

Relation of group performance to age

[Business](#), [Management](#)



Journal of Applied Psychology 2008, Vol. 93, No. 2, 392–423 Copyright 2008 by the American Psychological Association 0021-9010/08/\$12.00 DOI: 10.1037/0021-9010.93.2.392 The Relationship of Age to Ten Dimensions of Job Performance Thomas W. H. Ng The University of Hong Kong Daniel C. Feldman The University of Georgia Previous reviews of the literature on the relationship between age and job performance have largely focused on core task performance but have paid much less attention to other job behaviors that also contribute to productivity.

The current study provides an expanded meta-analysis on the relationship between age and job performance that includes 10 dimensions of job performance: core task performance, creativity, performance in training programs, organizational citizenship behaviors, safety performance, general counterproductive work behaviors, workplace aggression, on-the-job substance use, tardiness, and absenteeism. Results show that although age was largely unrelated to core task performance, creativity, and performance in training programs, it demonstrated stronger relationships with the other 7 performance dimensions.

Results also highlight that the relationships of age with core task performance and with counterproductive work behaviors are curvilinear in nature and that several sample characteristics and data collection characteristics moderate age-performance relationships. The article concludes with a discussion of key research design issues that may further knowledge about the age-performance relationship in the future. Keywords: age, aging, older workers, job performance, meta-analysis

According to the Bureau of Labor Statistics, the median age of the American workforce has been increasing over the last 30 years—35 years old in 1980, 37 years old in 1990, 39 years old in 2000, and 41 years old in 2006. This trend is also evident worldwide. For instance, International Labor Organization (2005) statistics indicate that young adults between the ages of 20 and 24 were the largest segment of the working population in 1980. However, by 1990 the 30 -34 age group was the largest segment of the working population, and today the largest segment of the world's working population is the age 40 - 44 cohort.

Older workers are becoming an increasingly important concern for organizations for reasons beyond their sheer numbers. The shift to an older workforce has caused many organizations to spend more money on succession planning, pension benefits, health insurance, and medical benefits (Beehr & Bowling, 2002; Paul & Townsend, 1993). In addition, numerous organizations have concerns (and/or stereotypes) that older workers may exhibit lower productivity (Avolio & Waldman, 1994; Greller & Simpson, 1999; Hassell & Perrewe, 1995; Lawrence, 1996).

For instance, compared with younger workers, older workers are stereotyped as being less physically capable, as more likely to have problems getting along with coworkers, as preferring to invest more time in their families than in their jobs (Fung, Lai, & Ng, 2001; Paul & Townsend, 1993), as less technologically savvy, and as less willing to adapt quickly in volatile environments (Isaksson & Johansson, 2000; Riolli-Saltzman & Luthans, 2001).

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Ng, School of Business and Economics, The University of Hong Kong, Pok Fu Lam, Hong Kong; Daniel C. Feldman, Terry College of Business, The University of Georgia. Correspondence concerning this article should be addressed to Thomas W. H. Ng, School of Business and Economics, The University of Hong Kong, Pok Fu Lam, Hong Kong. E-mail: hku. hk 392 Previous research has produced mixed results, however, regarding the precise relationship between age and job performance.

In the three most-cited quantitative reviews of this literature, one found a moderate-sized positive relationship between age and performance (Waldman & Avolio, 1986), one found that age was largely unrelated to performance (McEvoy & Cascio, 1989), and the third found that the age-performance relationship took an inverted-U shape (Sturman, 2003). We believe that one reason for these mixed results is that much of the previous research on the age-performance relationship has focused rather narrowly on the performance of core task activities.

As a result, past research has not closely examined the broad spectrum of behaviors that comprise “job performance” and the multiple ways in which age is related to work effectiveness. Over the past 2 decades, organizational researchers have been examining numerous other job-related behaviors that also legitimately fall under the rubric of job performance. These include the following: creativity, performance in training programs, organizational citizenship behaviors (OCBs), safety performance, counterproductive work behaviors, on-the-job substance use, workplace aggression, tardiness, and absence.

Although most of these job behaviors could not be called core task activities per se (Organ, 1988), they do significantly affect organizational productivity by shaping the organizational cultures and environments in which core task performance takes place (Borman & Motowidlo, 1997). As such, examining a broader and more inclusive set of job performance measures may help clarify the complex relationship between age and performance. Mixed results on the age-performance relationship may also be partially attributable to the differing nature of research samples and data collection characteristics (Lawrence, 1996; S.

R. Rhodes, 1983). For instance, research samples may vary in terms of the types of jobs workers perform, and as such, results may vary depending upon which skills older workers are required to utilize. AGE AND JOB PERFORMANCE 393 Similarly, because the nature of the work environment has changed substantially over the past 30 years, studies on the age-performance relationship conducted in the 1970s may have yielded very different results than studies conducted more recently. In addition, there may be differences in results depending upon whether data were collected cross-sectionally or longitudinally.

For example, the effect of intraindividual aging on performance observed in longitudinal studies may be smaller in magnitude than the effect of broad age group differences observed in cross-sectional studies at any one point in time. Thus, examining the potential moderating effects of sample and data collection characteristics is not only important for research methodology purposes but for theoretical and practical reasons too. It allows us to identify

the conditions under which age is likely to have positive, zero, or negative associations with various components of job performance.

In the following section of the article, then, we briefly address some definitional issues, consider the results of previous quantitative reviews of the age–performance relationship, and discuss how the current study extends these previous reviews. Next, we present the results of an extended meta-analysis and provide evidence on the relationships between age and 10 performance dimensions. In the subsequent section, we examine the moderating effects of sample and data collection characteristics and also explore potential curvilinear relationships between age and performance dimensions.

Finally, in the concluding section, we discuss the implications of our findings for future research and the management of older workers. Theoretical Background Definitional Issues Age versus aging. Age is a continuous variable and is used as such in our analyses. When we refer to age differences, we are referring to group-level differences between individuals at one age and individuals at another age. It is important to note here that, similar to previous quantitative reviews in this area of research (McEvoy & Cascio, 1989; Waldman & Avolio, 1986), the goal of the current meta-analysis is not to isolate the effects of aging per se.

That is, we are not directly examining the intraindividual aging process itself and how it relates to job performance. Instead, our goal is to examine the relationships between age and job performance dimensions across different cohorts and research contexts. For instance, is age, on average, related to job performance after taking into consideration different sample

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characteristics and research conditions? Is the relationship between age and core task performance stronger or weaker than the relationship between age and citizenship behavior? These are the kinds of questions we attempt to address here.

Older workers. Who is considered an “older worker” has been debated in the literature for quite some time. In the retirement literature, older workers are often identified by having reached retirement age or by years until reaching retirement age (Beehr, 1986; Doeringer, 1990). Moreover, as Cleveland and Shore (1992) have noted, age can be defined in terms of an employee’s chronological age, the employee’s subjective age (the individual’s self-perception of age), the employee’s social age (others’ perceptions of the employee’s age), and the employee’s relative age (the degree to which the individual is older than others in the work group). Thus, the meaning of “old” depends, to some extent, on the demographic profiles of an organization or occupation (Shore, Cleveland, & Goldberg, 2003). Another definition that is frequently used in this literature is the legal definition of “older worker” provided by the U. S. Age Discrimination in Employment Act of 1967 (ADEA). This act prohibits discrimination against workers who are 40 years old or above.

Although our data analyses use continuous measures of age wherever possible, in our discussion of “older workers” in the text, we generally rely on the ADEA definition for a variety of reasons. First, previous meta-analyses of age in the applied psychology literature have also utilized 40 years old as the cutoff age (Thornton & Dumke, 2005). Second, unlike authors in disciplines like gerontology and sociology (e. g. , Lindenberger & Baltes, 1997)

who use high cutoff ages to make fine distinctions between the “ young elderly” and “ old elderly” (e. g. under and over age 85), scholars in the organizational sciences are particularly attuned to the fact that the age range in the active workforce is typically 16 – 65 years old (International Labor Organization, 2005). Thus, at least in terms of making a dichotomous split in the workforce, 40 years old appears to be an acceptable cutoff to distinguish between younger and older workers. Third, careers researchers have observed that age 40 typically marks the end of career establishment stage and the start of career maintenance stage (Super, 1980).

As such, the chronological age of 40 often represents a major transition in career stages as well. Finally, defining older workers as 40 or above has some practical benefits because it directly aligns research findings regarding older workers to management implications regarding ADEA compliance in hiring, termination, performance evaluation, and promotion decisions. Undoubtedly over time, the definition of “ older worker” will change. For example, the amendment of ADEA (by the Older Workers Benefit Protection Act of 1990 and the Civil Rights Act of 1991) to prohibit mandatory retirement ages may ultimately push back the age at which people retire (although labor statistics have not indicated any increases in retirement age as of yet). Even more likely, gains in life expectancy will change our conceptions of who is “ middle-aged” and who is “ old. ” For our current purposes, though, the definition of older workers as being age 40 or older is consistent with both previous research and legal definitions and has the benefit of being “ objectively” determined and verifiable across researchers and contexts.

Previous Reviews of the Age-Performance Relationship

Three major quantitative reviews of this literature have been published in the last 25 years. Waldman and Avolio's (1986) review is the earliest meta-analysis in this area. The authors identified 13 empirical studies containing 40 samples. They found that age was positively related to productivity measures of job performance (.27). On the other hand, age was weakly but negatively related to supervisor ratings of job performance (.14). Furthermore, Waldman and Avolio found that the relationship between age and supervisor-rated job performance was stronger for nonprofessionals (.08) than for professionals (.05). Peer ratings of job performance were related to age at .10. In sum, Waldman and Avolio (1986) illustrated that the sign of the relationship between age and task performance varies depending upon which measure of performance is being utilized, who does the performance ratings, and what kinds of jobs workers hold. To the extent that there is a drawback to this meta-analysis, it is the lack of availability of a large number of studies at that time.

Meta-analyses that include too few cumulative studies may contain second-order sampling errors (Hunter & Schmidt, 1990). Addressing this drawback, McEvoy and Cascio (1989) identified 65 empirical studies (containing 96 samples) conducted on the relationship between age and performance. Across these 96 samples, the authors found that the mean correlation between age and job performance was quite low (.06) and that the confidence intervals contained the value of zero. Unlike Waldman and Avolio (1986), McEvoy and Cascio found that type of performance rating (productivity vs. supervisory rating) and job type (professional vs. nonprofessional) did not moderate the relationship between age and

performance. The different results observed in these two meta-analyses may be attributable to the different sets of studies the researchers considered, as McEvoy and Cascio located a wider range of empirical studies than Waldman and Avolio had included. Sturman's (2003) meta-analysis hypothesized that the relationships of performance with three age-related variables (chronological age, job experience, and organizational tenure) were in the form of an inverted-U shape.

With respect to the age-performance relationship, Sturman found that the corrected effect size across 115 empirical studies was .03. Although this effect size is very small, he did find that this relationship was indeed an inverted-U shape. That is, age was positively related to job performance when age was low but was negatively related to job performance when age was high (49 years old). Below, we highlight the main evidence supporting these three different perspectives on the age-performance relationship.

Whereas earlier research on older workers largely focused on the negative relationship between age and task performance (S. R. Rhodes, 1983), more recently researchers have been examining the ways in which age can facilitate task performance or, at the minimum, not adversely affect it (Ebner, Freund, & Baltes, 2006; Kanfer & Ackerman, 2004). As a result, we have a much richer picture now of how age is positively or negatively related to core task performance but not as complete a picture of how age relates to a broad spectrum of other performance measures. Functions, that is, monitoring and controlling attention, suppressing irrelevant information, utilizing analytical reasoning, and updating information in working memory. Older individuals were found to perform much more poorly on this test

battery than their younger counterparts. In general, M. G. Rhodes's results suggest that older individuals may have more difficulties with complex tasks that require a high level of executive functioning. Indeed, there is also cumulative empirical evidence to indicate that older individuals do not do as well as younger individuals when performing multiple complex tasks simultaneously (Verhaeghen, Steitz,

Sliwinski, & Cerella, 2003). Another area in which age appears to have negative association with performance is memory capacity. Previous meta-analyses have demonstrated a significant negative relationship between age and memory. For instance, older adults were found to have poorer recognition and recall memory than younger adults (La Voie & Light, 1994; Spencer & Raz, 1995; Verhaeghen, Marcoen, & Goosens, 1993). Moreover, as a result of these memory differences, employees are less likely to trust the memories of older coworkers.

In an experimental study of attribution theory, for example, Erber and Danker (1995) found that participants expected memory-related performance problems of older workers to continue longer than those of younger workers and were less likely to recommend training when “problem” employees were older. Above and beyond these differences in aptitudes and short-term memory, researchers have also found that older individuals may have less intense work motivation than their younger colleagues (S. R. Rhodes, 1983). For instance, Ebner et al. (2006) found that younger individuals are more likely to frame their goal orientations in terms of striving for gains (e. g. , I want to improve my fitness), whereas older individuals are more likely to frame their goal orientation around maintaining

the status quo or preventing loss (e. g. , I do not want my fitness to deteriorate). These changes in motivation may also be linked to lower productivity on the job. Evidence Supporting Positive or Neutral Relationships of Age With Performance The above literature paints a rather pessimistic view of the relationship of age with job performance.

Nonetheless, a strong case can also be made that older workers may exhibit at least the same, if not greater, job performance as their younger colleagues (Greller & Simpson, 1999). The rationale most frequently cited to support this case is that older workers substitute lengthy job experience and greater general expertise for speed of information acquisition and information recall. This wisdom and expertise, accumulated over the course of a career, may be sufficient to compensate for productivity losses due to any changes in cognitive and physical abilities (Baltes, Staudinger, Maercker, & Smith, 1995).

Kanfer and Ackerman (2004) have emphasized that older age is often accompanied by increases in “ crystallized” intelligence (experiential knowledge). Indeed, experimental evidence provides robust support for Kanfer and Ackerman’s assertion. For instance, Allen, Lien, Murphy, Sanders, and McCann (2002) found that older participants could multitask as effectively as younger participants, albeit at a slower pace. Artistic, Cervone, and Pezzuti (2003) found that older adults’ performance in solving problems exceeded that of younger adults when the problems were familiar

Evidence Supporting Negative Relationships of Age With Performance

Numerous studies have found support for the proposition that age negatively relates to cognitive functioning. For instance, in a large sample of 20, 000

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American workers across multiple occupational groups, Avolio and Waldman (1994) found that age was negatively related to several types of aptitudes, including general intelligence, verbal aptitude, numerical aptitude, spatial aptitude, form perception, clerical perception, motor coordination, finger dexterity, and manual dexterity.

Thus, for jobs in which general cognitive abilities, visual-perceptual abilities, and psychomotor abilities are important components for superior job performance, Avolio and Waldman have suggested that age is negatively related to job performance. Furthermore, M. G. Rhodes (2004) found that there was a strong and significant difference between older and younger adults in performance on a test battery measuring individuals' executive AGE AND JOB PERFORMANCE 395 and representative of tasks frequently encountered.

ColoniaWillner (1998) found that the best performing older employees had higher levels of tacit knowledge than their younger employees. Studies using different research designs have also found that professional expertise, developed over years of practice and experience, can attenuate potential negative relationships between age and performance dimensions (Hess & Auman, 2001; Lindenberger, Kliegl, & Baltes, 1992; Morrow, Leirer, Altieri, & Fitzsimmons, 1994; Thornton & Dumke, 2005; Wilson, Li, Bienias, & Bennett, 2006).

Taken together, the research described above suggests that, after a slower pace of initial learning, older workers can reach the same performance levels as those of their younger colleagues and can multitask effectively. Moreover, when older workers are asked to solve familiar problems, higher self-efficacy

beliefs are activated, and these beliefs can accelerate performance. Thus, although fluid intelligence, short-term working memory, and cognitive speed may decrease with age, deductive reasoning and professional expertise are likely to increase (Masunaga & Horn, 2001).

Moreover, increased wisdom and judgment gained over years of service may increase older workers' effectiveness in contextual performance activities as well. Creativity is the extent to which employees generate new and useful ideas for improving organizational productivity (Anderson, De Dreu, & Nijstad, 2004). For many jobs, creativity might be considered as a separate element of job performance, particularly when creativity relates to organizational adaptability and flexibility.

For instance, some researchers have emphasized the importance of employees' creativity as a critical component of an organization's ability to adapt to rapidly changing business environments (A. De Jonge & De Ruyter, 2004; Johnson, 2001). Consistent with this view of creativity as a key element of job effectiveness, a major study of performance evaluation systems found that some organizations evaluated employees on their innovativeness as well as on their core task performance (Welbourne, Johnson, & Erez, 1998). Performance in Training Programs

Older workers are often stereotyped as being somewhat resistant to change and slow in learning new material. For this reason, researchers have examined older workers' performance in training programs as an element of job effectiveness (Martocchio, 1994). As Tracey, Tannenbaum, and Michael (1995) have suggested, organizations typically provide training to employees on the basis of the assumption that the short-run costs of the design and

execution of training can be recouped through employees' increased productivity in the long run.

However, if employees do not perform well in training programs, it is highly unlikely that they will transfer that new knowledge to real work settings. Furthermore, when employees fail to learn in training programs, the expenses associated with training are wasted as well (Winfred, Bennett, Edens, & Bell, 2003). Expanding the Domain of the Performance Construct
Previous reviews of the age-performance relationship have primarily focused on the performance of core tasks.

According to Borman and Motowidlo (1997), core task performance is concerned with “ the effectiveness with which job incumbents perform activities that contribute to the organization's technical core” (p. 99). In addition to core task performance, however, we also examine nine other performance dimensions that comprise the two broad categories of job behaviors identified by Hunt (1996) as independent of the core job role, namely, citizenship behaviors and minimum performance behaviors.

Citizenship behaviors are those extra behaviors engaged in by employees, over and above their core task requirements, that actively promote and strengthen the organization's effectiveness (Organ, 1988). In this study, the first category is represented by such dimensions as employee creativity, performance in training programs, citizenship behaviors geared to different beneficiaries, and safety performance. In contrast, minimum performance behaviors are those that employees have to engage in (like attending work) or refrain from engaging in (like theft) to keep their jobs (Hunt, 1996).

This second category is represented by such dimensions as general counterproductive work behaviors, workplace aggression, on-the-job substance use, tardiness, and absenteeism. Conceptually, there are certainly other behavioral dimensions that could be included under these two categories. For example, working long hours and demonstrating effective leadership are examples of additional citizenship behaviors that might be considered, whereas refraining from sexual harassment and manipulating stock prices are additional examples of minimum performance variables that could be considered.

Empirically, however, a metaanalysis is constrained by the number of previous studies conducted on a specific relationship, and here we have included the nine dimensions identified above as the ones on which the most empirical studies are available. We discuss each of these additional nine dimensions of job performance in more detail below. OCBs Researchers have documented the importance of OCB for organizational functioning over the last 2 decades (LePine, Erez, & Johnson, 2002; Organ, 1988).

OCBs (sometimes called prosocial behaviors or extrarole behaviors) are not job-specific but rather support the broader organizational environment in which core performance takes place (Motowidlo & Van Scotter, 1994; Organ, 1988). Examples of OCB are compliance with organizational norms, not complaining about trivial matters, and helping coworkers. Employees' aggregated OCBs frequently benefit group, unit, and organizational productivity (Podsakoff, MacKenzie, Paine, & Bachrach, 2000). Safety Performance

Safety performance is the extent to which employees comply with safety rules and demonstrate safe behaviors in the workplace (Parker, Axtell, & Turner, 2001). This performance dimension is particularly important in industries that require employee contact with hazardous materials, operation of heavy machinery, and extensive highway driving (Clarke & Robertson, 2005). Poor safety performance can have two distinct negative consequences for firms' effectiveness. At the individual level, inattention to safety behaviors contributes to employee injuries; these injuries result in lower worker productivity and time lost from work.

At the organizational level, poor safety practices contribute to potentially costly litigation. These claims create substantial financial burdens for firms in the event of serious employee accidents, dismemberments, and death (Hofmann & Morgeson, 1999). Both directly and indirectly, then, employee safety behaviors are an important component of job performance. General Counterproductive Work Behaviors Whereas research investigating OCB concentrates on what workers can do to promote smooth organizational functioning, research on workplace deviance examines how the lack of counterproductive work behaviors is essential to maintaining smooth organizational functioning (Neuman & Baron, 1998). Counterproductive work behaviors are intentional employee acts that harm organizations' legitimate business interests (Bennett & Robinson, 2000). Examples of counterproductive work behaviors include working on personal matters instead of assigned tasks, neglecting supervisors' instructions, stealing property, starting or repeating rumors and gossip, and using unprofessional language.

It is easy to see the multiple ways in which these counterproductive work behaviors can reduce both individual and group performance. Moreover, Dalal (2005) found that employees who frequently engaged in counterproductive work behaviors were also less likely to demonstrate OCBs. (Dalal, 2005; Harrison & Martocchio, 1998; Martocchio, 1989; Son, 2000). Researchers have documented numerous negative effects of employee absence on organizational productivity (Harrison & Martocchio, 1998). When employees are absent from work, the completion of their own work is slowed down.

Coworkers are often called upon to cover for absent employees, thereby distracting them from completing their own assignments. In cases in which task interdependence among a group of workers is high, the whole team's progress may be affected when an employee is chronically absent or absent for extended periods of time. As with tardiness, frequent absences can also adversely affect organizational productivity by creating an "absence culture" in which more and more employees consider being absent acceptable (rather than counterproductive) behavior (Johns & Xie, 1998).

Summary. Before we can draw strong conclusions about the relationship of age to job performance, then, it is important to consider citizenship behaviors and minimum performance behaviors in addition to core task performance. In light of the above literature review, we include 10 dimensions of job performance in the current meta-analysis: core task performance, creativity, performance in training programs, OCB, safety performance, general counterproductive work behaviors, workplace aggression, on-the-job substance use, tardiness, and absenteeism.

From this point on, we use the phrase “ job performance” to represent these 10 dimensions collectively. Specific Counterproductive Work Behaviors In addition to general counterproductive work behaviors, four specific forms of counterproductive work behavior have been discussed separately and extensively in the literature. We also examine these four specific counterproductive work behaviors— workplace aggression, on-the-job substance use, tardiness, and absenteeism—in the present meta-analysis. Workplace aggression.

Workplace aggression consists of employees’ efforts to harm others with whom they work, harm the reputation of their current employers, or harm former colleagues and previous employers (Lapierre, Spector, & Leck, 2005). Acts of workplace aggression can cause bodily harm to employees, pose physical danger for customers, create public relations crises, and harm the business reputation of the firm as a whole. On-the-job substance use. On-the-job substance use involves drinking alcohol or taking illegal drugs at work or during work time (Frone, 2003).

Researchers have found that on-the-job substance use hampers individuals’ decision-making abilities; increases the frequency of dysfunctional job behaviors; and puts coworkers, supervisors, and customers at increased risk of injury (Lehman & Simpson, 1992). Tardiness. Tardiness is lateness for work (Blau, 1994; Koslowsky, Sagie, Krausz, & Singer, 1997). Employee tardiness is likely to create both direct financial costs to organizations (e. g. , decreased time on productive activities) and indirect financial costs (e. g. , time lost by coworkers waiting for late colleagues. . Left unchecked, numerous cases of tardiness can lead to a “ culture of tardiness” (Koslowsky

et al. , 1997) in which employees come to see being late as an acceptable behavior rather than as a deviant one. Absenteeism. Skipping work has also been conceptualized as a form of employee counterproductive behavior (Bennett & Robin- Moderator Relationships Another way in which the present study contributes to the literature is by investigating how different sample and design characteristics moderate the relationship between age and job performance.

Many of these characteristics have been discussed in the literature as variables that can affect age–performance relationships (Lawrence, 1996; S. R. Rhodes, 1983; Shore et al. , 2003; Sturman, 2003) and as potential explanations for inconsistent research findings in the area. Sample Characteristics In this study, we examine the potential moderating effects of the average age, age dispersion, job tenure, and organizational tenure of research samples.

Testing for average sample age as a moderator essentially examines whether the form of the relationship between age and performance is linear or curvilinear (see Sturman, 2003). Testing the moderating role of age dispersion associated with the sample (operationalized as the standard deviation of age in the sample) assesses whether the age–performance relationship varies across samples with different degrees of age homogeneity. Testing for average job tenure and average organizational tenure examines whether the age–performance relationship varies across samples with different (average) tenures.

In general, these four sample characteristics might influence authors' definitions of “ old” in a particular setting. We also examine the potential

moderating effects of job complexity. The job complexity of the sample is important to consider here because it influences the extent to which the specific job skills required on jobs are associated with age-related performance problems. For the same reason, we also consider two related variables, namely, proportion of college degree holders and proportion of AGE AND JOB PERFORMANCE 397 managers in the sample.

It is likely that older workers with more education or who hold managerial roles may have greater ability to substitute accumulated knowledge and judgment for precise technical skills. As such, the results of research on age-performance relationships may vary across samples with different mixes of college graduates and managers. In a more exploratory fashion, we also examine the effects of proportion of women and proportion of Caucasians in the sample. Gender and race have frequently been studied as independent or control variables in previous research on aging, but here we consider their potential moderating effects instead.

Examining these two “proportion” moderators assesses whether the age-performance relationship varies across samples with different proportions of women and Caucasians. of 1993 may have changed the ways in which organizations distinguish between “absence” and “leave” before and after that year. Similarly, the amended ADEA prohibits mandatory retirement ages, which might have changed the relationship between age and performance over time because of a potential change in the proportion of older workers in the labor force.

Collectively, then, these changes may have affected the context in which older workers perform and thus the relationship of age to performance as <https://assignbuster.com/relation-of-group-performance-to-age/>

well. Method Literature Search We performed a comprehensive search for those articles published during or before December 2006 that examined the relationship between age and job performance. Other published studies that did not aim at investigating this specific relationship but reported their effect sizes nonetheless were also included. We also searched for unpublished studies and dissertations to reduce the “file-drawer problem” (Rosenthal, 1979).

We began our literature search by using the following keywords: age, job performance, task performance, productivity, creativity, innovation, training effectiveness, training performance, contextual performance, citizenship behavior, prosocial behavior, extrarole behavior, safety, injuries, accidents, counterproductive behavior, deviance, deviant behavior, aggression, aggressive behavior, violence, violent behavior, substance use, drinking, alcohol, drug, tardiness, lateness, absenteeism, absence, and job complexity.

We searched in numerous research databases, including Dissertation Abstracts International, EBSCOHost, Emerald, Factiva, JSTOR, Oxford Journals, Proquest, PsycINFO, ScienceDirect, Sage Full-Text Collections, and several Wiley InterScience databases. Furthermore, the reference lists of recent meta-analyses that focused on criterion variables of interest were examined carefully to locate other relevant articles. These included, for instance, reference lists from meta-analyses on OCB (LePine et al. , 2002), absence (Martocchio, 1989), task performance (Judge, Thoresen, Bono, & Patton, 2001), work injuries (Clarke & Robertson, 2005), and counterproductive work behavior (Dalal, 2005). Such metaanalyses contained

comprehensive and current reference lists in their respective research fields. Four inclusion and exclusion criteria were set prior to the start of the article search. First, we included field studies in which the age–job performance relationship occurred naturally, whereas laboratory studies were excluded. It is much more difficult to gather measures on performance dimensions besides core task performance in experimental settings (e. g. , lateness and absence).

In addition, we had some concern that core task performance observed in laboratory studies might be partially attributable to the strength and form of the experimental manipulations themselves. Second, studies that examined age or performance only at the team level or organization level were excluded because our focus in this research is on individual behavior rather than group-level performance. Third, to avoid double counting, we excluded those studies in which authors used the same data set and reported the same correlations as in their other published studies.

Fourth, we included studies that involved four types of performance ratings: ratings by Data Collection Characteristics We examine the moderating effects of two data collection characteristics in particular: (a) whether data were collected longitudinally or cross-sectionally, and (b) the publication year of articles. Both these moderators address the role of time in the age–performance relationship. Cross-sectional data collection allows researchers to examine the extent to which there are group-level age differences (between different age cohorts) in job performance across different samples and research contexts.

In contrast, longitudinal data collection helps shed light on the extent to which intraindividual aging is related to job performance (Baltes, Schaie, & Nardi, 1971; Schaie & Hofer, 2001). Results may vary, then, depending upon how the data in a study were collected. For instance, the effect of intraindividual aging on performance may be subtle and gradual, but the differences in performance between broad age groups at one point in time can be quite large. Thus, we examine the distinction between cross-sectional and longitudinal data collection as a potential moderator here. It should be noted that to truly examine the effect of aging on performance, it would be ideal to focus the meta-analysis on longitudinal studies alone. However, there are too few articles available to conduct a meta-analysis on only longitudinal studies; in fact, only 12% of the articles on this topic have been longitudinal in nature. Further, even if we tried to examine only longitudinal studies, the time period examined in those studies does not exceed 5 years, and the average period of time examined in those studies is only about 1 year. Thus, these studies generally do not use long enough time periods to capture intraindividual aging either.

Thus, our database here largely consists of cross-sectional studies, allowing us to get an overall picture of the strength of various age-performance links, considering the variation in the specific performance measures, sample characteristics, and data collection characteristics. We revisit the limitations of cross-sectional data collection in conducting research involving age in more detail later in the article. The year a particular study was published is used here as a rough proxy for the nature of the work environment at the time a study was conducted.

For instance, the last 2 decades have seen increased reliance on career self-management (Arthur & Rousseau, 1996), which may have loosened workers' attachment to long-time employers and increased workers' willingness to change careers later in life. The introduction of the Family and Medical Leave Act 398 NG AND FELDMAN supervisors, ratings by others (peers, subordinates, and customers), self-ratings, and objective measures. This allowed us to examine the moderating role of sources of rating in the age-performance relationship.

With the above search criteria, our search yielded a total of 380 empirical studies, which collectively contain 438 independent samples. Thirteen studies were unpublished dissertations. Of the studies, 14% were published before 1990, 30% of the studies were published between 1990 and 1999, and the remaining 56% were published between 2000 and 2006. The average age across all samples that provided age information was 36.6 years old (ranged between 17 and 59 years old with a standard deviation of 8.8 years). The list of studies is provided in the Appendix. Measures of Key Constructs

Creativity. Previous studies have measured creativity either via self-ratings or ratings by others; we used these two categories in the meta-analysis as well. Sample items of typical Likert-scale measures of creativity include the following: “creating new ideas for improvements”; “searching out new working methods, techniques, or instruments”; and “generating original solutions to problems” (Janssen, 2001). It should be noted that we did not differentiate between creativity and innovation (Anderson et al., 2004); both types of measures are included in our study.

Performance in training programs. Here, we focused on studies that involved training of adults on tasks that have at least some relevance in organizational contexts. Furthermore, only studies that had an explicit training intervention and had measured posttraining performance, competence, or learning were included. Measures of training performance consisted of either ratings given by supervisors or performance on posttraining tests. Studies that assessed employees' participation in computer usage training are representative of the kinds of research articles included in this meta-analysis (e. . , Martocchio, 1994). Other example studies include training programs that teach specific competences or subject-related knowledge (e. g. , law or health care). Although our decision to include only studies that measured posttraining performance gave us a consistent perspective on the effects of training on performance, as we discuss later, the resulting set of studies was likely overrepresented by technology training programs in which older workers might be less likely to excel. OCBs. We included two types of OCB in the meta-analysis.

The first set of studies examined general OCBs and did not differentiate among beneficiaries of those OCBs. The second set of studies examined OCBs geared to three specific beneficiaries: other people on the job, the employer organization as a whole, and the tasks themselves. These subtypes have been identified by previous researchers as reasonable groupings of behaviors in this domain (LePine et al. , 2002). According to LePine et al. (2002), examples of OCB directed to others are helping colleagues with their work and orienting newcomers.

Examples of organization-directed OCB are compliance with organizational norms and not complaining about trivial matters. Examples of task-directed OCB are spending extra effort and persistence on the job and trying hard to improve personal and group performance. It should be noted, too, that within each of these three subtypes, we further differentiated self-ratings from ratings by others. Safety performance. With respect to the measurement of safety performance, three major indicators have frequently been used in previous research and were included in the present metaanalysis.

First, some studies have measured the frequency of work injuries via archival industrial health records. For instance, Hofmann and Morgeson (1999) measured workplace injuries by using the company's archival records of injuries or accidents that occurred in the previous 12-month period. Second, other studies have utilized self-report measures of frequency of work injuries. A third set of studies have measured self-reported levels of compliance with safety procedures and practices. A sample item from this kind of measure is "Occasionally I bend the safety rules when I know it's safe to do so (reverse coded)" (Parker et al. 2001). General counterproductive work behaviors. Most studies have measured general counterproductive work behaviors without differentiating targets, that is, without specifying the target of the counterproductive behavior. A few studies have differentiated between counterproductive work behaviors directed at specific others and those directed at the organization as a whole (e. g. , Liao, Joshi, & Chuang, 2004). However, because of the small number of studies making this distinction, the current meta-analysis did not differentiate between these two categories of studies.

In those few studies that reported both interpersonal and organizational counterproductive work behaviors, we averaged the correlations to obtain an estimate of general counterproductive work behavior. Sample Likert items of measures of general counterproductive work behaviors include the following: “ I keep important information away from my boss” and “ I openly compromise with others but delay implementing the compromise until my own objectives are accomplished” (Duffy, Ganster, & Shaw, 1998). Here, too, we differentiated between self-ratings of counterproductive work behavior and ratings by others.

Workplace aggression. As mentioned above, four specific types of counterproductive work behaviors have frequently been measured in previous research on this topic, and therefore we examined these four specific types of counterproductive behavior in more depth. Measures of workplace aggression typically ask respondents to indicate the frequency of occurrence of aggressive behaviors, such as yelling, swearing at others, damaging others’ property, and fighting (Glomb & Liao, 2003). All the studies we located utilized self-reported measures.

On-the-job substance use. These measures typically ask respondents to indicate the frequency of on-the-job use of alcohol or drugs (Frone, 2003). Here, too, all the studies identified utilized self-ratings. Tardiness. Tardiness is typically measured in two ways. In the first, employees are asked self-report questions like “ How often are you late from work? (never to constantly)” (Hanisch & Hulin, 1990). In the second, archival measures of lateness are obtained directly from personnel records (Conte & Jacobs, 2003).

We included both self-report and archival measures of tardiness in the meta-analysis. Absenteeism. Absenteeism has been measured in three different ways in previous research. The first group of studies measure general absenteeism; these studies do not differentiate between when employees are absent because of sickness or for purely discretionary reasons (Xie & Johns, 2000). Other studies in this line of research measure either the number of days absent from work in a given period (absence duration) or the frequency of absence spells in a given period (absence frequency). Because these indices are all closely related (Conte & Jacobs, 2003), they are aggregated together in the present meta-analysis. A second research stream includes studies that measure sickness absenteeism. As an example, J. De Jonge, Reuvers, Houtman, and Kompier (2000) computed sickness absence as the number of separate spells of sickness absence during 1 full calendar year. Researchers have traditionally viewed absenteeism due to sickness as involuntary absence (Dalton & Todor, 1993).

The third, and last, group of absence studies consists of those that measure nonsickness-related absenteeism. For instance, Vigoda (2001, p. 1499) asked respondents to report “ their estimates of days missed work (during the previous year) for reasons other than sickness. ” As another example, Deery, Erwin, and Iverson (1999) obtained personnel records of frequency of nonmedically certified absences during the prior 12-month period. In contrast to sickness-related absence, researchers have generally viewed nonsickness-related absence as an indicator of voluntary withdrawal behavior (Dalton & Todor, 1993).

Meta-Analytical Procedures Hunter and Schmidt's (1990) meta-analysis technique, which requires corrections for both measurement error and sampling error, was used. Because there is no theoretical reason to believe the measurement of age would contain measurement error, we followed the practice of previous researchers (Martocchio, 1989) and did not disattenuate the measurement of age in individual studies. On the other hand, the behavioral measures of job performance did require disattenuation to remove the influence of measurement errors.

Disattenuation of core task performance. Some researchers have reasoned that it is more appropriate to use interrater reliability to correct for imperfect measurement when task performance is rated by others (i. e. , not by oneself; Judge et al. , 2001; Schmidt & Hunter, 1996; Viswesvaran, Ones, & Schmidt, 1996). In contrast, other researchers argue that measures of intrarater reliability (that is, alpha coefficients or internal consistency estimates) are more appropriate in this regard (Murphy & De Shon, 2000).

In light of these different perspectives on disattenuation, we disattenuated the observed correlations for either imperfect intrarater reliability or imperfect interrater reliability. We first corrected studies for the lack of perfect intrarater reliability in the measurement of core task performance. Because different studies may measure the same construct using different scales, this disattenuation process also adjusts for the different levels of measurement error contained in different scales (Hunter & Schmidt, 1990).

This type of correction requires the use of alpha coefficients (i. e. , internal consistency estimates) reported in individual studies. If no alpha value was reported for a particular scale in a study, an average alpha value calculated

from the rest of the studies using the same scale was taken as a substitute (Judge et al. , 2001). The above procedure for correction for imperfect intrarater reliability was performed on all self-report measures and on all measures provided by supervisors, peers, and customers.

We corrected studies for imperfect interrater reliability when core task performance was measured via ratings by others (i. e. , not via self-reports). This type of correction required the use of interrater reliability estimates. Unfortunately, many studies included in the meta-analysis did not report these estimates. Therefore, following Judge et al. (2001), for studies that used supervisors as the rating source, we disattenuated the correlations using the metaanalytical estimate of the reliability of supervisor-rated job performance provided by Viswesvaran et al. (1996).

For studies that used peers to rate job performance, we disattenuated the correlations using the meta-analytical estimate of the reliability of peer-rated job performance. Because there is a lack of research on interrater reliability associated with less frequently-used raters (i. e. , customers, subordinates, students, or spouses), in these cases we utilized as a proxy estimate the average of the meta-analytical estimate of the reliability of supervisor-rated performance and that of peerrated job performance. As noted earlier, several studies utilized objective measures of core task performance (e. g. quantity of output, sales volume, errors made). Although the notion of interrater and intrarater reliability does not apply to objective measures, it should be noted that these objective measures are still likely to contain some measurement error and might vary depending upon the job complexity of the sample (Sturman, Cheramie, & Cashen, 2005). Because studies seldom reported any

kind of reliability estimates for objective measures of core task performance, as a substitute we adopted the meta-analytical estimate of the test-retest reliability of the objective measure of job performance provided by Sturman et al. (2005). Sturman et al. calculated two separate estimates of the reliability of objective task performance, one for jobs of low complexity (e. g. , secretary) and one for jobs of high complexity (e. g. , engineer). For those studies that sampled mixed job complexity types, we used the average value of Sturman et al. 's two estimates as the proxy. Disattenuation of other performance measures. The disattenuation of the observed correlations between age and the remaining dimensions of job performance largely followed the protocols outlined above.

For instance, for self-ratings of creativity, OCB, counterproductive work behaviors, workplace aggression, tardiness, and absence, we corrected for imperfect intrarater reliability using either alpha coefficients (if provided) or an average alpha value based on the remaining studies that used the same scales (if alpha was not provided). For nonself ratings of these performance dimensions, in addition to correcting for imperfect intrarater reliability using the above procedure, we also corrected for imperfect interrater reliability using Viswesvaran et al. 's (1996) metaanalytical estimates of the reliability of job performance. Finally, for performance measures that were objective in nature (e. g. , training test scores and company records of work injuries, lateness, and absence), we used Sturman et al. 's (2005) meta-analytical estimate of test-retest reliability of the objective performance measure as a substitute. Corrections for sampling errors. The second step in the metaanalysis was correction for sampling errors. Here, we calculated the

sample size-weighted corrected correlation. A corrected correlation was judged to be significant at .5 when its 95% confidence interval did not include the value of zero. Moderator Analyses Subgroup moderator analyses. Two approaches to moderator testing were used. The first one was subgroup analysis; this approach was taken when the moderator variables were categorical in nature (e.g., longitudinal vs. cross-sectional data collection). The coding of most of these categorical moderator variables is self-explanatory. The coding for the job complexity and age moderators, though, requires some further explanation.

In the case of job complexity, two researchers were responsible for the coding. The coding process was guided by previous metaanalyses that also coded job complexity (e.g., Avolio & Waldman, 1990; Salgado et al., 2003; Wood, Mento, & Locke, 1987). Specifically, the two raters classified each sample occupation into high and low job complexity according to the general intelligence, verbal ability, and numerical ability required to perform the job (Avolio & Waldman, 1990). Interrater agreement was 93%. In situations in which there was disagreement, discussion was used to reach consensus.

The Dictionary of Occupational Titles (1991) was used to assist in these discussions, too, because jobs in the Dictionary of Occupational Titles are coded and classified according to several dimensions (e.g., data, people, and things) that reflect job complexity (Avolio & Waldman, 1990; Salgado et al., 2003). Examples of “high complexity” jobs are researchers, accountants, business consultants, psychiatrists, engineers, managers/executives, financial analysts, nurses, IT professionals, and

teachers. “ Low complexity” jobs include clerks, restaurant workers, highway maintenance workers, truck drivers, and receptionists.

In those cases in which we needed to examine the differences across different age subgroups, we sorted studies into four groups on the basis of the average age of the sample: less than 30 years old, 31–35, 36 – 40, and over 40 years old. The reason underlying this categorization is four-fold. First, it approximately equalized the number of studies contained in each group. Second, previous research on life-p development has suggested that the time before 30 years old is often a period within which individuals explore careers, whereas the time after 40 years old roughly marked the end of establishment years (Super, 1980).

Third, ADEA also uses 40 as the “ cutoff age. ” Last, much of the previous research on age and job performance has used decade or halfdecade benchmarks. Regression-based moderator testing. In other cases, the original studies did not provide sufficient sample information with which to categorize moderators. For these moderator variables, therefore, regression-based moderator testing was used. To illustrate the statistical procedures, we utilize the example of “ proportion of women” (i. e. , gender).

We tested the plausibility of gender as a moderator by investigating the effect of the percentage of women in the sample (which was a continuous variable) on the observed relationship between age and job performance (cf. Ng, Eby, Sorensen, & Feldman, 2005). In essence, we used the percentage of women in the sample as an independent variable, in a weighted least squares multiple regression, to predict the correlation coefficients for the age–job performance relationship. If the percentage of women in the sample

as a significant predictor of a relationship between age and a dimension of job performance, then it would suggest that gender moderated that relationship. It should be noted that, among the eight sample characteristics on which we applied this regression approach, only average age, age dispersion, average job tenure, and average organizational tenure of the sample were truly continuous variables per se. The remaining characteristics (proportion of degree holders, managers, women, and Caucasians) were proxies for sociodemographic variables that are typically measured as categorical variables at the individual level.

Nonetheless, this regression technique for testing for moderators in meta-analyses has been found to be more reliable and robust than alternative methods for dealing with this analysis challenge (Steel & Kammeyer-Mueller, 2002). Results The meta-analysis results for the relationships between age and the 10 performance dimensions are presented in Table 1. Relationships Between Age and Job Performance Core task performance. We found that age was largely unrelated to core task performance. It was related to supervisor-rated task performance at .02 (.03 when corrected for interrater reliability), objective measures of task performance at .3, and self-rated task performance at .06. Age was unrelated to core task performance as rated by peers and others. Creativity. Age was not significantly related to creativity. Age was neither related to employee creativity as rated by supervisor (.01; .02 when corrected for interrater reliability) nor to self-reports of creativity (.01). Performance in training programs. We found that age had a weak, negative relationship with performance in training programs (.04). That is,

older workers' performance in training programs was found to be slightly lower than that of younger workers. General and specific types of OCB.

On the other hand, age demonstrated significant and positive relationships with OCB. With respect to general OCB (i. e. , OCB that did not differentiate among or specify targets), age was related to ratings by others at . 06 (. 08 when corrected for interrater reliability) and to self-ratings at . 08. Examining studies that differentiated targets of OCB revealed some interesting results. With respect to OCB directed at others, age was related to ratings by others at . 05 (. 06 when corrected for interrater reliability) and to self-ratings at . 07. With respect to OCB directed at organizations, age was related to ratings by others at . 6 (. 08 when corrected for interrater reliability) and to self-ratings at . 14. With respect to OCB directed at tasks, age was related to ratings by others at . 21 (. 27 when corrected for interrater reliability) and to self-ratings at . 13. Safety performance. Age also demonstrated significant relationships with safety behavior. Specifically, age was positively related to self-rated compliance with safety rules and procedures at . 10. Furthermore, it was negatively related to objective frequency measures of work injuries at . 08 and to self-rated frequency of work injuries at . 03.

General counterproductive work behavior. Age was significantly and negatively related to general counterproductive work behaviors. Most studies have measured general counterproductive work behaviors without differentiating targets. Age was negatively related to these ratings of counterproductive work behaviors given by others (supervisors/peers) at . 09 (. 12 when corrected for interrater reliability) and to self-ratings at . 12. Specific counterproductive work behaviors. Moreover, older workers appear

to engage in less workplace aggression, on-the-job substance use, and tardiness in particular. Age was negatively

AGE AND JOB PERFORMANCE 401 Table 1 Meta-Analytical Relationships Between Age and Job Performance Variable Core task performance Supervisor-rated (Corrected for interrater reliability) Rated by peers and others (Corrected for interrater reliability) Objective measures Self-rated Creativity Rated by supervisor or objective measures (Corrected for interrater reliability) Self-rated Performance in training programs Rated by supervisor or objective measures OCB General (undifferentiated targets) Rated by supervisors, peers, or others (Corrected for interrater reliability) Self-rated Directed at others

Rated by supervisors, peers, or others (Corrected for interrater reliability) Self-rated Directed at organization Rated by supervisors, peers, or others (Corrected for interrater reliability) Self-rated Directed at tasks Rated by supervisors, peers, or others (Corrected for interrater reliability) Self-rated Safety performance Self-rated compliance with safety rules Objective frequency of work injuries Self-rated frequency of work injuries General counterproductive work behavior (undifferentiated targets or types) Rated by supervisor or peers (Corrected for interrater reliability) Self-rated Self-rated workplace aggression Self-rated on-the-job substance use Tard