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Integrating Motivational, Social, and Contextual Work Design Features: A Meta-Analytic Summary and Theoretical Extension of the Work Design Literature

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The authors developed and meta-analytically examined hypotheses designed to test and extend work design theory by integrating motivational, social, and work context characteristics. Results from a summary of 259 studies and 219,625 participants showed that 14 work characteristics explained, on average, 43% of the variance in the 19 worker attitudes and behaviors examined. For example, motivational characteristics explained 25% of the variance in subjective performance, 2% in turnover perceptions, 34% in job satisfaction, 24% in organizational commitment, and 26% in role perception outcomes. Beyond motivational characteristics, social characteristics explained incremental variances of 9% of the variance in subjective performance, 24% in turnover intentions, 17% in job satisfaction, 40% in organizational commitment, and 18% in role perception outcomes. Finally, beyond both motivational and social characteristics, work context characteristics explained incremental variances of 4% in job satisfaction and 16% in stress. The results of this study suggest numerous opportunities for the continued development of work design theory and practice.

Keywords: work design, job design, satisfaction, performance, social support

Interest in work design has a long history. Early writings focused on how the division of labor could increase worker efficiency and productivity (Babbage, 1835; Smith, 1776). The first systematic treatment of the topic was conducted in the early part of the 20th century by Gilbreth (1911) and Taylor (1911), who focused on specialization and simplification in an attempt to maximize worker efficiency. Yet, one of the problems of designing work to maximize efficiency was that it tended to result in decreased employee satisfaction, increased turnover and absenteeism, and difficulties in managing employees in simplified jobs (Hackman & Lawler, 1971).

Reacting to this, researchers developed theories focusing on the motivating features of work (Hackman & Lawler, 1971; Hackman & Oldham, 1975; Herzberg, Mausner & Snyderman, 1959; Turner & Lawrence, 1965). The motivational approach forwarded by these scholars has been influential over the past 30 years (Morgeson & Campion, 2003). For example, the key articles summarizing Hackman and Oldham's job characteristics model and measures have been cited nearly 2,000 times by researchers (ISI Web of Knowledge, 2006). Although the model is more than 30 years old and there are several criticisms of its key propositions and measures (Johns, Xie, & Fang, 1992; Morgeson & Humphrey, 2006; Roberts & Glick, 1981; Taber & Taylor, 1990), it retains a central place in work design theory today. Yet the success of the motivational approach has had two curious effects on work design research over the past 30 years.

First, it has focused research attention on a limited set of motivational work features (e.g., skill variety, autonomy). Although these are important work characteristics, other important aspects of work (such as the social environment and work context) have been neglected. As a consequence, social and contextual aspects of work have received less attention. This is unfortunate, as research in other areas has documented the importance of both the social environment and work context for a wide range of outcomes.

Second, the success of the motivational approach has likely contributed to a general decline of research and theorizing on work design in the fields of industrial/organizational (I/O) psychology and management. Because the motivational approach is widely accepted, it appears that many in the fields of I/O psychology and management concluded that it was "case closed" with respect to work design. As Figure 1 demonstrates, work design research published in top I/O psychology and management journals began to decline in the late 1980s and has remained at a low level ever since. However, work design research appears to be alive and well outside of the top journals in the fields of I/O psychology and management. Such a decline is not entirely unexpected, as scholars in philosophy of science have noted that programs of research traditionally have highly fertile periods, followed by the accumulation of unsolved problems that require changes to the traditional perspective or the introduction of a radically new perspective in order to advance and spur new research (Bechtel, 1988; Kuhn, 1970; Laudan, 1977).

One way to invigorate an area of research is to use meta-analytic techniques to clarify and synthesize existing empirical findings,

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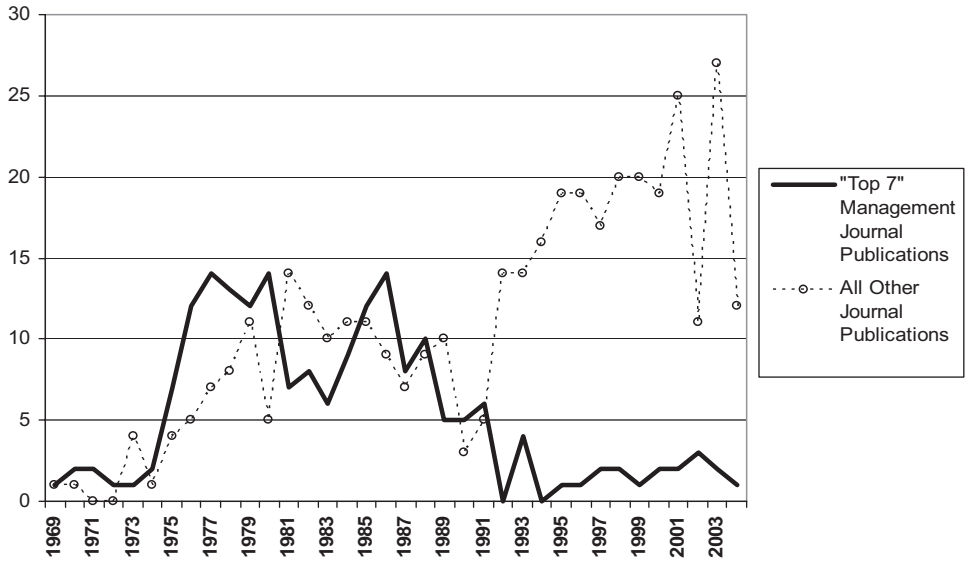

Figure 1. Work design publications (1969–2004). Podsakoff, Mackenzie, Bachrach, and Podsakoff (2005) divided management-related journals (which include the traditional top industrial/organizational psychology journals) into quartiles based upon the journal's impact (assessed via citations per article). The top quartile (seven journals) consisted of *Academy of Management Journal*, *Academy of Management Review*, *Administrative Science Quarterly*, *Journal of Applied Psychology*, *Organizational Behavior and Human Decision Processes*, *Personnel Psychology*, and *Strategic Management Journal*. These Top 7 journals accounted for almost 61% of all citations between 1981 and 1999. Moreover, the Top 7 journals "averaged almost six times more citations per paper (23.93 vs. 4.54) from 1981 to 1999 than the seven bottom journals" (p. 481).

test hypotheses at a qualitatively different level, and point to the best direction for new theoretical developments (Hunter & Schmidt, 2004). Given the large amount of research on work design that has occurred both within and outside the fields of I/O psychology and management, this topic can benefit from meta-analytic techniques.

The goal of our meta-analytic review is to summarize and extend the literature on work design for individual-level jobs. We define work design characteristics as the attributes of the task, job, and social and organizational environment. Our focus is on work design, rather than "job design," because it recognizes that work consists of the attributes of a job and the link between a job and the broader work environment (Morgeson & Humphrey, 2006).

First, we replicate and extend Fried and Ferris's (1987) meta-analytic summary of the motivational characteristics. Compared to Fried and Ferris, our analyses include almost 20 years of additional research studies, 14 additional work design outcomes, and the first formal meta-analytic test of Hackman and Oldham's (1976) mediation model. Second, we develop a theoretical model examining four social characteristics of work, an area long neglected in work design research (Grant, 2007; Morgeson & Humphrey, 2006), and three work context characteristics that have traditionally been examined in the human physiology and engineering literatures (Campion & Thayer, 1985; Parker & Wall, 2001). This expanded model is summarized in Figure 2. Third, we assess the amount of unique variance in work outcomes explained by social characteristics and work context characteristics beyond what is explained by motivational characteristics.

Testing and Extending Work Design Theory

Testing the Job Characteristics Model

Hackman and Oldham (1976) suggested that five work characteristics make jobs more satisfying for workers: *autonomy* (i.e., the freedom an individual has in carrying out work), *skill variety* (i.e., the extent to which an individual must use different skills to perform his or her job), *task identity* (i.e., the extent to which an individual can complete a whole piece of work), *task significance* (i.e., the extent to which a job impacts others' lives), and *feedback from the job* (i.e., the extent to which a job imparts information about an individual's performance). These work characteristics were expected to increase positive behavioral (e.g., job performance) and attitudinal (e.g., job satisfaction) outcomes and decrease negative behavioral outcomes (e.g., absenteeism). In their meta-analytic examination, Fried and Ferris (1987) found that these five characteristics were strongly related to job satisfaction, growth satisfaction, and internal work motivation, with weaker relationships to job performance and absenteeism. In our expanded set of research studies we expected to find similar relationships between these five work characteristics and outcomes.

> *Hypothesis 1:* Autonomy, skill variety, task identity, task significance, and feedback from the job will be (a) positively related to job satisfaction, (b) positively related to growth satisfaction, (c) positively related to internal work motivation, (d) positively related to job performance, and (e) negatively related to absenteeism.

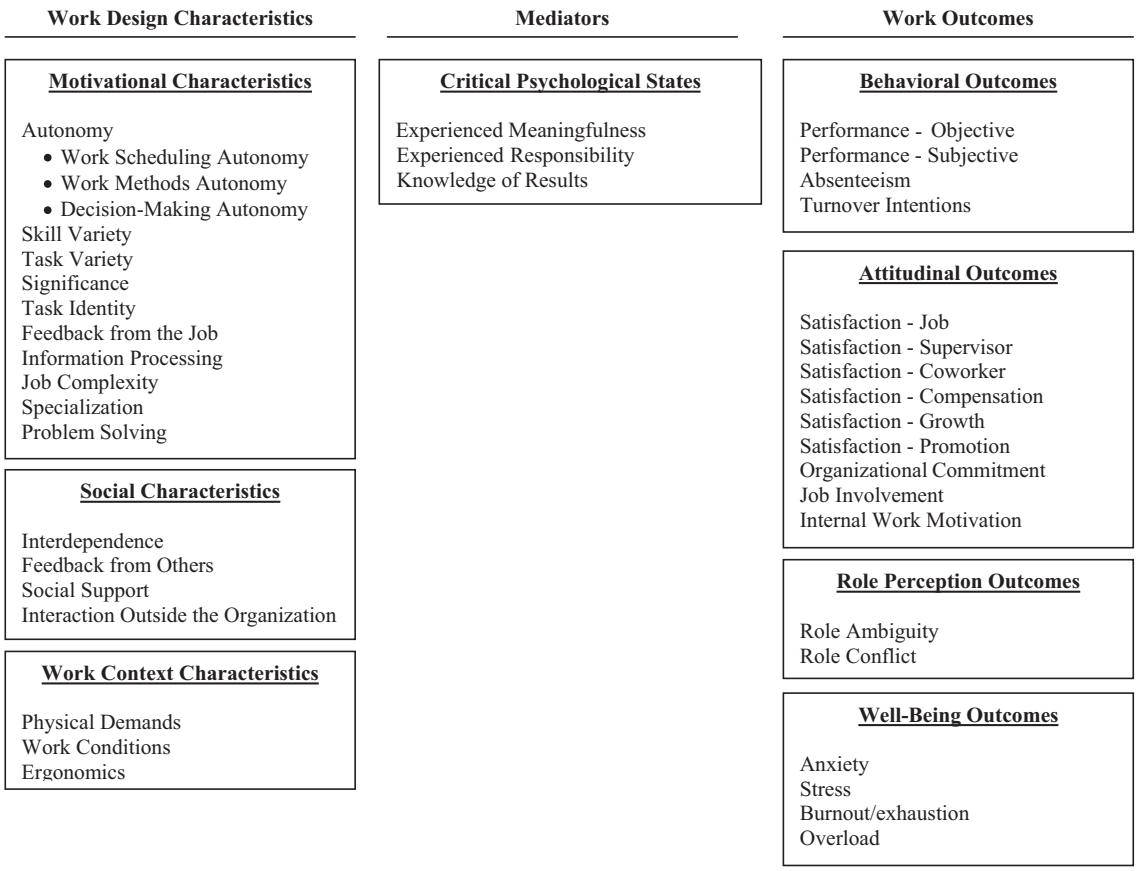

Figure 2. Expanded work design model.

Although Fried and Ferris's (1987) review was limited to the five outcomes of work directly specified by Hackman and Oldham (1976), there is reason to suspect that this set of work characteristics applies to a broader set of outcomes. In fact, Hackman and Oldham's (1976) theoretical model did not specifically argue that the motivational characteristics would only relate to the five outcomes. Instead, they argued more generally that these characteristics would impact positive personal and work outcomes. Thus, we formally tested whether these characteristics generalize to a broader set of behavioral (e.g., turnover intentions) and attitudinal (e.g., organizational commitment, job involvement, supervisor satisfaction) outcomes.

> *Hypothesis 2:* Autonomy, skill variety, task identity, task significance, and feedback from the job will be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes.

Hackman and Oldham (1976) suggested that motivational work characteristics impact behavioral and attitudinal outcomes through their influence on three critical psychological states: experienced meaningfulness (i.e., the degree to which an employee feels the job has value and importance), experienced responsibility (i.e., the degree to which an employee feels liable and accountable for job results), and knowledge of results (i.e., the degree to which the employee is aware of his or her level of performance). Specifically, skill variety, task identity, and task significance are thought to impact experienced meaningfulness, autonomy is thought to impact experienced responsibility, and feedback from the job is thought to impact knowledge of results.

We also expected the critical psychological states to mediate the relationships between these work characteristics and work outcomes. Despite the considerable amount of work design research, however, there has been no comprehensive meta-analytic evaluation of the proposed mediation. Fried and Ferris (1987, p. 305) examined only corrected correlations between the motivational work characteristics, the critical psychological states, and outcomes and explicitly noted that "bivariate correlational analysis cannot provide a specific test of the mediating hypothesis and is less appropriate than other more sophisticated statistical tests." Using more sophisticated techniques, we performed the first meta-analytic test of these mediational predictions.

Whereas Hackman and Oldham (1975, 1980) suggested that the critical psychological states would each independently act as mediators, later work suggested that the true mediation model is different (Johns et al., 1992; Oldham, 1996). In particular, Johns et al. (p. 667) suggested that experienced meaning was a "particularly encompassing psychological state," as it served as a mediator for all five motivational characteristics. Johns et al. did not argue that the other two critical psychological states should be removed from

mediational models but instead suggested that each contributes in varying degrees in the mediational process. Following Johns et al., we tested an alternative mediational model in which we compared the simultaneous mediation ability of all three critical psychological states.

> *Hypothesis 3:* Experienced meaningfulness, experienced responsibility, and knowledge of results will mediate the relationships between (a) autonomy, (b) skill variety, (c) task identity, (d) task significance, and (e) feedback from the job and the behavioral and attitudinal outcomes.

Extending the Job Characteristics Model: Additional Motivational Characteristics

In addition to the five work characteristics identified by Hackman and Oldham (1975), five other motivational work characteristics have been discussed in the literature: task variety, information processing, job complexity, specialization, and problem solving. *Task variety* (i.e., the extent to which an individual performs different tasks at his or her job) is different from skill variety, such that skill variety focuses on the skills necessary to perform a job, whereas task variety focuses on the specific tasks performed. Thus, task variety is conceptually more similar to the other four Hackman and Oldham (1975) characteristics (i.e., autonomy, task significance, task identity, and feedback from the job) than skill variety, in that these four characteristics are concerned with how work is performed and the specific tasks composing a job (Morgeson & Humphrey, 2006). In contrast, skill variety reflects the knowledge and skills necessary to perform a job.

It is interesting to note that task variety was not measured in the most popular work design measure (i.e., the Job Diagnostic Survey; Hackman & Oldham, 1975) and instead is most frequently measured via the Job Characteristics Inventory (Sims, Szilagyi, & Keller, 1976). Because previous researchers often did not conceptually separate skill and task variety, it is not surprising that Fried and Ferris (1987) combined measures of skill and task variety into the same construct when reviewing the work design literature. Due to differences in their construct definitions and operationalizations, however, we separated the two constructs. Yet because task variety is conceptually similar to autonomy, task significance, task identity, and feedback from the job, such that they all focus on how work occurs and the specific tasks being performed, it was reasonable to speculate that task variety would have similar relationships with specified outcomes.

> *Hypothesis 4:* Task variety will be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes.

In contrast to task-focused motivational characteristics, several motivational characteristics are primarily concerned with the knowledge demands of work. These include information processing, job complexity, specialization, and problem solving. First, *information processing* is the extent to which a job necessitates an incumbent to focus on and manage information. Past research has suggested that jobs differ in their level of monitoring and processing of information (Martin & Wall, 1989; Wall & Jackson, 1995; Wall, Jackson, & Mullarkey, 1995). Higher levels of information processing were expected to change the requirements for jobs, as employees require high levels of knowledge in high information processing jobs in order complete their work (Morgeson & Humphrey, 2006).

Second, *job complexity* is the extent to which a job is multifaceted and difficult to perform. Others have discussed the opposite of job complexity, namely *job simplicity* (Campion, 1988; Edwards, Scully, & Brtek, 2000). Because complex jobs involve the use of high-level skills, they tend to be mentally demanding. Previous research has suggested that high job complexity promotes satisfaction but is also likely to hurt efficiency and promote perceptions of work overload, as incumbents find that high-complexity work both engages and overwhelms them.

Third, *specialization* is the extent to which a job involves the performance of tasks requiring specific knowledge and skill. Whereas skill and task variety reflect the breadth of behaviors and skills involved in a job, specialization represents the depth of knowledge and skills necessary. Although there is only limited research surrounding specialization (e.g., Campion, 1988; Edwards et al., 2000), recent research has suggested that increasing specialization may resolve the tradeoff in work design between satisfaction and efficiency (Morgeson & Campion, 2002). That is, although specialization may make work more efficient by simplifying it, it also may make work more motivating by requiring a depth of knowledge in a specific area.

Fourth, *problem solving* is the extent to which a job requires the production of unique solutions or ideas. It is conceptually similar to creativity in that it involves innovating, solving nonroutine problems, and dealing with (or preventing) errors (Jackson, Wall, Martin, & Davids, 1993; Wall, Corbett, Clegg, Jackson, & Martin, 1990).

These four work characteristics were expected to impact a variety of work outcomes. Past research has suggested that increasing knowledge requirements makes work more intrinsically motivating and promotes positive attitudinal outcomes. For example, jobs with high problem-solving requirements provide a chance for employees to perform in challenging, novel situations in which they can demonstrate and reinforce their sense of competence on the job (Deci & Ryan, 2000). In these jobs, the employees were expected to be more motivated and more satisfied.

Whereas these work characteristics were expected to promote positive attitudinal outcomes, the increased cognitive requirements associated with these four work characteristics were expected to harm employee well-being. For example, high-complexity jobs were expected to tax employees' cognitive resources, increasing their stress and perceptions of overload. Finally, we expected that these work characteristics would increase performance. For example, specialization has been shown to increase job efficiency (Morgeson & Campion, 2002) and therefore performance.

> *Hypothesis 5:* Information processing, job complexity, specialization, and problem solving will be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes.

Finally, relying on Hackman and Oldham's (1975) model, we have thus far discussed autonomy as a one-dimensional construct. However, numerous scholars have suggested that autonomy has multiple facets with unique predictive qualities (Breaugh, 1985; Morgeson & Humphrey, 2006). For example, Jackson and colleagues (1993) argued that autonomy can be conceptualized as *work scheduling autonomy* (i.e., the freedom to control the scheduling and timing of work) and *work methods autonomy* (i.e., the freedom to control which methods and procedures are utilized). Additional research has suggested that *decision-making autonomy* (i.e., the freedom to make decisions at work) is also an important component of autonomy (e.g., Karasek et al., 1998).

Although each of these three facets of autonomy was expected to relate to work outcomes, there was reason to suspect differences in their impact. For example, as compared to work scheduling autonomy, job incumbents with high levels of work methods autonomy should perceive that they have greater influence on how a task is accomplished. That is, work methods autonomy allows job incumbents the opportunity to influence the specific behaviors on the job, whereas work scheduling autonomy just suggests that an incumbent can influence how the behaviors are ordered. We therefore hypothesized that the three dimensions of autonomy would be related to work outcomes. In addition, we examined whether the relationships between these three dimensions and work outcomes demonstrate differences in magnitudes on an exploratory basis.

> *Hypothesis 6:* Work scheduling autonomy, work methods autonomy, and decision-making autonomy will be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes.

Extending the Job Characteristics Model: Social Characteristics

Early work design research recognized the importance of the social environment (Trist & Bamforth, 1951; Turner & Lawrence, 1965). In fact, two social characteristics (dealing with others and friendship opportunities) were identified and examined (Hackman & Lawler, 1971). Although it was found that these social characteristics related to satisfaction, their lack of relationships with behavioral outcomes or motivation tempered enthusiasm. From that point forward, with the exception of their inclusion in the Job Characteristics Inventory (Sims et al., 1976), social characteristics received much less attention in the work design literature (Morgeson & Campion, 2003). Although social information processing theory deals with social influences on the perceptions of motivational work characteristics (Pfeffer, 1981; Salancik & Pfeffer, 1978), it does not discuss social characteristics as substantive work characteristics.

Recently, researchers have noted that social characteristics are important components of work (Parker & Wall, 2001) that are nonredundant with motivational characteristics (Grant, 2007; Morgeson & Humphrey, 2006). For example, researchers have noted that relationships between workers are among the most important determinants of well-being (Myers, 1999) and perceptions of meaningful work (Gersick, Bartunek, & Dutton, 2000; Wrzesniewski, Dutton, & Debebe, 2003). These characteristics were expected to reduce job stress by buffering workers against negative job events (Karasek, 1979; Karasek, Triantis, & Chaudhry, 1982). They may also increase work motivation (Adler & Kwon, 2002) and prosocial work behaviors (Grant, 2007), as they promote resilience, security, and positive moods on the job (Ryan & Deci, 2001).

In addition, part of the growth in interest in social characteristics may be attributed to the increased use of teams in organizations (Ilgen, 1999). A team, by definition, has some degree of interdependence amongst its members (Guzzo & Dickson, 1996), producing ample opportunities for social interaction. Moreover, a number of researchers have begun to conduct team task analyses (e.g., Arthur, Villado, & Bennett, in press) that specifically highlight the importance of interdependence (Arthur, Edwards, Bell, Villado, & Bennett, 2005).

We focused on four social characteristics. *Interdependence* is the extent to which a job is contingent on others' work and other jobs are dependent on the work of the focal job. This dimension has alternatively been labeled *dealing with others* (Hackman & Lawler, 1971). Our focus was solely on task interdependence, rather than the broader set of interdependencies people may share (Saavedra, Earley, & Van Dyne, 1993). *Feedback from others* is the extent to which other organizational members provide performance information. It is different from feedback from the job, as it focuses more broadly on the interpersonal component of feedback rather than the performance information derived directly from the work itself. *Social support* is the extent to which a job provides opportunities for getting assistance and advice from either supervisors or coworkers (Karasek, 1979; Karasek et al., 1998) and includes friendship opportunities on the job (Sims et al., 1976). Finally, *interaction outside the organization* is the extent to which a job requires an incumbent to communicate with people (e.g., suppliers or customers) external to the organization. Alternatively labeled *serves the public* (Stone & Gueutal, 1985), this dimension reflects a social component of work linking job incumbents to people who are not members of an employee's organization.

Social characteristics are likely to impact a variety of work outcomes. First, social characteristics were expected to impact well-being, as social interactions are associated with positive mood (Watson, 2000). Wanting to form, participate in, and maintain interpersonal relationships is a fundamental motivation (Baumeister & Leary, 1995), and having interpersonal relationships helps to increase well-being (Cohen & Wills, 1985). Research has demonstrated that social activity, regardless of its nature, extent, duration or valence, has a positive quality and conveys feelings of energy, enthusiasm, and general feelings of positive affect (Watson, 1988, 2000). Thus, increases in social aspects of work were expected to increase incumbent well-being.

Social characteristics should enhance role perceptions, as role theory suggests that roles become more clearly defined through greater contact with others (Biddle, 1979). First, highly interdependent jobs provide increased contact and more opportunities to communicate what each worker requires (Salas, Rozell, Mullen, & Driskell, 1999), what is expected in return (Seers, Petty, & Cashman, 1995), and what each worker is doing (Humphrey, Hollenbeck, Meyer, & Ilgen, 2007). That is, this contact helps bound individual roles (Alderfer & Smith, 1982) by clarifying the roles that each individual fills (Tuckman, 1965). Second, feedback from

others enhances role perceptions by providing opportunities to negotiate and define roles with the appropriate people who hold the expectations and provide the performance feedback (Graen, 1976). Third, high levels of social support provide opportunities in which people can garner advice and assistance from others. This form of interaction is likely to help people clarify their roles and address concerns when they experience incompatible expectations. Fourth, interactions outside an organization allow incumbents to gain additional (external) insight into the specific tasks they perform and provide opportunities for additional, nonredundant feedback on their performance.

We also expected social characteristics to impact attitudinal outcomes. The well-being literature has demonstrated that interactions with others make work more satisfying for an employee (Ryan & Deci, 2001). In addition, having greater interaction with others (through greater interdependence or interaction outside the organization) creates a more complex and challenging job, which can increase motivation (Kiggundu, 1983). Finally, social support from coworkers and supervisors has been found to be important in buffering workers from negative outcomes (Johnson & Hall, 1988; Karasek et al., 1998), thereby increasing satisfaction.

Finally, we expected that social characteristics would impact behavioral outcomes. Social characteristics provide a chance for job incumbents to learn from others. That is, having greater interaction with other employees in performance-oriented (i.e., interdependence) and non-performance-oriented contexts (i.e., social support), having greater interaction outside the organization, and having opportunities for direct performance-related feedback (i.e., feedback from others) provides job incumbents the opportunity to learn how to perform their job more effectively through the transfer of implicit and explicit knowledge (Berman, Down, & Hill, 2002). In addition, we expected that social characteristics would decrease absenteeism and turnover, as social interaction can reduce the negative outcomes associated with work (e.g., stress and overload) and promote positive affect in the job incumbents, making them less likely to want to skip work and more likely to want to continue to work at the organization (Steers & Mowday, 1981).

> *Hypothesis 7:* Interdependence, feedback from others, social support, and interaction outside the organization will be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes.

Extending the Job Characteristics Model: Work Context Characteristics

Work context characteristics, which reflect the broad performance context, have been virtually ignored in the fields of I/O psychology and management (Morgeson & Campion, 2003). However, researchers in related fields such as work physiology, ergonomics, human factors engineering, and biomechanics have studied the physical and environmental context (Campion & Thayer, 1985). Three work context characteristics are pertinent for our discussion: physical demands, work conditions, and ergonomics.

Physical demands reflect the amount of physical activity or effort necessary for a job. Alternatively labeled *physical ease* (Edwards et al., 2000), this characteristic measures the physical strength, endurance, and activity components of a job. *Work conditions* reflect aspects of the work environment such as health hazards, temperature, and noise (Campion & McClelland, 1991; Edwards, Scully, & Brtek, 1999). Finally, *ergonomics* reflects the extent to which work permits appropriate posture and movement.

There are reasons to expect that work context characteristics will impact various work outcomes. First, physical demands, work conditions, and ergonomics reflect the extent to which the job is designed in terms of biological concerns (Campion & Thayer, 1985). If physical demands increase and work conditions or ergonomics decrease, job incumbents will become increasingly physically uncomfortable (Campion, 1988), which in turn will hurt attitudinal outcomes such as job satisfaction. Moreover, if jobs are uncomfortable and dissatisfying, it is likely that job incumbents will want to avoid going to work and will instead look for new jobs.

> *Hypothesis 8:* Physical demands will be (a) negatively related to positive behavioral outcomes, (b) negatively related to positive attitudinal outcomes, and (c) positively related to negative behavioral outcomes.

> *Hypothesis 9:* Work conditions and ergonomics will be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes.

Integrating Motivational, Social, and Work Context Characteristics

Thus far, we have suggested that motivational characteristics, social characteristics, and work context characteristics impact behavioral and attitudinal outcomes. We also expected unique contributions from these work characteristics. Because motivational characteristics focus on individual job components, social characteristics focus on the interactional components, and work context characteristics focus on contextual components, they were expected to have nonredundant effects on behavior and reactions of workers. Thus, the inclusion of all three sets of characteristics would explain unique variance in work outcomes.

Although researchers have not traditionally examined the incremental contribution of either social or work context characteristics above the motivational characteristics, there is some empirical evidence suggesting that this may occur. For example, Hackman and Lawler (1971) and Brief and Aldag (1978) found only a modest correlation between their motivational characteristics and several social characteristics. Yet they found that satisfaction was related to both sets of work characteristics. More recently, Morgeson and Humphrey (2006) found that social support incrementally predicted job satisfaction, training requirements, and compensation requirements beyond the motivational characteristics in their study.

> *Hypothesis 10:* (a) Social characteristics and (b) work context characteristics will explain unique variance in the behavioral and attitudinal outcomes, above and beyond motivational characteristics.

Method

Literature Search

A literature search was conducted to identify published articles, conference papers, and doctoral dissertations that were related to the design of work. The articles were identified through computer-based searches of the PsycINFO (1887–2004) and Web of Science ISI (1970–2004) databases. Searches included the terms *work* or *job* with keywords such as *design, content, redesign, complexity, characteristics, conditions, dimensions, scope, demands, social support, enrichment,* and *interdependence.* In addition, keywords from Hackman and Oldman's (1975, 1976) job characteristic model, such as *job feedback, skill variety, task identity, task significance, autonomy,* and *psychological states,* were also used in the searches. The electronic search was supplemented with a manual search of reference lists of key empirical and theoretical articles as well as reference sections from key chapters on work design and prior meta-analyses. The searches identified more than 8,000 published articles, dissertations, and conference presentations.

Inclusion Criteria

The abstracts obtained from this initial search were reviewed for appropriate content and considered for inclusion in the meta-analysis. After reading the abstracts, we eliminated studies without data (theoretical work or literature reviews) and studies outside of the work context. This resulted in an initial population that was split among the three authors for review. Overall, we examined 677 studies to determine whether each would be included in the meta-analysis. A number of decision rules were used to determine which studies would be included. First, a study must have investigated at least one relationship from the constructs of interest. Second, the study had to report sufficient results to calculate an effect size. Third, the study had to be a unique sample that had not been previously included in the current meta-analysis. If a data set was used more than once, we coded all of the data from the first published manuscript utilizing the data set. We then examined each subsequent study to determine whether it presented unique information about the data set. If a subsequent study presented unique information, we coded that information; if a subsequent study did not present any unique information beyond what was already coded, we did not include the subsequent study in our analyses. These inclusion criteria reduced our final study population to 259 articles, of which 232 were published articles, 23 were dissertations, and 4 were conference presentations.

All three authors participated in the coding of the studies. We each coded approximately one third of the total set of manuscripts. We independently coded each manuscript and met weekly as a group to discuss the manuscripts coded that week. During the weekly meetings, we clarified any ambiguous coding situations (e.g., whether a variable represented Construct A or Construct B), discussed whether an article's data set was unique, and worked to achieve consensus on any disagreements.

In conducting this meta-analysis, we tried to be as comprehensive as possible in capturing all work design constructs. Our initial set of work design constructs was derived from the set of characteristics identified by Morgeson and Humphrey (2006). As we comprehensively reviewed the literature, we started with the 21 dimensions of work design these authors had identified. We then read the recent reviews of the work design literature in order to expand our construct domain. Finally, we examined our population of 677 articles for any additional work design characteristics. At our weekly meetings, we discussed whether variables found in that week's articles should be coded. At the end of this process, we had a list of 33 potential work design characteristics to be coded. To develop the list of mediators and outcomes, we started with the outcomes investigated in the Fried and Ferris (1987) meta-analysis. We then added all relevant constructs studied in previous work design studies, following the same process as described above. This resulted in our coding 36 potential outcomes. In sum, we were coding a total of 2,346 potential relationships. Given the theoretical focus of this article and the low k associated with numerous relationships, we only included a subset of the total possible number of relationships in our meta-analytic review. Specifically, we included a work characteristic in our meta-analytic review if there were at least five studies examining the relationship between the characteristic and job satisfaction. This criterion was selected in order to include a large number of work characteristics yet simultaneously restrict the empirical examination to only those characteristics for which there was a significant accumulation of research. Because of the limited number of studies examining specialization, problem solving, and ergonomics, we followed our inclusion criterion and thus did not meta-analytically summarize these characteristics. Nonetheless, in an effort to be as comprehensive as possible, we coded all of these relationships.

We developed several rules regarding how we would code variables into constructs. The purpose of these rules was to have a common rubric for coding frequently encountered variables that were ambiguously labeled. We developed these rules by examining the wording of the measures. During our weekly meetings, we discussed each ambiguous variable and reached consensus on which constructs were being captured by a specific measure. For example, we concluded that the Job Diagnostic Survey (Hackman & Oldham, 1980) variety measure assessed skill variety, whereas the Job Characteristics Inventory (Sims et al., 1976) variety measure assessed task variety. The complete set of rules is available from Stephen E. Humphrey upon request. These procedures resulted in the coding of 6,333 unique correlations across the 259 articles.

In order to check the reliability of the coding, two of the authors coded a random sample of approximately 10% of the articles (25 out of 259). We found there were only 66 differences in coding (out of 958 pieces of information coded) on the construct labels, resulting in an interrater agreement of 93%. For the coding of the correlations in the studies, we found there were only 70 differences in coding (out of 958 pieces of information coded), again resulting in an interrater agreement of 93%. The interrater reliability estimate for the constructs was .98 and for the correlations was .97. All differences were checked against the original documents to ensure that only correctly coded information was included in analyses.

Meta-Analytic Procedures

We used the Schmidt–Hunter psychometric meta-analysis method (Hunter & Schmidt, 2004) to conduct the meta-analytic review. For studies with multiple measures of the same construct,

we followed Hunter and Schmidt's recommendations by creating composite correlation values. This prevented a study being "double-counted" in the meta-analysis. In contrast, studies that included multiple independent samples were separately coded. We also corrected for measure unreliability. Correlations from individual samples were corrected for measurement error in both the predictor and the criterion scores using Cronbach's alpha (these values were provided by the majority of studies). For the studies missing this reliability coefficient, we used the average value from the other studies.

Several pieces of information are presented concerning the population correlation estimates. First, we include both the uncorrected (r) and corrected (ρ) estimates. Second, we include the 95% confidence interval (CI) for each corrected population correlation. Finally, we present the number of studies included in determining the correlation (k) and the total number of participants in the studies (n).

The following meta-analytic regression procedures were followed. First, as sample sizes differed across studies, we followed previous recommendations (Viswesvaran & Ones, 1995) and utilized the harmonic mean when calculating sample sizes for the meta-analytic regression. Second, we used ordinary least squares techniques for meta-analytic regression, as they have less restrictive assumptions than maximum likelihood and are more optimal when the data are in the form of correlations, rather than covariances. Third, as there were many relationships between work design characteristics and outcomes for which we were not able to find any studies that examined the relationships, we reduced our correlation matrix for specific hypothesis tests to include only constructs for which there was a full matrix. In doing so, we calculated a new sample size derived from the harmonic mean for each regression analysis.

Results

Correlation Results

We first examined the relationships between the work design characteristics. As seen in Table 1, the corrected intercorrelations were positive in sign (with the exception of the relationships with the two work context characteristics) and generally moderate in magnitude (mean $\rho = .25$). This suggested that although the work design characteristics were interrelated, they were not so highly correlated as to be multiple indicators of the same construct. There were several interesting correlations to note. First, the eight motivational characteristics were more highly correlated with one another (mean $\rho = .46$) than with either the four social characteristics (mean $\rho = .27$) or the two work context characteristics (mean $\rho = -.05$), providing evidence that motivational, social, and work context characteristics were unique sets of characteristics. Second, the results showed that although feedback from the job and feedback from others (which have been combined into one scale in some studies) were correlated ($\rho = .57$; 95% CI $= .51 < .57 < .63$), they shared only approximately one third of the same variance. Thus, there seemed to be ample evidence for studying the two constructs independently.

Motivational Characteristics

We sought to replicate Fried and Ferris's (1987) findings by hypothesizing that autonomy, skill variety, task identity, task significance, and feedback from the job would be (a) positively related to job satisfaction, (b) positively related to growth satisfaction, (c) positively related to internal work motivation, (d) positively related to job performance, and (e) negatively related to absenteeism. Table 2 presents the results of these analyses. First, all five motivational characteristics were positively related to job satisfaction (mean $\rho = .41$), growth satisfaction (mean $\rho = .55$), and internal work motivation (mean $\rho = .39$). Thus, the results strongly supported Hypotheses 1a, 1b, and 1c. Second, we note that autonomy was the only motivational characteristic for which the 95% CI did not include zero ($\rho = .17$; 95% CI $= .04 < .17 < .30$) for the relationship with objective performance. In contrast, autonomy, task identity, task significance, and feedback from the job had non-zero correlations with subjective performance (mean $\rho = .18$). Thus, Hypothesis 1d was supported for subjective performance with four of the five motivational characteristics discussed in Fried and Ferris. Finally, in testing Hypothesis 1e, we found that autonomy ($\rho = -.15$; 95% CI $= -.21 < -.15 < -.09$), task identity ($\rho = -.09$; 95% CI $= -.17 < -.09 < -.01$), and feedback from the job ($\rho = -.10$; 95% CI $= -.16 < -.10 < -.03$) were all related to absenteeism, whereas the 95% CIs for skill variety ($\rho = -.07$; 95% CI $= -.15 < -.07 < .01$) and task significance ($\rho = .06$; 95% CI $= -.04 < .06 < .17$) included zero.

In comparison to Fried and Ferris's (1987) meta-analysis, the results of our meta-analysis demonstrated generally stronger relationships between the motivational characteristics and outcomes. One notable exception was absenteeism, which demonstrated markedly smaller magnitude correlations in our review. This difference may be partially attributable to the fact that our review had between 8 and 12 studies of relationships with absenteeism, and the total sample sizes ranged from 1,706 to 2,902 (depending on the specific work characteristic), whereas Fried and Ferris only had 3 studies and a total sample size of 658 per characteristic. Because of the larger number of studies and sample sizes in our review, we were able to produce more accurate coefficient estimates.

Hypothesis 2 predicted that autonomy, skill variety, task identity, task significance, and feedback from the job would be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes. First, as shown in Table 2, none of these characteristics were related to turnover intentions (mean $\rho = -.03$). Second, all of the motivational characteristics were related to supervisor satisfaction (mean $\rho = .30$), coworker satisfaction (mean $\rho = .39$), compensation satisfaction (mean $\rho = .19$), and promotion satisfaction (mean $\rho = .21$), with the strongest relationships consistently held by autonomy (except for promotion satisfaction, for which feedback from the job demonstrated the largest relationship). Third, these five motivational characteristics were related to organizational commitment (mean $\rho = .34$) and job involvement (mean $\rho = .29$). Fourth, only autonomy ($\rho = -.23$; 95% CI $= -.35 < -.23 < -.12$) and feedback from the job ($\rho = -.43$; 95% CI $= -.59 < -.43 < -.28$) were related to role ambiguity, whereas autonomy ($\rho = -.17$; 95% CI $= -.26 < -.17 < -.09$), feedback from the job ($\rho = -.32$; 95% CI $= -.42 < -.32 < -.23$), and task identity ($\rho = -.17$; 95% CI $= -.22 < -.17 < -.12$) were related to role conflict. Fifth, turning to well-being outcomes, autonomy ($\rho = -.10$; 95% CI $= -.14 < -.10 < -.06$) and feedback from the job ($\rho = -.32$; 95% CI $= -.37 < -.32 < -.27$) were related to anxiety; autonomy ($\rho = -.23$; 95%

Table 1
Interrelationships of Work Design Characteristics

Characteristic	Autonomy *r*, ρ (95% CI)	Skill variety *r*, ρ (95% CI)	Task variety *r*, ρ (95% CI)	Task significance *r*, ρ (95% CI)	Task identity *r*, ρ (95% CI)	Feedback from the job *r*, ρ (95% CI)	Information processing *r*, ρ (95% CI)	Job complexity *r*, ρ (95% CI)	Interdependence *r*, ρ (95% CI)	Feedback from others *r*, ρ (95% CI)	Social support *r*, ρ (95% CI)	Interaction outside the organization *r*, ρ (95% CI)	Physical demands *r*, ρ (95% CI)	Work conditions *r*, ρ (95% CI)
Skill variety	.47, .64	—												
	(.60, .69)													
k, N	100, 58,350													
Task variety	.34, .46	.47, .52	—											
	(.32, .60)	(.47, .56)												
k, N	21, 8,877	2, 974												
Significance	.36, .50	.44, .62	.40, .52	—										
	(.46, .54)	(.58, .66)	(.28, .75)											
k, N	100, 41,837	78, 37,758	8, 2,885											
Task identity	.39, .55	.26, .37	.27, .39	.27, .39	—									
	(.51, .59)	(.32, .41)	(.26, .51)	(.34, .43)										
k, N	111, 43,427	80, 36,334	16, 5,881	83, 37,435										
Feedback from the job	.38, .53	.36, .50	.30, .40	.38, .56	.35, .49	—								
	(.49, .56)	(.46, .55)	(.30, .50)	(.51, .61)	(.45, .54)									
k, N	110, 44,390	79, 36,256	15, 5,765	80, 37,082	92, 41,108									
Information processing	.37, .45	.50, .57	.43, .48	.39, .44	−.02, −.02	.21, .25	—							
	(.41, .49)	(.53, .62)	(.43, .53)	(.39, .50)	(−.09, .04)	(.18, .32)								
k, N	6, 1,838	2, 974	2, 974	2, 974	2, 974	2, 974								
Job complexity	.35, .43	.40, .51	.54, .62	.25, .31	.17, .22	.17, .21	.51, .60	—						
	(.28, .58)	(.38, .64)	(.40, .84)	(.19, .42)	(.02, .41)	(.14, .29)	(.51, .68)							
k, N	14, 4,926	9, 3,194	4, 2,404	9, 3,194	10, 3,703	11, 4,644	2, 974							
Interdependence	.19, .29	.39, .61	.14, .18	.31, .50	.13, .19	.26, .41	.21, .25	.25, .37	—					
	(.13, .44)	(.50, .72)	(.08, .28)	(.43, .57)	(.08, .30)	(.31, .51)	(.19, .31)	(.21, .52)						
k, N	33, 19,733	23, 16,448	11, 4,695	25, 51,700	28, 17,889	28, 17,889	2, 974	7, 2,610						
Feedback from others	.35, .48	.27, .37	.07, .10	.25, .36	.21, .31	.40, .57	.12, .14	.01, .01	.23, .33	—				
	(.40, .56)	(.31, .44)	(.06, .15)	(.30, .42)	(.25, .38)	(.51, .63)	(.08, .20)	(−.13, .15)	(.25, .42)					
k, N	38, 19,915	34, 18,987	5, 1,788	35, 19,101	37, 17,410	43, 17,953	2, 974	2, 974	21, 14,850					
Social support	.26, .38	.24, .36	.17, .21	.27, .39	.18, .24	.22, .27	.22, .26	.08, .12	.34, .46	.31, .38	—			
	(.34, .42)	(.32, .40)	(.11, .31)	(.37, .41)	(.14, .34)	(.16, .37)	(.20, .32)	(−.02, .26)	(.41, .51)	(.32, .44)				
k, N	43, 42,668	10, 19,680	9, 3,339	9, 37,908	12, 4,444	13, 13,153	2, 974	6, 3,115	12, 40,181	5, 1,240				
Interaction outside the organization	.10, .11	.15, .17	−.05, −.06	.22, .25	−.09, −.10	.14, .15	.24, .27	.17, .19	−.01, −.01	.07, .08	.03, .04	—		
	(.00, .22)	(.11, .23)	(−.28, .17)	(.19, .31)	(−.17, −.04)	(.07, .24)	(.22, .31)	(.13, .25)	(−.12, .11)	(−.04, .19)	(−.01, .09)			
k, N	4, 2,608	2, 974	3, 2,467	2, 974	2, 974	2, 974	3, 1,626	2, 974	3, 2,467	4, 1,296	3, 31,812			
Physical demands	−.17, −.22	−.13, −.16	.07, .07	−.01, −.01	.01, .01	−.04, −.04	−.19, −.21	−.23, −.27	.11, .13	.04, .05	−.06, −.08	−.04, −.04	—	
	(−.28, −.17)	(−.23, −.09)	(.01, .13)	(−.05, .04)	(−.07, .10)	(−.12, .04)	(−.26, −.16)	(−.38, −.17)	(−.01, .28)	(−.05, .14)	(−.11, −.05)	(−.08, −.01)		
k, N	8, 20,154	6, 18,449	3, 2,467	4, 1,848	4, 1,848	5, 2,222	3, 1,626	5, 2,042	5, 3,341	2, 974	7, 18,823	4, 3,119		
Work conditions	.08, .10	−.09, −.12	−.07, −.07	−.03, −.04	−.03, −.03	−.01, −.01	.20, .23	−.06, −.09	.08, .09	.06, .07	.13, .18	−.08, −.08	−.04, −.04	—
	(.00, .20)	(−.29, .06)	(−.15, .01)	(−.10, .03)	(−.08, .02)	(−.11, .09)	(.17, .29)	(−.26, .09)	(−.08, .26)	(.00, .13)	(.00, .36)	(−.27, .10)	(−.36, .27)	
k, N	9, 4,659	5, 2,747	3, 2,467	4, 1,848	4, 1,848	6, 2391	2, 974	4, 1,848	5, 3,341	2, 974	8, 2,752	3, 2,467	6, 3,715	

Note. r = uncorrected meta-analytic correlation; ρ = correlation corrected for unreliability; 95% CI = 95% confidence interval around ρ; k = number of studies for specific correlation; N = total number of people in the studies for specific correlation.

CI = –.27 < –.23 < –.18), feedback from the job (ρ = –.21; 95% CI = –.33 < –.21 < –.08), and task identity (ρ = –.17; 95% CI = –.23 < –.17 < –.11) were related to stress; and only task significance (ρ = .38; 95% CI = .29 < .38 < .47) was related to overload. In contrast, four characteristics (autonomy, skill variety, task significance, and task identity) were negatively related to burnout/exhaustion (mean ρ = –.26). Taken together, the results demonstrated that these five motivational characteristics generalized to outcomes beyond the five specifically proposed, supporting Hypotheses 2b and 2c.

Hypothesis 3 stated that experienced meaningfulness, experienced responsibility, and knowledge of results would mediate the relationships between (a) autonomy, (b) skill variety, (c) task identity, (d) task significance, and (e) feedback from the job and the behavioral and attitudinal outcomes. As noted by Baron and Kenny (1986), mediation is a multistep process. First, the dependent variables are regressed on the independent variables. Our tests of Hypothesis 1 demonstrated those relationships that successfully passed this step. In the second step, the mediators are regressed on the independent variables. The results of this step can be found in Table 2. For the five characteristics, there were moderate to large relationships (ranging from ρ = .22 to ρ = .68) between these characteristics and experienced meaningfulness, experienced responsibility, and knowledge of results.

The final step of the mediation test was to show that the direct effect of the motivational characteristics on the outcomes was reduced with the inclusion of the mediators. To perform this step, we ran a series of regressions in which we regressed the outcome of interest simultaneously on both the motivational characteristic of interest and the predicted mediator. However, because of missing data between the critical psychological states and several outcomes, we were only able to test mediation for three outcomes: subjective performance, job satisfaction, and internal work motivation. Table 3 presents the results of this step.

The first regression demonstrated that although the relationship between autonomy and subjective performance only decreased slightly with the inclusion of experienced responsibility (β decreased from .23 to .19), the R^2 decreased from .05 to .02, meaning that autonomy explained less than half of the variance in subjective performance when experienced responsibility was included. Experienced meaningfulness served to partially mediate task significance (Δβ: .23 to .21; ΔR^2: .05 to .02), task identity (Δβ: .17 to .12; ΔR^2: .03 to .01), and skill variety (Δβ: .07 to –.06; ΔR^2: .01 to .00). Finally, knowledge of results did not mediate feedback from the job. Table 3 shows that for both job satisfaction and internal work motivation, autonomy was mediated by experienced responsibility; and skill variety, task significance, and task identity were mediated by experienced meaningfulness. In contrast, feedback from the job was only partially mediated by knowledge of results. Taken together, there was strong support for the mediating effect of experienced meaningfulness for skill variety, task significance, and task identity; partial support for the mediating effect of experienced responsibility for autonomy; and no support for the mediating effect of knowledge of results for feedback from the job. Thus, Hypotheses 3a, 3b, 3c, and 3d were supported, whereas Hypothesis 3e was not supported.

To test the alternative model suggested by Johns et al. (1992), we compared the theorized model with one that allowed all three critical states (i.e., experienced meaningfulness, experienced responsibility, and knowledge of results) to act as mediators. The results of these analyses are presented in the right side of Table 3. For subjective performance, the only meaningful difference was the decrease in the beta of autonomy from .19 (mediated by only experienced responsibility) to .07 (mediated by all three critical psychological states). For job satisfaction and internal work motivation, the major difference was that feedback from the job was fully mediated with both outcomes. These mediations can be primarily attributed to experienced meaning, as its inclusion drove the beta and R^2 values to zero. Thus, the results suggested that experienced meaning was the "most critical" critical psychological state, consistent with Johns et al.

Additional Motivational Characteristics

Hypothesis 4 stated that task variety would be (a) positively related to the positive behavioral outcomes, (b) positively related to the attitudinal outcomes, and (c) negatively related to the negative behavioral outcomes. As shown in Table 2, little research has examined the relationships between task variety and a number of outcomes (making it impossible to test Hypothesis 4c). Nonetheless, the limited research demonstrated several relationships. First, although task variety was not related to objective performance (ρ = –.02; 95% CI = –.14 < –.02 < .10), it was related to subjective performance (ρ = .23; 95% CI = .16 < .23 < .29), providing support for Hypothesis 4a. Task variety did not relate to role ambiguity (ρ = –.08; 95% CI = –.17 < –.08 < .01) or role conflict (ρ = .05; 95% CI = –.07 < .05 < .18) but did relate to overload (ρ = .38; 95% CI = .30 < .38 < .46). In addition, it related to four satisfaction outcomes, including job satisfaction (ρ = .46; 95% CI = .35 < .46 < .56), supervisor satisfaction (ρ = .31; 95% CI = .21 < .31 < .40), compensation satisfaction (ρ = .19; 95% CI = .15 < .19 < .23), and promotion satisfaction (ρ = .32; 95% CI = .27 < .32 < .37). Thus, the results provided some support for Hypothesis 4b.

Hypothesis 5 stated that information processing, job complexity, specialization, and problem solving would be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes and (c) negatively related to negative behavioral outcomes. As noted in the Method section, there were not enough studies examining specialization or problem solving to include these characteristics in our meta-analytic review. Moreover, as shown in Table 2, we were only able to examine the relationships for information processing and job complexity with a limited number of outcomes. First, Table 2 shows that information processing was related to job satisfaction (ρ = .38; 95% CI = .35 < .38 < .42), as was job complexity (ρ = .37; 95% CI = .22 < .37 < .52). In addition, job complexity was related to job involvement (ρ = .24; 95% CI = .04 < .24 < .45) and overload (ρ = .59; 95% CI = .52 < .59 < .65), whereas it was not related to anxiety (ρ = .01; 95% CI = –.09 < .01 < .12). Thus, there was some limited, preliminary support for Hypothesis 5b. However, because of the low *n*s and *k*s for both work characteristics, it is important to temper the interpretation of these results.

Hypothesis 6 stated that work scheduling autonomy, work methods autonomy, and decision-making autonomy would be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes. As shown in Table 4, there have

Table 2
Correlations Between Work Characteristics and Outcomes

Outcome	Autonomy *r*, ρ (95% CI)	Skill variety *r*, ρ (95% CI)	Task variety *r*, ρ (95% CI)	Task significance *r*, ρ (95% CI)	Task identity *r*, ρ (95% CI)	Feedback from the job *r*, ρ (95% CI)	Information processing *r*, ρ (95% CI)	Job complexity *r*, ρ (95% CI)	Interdependence *r*, ρ (95% CI)	Feedback from others *r*, ρ (95% CI)	Social support *r*, ρ (95% CI)	Interaction outside the organization *r*, ρ (95% CI)	Physical demands *r*, ρ (95% CI)	Work conditions *r*, ρ (95% CI)
Behavioral outcomes														
Performance—objective	.14, .17 (.04, .30)	−.03, −.03 (−.14, .07)	−.02, −.02 (−.14, .10)		.05, .06 (−.02, .13)	.09, .09 (−.04, .23)		−.06, −.07 (−.57, .43)						
k, N	9, 1,185	3, 344	5, 613		7, 760	8, 874		3, 557						
Performance—subjective	.18, .23 (.19, .28)	.06, .07 (−.01, .15)	.21, .23 (.16, .29)	.16, .23 (.16, .29)	.13, .17 (.14, .19)	.14, .20 (.15, .24)		.32, .37 (.26, .48)	.14, .18 (.05, .31)	.22, .28 (.24, .33)	.09, .12 (−.01, .25)			
k, N	42, 7,886	26, 5,374	2, 918	20, 3,503	25, 8,055	26, 5,241		2, 268	8, 2,200	9, 1,584	5, 1,369			
Absenteeism	−.13, −.15 (−.21, −.09)	−.06, −.07 (−.15, .01)		.05, .06 (−.04, .17)	−.08, −.09 (−.17, −.01)	−.08, −.10 (−.16, −.03)		−.03, −.03 (−.17, .10)	−.06, −.09 (−.22, .05)		−.06, −.09 (−.14, −.03)			
k, N	12, 2,972	11, 2,288		8, 1,706	10, 2,154	11, 2,211		2, 464	4, 853		4, 1,252			
Turnover intentions	.00, −.01 (−.14, .13)	−.07, −.09 (−.21, .04)		−.02, −.03 (−.16, .11)	.00, .00 (−.09, .08)	−.01, −.02 (−.13, .10)		.04, .04 (−.05, .13)	−.11, −.17 (−.31, −.03)	−.22, −.34 (−.46, −.23)	−.26, −.34 (−.47, −.22)			
k, N	21, 7,721	20, 7,549		17, 6,355	17, 6,355	20, 6,720		2, 464	5, 1,178	8, 1,453	9, 1,886			
Role perceptions outcomes														
Role ambiguity	−.19, −.23 (−.35, −.12)	−.06, −.08 (−.25, .08)	−.07, −.08 (−.17, .01)	−.03, −.03 (−.30, .24)	−.09, −.09 (−.33, .15)	−.36, −.43 (−.59, −.28)		.01, .02 (−.16, .19)	.03, .03 (−.13, .19)	−.28, −.54 (−1.00, .00)	−.25, −.32 (−.42, −.21)			.00, .00 (−.20, .20)
k, N	21, 8,186	7, 2,538	10, 3,167	7, 1,369	11, 2,873	14, 12,351		4, 1,863	4, 2,216	5, 1,350	15, 14,385			2, 1,333
Role conflict	−.14, −.17 (−.26, −.09)	.01, .02 (−.13, .17)	.00, .05 (−.07, .18)	.04, .06 (−.11, .24)	−.12, −.17 (−.22, −.12)	−.27, −.32 (−.42, −.23)			−.03, −.03 (−.13, .06)		−.24, −.31 (−.36, −.26)			
k, N	14, 5,400	7, 2,515	5, 978	7, 1,346	8, 2,036	8, 10,369			2, 415		11, 11,996			
Well-being outcomes														
Anxiety	−.08, −.10 (−.14, −.06)	.00, −.01 (−.07, .06)		−.02, −.03 (−.10, .05)	−.07, −.09 (−.20, .01)	−.26, −.32 (−.37, −.27)		.01, .01 (−.09, .12)			−.19, −.23 (−.27, −.19)			
k, N	14, 4,414	5, 1,021		5, 1,021	5, 1,021	6, 9,470		3, 882			10, 12,676			
Stress	−.18, −.23 (−.27, −.18)	−.10, −.14 (−.32, .05)		.04, .05 (−.01, .12)	−.13, −.17 (−.23, −.11)	−.15, −.21 (−.33, −.08)			−.06, −.09 (−.17, −.02)	−.25, −.32 (−.39, −.25)	−.22, −.26 (−.36, −.16)			−.36, −.42 (−.48, −.37)
k, N	13, 12,240	6, 1,673		4, 1,008	4, 1,008	6, 1,212			3, 1,098	7, 1,170	11, 7,946			2, 6,726
Burnout/exhaustion	−.25, −.30 (−.38, −.23)	.06, .07 (−.30, .45)		−.24, −.29 (−.43, −.16)	−.23, −.28 (−.37, −.18)	−.09, −.10 (−.48, .28)				−.14, −.17 (−.29, −.06)	−.27, −.34 (−.40, −.29)			.08, .10 (−.17, .37)
k, N	14, 14,825	4, 1,789		2, 756	2, 756	3, 1,130				2, 322	18, 10,647			2, 1,273
Overload	.02, .02 (−.11, .14)		.33, .38 (.30, .46)	.32, .38 (.29, .47)				.50, .59 (.52, .65)	.08, .10 (−.15, .35)		−.10, −.15 (−.27, −.03)			
k, N	7, 2,961		4, 992	3, 587				2, 1,076	4, 2,520		10, 3,377			

Table 2 (*continued*)

Outcome	Autonomy *r*, ρ (95% CI)	Skill variety *r*, ρ (95% CI)	Task variety *r*, ρ (95% CI)	Task significance *r*, ρ (95% CI)	Task identity *r*, ρ (95% CI)	Feedback from the job *r*, ρ (95% CI)	Information processing *r*, ρ (95% CI)	Job complexity *r*, ρ (95% CI)	Interdependence *r*, ρ (95% CI)	Feedback from others *r*, ρ (95% CI)	Social support *r*, ρ (95% CI)	Interaction outside the organization *r*, ρ (95% CI)	Physical demands *r*, ρ (95% CI)	Work conditions *r*, ρ (95% CI)
Attitudinal outcomes														
Satisfaction-job	.37, .48 (.45, .50)	.32, .42 (.38, .46)	.35, .46 (.35, .56)	.31, .41 (.39, .43)	.23, .31 (.29, .32)	.33, .43 (.41, .45)	.31, .38 (.35, .42)	.32, .37 (.22, .52)	.23, .33 (.30, .36)	.32, .42 (.38, .45)	.41, .56 (.52, .59)	.05, .06 (.03, .08)	−.15, −.17 (−.26, −.08)	.20, .23 (.07, .39)
k, *N*	175, 75,364	111, 48,795	27, 8,480	108, 84,141	121, 49,973	126, 60,272	7, 2,490	13, 3,758	41, 53,993	39, 18,551	52, 91,109	5, 32,625	5, 5,201	8, 9,392
Satisfaction-growth	.51, .69 (.64, .74)	.46, .61 (.57, .66)		.34, .49 (.43, .55)	.25, .35 (.31, .40)	.41, .55 (.50, .60)			.24, .33 (.29, .38)	.08, .11 (−.01, .24)	.52, .78 (.66, .90)			
k, *N*	32, 17,602	31, 15,941		29, 15,395	30, 15,603	31, 15,941			9, 9,370	7, 8,824	3, 1,987			
Satisfaction-supervisor	.30, .40 (.37, .43)	.16, .22 (.18, .25)	.25, .31 (.21, .40)	.18, .25 (.21, .29)	.16, .22 (.18, .26)	.31, .41 (.37, .44)			.14, .19 (.14, .24)	.37, .49 (.42, .56)	.51, .59 (.47, .71)			
k, *N*	31, 20,157	21, 12,482	5, 2,631	19, 12,531	25, 14,246	25, 14,246			13, 11,694	14, 11,109	6, 6,327			
Satisfaction-coworker	.31, .47 (.42, .52)	.26, .39 (.36, .41)		.27, .43 (.40, .46)	.16, .26 (.22, .30)	.27, .41 (.37, .45)			.25, .41 (.35, .46)	.44, .65 (.52, .77)	.41, .64 (.50, .77)			
k, *N*	17, 13,479	15, 11,052		13, 10,740	16, 11,818	16, 11,818			10, 11,071	7, 9,759	4, 2,753			
Satisfaction-compensation	.20, .27 (.23, .31)	.12, .16 (.10, .21)	.14, .19 (.15, .23)	.09, .13 (.10, .15)	.08, .12 (.06, .17)	.19, .26 (.23, .29)			.10, .16 (.13, .18)	.26, .33 (.29, .37)	.15, .24 (.21, .27)			
k, *N*	18, 14,765	15, 11,191	3, 2,417	14, 46,876	16, 12,237	17, 12,406			11, 46,541	7, 9,512	6, 69,294			
Satisfaction-promotion	.13, .19 (.12, .26)	.09, .15 (.11, .19)	.23, .32 (.27, .37)	.08, .14 (.12, .15)	.12, .20 (.16, .24)	.22, .37 (.26, .48)			.08, .15 (.12, .17)	.25, .43 (.20, .66)	.12, .20 (.19, .21)			
k, *N*	8, 3,559	6, 1,926	2, 1,633	5, 37,331	7, 2,692	7, 2,692			5, 37,894	3, 1,510	4, 36,795			
Organizational commitment	.30, .37 (.31, .43)	.23, .28 (.22, .35)		.34, .44 (.39, .48)	.18, .21 (.16, .27)	.29, .33 (.28, .39)			.34, .39 (.37, .40)		.56, .77 (.71, .82)			
k, *N*	15, 6,420	9, 4,799		6, 39,463	9, 4,781	8, 4,665			3, 36,128		12, 69,313			
Job involvement	.23, .30 (.25, .35)	.24, .30 (.25, .36)		.26, .36 (.29, .43)	.14, .19 (.15, .24)	.20, .26 (.20, .32)		.20, .24 (.04, .45)	.16, .20 (.11, .30)	.13, .17 (.11, .24)	.16, .21 (−.01, .42)			
k, *N*	20, 6,502	18, 6,060		15, 5,197	19, 6,282	19, 6,282		2, 1,076	9, 2,585	4, 861	5, 1,493			
Internal work motivation	.27, .38 (.35, .42)	.30, .42 (.39, .46)		.30, .45 (.41, .50)	.17, .26 (.23, .28)	.29, .42 (.39, .46)			.21, .33 (.29, .37)	.22, .31 (.26, .35)	.11, .13 (.04, .23)			
k, *N*	48, 20,835	47, 19,098		41, 18,362	44, 19,013	44, 19,013			13, 10,298	15, 10,186	12, 2,944			
Critical psychological states														
Experienced meaning	.41, .60 (.56, .63)	.44, .62 (.60, .64)		.45, .68 (.64, .73)	.24, .37 (.33, .40)	.37, .53 (.47, .59)			.21, .32 (.28, .36)	.28, .38 (.33, .43)				
k, *N*	22, 11,225	23, 11,274		24, 11,444	24, 11,444	22, 11,225			7, 8,824	7, 8,824				
Knowledge of results	.27, .40 (.37, .43)	.15, .22 (.20, .24)		.21, .33 (.31, .36)	.20, .31 (.28, .34)	.46, .67 (.61, .73)			.05, .08 (.05, .10)	.36, .50 (.42, .58)				
k, *N*	22, 11,225	22, 11,225		22, 11,225	22, 11,225	23, 11,366			7, 8,824	7, 8,824				
Responsibility	.38, .58 (.53, .62)	.33, .49 (.45, .53)		.32, .51 (.47, .56)	.27, .43 (.39, .47)	.33, .49 (.43, .55)			.15, .24 (.21, .28)	.22, .32 (.28, .36)				
k, *N*	23, 11,366	22, 11,225		22, 11,225	22, 11,225	22, 11,225			7, 8,824	7, 8,824				

Note. *r* = uncorrected meta-analytic correlation; ρ = correlation corrected for unreliability; 95% CI = 95% confidence interval around ρ; *k* = number of studies for specific correlation; *N* = total number of people in the studies for specific correlation.

Table 3
Mediation Tests for the Motivational Characteristics

	Hypothesized mediator						All three mediators					
	Performance—subjective		Satisfaction—job		Internal work motivation		Performance—subjective		Satisfaction—job		Internal work motivation	
Characteristic	β	R^2	β	R^2	β	R^2	β	R^2	β	R^2	β	R^2
Autonomy												
Unmediated	.23	.05	.48	.23	.38	.14	.23	.05	.48	.23	.38	.14
Mediated	.19	.02	.16	.02	−.14	.01	.07	.02	−.04	.00	−.20	.02
Skill variety												
Unmediated	.07	.01	.42	.18	.42	.18	.07	.01	.42	.18	.42	.18
Mediated	−.06	.00	−.17	.02	−.09	.01	−.05	.00	−.16	.02	−.10	.01
Task significance												
Unmediated	.23	.05	.41	.17	.45	.20	.23	.05	.41	.17	.45	.20
Mediated	.21	.02	−.31	.05	−.14	.01	.23	.03	−.33	.06	−.10	.01
Task identity												
Unmediated	.17	.03	.31	.10	.26	.07	.17	.03	.31	.10	.26	.07
Mediated	.12	.01	−.01	.00	−.03	.00	.11	.01	−.07	.00	−.07	.00
Feedback from the job												
Unmediated	.20	.04	.43	.19	.42	.18	.20	.04	.43	.19	.42	.18
Mediated	.22	.03	.39	.15	.39	.15	.18	.02	.02	.00	−.07	.00

only been enough studies to summarize the relationships between these three facets of autonomy and job satisfaction. Even so, this table provides some interesting information. First, these three facets of autonomy were fairly strongly correlated (mean ρ = .67), which was not surprising because they are considered subsets of the broader autonomy construct. Second, these three facets of autonomy demonstrated widely different relationships with job satisfaction. That is, whereas the CI for work scheduling autonomy included zero (ρ = .11; 95% CI = .00 < .11 < .21), work methods autonomy had a stronger relationship with job satisfaction (ρ = .34; 95% CI = .30 < .34 < .38) and decision-making autonomy demonstrated an even larger relationship with job satisfaction (ρ = .58; 95% CI = .52 < .58 < .65). Moreover, the CIs for each facet did not overlap, which suggested that the differences in magnitude of these relationships were meaningfully different. Thus, these results provided limited support for Hypothesis 6b.

Social Characteristics

Hypothesis 7 stated that interdependence, feedback from others, social support, and interaction outside the organization would be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively related to negative behavioral outcomes. The results of our meta-analyses investigating this hypothesis are presented in Table 2. As shown in Table 2, no studies have investigated the relationship between these social characteristics and objective performance. Both interdependence (ρ = .18; 95% CI = .05 < .18 < .31) and

Table 4
Correlations Between Autonomy Dimensions and Job Satisfaction

	Work scheduling autonomy	Work methods autonomy	Decision-making autonomy
Variable	*r*, ρ (95% CI)	*r*, ρ (95% CI)	*r*, ρ (95% CI)
Work scheduling autonomy	—		
k, N			
Work methods autonomy	.56, .68	—	
	(.58, .78)		
k, N	9, 1,987		
Decision-making autonomy	.53, .71	.53, .63	—
	(.58, .84)	(.59, .66)	
k, N	7, 1,412	8, 9,731	
Satisfaction—job	.09, .11	.29, .34	.50, .58
	(.00, .21)	(.30, .38)	(.52, .65)
k, N	7, 1,294	12, 11,738	7, 9,008

Note. *r* = uncorrected meta-analytic correlation; ρ = correlation corrected for unreliability; 95% CI = 95% confidence interval around ρ; *k* = number of studies for specific correlation; *N* = total number of people in the studies for specific correlation.

feedback from others (ρ = .28; 95% CI = .24 < .28 < .33) were related to subjective performance, whereas social support (ρ = .12; 95% CI = –.01 < .12 < .25) only weakly was, supporting Hypothesis 7a. Whereas social support (ρ = –.09; 95% CI = –.14 < –.09 < –.03) was related to absenteeism, the 95% CI for interdependence included zero (ρ = –.09; 95% CI = –.22 < –.09 < .05). In contrast, interdependence (ρ = –.17; 95% CI = –.31 < –.17 < –.03), feedback from others (ρ = –.34; 95% CI = –.46 < –.34 < –.23), and social support (ρ = –.34; 95% CI = –.47 < –.34 < –.22) were all related to turnover intentions, providing support for Hypothesis 7c.

All four social characteristics were related to job satisfaction (mean ρ = .36). Interdependence, feedback from others, and social support were all related to supervisor satisfaction (mean ρ = .44), coworker satisfaction (mean ρ = .58), compensation satisfaction (mean ρ = .24), and promotion satisfaction (mean ρ = .26). However, for growth satisfaction, only the CIs for interdependence (ρ = .33; 95% CI = .29 < .33 < .38) and social support (ρ = .78; 95% CI = .66 < .78 < .90) did not include zero, whereas the CI for feedback from others (ρ = .11; 95% CI = –.01 < .11 < .24) included zero. Interdependence (ρ = .39; 95% CI = .37 < .39 < .40) and social support (ρ = .77; 95% CI = .71 < .77 < .82) both were related to organizational commitment; interdependence (ρ = .20; 95% CI = .11 < .20 < .30) and feedback from others (ρ = .17; 95% CI = .11 < .17 < .24) were related to job involvement; and interdependence, feedback from others, and social support (mean ρ = .26) were all related to internal work motivation.

Finally, we examined the relationships between these social characteristics and both role perception outcomes and well-being outcomes. As shown in Table 2, only social support (ρ = –.32; 95% CI = –.42 < –.32 < –.21) was related to role ambiguity, role conflict (ρ = –.31; 95% CI = –.36 < –.31 < –.26), anxiety (ρ = –.23; 95% CI = –.27 < –.23 < –.19), and overload (ρ = –.15; 95% CI = –.27 < –.15 < –.03). All three characteristics were negatively related to stress (mean ρ = –.22), whereas only feedback from others (ρ = –.17; 95% CI = –.29 < –.17 < –.06) and social support (ρ = –.34; 95% CI = –.40 < –.34 < –.29) were related to burnout/exhaustion. Taken together, there was partial support for Hypothesis 7b.

Work Context Characteristics

Hypothesis 8 stated that physical demands would be (a) negatively related to positive behavioral outcomes, (b) negatively related to positive attitudinal outcomes, and (c) positively related to negative behavioral outcomes. As shown in Table 2, we only had enough studies to meta-analyze the relationship between physical demands and job satisfaction. Physical demands was negatively related to job satisfaction (ρ = –.17; 95% CI = –.26 < –.17 < –.08), providing limited support for Hypothesis 8b.

Hypothesis 9 stated that work conditions and ergonomics would be (a) positively related to positive behavioral outcomes, (b) positively related to positive attitudinal outcomes, and (c) negatively relate to negative behavioral outcomes. As noted in the Method section, there were not enough studies examining ergonomics to include this characteristic in our meta-analytic review. As shown in Table 2, work conditions was positively related to job satisfaction (ρ = .23; 95% CI = .07 < .23 < .39) and negatively related to stress (ρ = –.42; 95% CI = –.48 < –.42 < –.37). However, the 95% CIs for both role ambiguity (ρ = .00; 95% CI = –.20 < .00 < .20) and burnout/exhaustion (ρ = .10; 95% CI = –.17 < .10 < .37) included zero. Thus, there was limited support for Hypothesis 9b.

Incremental Contribution of Social and Work Context Characteristics

Hypothesis 10 stated that (a) social characteristics and (b) work context characteristics would explain unique variance in the behavioral and attitudinal outcomes above and beyond motivational characteristics. To test this hypothesis, we conducted several regressions in which the set of motivational characteristics was entered in the first step, the set of social characteristics was entered in the second step, and the set of work context characteristics was entered in the third step. Results of these regressions are presented in Table 5.

First, as shown in Table 5, three social characteristics explained an additional 9% of the variance in subjective performance above and beyond the 25% of the variance explained by the seven motivational characteristics. Although the set of social characteristics only explained an additional 2% of the variance in absenteeism, it explained an additional 24% of the variance in turnover intentions. Thus, the set of social characteristics explained a large amount of variance beyond the motivational characteristics for two behavioral outcomes.

Second, the social characteristics explained an additional 40% of the variance in organizational commitment and 44% of the variance in job involvement. In contrast, they only explained an additional 2% of the variance in internal work motivation. In addition, the social characteristics explained, on average, an additional 24% of the variance in the six satisfaction outcomes, whereas the two work context characteristics accounted for an additional 4% of the variance in job satisfaction beyond the 51% of the variance explained by the 12 motivational and social characteristics.

Third, the social characteristics explained an additional 24% of the variance in role ambiguity and 9% of the variance in role conflict, whereas work conditions did not explain any additional variance role ambiguity. Turning to the well-being outcomes, the social characteristics explained an additional 6% of the variance in anxiety, 9% of the variance in stress, 4% of the variance in burnout/exhaustion, and 10% of the variance in overload. In addition, work conditions explained an additional 16% of the variance in stress and 2% of the variance in burnout/exhaustion. In sum, the social characteristics explained a considerable amount of variance beyond the motivational characteristics, supporting Hypothesis 10a. In addition, although there were only limited empirical data for the work context characteristics, the results of our hierarchical regressions suggested that work context characteristics could explain some additional variance in work outcomes beyond either motivational or social characteristics, providing limited support for Hypothesis 10b.

Discussion

Goals of the Meta-Analytic Review

Meta-analytic techniques are uniquely suited for summarizing and clarifying past research, testing new hypotheses at a qualita-

Table 5
Incremental Regression Results for Outcomes

Outcome	Motivational characteristics Step 1 R^2	Social characteristics Step 2 ΔR^2	Work context characteristics Step 3 ΔR^2	Total R^2
Behavioral outcomes				
Performance-objective	.08			0.08
Performance-subjective	.25	.09		0.34
Absenteeism	.06	.02		0.07
Turnover intentions	.02	.24		0.26
Attitudinal outcomes				
Satisfaction—job	.34	.17	.04	0.55
Satisfaction—supervisor	.25	.29		0.55
Satisfaction—coworker	.29	.33		0.62
Satisfaction—compensation	.11	.07		0.18
Satisfaction—growth	.56	.44		1.00
Satisfaction—promotion	.21	.15		0.35
Organizational commitment	.24	.40		0.64
Job involvement	.43	.44		0.87
Internal work motivation	.27	.02		0.29
Role perception outcomes				
Role ambiguity	.29	.25	.00	0.54
Role conflict	.22	.11		0.33
Well-being outcomes				
Anxiety	.15	.06		0.20
Stress	.14	.09	.16	0.38
Burnout/exhaustion	.17	.04	.02	0.23
Overload	.54	.10		0.64

Note. Motivational characteristics are autonomy, skill variety, task variety, task significance, task identity, feedback from the job, information processing, and job complexity. Social characteristics are interdependence, feedback from others, social support, and interaction outside the organization. Work context characteristics are physical demands and work conditions. Only those work characteristics that appear with population correlations in Table 2 are included in specific regressions.

tively different level, and advancing theory (Hunter & Schmidt, 2004). Although work design research has slowed in the I/O psychology and management fields during the past 20 years, it is important that researchers continue to investigate this topic, as the design of work has a profound effect on employees' behavior, attitudes, and well-being (Campion, Mumford, Morgeson, & Nahrgang, 2005). More than 34% of the variance in performance and more than 55% of the variance in job satisfaction was a function of the 14 work characteristics investigated herein. Thus, we had three goals for our meta-analytic review.

First, we were interested in replicating and extending Fried and Ferris's (1987) meta-analytic summary of the work design literature. To accomplish this goal, we meta-analytically summarized 259 studies, compared to Fried and Ferris's 76 studies. This allowed us to test 19 outcomes (vs. their 5) in our meta-analytic review. The large sample sizes for several relationships (e.g., 75,364 respondents and 175 studies for the autonomy–job satisfaction relationship) provided highly stable estimates of the true population correlation. Thus, we have provided the best estimates to date for the relationships studied herein.

In addition, we were able to provide the first meta-analytic test of the job characteristics–critical psychological states–outcomes mediation model. Whereas Fried and Ferris (1987) were able to examine only bivariate correlations between the motivational characteristics, mediation processes, and work outcomes, we utilized Baron and Kenny's (1986) multistep mediation process. The results suggest a modified mediation model for the motivational characteristics in which the primary mediator of the motivational characteristics–work outcome relationships is experienced meaning. Its inclusion in the mediation model led to the greatest level of mediation.

Perhaps it should not be surprising that experienced meaningfulness is the best mediator of the relationships between motivational characteristics and work outcomes. Three motivational characteristics (skill variety, task identity, and task significance) have been hypothesized to impact work outcomes through experienced meaningfulness (Hackman & Oldham, 1976).

Other psychological research helps us understand why the other two motivational characteristics (autonomy and feedback from the job) impact work outcomes through experienced meaningfulness. The research suggests that the ultimate goal of human beings is to pursue meaning in our work and nonwork lives (Ryan & Deci, 2001), as experiencing meaning has been found to promote well-being and happiness (King & Napa, 1998; Zika & Chamberlin, 1992). Authors have suggested that experienced meaning is the critical mediator between life events and positive outcomes (Fredrickson, 2003) and that promoting intrinsic motivation is central to helping people achieve this meaning (Deci & Ryan, 2000). Therefore, all of the motivational characteristics, which are theoretically and empirically linked to internal work motivation, should be expected to promote meaning.

People also find work meaningful if they are able to pursue cherished goals (Klinger, 1977; Ryff & Singer, 1998). Thus, if one views the development of meaning as a process of setting and pursuing important goals, having both autonomy and feedback from the job is essential. Successful goal completion requires that employees have flexibility in how goals are pursued (Locke & Latham, 1990). If employees have autonomy in the decision-making process leading to goal completion, they will have higher levels of experienced meaning (Maddi, 1970). More directly, numerous studies have shown that autonomy is critical for creating self-determination and meaning (Deci & Ryan, 2000). In addition, it is crucial that employees receive feedback on the progress toward goal accomplishment (Locke & Latham, 1990). Feedback from the job provides an opportunity for employees to learn about their performance level and proximity to their goal. If employees are successfully moving toward goal accomplishment, experienced meaning will be enhanced. If employees learn that they are not moving toward goal accomplishment, having the ability to change their behavior (i.e., autonomy) will allow them the ability to find different paths toward goal accomplishment. Thus, having autonomy and feedback from the job should promote experienced meaning and positive work outcomes.

Second, we were interested in extending the job characteristics model by including additional motivational characteristics. In our theoretical model, we added five additional motivational characteristics to the five motivational characteristics proposed in the job characteristics model. The results demonstrate that task variety, job complexity, and information processing impact a variety of work outcomes. In particular, all three characteristics demonstrated large relationships with job satisfaction, and both job complexity and task variety were strongly related to overload. However, our meta-analytic review also highlights the fact that a large number of relationships (e.g., specialization, problem solving, and information processing) have not been sufficiently studied. There also has been limited research examining either task variety or job complexity. Future research should be conducted to investigate the impact of these characteristics on work outcomes.

Third, we were also interested in extending the job characteristics model by integrating social and work context characteristics into a broader theoretical model and meta-analytically estimating their effects. Our results suggest that the four social and two work context characteristics have comparable relationships with many of the same work outcomes as the motivational characteristics and predict some outcomes that are not predicted by the motivational characteristics. Moreover, our hierarchical regression analyses provide evidence for the incremental impact of social and work context characteristics above and beyond the eight motivational characteristics. This is made even more remarkable because our method was a conservative test of this hypothesis. That is, by entering the set of motivational characteristics in the first step of the regression, all shared variance between the social, work context, and motivational characteristics was attributed to the eight motivational characteristics.

Several findings are particularly noteworthy. For example, the set of social characteristics was strongly related to turnover intentions ($\Delta R^2 = .24$), whereas the set of motivational characteristics demonstrated almost no relationship ($R^2 = .02$) with turnover intentions. Similarly, whereas the motivational characteristics were strongly related to organizational commitment ($R^2 = .24$), three social characteristics demonstrated even stronger incremental relationships with it ($\Delta R^2 = .40$). In contrast, the set of motivational characteristics was strongly related to internal work motivation ($R^2 = .27$), whereas the set of social characteristics demonstrated almost no unique relationship with it ($\Delta R^2 = .02$). In addition, the set of motivational characteristics was strongly related to overload ($R^2 = .54$), whereas the set of social characteristics explained a comparatively smaller amount of unique variance in it ($\Delta R^2 = .10$). For other outcomes, the set of social characteristics explained an equivalent amount of variance as the set of motivational characteristics (e.g., supervisor satisfaction, coworker satisfaction, job involvement, role ambiguity, and stress). These findings highlight the differing impact of motivational and social characteristics. In particular, this suggests that social characteristics provide a unique perspective on work design beyond motivational characteristics.

In addition, although there were fewer studies examining the work context characteristics, it is important to note two findings. First, work conditions explained an incremental 16% of the variance in stress. The variance explained by this single work characteristic was larger than the variance explained by either the five motivational characteristics or three social characteristics, highlighting the power of work conditions to influence work outcomes. Second, it is important to note that the two work context characteristics explained unique variance ($\Delta R^2 = .04$) in job satisfaction above the variance explained by the eight motivational ($R^2 = .34$) and four social ($\Delta R^2 = .17$) characteristics. Although this is not a large amount of variance compared to the variance explained by the 12 other characteristics, it does suggest that attitudinal outcomes can be influenced by work context conditions.

Future Directions

Our review suggests several future directions for research. First, although the theories of work design reside at the job level, the studies of work design have been conducted at the individual level. In fact, of the 677 studies examined for inclusion in the meta-analytic review, only 8 provided job-level data. In addition, many studies were conducted with a limited number of jobs. For example, 70 of the 259 studies reported sampling only one job, and an additional 29 reported sampling only two to four jobs, and almost 50% of the total studies did not report the number of jobs sampled. This means that the restriction in range within studies (due to the limited number of jobs) may have reduced the observed correlations between work characteristics and outcomes, producing lowered estimates of population correlations. Clearly, future research should investigate these relationships at the job level.

Second, most research on work design has been conducted such that employees evaluated both the work characteristics and perceptual outcomes. With the exception of relationships with several behavioral outcomes, this means that the data likely suffer from common-source biases that inflate the relationships between constructs (Crampton & Wagner, 1994; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Roberts & Glick, 1981). Meta-analyzing data does not remove these flaws. Moreover, even though we coded for common-source issues, we were not able to adjust the population correlation estimates, because very few studies had independent sources of data. One way to address this problem is to conduct

job-level analyses in which respondents evaluate either the work characteristics or work outcomes, but not both.

Third, although we worked to be as comprehensive as possible in our summary of the work design literature, we were limited by the available research. This was evident in the almost complete lack of research examining specialization, problem solving, or ergonomics. In several cases, the relationship between a characteristic and an outcome was estimated with a low number of both studies (k) and job incumbents (n). For example, there were only three studies ($n = 587$) that examined the relationship between task significance and overload. For any relationship in our meta-analytic review with such a small k and n, it is important to recognize that the results are only the best approximations of population coefficients to date. Future research is necessary to increase the quality of estimates of these population coefficients.

Fourth, as the focus of our research was on how individual job incumbents reacted to the characteristics of work, rather than on how teams reacted to their design, our study excluded team-level research. Nonetheless, it is important to note that several researchers have begun to utilize work design characteristics in the investigation of team-level phenomena (e.g., Bailey, 1998; Janz, Colquitt, & Noe, 1997). However, research to date has examined only a subset of the work characteristics discussed herein, primarily focusing on autonomy and interdependence. Future research is needed to determine the impact of the work characteristics presented in this meta-analytic review on team-level work design. Moreover, as moving to the team level creates unique constructs that may not exist at the individual level (Morgeson & Hofmann, 1999), future research should investigate how characteristics of the team such as trust and cooperative norms relate to the work characteristics discussed herein.

Fifth, the nature of work has been marked by dramatic technological changes, increased competition, and workforce composition changes (Howard, 1995a; Morgeson & Campion, 2003; Parker, Wall, & Cordery, 2001). Although some have suggested that models of work design should expand to address these changes, there has been no direct investigation of the impact of these changes. Yet it is clear that work has become more cognitively demanding and complex due to increased technology, increased skill variety, and a shift to knowledge-based work (Howard, 1995b; Parker & Wall, 2001). In addition, uncertainty has increased as a result of global competition and changes in employment contracts, whereas increasingly flexible technologies have added to operational uncertainty because of the growing variability and complexity of many work processes (Parker & Wall, 2001). Work has become increasingly interdependent through new production technologies and the use of team-based designs such that workers now have new roles and relationships (Howard, 1995b; Ilgen, 1999). Finally, certain jobs have different consequences of failure. For example, an error in the health care industry may result in an injury or death to the patient. In contrast, an error in a customer service context may result in a dissatisfied customer, an unpleasant but not life-threatening outcome. These changes, taken together, suggest that future research should actively investigate how changes in work and differences across industries impact the relationships between work characteristics and outcomes.

Sixth, our implicit assumption is that the relationship between work characteristics and well-being outcomes is linear. However, some research has suggested that the true relationship may be nonlinear. For example, Xie and Johns (1995) found that both high and low levels of job complexity were related to high levels of exhaustion, whereas moderate levels of complexity were related to low levels of exhaustion. To date there has only been limited research examining curvilinear relationships between work characteristics and outcomes. Yet these results suggest the need to examine more complex relationships.

Finally, our results provide clear evidence that there are multiple options for redesigning work to achieve certain work outcomes. For example, the two best predictors of job satisfaction were autonomy and social support. If an organization were interested in improving job satisfaction, it could improve either job autonomy or social support. However, as shown by Morgeson and Humphrey (2006), increasing autonomy can increase compensation and training requirements, whereas increasing social support does not have these negative tradeoffs. Thus, organizations may benefit by utilizing the results of our meta-analysis in their work redesign process to pinpoint those work characteristics that maximize the outcomes they are interested in and minimize the negative impact on other desirable outcomes.

Conclusion

This meta-analytic review of the work design literature integrated motivational, social, and work context characteristics. We reviewed 677 articles, coded 259 empirical articles, and meta-analyzed 6,333 correlations to examine 276 relationships. Our results demonstrate that work design has a large impact on worker attitudes and behaviors, explaining on average 43% of the variance in these outcomes. Our results also suggest weaknesses in work design theory and empirical research, indicating areas in need of future research. Due to the importance and impact of work design, we hope that our meta-analytic review helps stimulate future research and reinvigorates the work design literature within the I/O psychology and management domains.

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