differences increase when task complexity increases (Salthouse, 2001, 2004). This is the age \times complexity hypothesis, which seems circular at first glance (i.e., difficult tasks produce larger age differences because they are difficult). However, if task complexity is defined as reliance on speed of processing and/or working memory capacity (i.e., how GMA-loaded a mental task is), then the hypothesis is borne out in a large percentage of published research. The hypothesis also represents a reasonable and simple summary of cognitive aging (Salthouse, 2004). Tasks that are GMA-intensive show large age differences. Tasks that depend less on processing power (and more on retrieval from an existing knowledge base) show small or no age differences, and sometimes older adult superiority.

The age \times complexity hypothesis potentially offers a parsimonious account of many of the effects described in our review, including age differences in automatic versus effortful processes, crystallized versus fluid intelligence, and episodic versus semantic memory accuracy. It is possible that age \times complexity is a more narrow example of a general rule: namely, GMA \times complexity.

GMA \times Complexity

Individuals differ often markedly in GMA (whether caused by age, environment, or genes). The more a

task loads on GMA, the larger the performance difference between groups scoring high or low in intelligence (see, e.g., Jensen's method of correlated vectors, Jensen, 1998). However, both fluid and crystallized tasks tend to load strongly on GMA (Jensen, 1998). We see this as a cause and then an effect of individual differences in GMA, respectively. Processing power leads individuals to learn more (and more quickly) about a knowledge domain. Depth of knowledge can then become a valid marker for GMA. As an analogy, it is possible that the best schools make students smart; conversely, perhaps the smartest students attend the best schools.

With regard to work, individuals high in GMA—independent of their age—should perform mental tasks more efficiently than those low in GMA. The difference between groups would only increase as job tasks demand more and more processing power (i.e., GMA). Over time, high-GMA workers would also become more competent experts in their fields. Hence, the relationship between experience and job performance is strongly moderated by GMA (Hunter, 1993; Schmidt, Hunter, & Outerbridge, 1986).

Consistent with these ideas, the work outcome best predicted by GMA is training performance (see, e.g., Schmidt & Hunter, 1998). Again, GMA seems to determine the rate and depth of learning occurring in a job. Older adults do benefit from cognitive training, but the effects are typically smaller than those seen with younger adults, especially when training GMA-loaded tasks (Kliegl, Smith, & Baltes, 1989). However, those individuals beginning life with higher levels of GMA should later show less steep performance declines across any job (though this is also as a function of job complexity). High levels of GMA will also help determine the older worker's relative expertise in an area, which can then insulate him or her from age-related information-processing declines.

Conclusions Concerning Developmental Changes

The key point here is not the simple taxonomy of declines/changes that occur with age, but an awareness of the domain-general effects of aging that could affect performance in any job (and especially those jobs high in complexity). That aging produces domain-general declines is supported by our review of the intercorrelated nature of cognitive, sensory, and physical declines, as revealed by studies of cognitive epidemiology. These effects would most likely

affect performance in jobs where processing new information rapidly is essential. Conversely, domain-general age effects can be mitigated by expertise in one's field. In jobs where incumbents rely on over-learned knowledge—even when that knowledge is highly technical in nature—aging seems to have small to no effect on performance.

Given the above review, we believe the most parsimonious explanation for the effects of age on work performance is the GMA \times complexity hypothesis. High levels of GMA will lead people to absorb, integrate, and remember what an expert needs to know about his or her job. The expert knowledge base, once acquired, can be accessed relatively automatically, despite declines in other areas that may occur as a normal part of aging. Since automatic processes seem to be age-invariant, older workers would exhibit little or no deficits in jobs where performance depends on expert knowledge. However, incumbents in jobs where performance is not dependent on expert knowledge (lower-complexity jobs) can be expected to suffer performance declines. Likewise, if job performance depends on expert knowledge, but the older employee's knowledge becomes obsolete, his or her performance would be expected to decline as well. Finally, in jobs with GMA-loaded job tasks that require rapid processing of new information, the performance of older employees may not keep pace with the mental demands of the job.

The Literature Concerning Age and Job Performance

We begin this section by describing a simple but insightful taxonomy developed by Warr (1994a). The taxonomy incorporates two moderators that interact with age to influence job performance. The first moderator is the extent to which job-related capacities decline with age. Capacities can be broadly defined to include any physical, cognitive, or other essential characteristic of a job (Maertens et al., 2010). Many but not all capacities tend to decline with age, and these declines would likely be most pronounced after age 60 (or perhaps age 70; Warr, 1994b). Also, whether the capacity is job-related will vary across jobs. Physical strength, for example, is job-related for the occupation of piano mover but is not particularly job-related for a pianist.

The second moderator is the extent to which job experience affects job performance. Job experience can be viewed as a surrogate for job knowledge, or for expertise gained through experience (i.e., the effect of job experience on job performance is

probably mediated by job knowledge). Like capacity, the interactive effects of job experience and age will vary across jobs. In jobs where the knowledge base changes rapidly (e.g., engineers; Dalton & Thompson, 1971), incumbents may not benefit from increased experience. Conversely, in jobs where large amounts of interrelated information is needed to perform well (e.g., lawyers, doctors), experience and job performance should be positively correlated.

The two moderators in Warr's model (capacity and job experience) can be crossed to form four possible scenarios, as displayed in Table 15.1. In the first scenario, job-related capacities do not decline with age, but experience aids job performance. This combination should produce a positive relationship between age and job performance. For many jobs, knowledge gained over time can fuel job performance gains. This is especially true when the job requires complicated, knowledge-based judgments (e.g., for doctors or lawyers). Here, experienced workers should have an advantage, as they have had more time to absorb the knowledge relevant to their field. The result is the development of expertise, which creates the positive relationship between aging and job performance.

Job experience can sometimes compensate for declines in job-related capacity. This is shown in Scenario 2, as job-related capacities decline with age but performance nonetheless benefits from experience. In this scenario, performance increments associated with age-correlated job experience compensate for performance decrements associated with age-correlated capacity declines. These positive and negative effects mostly cancel each other out, resulting in no overall relationship between age and job performance. An illustration of this effect was reported by Salthouse (1984), where older typists maintained job performance despite slower overall finger speed. Likely caused by their extensive experience, older typists stored more of the to-be-typed text in working memory, which allowed them to compensate (by thinking further ahead) for slower fingers.

In contrast, Scenario 3 shows the case where job-related capacities decline with age but experience does not aid job performance. This could happen when knowledge gained through experience becomes obsolete (e.g., engineers; Dalton & Thompson, 1971) and age-related capacity deficits prevent mastery of current knowledge. This scenario might also apply to any job where processing new information rapidly (e.g., air traffic controllers) is important.

With either example, job performance can be expected to decline with age.

Scenario 4 presents the remaining condition: job-related capacities do not decline with age but experience does not aid job performance. In this case, one would expect no relationship between age and job performance. A possible example is a grocery store cashier. A new employee can be taught the essential functions of this job with minimal training and can probably achieve a high level of performance relatively quickly. Here aging would probably neither increase job performance via more experience nor decrease job performance via global physical and cognitive declines occurring as a normal part of growing older.

Consistent with Warr's taxonomy, Rhodes (1983) observed evidence for positive, negative, and non-linear relationships between age and job performance. Rhodes argued that it is difficult to interpret this literature due to both methodological and conceptual issues that cloud true relationships between age and job performance. We highlight some of these issues after first reviewing the major empirical work in this area.

Waldman and Avolio (1986) conducted a pioneering meta-analysis of age and job performance but summarized data from only 13 studies. Their contribution was soon subsumed and surpassed by McEvoy and Cascio (1989), who analyzed data from 96 independent samples. McEvoy and Cascio reported a mean correlation of only 0.06 and concluded that age was mostly unrelated to job performance. However, their analyses showed that age appeared to have larger (positive) effects on job performance in samples where the average age of workers was low. In samples with a higher mean age of workers, the age/job performance correlation was smaller (and negative).

One example included in their meta-analysis was a field study by Mark (1957), conducted in a manufacturing setting. Mark's study showed that performance improved for workers less than 25 years of age as they matured into the 25- to 34-year-old group. More noticeable age declines were not apparent until workers reached the 55- to 64-year-old group. Overall, the McEvoy and Cascio (1989) meta-analysis suggests that age may have an asymptotic relationship with job performance.

The existence of an asymptotic relationship between age and job performance is also supported by research on job experience. Schmidt, Hunter, Outerbridge, and Goff (1988) speculated that the relationship between experience and job performance is

non-linear and asymptotic. They found specifically that the relationship was positive in the initial years of job experience, but then reached an asymptote such that experience was no longer related to job performance. This non-linear relationship between experience and job performance was judged to be a function of experience leading to job knowledge, and job knowledge leading to job performance. Schmidt et al. argued that most job knowledge is gained in the initial years on the job, and that once an early-career worker has absorbed this knowledge, increasing experience with the job does little to further increase job knowledge.

Although they did not offer specific analyses related to an inverted U-shaped relationship between age and job performance, McEvoy and Cascio (1989) suggested that such a relationship may exist. They speculated that declining abilities associated with aging might impair the performance of older workers. They noted, however, that these declines may be masked due to selective retention. Some older workers leave the workforce, so those who remain and perform adequately probably do not represent all older adults. Also, despite having data from 96 independent samples, McEvoy and Cascio found no large samples with any workers over age 60. Thus, the literature as of 1989 addressed age and job performance, but due to few older workers in the cumulative dataset, it said little about the job performance of older workers. Based on subsequent reviews discussed below, lack of data on older workers continues to be a problem and a limitation to our understanding of the relationship between age and job performance.

In a large-sample study, Avolio, Waldman, and McDaniel (1990) found evidence consistent with a non-linear relationship between total years of experience and supervisory ratings of job performance when accounting for a worker's age. The total years of a worker's experience was shown to be a better predictor of job performance than was the worker's age alone.

Warr's (1994a) model featured above was incorporated into an empirical study by Callahan (1998). In this meta-analytic study, Callahan examined five potential moderators of the relationship between age and job performance. Here, we consider these moderators in some depth for three reasons. First, in conjunction with Warr's model, Callahan's moderators provide a good organizing framework for understanding the complexity of the age/job performance relationship. Second, with 206 correlations, it is by far the largest meta-analysis of age and job

performance, operationalized as task performance (Waldman & Avolio, 1986, had 13; McEvoy & Cascio, 1989, had 96; Sturman, 2003, had 95; and Ng & Feldman, 2008, had 118). Callahan had more independent samples than did other similar studies, including the recent ones (Ng & Feldman, 2008; Sturman, 2003) because she included data from the General Aptitude Test Battery (GATB) database maintained by the Department of Labor. Third, perhaps because Callahan never published her 1998 dissertation, it is rarely cited (it was cited by neither Sturman nor Ng and Feldman), and its findings warrant more attention.

The first moderator examined related to job experience, which Callahan (1998) defined as the number of years a person had worked in an occupation, whether with his or her current or past employer. She noted that occupations vary in the extent to which job experience is associated with job performance. As such, the age/job performance relationship would increase only to the extent that job experience predicted job performance. In addition to Warr's (1994a) model, this moderation hypothesis rested in part on research indicating that there was a positive correlation between experience and job performance (Hunter & Hunter, 1984; McDaniel, Schmidt & Hunter, 1988). Callahan also drew from research by Schmidt, Hunter, Outerbridge, and Goff (1988), who found evidence for an asymptotic relationship between experience and job performance.

Callahan's (1998) second moderator hypothesis concerned the cognitive demands of the job. This moderator hypothesis was motivated by Salthouse's (1992) demonstration of the age \times complexity phenomenon. As reviewed earlier, the effect is probably caused by age-related declines in speed, or information-processing (e.g., working memory) capacity. The logic for selecting this moderator also included the literature on occupational choice and the cognitive ability of incumbents in an occupation (i.e., the GMA \times complexity hypothesis, also reviewed above).

Mean levels of general cognitive ability clearly vary across occupations. Jobs associated with higher cognitive demands have more cognitively gifted incumbents, and jobs lower in cognitive demands have incumbents with lower mean levels of cognitive ability (Wonderlic, 2002). Callahan noted that Avolio and Waldman (1987) demonstrated that the cognitive demands of the job moderate the relationship between age and general cognitive ability. For incumbents in cognitively demanding jobs, there was no relationship between age and general

cognitive ability. However, for incumbents in lower-complexity jobs, there was a negative relationship between age and job performance.

Callahan's (1998) theorizing combined Warr's taxonomy with literature on the cognitive demands of different jobs, and literature on the cognitive decay that occurs as workers grow older. She derived four hypotheses:

1. In low-complexity jobs where performance does not benefit from experience, a negative relationship between age and job experience is expected. This hypothesis stemmed from Avolio and Waldman's (1987) finding that age is negatively related to general cognitive ability in low-complexity jobs. It also relied on Warr's (1994a) taxonomy (Scenario 3 in Table 15.1).

2. In low-complexity jobs where performance does benefit from increased experience, there should be no relationship between age and job performance. Consistent with Warr's taxonomy (Scenario 2 in Table 15.1), the expectation is that declines in general cognitive ability will be offset by benefits of experience for job performance. The result is no net gain or loss in job performance.

3. In high-complexity jobs where performance does not benefit from experience, there should be no relationship between age and job performance. This hypothesis stemmed from Avolio and Waldman's (1987) finding that age is not correlated with general cognitive ability in high-complexity jobs. Also consistent with Warr's taxonomy (Scenario 4 in Table 15.1), if there is no decline in general cognitive ability and experience is unrelated to job performance, then there is neither an advantage nor a disadvantage in job performance associated with age.

4. In high-complexity jobs where experience benefits job performance, the age and job performance relationship will be positive. Because these types of jobs rely more on age-invariant automatic processes (e.g., retrieval from an expertly organized semantic memory system), and because experience aids performance, the age and job performance relationship should be positive.

Callahan's (1998) third moderator highlights the need for frequent retraining of employees. Many jobs change as the result of technology enhancements. Jobs also change as a result of job redesign, such as the restructuring of jobs to accommodate self-managed work teams (Cohen, Ledford, & Spreitzer, 1996). Kubeck, Delp, Haslett, and McDaniel (1996) conducted a meta-analytic review of age and training performance that summarized 83 effect sizes based on 6,610 employees. The results were robust in showing that older adults, on average, performed worse than younger adults. Specifically, older adults scored about 1 standard deviation lower than younger adults with respect to post-training knowledge test scores. In addition, older adults took 1 standard deviation longer on average to complete training tasks, and were about 1.5 standard deviations slower on average to complete an entire training program. These age differences were large across all training tasks but were particularly large when technology was the domain being trained. In sum, compared to younger workers, older adults on average take longer in training, perform worse on training tasks, and benefit less from training. On the basis of the Kubeck et al. study and other age and training literature, Callahan argued that if jobs change frequently, and require frequent retraining, age will correlate negatively with job performance.

Table 15.1 Warr's (1994a) taxonomy of age, job performance, and job characteristics

Scenario	Job-Related Capacities Decline with Age	Job Experience Aids Job Performance	Relationship Between Performance and Age	Illustrative Job Content
1	No	Yes	Positive	Knowledge-based judgments with no time pressure
2	Yes	Yes	No relationship	Skilled manual work
3	Yes	No	Negative	Continuous, paced data processing
4	No	No	No relationship	Relatively undemanding activities

Adapted from Warr, P. (1994a). Age and employment. In H. C. Trandis, M. D. Dunnette, & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (2nd ed., Vol. 4). Palo Alto, CA: Consulting Psychologist Press.

On the other hand, if jobs do not change frequently, age will be positively correlated with job performance (because age will be positively correlated with experience).

Callahan's (1998) fourth moderator concerned physical demands. As summarized earlier in this chapter, numerous studies have found that physical capacity declines with age, including muscular strength (Green, 1986) and motor ability (Noble, Baker, & Jones, 1964). Based on this literature, Callahan argued that jobs with substantial physical demands will show a negative relationship between age and job performance, whereas jobs with low physical demands will show no relationship between age and job performance. Finally, Callahan (1998) also analyzed the mean age of each sample. Although not classified by Callahan as a moderator, this variable was nonetheless used to evaluate whether the age/job performance relationship also depends on the relative mean age of the work samples.

To evaluate her hypotheses, Callahan (1998) collected data on several job attributes. The cognitive and physical demands of jobs were drawn from the "Dictionary of Occupational Titles" (U.S. Department of Labor, 1977). The job attributes of amount of retraining needed and the influence of experience on job performance were measured by ratings provided by experienced occupational analysts. The reliability for the training rating was 0.67 and the reliability of the experience variable was 0.72.

Consistent with the findings of McEvoy and Cascio (1989) and Waldman and Avolio (1986), the mean correlation between age and job performance was 0.06. Random sampling error accounted for only 24% of the variance across studies, suggesting that moderators of the age and job performance relationship were likely. Callahan's (1998) first hypothesis held that the magnitude of the age/job performance relationship would increase to the extent that job experience predicted job performance. The results did not provide strong support for this hypothesis.

Hypothesis 2 had four parts related to the four levels of Warr's (1994) taxonomy. The results supported one of the four parts corresponding to Scenario 1 in Table 15.1. Recall Warr's argument that if age did not result in declines in job-related capacities, and if experience benefited job performance, then the age and job performance relationship would be positive. Because general cognitive ability is not expected to decline (as much) with age in high-complexity jobs (Avolio & Waldman,

1987), Callahan argued that in such jobs, age and job performance would be related when job performance benefits from experience. This hypothesis was supported in that the observed correlation was positive ($r = 0.08$), albeit small.

Callahan's third hypothesis was that jobs that did not require frequent retraining would have a positive correlation between age and job performance, but jobs that required frequent retraining would have a negative correlation. This hypothesis was not supported in that both sets of jobs had small positive correlations between age and job performance (the hypothesis predicted that one correlation would be positive and the other negative). Callahan's fourth hypothesis predicted that the age/job performance relationship would be negative for jobs with high physical demands. Little support was found for this hypothesis.

Callahan's fifth moderator was the mean age of the sample. The age/job performance correlation varied meaningfully across her age categories. When the mean age of the sample was under 25, age and job performance were positively correlated ($r = 0.19$). The correlations were lower and approximately equal yet slightly declining for the next three age categories (mean age 25.1 to 30; mean age 30.1 to 35; mean age 35.1 to 40), specifically r 's = 0.07, 0.06, and 0.05, respectively. This pattern is consistent with the relationship between job experience and job performance in which most of the linear effect is found in early years of experience, and then the effect asymptotes with increasing years of experience (McDaniel et al., 1988; Schmidt et al., 1988).

However, in the age group over 40, the age/job performance relationship turns negative ($r = -0.01$). This pattern of correlations suggests an inverted-U relationship between age and job performance such that age benefits job performance in early years, and then the relationship plateaus from about age 25 to age 40 and then begins to slightly decline for those over 40. This inverted U-shaped relationship is consistent with McEvoy and Cascio's (1989) speculation concerning the shape of the age/job performance relationship, as well as the findings of Avolio et al. (1990).

Callahan's (1998) research found little support for most of the hypothesized moderators. We suspect there are at least two reasons for her largely null results. First, like the McEvoy and Cascio (1989) review, Callahan's samples did not include very many older adults. In her age moderator analysis, only 14 of 206 (7%) samples had a mean age over 40. Therefore, Callahan's samples were likely ill

sued to test hypotheses related to declining capacities associated with advanced age. Her cumulative data say more about age differences between young adults (ages in the twenties) and not-so-old adults (ages in the thirties and perhaps the forties) and less about the job performance of older workers (ages in the fifties, sixties, and seventies). Second, some of Callahan's moderators related to jobs with higher complexity. Although her inclusion of the GATB data enhanced the analyses in many ways (e.g., power, more precise point estimates), few of the jobs in that database are high in complexity.

Sturman (2003) offered a more recent meta-analysis of the age/job performance relationship. His analysis was novel in that it included the evaluation of non-linear models, in a meta-regression framework. In Sturman's analysis, the least complex non-linear model suggested that the relationship between age and job performance approximates an inverted-U shape. Specifically, for younger adults, age is positively correlated with job performance such that increases in the former produce increases in the latter. This relationship gets progressively smaller until around age 49, where the correlation between age and job performance is estimated at zero. After age 49, the relationship between age and job performance becomes negative, such that increasing age is associated with decreasing job performance. This inverted U-shaped relationship is consistent with the theorizing of McEvoy and Cascio (1989) and the empirical findings of Callahan (1998) and Avolio et al. (1990).

However, Sturman also considered a non-linear model containing interactions between age and job complexity, where job complexity reflects the cognitive demands of the job. In this model, age was positively related to job performance in complex jobs. The most reasonable interpretations of Sturman's (2003) results are as follows: (1) there is an inverted U-shaped relationship between age and job performance for lower-complexity jobs; (2) for higher-complexity jobs, the relationship between age and job performance is positive such that older adults do better than younger adults; and (3) these age/job performance relationships are similar for both objective and subjective criteria. We note that the Sturman model consistent with this interpretation explained 8% of the variance (multiple $R \approx 0.28$). Thus, the relationships could be characterized as moderate with respect to Cohen's (1992) rules of thumb for effect sizes.

Our interpretation of the Sturman (2003) results relates to worker capacity issues that covary with age.

Lower-complexity jobs include those that have high levels of physical demands. As workers age, cumulative deficits in physical conditioning may explain the declines in job performance that correspond to the inverted U-shaped curve reported by Sturman. Lower-complexity jobs also tend to have incumbents with lower cognitive skills (Wonderlic, 2002). For such incumbents, the increasing cognitive deficits associated with age may add to the decline in their job performance. This may be particularly true when cognitive resources are needed to adapt to job changes.

In contrast, higher-complexity jobs, on average, place lower demands on physical attributes (e.g., strength and endurance), and thus performance in these jobs will likely suffer less from age-related deficits in physical conditioning, relative to those found with lower-complexity jobs. Older adults in cognitively demanding jobs also face some increasing cognitive deficits with age, but presumably they have ample cognitive resources that buffer against expected age-related declines in performance. In addition, incumbents in complex jobs are likely to have some specialization. Specialization permits the investment of cognitive resources in narrow areas so that age-related deficits may have little impact on performance. Finally, higher cognitive abilities may help the worker discover other ways in which to compensate for age-related deficits (Alea & Cunningham, 2003).

Ng and Feldman (2008) offered the most recent meta-analysis of age and job performance. As with past meta-analyses, the correlation between age and task performance was near zero ($r = 0.02$). In addition, the research also supported the inverted U-shaped relationship between age and task performance. Thus, Ng and Feldman join the earlier studies (Callahan, 1998; McEvoy & Cascio, 1989; Sturman, 2003) in this conclusion. However, the primary contribution of Ng and Feldman is expanding the criterion domain beyond task performance. With respect to these other domains, employee creativity was judged unrelated to age. Conversely, age had small relationships with general (undifferentiated) organizational citizenship behavior (OCB; r^2 's = 0.06 to 0.08), OCB directed at others (r^2 's = 0.05 to 0.07), OCB directed at the organization (r^2 's = 0.06 to 0.14), and somewhat larger correlations with OCB directed at tasks (r^2 's = 0.13 to 0.21).

Ng and Feldman also found that age was positively related to self-rated compliance with safety rules ($r = 0.10$) but negatively related to both objective- and self-rated frequencies of work injuries

($r = -0.08$ and -0.03). There was somewhat less counterproductive behavior with increasing age (r 's = 0.07 to 0.12). Finally, older workers tended to be less tardy (r 's = -0.12 to -0.26) and less absent based on objective measures ($r = -0.26$), although there was a slight positive relationship between age and absences related to sickness (r 's = 0.02 to 0.04). Overall, these results indicate small relationships with age, yet the findings suggest slightly higher non-task performance in many areas favoring older workers.

A largely neglected area of research on age and job performance concerns working in teams. Streufert, Pogash, Piasecki, and Post (1990) found that age-homogenous young (28 to 35 years of age) and middle-age (45 to 55 years of age) teams do not differ by performance. However, older age-homogenous teams (65 to 75 years of age) were less successful at team performance due to an inability to manage incoming information. Conversely, older teams were able to capitalize on opportunities and deal with a simulated emergency as well as young and middle-aged teams. Preliminary meta-analytic results based on a modest number of independent samples ($k = 4$) suggest that older adults outperform their younger and middle-age counterparts when problem content is interpersonal in focus (Thornton & Dumke, 2005). This result is hypothesized to be due to the greater amount of interpersonal experience of older individuals. Subsequently, as an individual ages and encounters more and more interpersonal interactions, his or her performance may improve due to the benefits of increased experience.

The Complexity of Understanding the Age/Job Performance Relationship

As noted by Rhodes (1983), the study of job performance and the aging worker is complicated by several factors. We present five classes of such factors. First, the distinct contributions of age and other time-related factors cannot be easily separated. Consider length of job experience as a time-related factor. Older adults, on average, have more job experience, which contributes to gains in job knowledge over time. However, the influence of job experience on job knowledge may largely dissipate over time if most job-relevant knowledge is gained in the initial years on the job (McDaniel et al., 1988). Likewise, an older worker's job knowledge may become less relevant, or obsolete, to the extent that the job changes with time. For example, Dalton and Thompson (1971) reported performance declines in

engineers that correlated with the relevance of each employee's technical knowledge. Obviously, in jobs where the required technical knowledge changes rapidly, the benefits of experience, as correlated with age, diminish.

Another time-related factor concerns cohort effects. Cohorts consist of persons of about the same age who share common experiences. Examples of cohorts include people who experienced the Great Depression beginning with the stock market crash of 1929, the physical fitness movement, or the women's rights movements (Rhodes, 1983). For the interpretation of cognitive declines with age, an important cohort effect may be the tendency for the mean level of general cognitive ability to rise in recent generations (Flynn, 1984, 1987, 2007). At a micro level, one can find cohort effects in specific organizations (Sterns & Alexander, 1987). These organization-specific cohort effects can stem from many factors, but one is the result of changing selection standards over time. If employers improve their job applicant screening procedures, employees hired later, under the more stringent screening standards, are likely to be higher-performing employees. The result is a confounding of age and selection criteria, as older/long-service employees seem to perform worse while younger/newly hired employees seem to perform better.

A second factor complicating the study of job performance in older workers is the variance in job-related characteristics associated with aging. In relation to job performance, chronological age is the most-studied conceptualization of age (Cleveland & Lim, 2007). Other conceptualizations of age, such as functional or biological age (Salthouse, 1986; Sterns & Doverspike, 1989), may also be relevant. However conceptualized, age gradients associated with job-related characteristics vary widely across individuals (Warr, 1994b). Thus, although age may produce declines in biologically based job-related attributes (e.g., speed, learning, or memory) the variance among older workers is large (Sheppard & Rix, 1977; Sterns & Alexander, 1987). For example, up to 40% of 70-year-olds show no evidence of any known health disorder (Svanborg, 1984). This variability makes conclusions about the "average" older worker more tenuous.

A third factor complicating the study of job performance in older workers is the extent to which job-related deficits associated with aging can be remediated or addressed through compensatory strategies. One approach to dealing with global, age-related cognitive decline is to specialize (Baltes & Baltes, 1990).

Directing reduced capabilities to a specialized area may permit an older worker to maintain or even increase job performance. Specialized knowledge may also aid the older worker in understanding how to best compensate for increasing deficits (Warr, 1994b). For example, older typists, although having lower overall response speed than younger typists, compensate by reading ahead and storing longer segments of text in memory. The expertise of the older, experienced typist acts as a buffer against age-related generalized slowing (Salthouse, 1984).

However, some deficits might not be mitigated by compensatory strategies. Although training may assist an older worker in gaining knowledge and skills associated with changing jobs, older workers, on average, benefit less from training than do younger workers (Kubeck et al., 1996; Trites & Cobb, 1964). Thus, some performance deficits may not be easily or fully remediated by training. Likewise, some job-related deficits regarding worker health (e.g., dementia, death) may not be easily remediated. Additional results by Alea and Cunningham (2003) indicated that even when older individuals perform worse than younger individuals; younger individuals are more likely to attempt to improve performance by seeking help.

Fourth, the study of job performance in older workers is further complicated by movement of older workers out of jobs. Most studies of the job performance of older workers are concurrent; that is, they examine data at one point in time. To the extent that older workers leave jobs because of reasons correlated with job performance, the job performance of older workers may be either over- or underestimated. For example, physical strength declines with age (Stones & Kozma, 1985), which may cause many older workers to leave jobs requiring substantial physical strength. The same can be said for declines in mental abilities.

There is strong empirical support for the gravitational hypothesis of cognitive ability, which states that workers gravitate over their careers to jobs that match their cognitive ability (Wilk, Desmarais, & Sackett, 1995). The remaining older workers in a position may be performing well, leading to the false conclusion that any older adult can perform well in those jobs. Rhodes (1983) noted that this phenomenon is an example of selective survival, common in age research (Baltes, 1968), and that it biases age/job performance relationships in a positive direction.

Positive relationships between age and performance may also be a function of studies that include,

in the same sample, occupations from varying levels in the organization. Older adults are probably over-represented in high-level jobs. In these jobs, performance may be more likely to be evaluated favorably. Such a situation will artificially create a positive relationship between age and job performance (Warr, 1994b). Alternatively, a negative relationship between age and job performance may be a function of promotional practices. The best-performing older workers probably get promotions, leaving only the less-able workers in a position. This situation would result in an apparent negative relationship between age and job performance (Avolio et al., 1990).

Fifth, there are probably occupational moderators that affect the strength, direction, and shape of the age/job performance relationship (Sterns & Alexander, 1987). For example, in jobs with strenuous physical demands (e.g., professional athletes, furniture movers), one may see a sharp decline in performance with increasing age. Those in jobs with few physical demands, such as university professors, may experience few decrements in job performance with age-related declines in physical capabilities. Likewise, if an aging employee had previously acquired job-relevant expert knowledge, one would expect no decline in job performance as long as the knowledge base remains relevant and the job does not require rapid processing of new information.

Different jobs are also associated with different opportunities for career growth or other factors that influence motivation to perform well with increasing age. For example, some jobs have a greater potential for burnout with increasing years of employment early on in an employee's career. Meta-analytic results suggest that there is a modest negative correlation between age and emotional exhaustion, as well as years of experience and emotional exhaustion (Brewer & Shapard, 2004). Finally, different jobs attract different people. Cognitively gifted people tend to work in more complex jobs. High cognitive skills may permit one to enhance performance with age through specialization, or other compensatory strategies. Those with lower cognitive skills may gravitate toward jobs where they are a better fit (Wilk et al., 1995).

Conclusions and Future Directions

What Do We Know About Job-related Capabilities of the Older Worker?

In contrast to the literature on the job performance of older workers, we know a lot about age-related declines in capacities reasonably associated with job performance. The mean declines in job-related

capacities associated with increasing age can reasonably be expected to result in job performance declines associated with increasing age. Thus, rational and empirical arguments suggesting no mean declines in job performance with increasing age should be subject to serious skepticism. Given the present review, it is clear that more research is needed, especially research that includes relatively older working adults.

What Do We Know About the Quality of the Data Available to Draw Conclusions Concerning Age and Job Performance?

We have abysmal data to examine job performance in older workers. McEvoy and Cascio (1989) lamented that they located *no* large samples that included any workers over 60. The cumulative data tell us most about age correlates of performance among those who are not particularly old. Thus, our data do little to inform the issue of job performance in older workers. To the extent that our data do provide information on the job performance of older workers, it may underestimate performance declines. This is probably due to selective retention (McEvoy & Cascio, 1989). Older workers experiencing job performance decrements can leave the workforce and are thus missing from our samples. Or, they change jobs or restrict their activities to those segments of job performance where they remain competent, or at least marginally so. Under most reasonable scenarios, the older workers in our samples are likely to perform at much higher levels than the typical older person.

Although some large meta-analyses (Callahan, 1998; McEvoy & Cascio, 1989; Ng & Feldman, 2008; Sturman, 2003) agree on some of their conclusions, it does not follow, necessarily, that these conclusions are “well supported.” The meta-analyses are analyzing more or less the same set of studies that are substantially deficient in offering credible information about the job performance of older workers. We concede that these meta-analyses tell us a lot about age and job performance differences between young adults (20-year-olds) and not-so-young adults (30- and maybe 40-year-olds), but due to their underrepresentation in the samples, these analyses tell us very little about the job performance of older workers (people age 50 or older).

What Conclusions Can We Draw About the Job Performance of Older Workers?

Given problems with the large body of research in this area, one can draw a number of conclusions,

but some of them are contradictory. Here, we offer four conclusions to complete our chapter. First, one could conclude that age, on average, is a very weak predictor of job performance (Avolio et al., 1990; Callahan, 1998; McEvoy & Cascio, 1989, Ng & Feldman, 2008; Sturman, 2003, Waldman & Avolio, 1986). From the point of view of those who make personnel decisions concerning older adults, this is recommended as a default position. Even if older workers on average suffer job performance declines, not all of them suffer job performance declines. A person should be judged only on his or her individual capabilities rather than the mean capabilities of the group to which they belong.

A second conclusion one could draw from the literature is that age has an inverted-U relationship with job performance. After around age 50, performance in most jobs starts to decline (Callahan, 1998; Ng & Feldman, 2008; Sturman, 2003). One adopting this conclusion might argue that the slope of the decline in job performance, on average, is likely to be steeper than the data suggest because of the movement of the worst-performing older workers out of the workforce, or into jobs more suitable to their declining job-related capacities. This perspective may be the best one for workforce planning professionals who need to forecast staffing needs. Thus, in addition to considering issues like retirement, a planning professional may wish to evaluate how a group of employees with declining job performance, on average, will affect the competitiveness of the organization.

A third conclusion one could draw from the literature is that the inverted U-shaped relationship applies only to those in less cognitively demanding jobs (Sturman, 2003). Workers in high-complexity jobs, where performance relies on an already-acquired knowledge structure, can be expected to maintain performance. This seems true as long as the knowledge base remains relevant to the job and there is no need for the rapid processing of new information. An organization adopting this position may wish to provide incentives to older workers in complex knowledge-based positions to remain in the workforce (see Paullin & Whetzel, 2010, Chapter 21 of this volume). Simultaneously, the organization could provide incentives for older workers in lower-complexity jobs to leave the organization.

A fourth potential conclusion is that organizations can benefit from employing older workers if the employer accommodates their declining

capabilities and capitalizes on their strengths. Older workers engage in slightly more organizational citizenship behaviors than do younger workers. They also have lower rates of tardiness, absenteeism, and counterproductive behavior, and possibly better safety-related performance (Ng & Feldman, 2008). To the extent that organizations can structure work to take advantage of these positive aspects of older workers, the organization will benefit. It may be more productive for organizations to let older workers focus on job content that they can do well, rather than attempting to “train away” performance deficiencies in other areas. For example, faculty members who have declining research productivity with increasing age could be encouraged to focus on teaching and service. If their job performance with respect to teaching and service is also problematic, they could always become university administrators.

Related Chapters

Chapter 9. Studying the Aging Worker: Research Designs and Methodologies

Chapter 12. Physical Capabilities and Occupational Health of Older Workers

Chapter 13. The Aging Process and Cognitive Capabilities

Chapter 14. Aging, Personality, and Work Attitudes

Chapter 16. Age Stereotypes and Workplace Age Discrimination

Further Readings

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