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

Stephen E. Humphrey
Department of Management
Florida State University
Tallahassee, FL 32306-1110
Voice: (850) 644-1138
Fax: (850) 644-7843
stephen.humphrey@fsu.edu

Jennifer D. Nahrgang
The Eli Broad Graduate School of Management
Michigan State University
N475 North Business Complex
East Lansing, Michigan 48824-1122
Voice: (517) 353-6970
Fax: (517) 432-1111
nahrgang@msu.edu

Frederick P. Morgeson
The Eli Broad Graduate School of Management
Michigan State University
N475 North Business Complex
East Lansing, Michigan 48824-1122
Voice: (517) 432-3520
Fax: (517) 432-1111
morgeson@msu.edu
Integrating Social and Motivational Models of Work Design:
A Meta-Analytic Summary and Theoretical Extension of the Work Design Literature

By integrating social and motivational models of work design, we developed and meta-analytically examined hypotheses designed to test and extend work design theory. Results from a summary of 250 studies and 217,081 participants show that nine work characteristics explain, on average, 34% of the variance in worker attitudes and behaviors. The social characteristics, although neglected in mainstream work design theory, demonstrate equivalent or greater prediction of outcomes than traditional motivational characteristics, as well as predict several outcomes unrelated to motivational characteristics. We also found evidence that the dynamic changing nature of work has increased the relevance of the social characteristics over time.
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. One of the problems of designing work to maximize efficiency, however, is 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 and described techniques such as job enlargement and job enrichment whereby jobs could be made more interesting to perform. Research by Herzberg (Herzberg, Mausner & Snyderman, 1959), Turner and Lawrence (1965), and Hackman and Oldham (1975, 1976; Hackman & Lawler, 1971) further developed this “motivational” approach and have proved to be tremendously influential over the last 30 years (Morgeson & Campion, 2003).

For example, the key articles summarizing Hackman and Oldham’s job characteristics model and measures have been heavily cited (nearly 2,000 citations; ISI Web of Knowledge, 2005). Despite the fact that the model is over 30 years old and several important criticisms of its key propositions and measures have been raised (Johns, Xie, & Fang, 1992; Morgeson & Humphrey, in press; Roberts & Glick, 1981; Taber & Taylor, 1990), it retains a central place in work design theory in the field of management today. The success of the motivational approach, however, has had a curious effect on work design research over the past 30 years, in two ways.

First, it focused research attention on motivational features of work (i.e., skill variety, autonomy, task identity, task significance, and feedback from the job). Although these are important work characteristics, other important aspects of work (such as the social environment)
were neglected. As a consequence, social aspects of work have received less attention in the field of management. This is unfortunate because research in other areas has documented the importance of the social environment for a wide range of important outcomes.

Second, the success of the motivational approach has likely contributed to a general decline of research and theorizing on work design in the field of management. Because the motivational approach is so widely accepted, it appears that many in the field of management concluded that it was “case closed” with respect to work design. As Figure 1 demonstrates, work design research published in the top management journals began to decline in the late 1980’s and has remained at a low level ever since. It is interesting to note, however, that work design research appears to be alive and well outside the field of 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, which are 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 the literature 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, test hypotheses at a qualitatively different, higher level, and point to the best direction for new theoretical developments (Hunter & Schmidt, 1990). Given the large amount of research on work design that has occurred both within and outside the field of management, this is an area that can benefit from meta-analytic techniques. In this meta-analytic review, we first replicate and extend Fried and Ferris’s (1987) meta-analytic summary of the motivational characteristics. As compared to Fried and Ferris, our analyses include almost 20 years of additional research studies (e.g., 137 additional studies published after
Work Design Meta-Analysis

1987), fourteen additional outcomes of work design, and the first formal meta-analytic test of Hackman and Oldham’s (1976) job characteristics–critical psychological states–outcomes mediation model. Second, we integrate and meta-analytically examine the social characteristics of work, an area that has been long neglected in traditional work design research (Grant, in press; Morgeson & Humphrey, in press; Parker & Wall, 2001). Third, we integrate the motivational characteristics and the social characteristics by utilizing regression techniques to test the unique incremental contribution of the social characteristics on the outcomes. Fourth, we examine whether the changing nature of work over the last four decades has influenced the relationship between the work characteristics described herein and work satisfaction.

Testing and Extending Work Design Theory

Testing the Job Characteristics Model

Hackman and Oldham (1975, 1976) suggest that enriched jobs will be more satisfying to workers, with a focus on five specific work characteristics: 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/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 job (i.e., the extent to which a job imparts information about an individual’s performance). These work characteristics are expected to increase positive behavioral (e.g., job performance) and attitudinal outcomes (e.g., job satisfaction), while simultaneously decreasing 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
expect to find similar relationships between these five work characteristics and job satisfaction, growth satisfaction, internal work motivation, job performance, and absenteeism.

In addition to the five work characteristics identified by Hackman and Oldham (1975), others have examined task variety. Compared to skill variety, task variety focuses on the number of different behaviors that are performed on the job. Although not measured in the most popular work design measure (i.e., the Job Diagnostic Survey, Hackman & Oldham, 1975; Idaszak & Drasgow, 1987), task variety has frequently been measured via the Job Characteristics Inventory (Sims, Szilagyi, & Keller, 1976). In their review, Fried and Ferris (1987) combined measures of skill and task variety into the same construct. Due to differences in their construct definitions and operationalizations (Morgeson & Humphrey, in press), we analyze the two constructs separately. However, we expect that task variety will be related to the same behavioral and attitudinal outcomes as the other motivational characteristics.

**H1**: The motivational characteristics will be positively related to job satisfaction, growth satisfaction, internal work motivation, and job performance, and negatively related to absenteeism.

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, their 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 test 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.

**H2**: The motivational characteristics will positively relate to positive behavioral outcomes and positive attitudinal outcomes, and negatively relate to negative
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 is thought to impact experienced meaningfulness, autonomy is thought to impact experienced responsibility, and feedback from the job is thought to impact knowledge of results.

Given this previous theorizing, we expect that the critical psychological states will mediate the relationships between these work characteristics and the behavioral and attitudinal outcomes. Despite the considerable amount of work design research, there has been no comprehensive meta-analytic evaluation of the mediational role of the critical psychological states. The most recent meta-analysis (Fried and Ferris, 1987) only examined the corrected correlations between the motivational work characteristics, the critical psychological states, and several outcomes. In fact, Fried and Ferris (1987, p. 305) 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 perform the first meta-analytic test of these mediational predictions.

Whereas Hackman and Oldham (1975, 1980) suggested that the three critical psychological would each independently contribute to the mediation of the relationship between the motivational characteristics and work outcomes, later work suggested that the true mediation model is different (Johns, et al., 1992; Oldham, 1996). In particular, Johns et al.’s (1992, p. 667)
critique and primary study analysis suggested that experienced meaning was a “particularly encompassing psychological state,” as it served as a mediator for all five motivational characteristics. Johns et al. (1992) do not argue that the other two critical psychological states should be removed from mediational models, but instead suggest that each contributes in varying degrees in the mediational process. Following Johns et al. (1992), we test an alternative mediational model in which we compare the simultaneous mediation ability of all three critical psychological states. This will allow us to better clarify the mediational effects of the critical psychological states.

**H3:** The critical psychological states will mediate the relationships between the motivational characteristics and the behavioral and attitudinal outcomes.

Extending the Job Characteristics Model: The Social Characteristics

Early work design research recognized the importance of the social environment for worker outcomes (Trist & Bamforth, 1951; Turner & Lawrence, 1965). In fact, in early research on motivational work characteristics, two social characteristics of work (dealing with others and friendship opportunities) were identified and examined (Hackman & Lawler, 1971). Although it was found that these social characteristics related to satisfaction, the lack of relationships with behavioral outcomes or motivation tempered any enthusiasm. From that point forward, with the notable exception of their inclusion in the Job Characteristics Inventory (Sims et al., 1976), the social characteristics received significantly less attention in the work design literature (Morgeson & Campion, 2003).

Recently, however, several researchers have noted that the social characteristics of work are important components of work (Parker & Wall, 2001) that are non-redundant with the motivational work characteristics (Grant, in press; Morgeson & Humphrey, in press). For example, an emerging literature has noted that the 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 have been proposed to reduce job stress by buffering workers against negative job events (Karasek, 1979; Karasek, Triantis & Chaudhry, 1982). Moreover, they may increase work motivation (Adler & Kwon, 2002) and pro-social work behaviors (Grant, in press), as they promote resilience, security, and positive moods on the job (Ryan & Deci, 2001).

Although several social characteristics of been proposed (Morgeson & Humphrey, in press), three have received the most attention in the research literature: interdependence, feedback from others, and social support. *Interdependence* is the extent to which a job is contingent on the work of others and other jobs are dependent on the work of the focal job (Kiggundu, 1981). That is, it represents how interconnected jobs are. This dimension has alternately been labeled “dealing with others” (e.g., Hackman & Lawler, 1971). *Feedback from others* is the extent to which other organizational members provide performance information. It is different from the “feedback from job” dimension described in motivational work design models, as it focuses more broadly on the interpersonal component of feedback, rather than the performance information derived directly from the work itself. Finally, *social support* is the extent to which a job provides opportunities for getting assistance and advice from others (Karasek, 1979). This support may be derived from either supervisors or coworkers (Karasek, Brisson, Kawakami, Houtman, Bongers, & Amick, 1998), and includes friendship opportunities on the job (Sims et al., 1976).

As the social characteristics are proposed to be critical for work well-being, it is not surprising that research has found that they relate to numerous work outcomes. For example, Kiggundu (1983) found that interdependence was positively related to motivational outcomes.
The well-being literature has also demonstrated that interactions with others make work more satisfying for an employee (Ryan & Deci, 2001). This has encouraged organizations to create interdependent work, as it may reduce turnover (De Lissers, 1999) and promote organizational commitment (Heald, Contractor, Koehly, & Wasserman, 1998). Feedback from others has been found to positively relate to several outcomes, including job satisfaction, involvement, and role clarity (Hackman & Lawler, 1971; Sims et al., 1976). 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), therefore increasing satisfaction.

\[ H4: \] The social characteristics will positively relate to positive behavioral outcomes and positive attitudinal outcomes, and negatively relate to negative behavioral outcomes.

Integrating the Motivational and Social Characteristics

Thus far, we have suggested that both the motivational characteristics and the social characteristics impact behavioral and attitudinal outcomes. However, we also believe that these two sets of work characteristics have unique contributions to work outcomes. Because the motivational approach focuses on individual job components, whereas the social characteristics focus on the interactional components of work (Parker & Wall, 2001), they are expected to have non-redundant effects on behavior and reactions of workers. Thus, if these two sets of work characteristics are truly discrete, the inclusion of both sets of characteristics will explain unique variance in work outcomes.

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

**H5**: The social characteristics will explain unique variance in the behavioral and attitudinal outcomes, above and beyond the motivational characteristics.

**Dynamic Nature of Work**

Although the primary focus of work design research has been to identify the specific characteristics of work that impact behavioral and attitudinal outcomes, a secondary focus has been on identifying moderators of these relationships. A variety of different individual difference moderators have been proposed, but most moderator research has focused on the role of growth need strength, which is the preference for challenging and stimulating work. Unfortunately, very little recent research has investigated this (or other) individual difference moderators. In fact, virtually all of the studies that have examined growth need strength as a moderator have already been analyzed in previous meta-analyses (Fried & Ferris, 1987; Loher, Noe, Moeller, & Fitzgerald, 1985). As such, we chose not to investigate growth need strength. Instead, we decided to take advantage of one of the unique features of meta-analysis and explore a potentially important contextual moderator.

There have been several calls for greater investigation of the role of context in organizational behavior (Cappelli & Sherer, 1991). Because of the difficulty in testing contextual factors in individual work design studies, work design research has generally neglected to study the effect that the broader context can have on the relationship between work characteristics and outcomes. However, meta-analytic techniques provide the opportunity to examine contextual factors across studies, across industries, across populations, and across time. Therefore, we
examine one specific contextual factor—the dynamic nature of work—in this study.

The nature of work has displayed a dynamic nature throughout the centuries. In the 18th century, the Industrial Revolution brought about changes to the nature of work as people came together to work in factories. The dominant approach to work design that emerged to address this change was job simplification (e.g. Smith, 1776). After this emerged the dominant paradigms of job enrichment and job enlargement to address worker motivation (e.g. Hackman & Oldman, 1975, 1976; Herzberg et al., 1959). Socio-technical systems approaches emerged in the 20th century to address both social and technical subsystems of organizations and the use of autonomous work groups (Trist & Bamforth, 1951).

In the late 20th century and the current 21st century, work demands have also changed in numerous ways in the post-industrial organization. The nature of work has been marked by dramatic technological changes, increased competition, and changes in workforce composition (Howard, 1995a; Morgeson & Campion, 2003; Parker & Wall, 1998; Parker & Wall, 2001; Parker, Wall, & Cordery, 2001). Although there has been some suggestion that models of work design should be expanded to address these changes (Morgeson & Campion, 2003; Parker & Wall, 2001; Parker et al., 2001), the changing nature of work has not been investigated as a moderating effect on the relationship between work characteristics and work outcomes.

The changes taking place in work have many implications for the development of work design theory and on the relationship between work characteristics and work outcomes (Parker & Wall, 2001). First, work has become more cognitively demanding and complex due to increased technology, increased skill variety, and a shift to knowledge based work (Howard, 1995b; Morgeson & Campion, 2003; Parker & Wall, 2001). Second, uncertainty has increased due to changes in response to global competition and changes in employment contracts. In addition,
more flexible technologies have increased operational uncertainty due to more variability and complexity in work processes (Parker & Wall, 2001). Finally, work has become increasingly integrated and 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; Mohrman, Cohen, & Mohrman, 1995; Parker & Wall, 2001).

Unfortunately, these changes in the nature of work cause several potential problems for workers. First, increased cognitive demands and complexity can have a negative impact on worker well-being. For example, increased vigilance requirements have increased attentional demand (e.g. Van Cott, 1985) that may result in decreased well-being. Second, uncertainty in employment contracts can result in feelings of insecurity for workers, such that workers are concerned with downsizing, psychological contract violations, and changes in benefits. Frequent changes in work processes may also increase role ambiguity for workers, resulting in decreased employee well-being. Third, increased interdependence and teamwork leads to the increasing importance of the social and emotional demands of work (Parker & Wall, 2001). Finally, the increased demands and long work hours also results in increased stress for workers (Howard, 1995b). For example, the average number of hours worked annually by United States employees has increased steadily over several decades, surpassing Japan and Western Europe. Research indicates that the long working hours and overtime have significantly impacted the health, safety, and overall quality of life of workers (Caruso, Hitchcock, Dick, Russo, & Schmit, 2004).

The problems noted above illustrate the impact of the changing nature of work on employee well-being and job satisfaction. As a result of the numerous changes to work, employees will experience more stress, anxiety, burnout, and overload. In line with previous research, we expect the social characteristics, which promote well-being, to become increasingly
important to job satisfaction over time. Thus, we expect the changing nature of work to moderate the relationship between the social characteristics and job satisfaction.

\[ H6: \quad (a) \text{Interdependence}, \ (b) \text{feedback from others}, \ (c) \text{social support will demonstrate larger relationships with job satisfaction over time.} \]

Method

Literature Search

A literature search was conducted to identify published articles, conference papers, doctoral dissertations, and unpublished manuscripts that were related to the design of work. The articles were identified through computer-based searches of the PsychInfo (1887-2004) and Web of Science ISI (1970-2004) databases. Searches included the terms work or job with key words 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 over 8,000 articles.

Inclusion Criteria

The abstracts obtained as a result of this initial search were reviewed for appropriate content and considered for inclusion in the meta-analysis. After reading through the abstracts, studies without data (theoretical work or literature reviews) and studies outside of the context of work were eliminated. This resulted in identifying an initial population that was split among the three authors for review. Overall, the authors examined 677 studies to determine whether the study would be included in the meta-analysis. A number of decision rules were used to determine
which studies would be included in the meta-analysis. First, a study must have investigated at least one relationship from the constructs of interest. Second, studies had to report sufficient results to calculate an effect size for the relationship. Third, the study had to be a unique sample that had not been previously included in the current meta-analysis. These selection criteria reduced our final study population to 250 articles. All three authors participated in the coding of the studies. Although attempts were made to ensure that coding procedures were clear and objective, coding questions were discussed by all three authors and a consensus decision was reached as to the proper coding of the study. These procedures resulted in the coding of 6,025 unique correlations across the 250 articles.

Meta-Analytic Procedures

There were a number of decisions regarding how to conduct the meta-analyses. First, for studies with multiple measures of the same construct, we followed Hunter and Schmidt’s (1990) recommendations by averaging correlations (e.g., measures of peer and supervisor support in the same study were averaged together to produce one score). This prevented a study being “double-counted” in the meta-analysis. In contrast, studies that included multiple independent samples were separately coded. Also following previous recommendations, we corrected for unreliability in the measures. For studies in which reliability information was unavailable, we used the mean reliability information drawn from all other studies (Hunter & Schmidt, 1990).

We present several pieces of information about the population correlation estimates. First, we include both the uncorrected \( r \) and corrected \( r_c \) estimates. Second, we include the 95% confidence interval for each uncorrected population correlation, using the standard error of the mean correlation. If the confidence interval does not include zero, we can conclude that the population correlation is significant. Finally, we present the number of studies included in
determining the correlation \( k \) and the total number of people in the studies \( n \).

The following meta-analytic regression procedures were followed. First, as sample sizes differ 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 it has less restrictive assumptions than Maximum Likelihood and is more optimal when the data is 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 only include constructs for which there was a full matrix.

Results

Correlation Results

We first examined the relationships between the work design characteristics. As seen in Table 1, the uncorrected intercorrelations were all positive in sign and generally moderate in magnitude (mean \( r = .30 \)). This suggests that although the work design characteristics are interrelated, they are not so highly correlated as to be multiple indicators of the same construct. There are several interesting correlations to note. First, the motivational characteristics are more highly correlated with each other (mean \( r_c = .50 \)) than with the social characteristics (mean \( r_c = .35 \)), providing evidence that the motivational and social characteristics are unique sets of characteristics. Second, the results show that although feedback from job and feedback from others (which have been combined into one scale in some studies) are correlated \( (r_c = .57) \), they only share approximately one-third of the same variance. Thus, there seems to be ample evidence for studying the two constructs independently.
Motivational Characteristics

We next investigated our hypotheses. With our first hypothesis, we sought to replicate Fried and Ferris’s (1987) findings on the predictive ability of the motivational characteristics on job performance, absenteeism, job satisfaction, growth satisfaction, and internal work motivation. Table 2 presents the results of these analyses. First, we note that although autonomy is the only motivational characteristic significantly related to objective performance ($r_c = .17$), all of the motivational characteristics (with the exception of skill variety) significantly related to subjective performance (mean $r_c = .19$). Second, we found that autonomy ($r_c = -.15$), task identity ($r_c = -.09$), and feedback from job ($r_c = -.10$) all significantly related to absenteeism, whereas skill variety ($r_c = -.07$) and task significance ($r_c = .06$) were not significantly related. Finally, all of the motivational characteristics significantly related to job satisfaction (mean $r_c = .42$), growth satisfaction (mean $r_c = .55$), and internal work motivation (mean $r_c = .39$). Thus, it appears that the results generally support Hypothesis 1, with the motivational characteristics demonstrating stronger relationships with the attitudinal outcomes and weaker relationships with the behavioral outcomes.

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 is absenteeism, which demonstrated markedly smaller magnitude correlations in our review. This difference may be partially attributable to the fact that our review had between eight and twelve 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 (1987) only had three 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 stable coefficient estimates. We also note that there were only a limited number of studies that assessed task variety, resulting in missing data for this construct for several outcomes.

Hypothesis 2 predicted that the motivational characteristics would relate to a broader set of behavioral and attitudinal outcomes. First, as shown in Table 2, none of the motivational characteristics related to turnover intentions (mean $r_c = -.03$). Second, all of the motivational characteristics significantly related to supervisor satisfaction (mean $r_c = .30$), coworker satisfaction (mean $r_c = .39$), compensation satisfaction (mean $r_c = .19$), and promotion satisfaction (mean $r_c = .23$), with the strongest relationships consistently held by autonomy (except for promotion satisfaction, for which feedback from job demonstrated the largest relationship). Third, the motivational characteristics significantly related to organizational commitment (mean $r_c = .34$) and job involvement (mean $r_c = .29$). Fourth, only autonomy ($r_c = -.23$) and feedback from job ($r_c = -.43$) significantly related to role ambiguity, whereas autonomy ($r_c = -.17$), feedback from job ($r_c = -.32$), and task identity ($r_c = -.17$) significantly related to role conflict. Fifth, turning to well-being outcomes, autonomy ($r_c = -.10$) and feedback from job ($r_c = -.32$) significantly related to anxiety; autonomy ($r_c = -.23$), feedback from job ($r_c = -.21$), and task identity ($r_c = -.17$) significantly related to stress; whereas task variety ($r_c = .38$) and task significance ($r_c = .38$) significantly increased overload. In contrast, four characteristics (autonomy, skill variety, task significance, and task identity) significantly negatively related to burnout/exhaustion (mean $r_c = -.26$). Taken together, the results demonstrate that the motivational characteristics generalize to outcomes beyond the five specifically proposed, supporting Hypothesis 2.

Hypothesis 3 stated that the critical psychological states would mediate the relationships
between the motivational characteristics and the behavioral and attitudinal outcomes. As noted by Baron and Kenny (1986), mediation is a multi-step 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. No studies examined the relationship between task variety and the critical psychological states. For the remaining characteristics, there were significant moderate to large relationships (ranging from $r_c = .22$ to $r_c = .68$) between the motivational characteristics and the critical psychological states.

The final step of the mediation test is 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. Because of missing data between the critical psychological states and several outcomes, however, 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.

First, we examined subjective performance. The first regression demonstrated that although the relationship between autonomy and subjective performance only decreased slightly with the inclusion of experienced responsibility ($\beta$ 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 both task significance ($\beta$ change: .23 to .21; $R^2$ change .05 to .02) and task identity ($\beta$ change: .17 to .12; $R^2$ change .03 to .01). Finally, knowledge of results did not mediate feedback from job. For both job satisfaction and internal work motivation, Table 3
shows that autonomy was mediated by experienced responsibility, and skill variety, task significance, and task identity were mediated by experienced meaningfulness. In contrast, feedback from job was only partially mediated by knowledge of results. Taken together, there is 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 job. Thus, Hypothesis 3 is partially supported.

To test the alternative model suggested by Johns et al. (1992), we compared the theorized model with one that allows all three critical states to act as mediators. The results of these analyses are presented in the bottom of Table 3. For subjective performance, the only meaningful difference is the decrease in the β 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 is that feedback from job was fully mediated with both outcomes. These mediations can be primarily attributed to experienced meaning, as its inclusion drove the β and R² values to zero. Thus, the results suggest that experienced meaning is the most “critical” critical psychological state, consistent with Johns et al. (1992).

Social Characteristics

Hypothesis 4 stated that the social characteristics would be positively related to the positive behavioral outcomes, negatively related to the negative behavioral outcomes, and positively related to the attitudinal 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 the social characteristics and objective performance. Both interdependence (r_c = .18) and feedback from others (r_c = .28) were significantly related to subjective
performance, whereas social support \( r_c = .06 \) was not. Although social support \( r_c = -.07 \) was significantly related to absenteeism, interdependence \( r_c = -.09 \) was not. In contrast, all three social characteristics (interdependence \( r_c = -.17 \); feedback from others \( r_c = -.34 \); social support \( r_c = -.34 \)) significantly related to turnover intentions.

All three social characteristics were significantly related to job satisfaction (mean \( r_c = .41 \)), supervisor satisfaction (mean \( r_c = .43 \)), coworker satisfaction (mean \( r_c = .51 \)), compensation satisfaction (mean \( r_c = .23 \)), and promotion satisfaction (mean \( r_c = .25 \)). However, for growth satisfaction, only interdependence \( r_c = .33 \) and social support \( r_c = .50 \) demonstrated significant relationships, whereas feedback from others \( r_c = .11 \) was non-significant. Interdependence \( r_c = .39 \) and social support \( r_c = .62 \) were significantly related to organizational commitment, interdependence \( r_c = .20 \) and feedback from others \( r_c = .17 \) were significantly related to job involvement, and all three social characteristics (mean \( r_c = .26 \)) were significantly related to internal work motivation.

Finally, we examined the relationships between the social characteristics and both role perception outcomes and well-being outcomes. As shown in Table 2, both feedback from others \( r_c = -.54 \) and social support \( r_c = -.29 \) were significantly related to role ambiguity, whereas only social support significantly related to role conflict \( r_c = -.27 \). Only social support was significantly related to anxiety \( r_c = -.23 \) and overload \( r_c = -.12 \). Finally, feedback from others \( r_c = -.32; -.17 \) and social support \( r_c = -.25; -.32 \) were related to both stress and burnout / exhaustion. In contrast, interdependence did not significantly relate to any role perception or well-being outcomes. Taken together, it appears that the social characteristics have small or no relationships with positive behavioral outcomes, anywhere from moderate to no relationships with negative behavioral outcomes, and predominantly moderate relationships with attitudinal
outcomes. Thus, Hypothesis 4 is partially supported.

Incremental Contribution of Social Characteristics

Hypothesis 5 states that the social characteristics will explain unique variance in the behavioral and attitudinal outcomes. To test this hypothesis, we conducted several regressions in which the motivational characteristics were entered first and the social characteristics were entered in the second step. Results of these regressions are presented in Table 4.

First, as shown in Table 4, the social characteristics explain an additional 14% of the variance in subjective performance, above and beyond the 12% of variance explained by the motivational characteristics. Although the social characteristics only explain an additional 1% of the variance in absenteeism, they explain an additional 25% of variance in turnover intentions. Thus, the social characteristics explained a large amount of variance beyond the motivational characteristics for two behavioral outcomes.

Second, the social characteristics explained, on average, an additional 23% of variance in the satisfaction outcomes. In addition, they explained an additional 21% of the variance in organizational commitment. In contrast, they only explained an additional 2% of the variance in internal work motivation and no variance in job involvement beyond the motivational characteristics.

Third, the social characteristics explained an additional 24% of the variance in role ambiguity and 9% of the variance in role conflict. In addition, they explained an additional 5% of the variance in anxiety, 10% of the variance in stress, 4% of the variance in burnout / exhaustion, and 7% of the variance in overload. In sum, the social characteristics explained a considerable amount of variance beyond the motivational characteristics, supporting Hypothesis 5.

Moderator Analyses
Hypothesis 6 stated that (a) interdependence, (b) feedback from others, and (c) social support will demonstrate stronger relationships with job satisfaction over time. To test this set of hypotheses, we conducted a meta-analytic analog to a one-way ANOVA (Lipsey & Wilson, 2001), comparing the change in effect sizes of a relationship across studies conducted from 1970-1979, 1980-1989, and 1990-2004. The results are presented in Table 5. First, for interdependence, we found that although the effect size did not meaningfully change between 1970-1979 ($r_c = .24$) and 1980-1989 ($r_c = .25$), it increased significantly during 1990-2004 ($r_c = .37$), $Q_b = 147.29, p < .001$, supporting Hypothesis 6a. In contrast, the relationship between feedback from others and job satisfaction actually decreases across decades between 1970-1979 ($r_c = .42$), 1980-1989 ($r_c = .34$), and 1990-2004 ($r_c = .28$), $Q_b = 35.95, p < .001$. Thus, the data does not support Hypothesis 6b. Third, similar to the results with interdependence, we found for social support that the effect size did not meaningfully change between 1970-1979 ($r_c = .32$) and 1980-1989 ($r_c = .36$), but is significantly higher during 1990-2004 ($r_c = .47$), $Q_b = 97.74, p < .001$, supporting Hypothesis 6c.

Discussion

Goals of the Meta-Analytic Review

As noted by Hunter and Schmidt (1990), meta-analytic techniques are uniquely suited for summarizing and clarifying past empirical research, testing new hypotheses that exist at a different level than previously specified, and advancing theory. Although work design research has slowed in the management field during the last twenty years, it is important that we continue to investigate this problem as the design of work has a profound effect on employees’ behavior, attitudes, and well-being (Campion, Mumford, Morgeson, & Nahrgang, 2005). Over 25% of the variance in performance and over 40% of the variance in job satisfaction is a function of the nine
work characteristics investigated herein. With the strengths of meta-analysis and the importance of work design research in mind, 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. Towards the accomplishment of this goal, we meta-analytically summarized 250 studies, compared to Fried and Ferris’s (1987) 76 studies. This allowed us to test a greater number of outcomes (nineteen versus five) in our meta-analytic review. Moreover, 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, due to the comprehensive nature of this review, we have provided the best estimates to date for the relationships studied herein.

In addition, we were able provide the first meta-analytic test of the job characteristics—critical psychological states—outcomes mediation model. As compared to Fried and Ferris (1987), who were only able to examine bivariate correlations between the motivational characteristics, mediation processes, and work outcomes, we utilized Barron and Kenny’s (1986) multi-step mediation process. The results of this process 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.

Second, we were interested in examining the impact of the social characteristics on work outcomes, and calculating the incremental explanatory power of the social characteristics beyond the motivational characteristics. The results of our analyses suggest that the social characteristics have comparable relationships with many of the same work outcomes as the motivational characteristics. Moreover, our hierarchical regression analyses provide evidence for the
incremental impact of the social characteristics above and beyond the motivational characteristics. This is made even more remarkable because our method was a conservative test of this hypothesis. That is, by entering the motivational characteristics in the first step of the regression, all shared variance between the social and motivational characteristics were attributed to the motivational characteristics.

Several findings are particularly noteworthy. For example, the social characteristics are strongly related to turnover intentions ($R^2 = .25$), whereas the motivational characteristics demonstrated almost no relationship ($R^2 = .01$). In contrast, the motivational characteristics strongly related to both job involvement ($R^2 = .15$) and internal work motivation ($R^2 = .27$), whereas the social characteristics demonstrated almost no unique relationship with either ($R^2 = .00$ and .02, respectively). For other outcomes, the social characteristics explain an equivalent amount of variance as the motivational characteristics (e.g., subjective performance ratings, organizational commitment, supervisor satisfaction, coworker satisfaction, role ambiguity, and stress). These findings highlight the differing impact of the motivational and social characteristics. In particular, this suggests that the social characteristics provide a unique perspective on work design beyond the motivational characteristics.

Third, we were interested in investigating a macro-level work design issue that would be difficult or impossible to study within a single empirical study. To this end, we proposed and tested hypotheses related to macro-level changes to the nature of work. Our results suggested that the dynamic nature of work has led to the increased importance of social characteristics. In particular, interdependence and social support have demonstrated increasing importance for job satisfaction over the past 15 years. This does not suggest that the motivational characteristics are becoming less important; instead, it suggests that the social characteristics have now been
elevated to the point that they rival the motivational characteristics in importance. Based on these results, it is not surprising that the early research on work design (e.g., Hackman & Lawler, 1971) discounted the effects of the social characteristics, as they only recently became relatively important.

Future Directions

The current results, coupled with limitations in the existing body of research literature, suggest several future directions for research. First, in our replication and extension of the previous meta-analysis on work design, we concentrated on integrating additional work characteristics. However, because we were limited to including only those work characteristics for which research has accumulated, we neglected to integrate work characteristics beyond the social characteristics. For example, researchers have noted the potential impact of work context characteristics, such as physical demands and work conditions (Morgeson & Campion, 2003; Parker & Wall, 2001). Even though there is some evidence that these characteristics may explain unique variance in work design outcomes (Morgeson & Humphrey, in press), there is only a small amount of research on these characteristics (Campion, 1988). Future research is encouraged to broaden the domain of work design to specifically include these characteristics in theoretical models and empirical studies.

Second, 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 eight provided job-level data. In addition, many studies were conducted with a limited number of jobs. Seventy of the 250 studies reported sampling only one job and additional 29 reported only sampling two to four jobs, whereas 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.

Third, 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 suffers from common-source biases that inflate the relationships between constructs (e.g., Crampton & Wagner, 1994; 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.

Conclusion

This meta-analytic review of the work design literature integrated the social and motivational work characteristics. In total, we reviewed 677 articles, coded 250 empirical articles, and meta-analyzed 6,025 correlations to examine 205 relationships. Our results demonstrated that work design has a large impact on worker attitudes and behaviors, explaining on average 34% of the variance in these outcomes. We found that context is important for work design. However, our results also suggested weaknesses in both 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 management domain.
References

References marked with an asterisk indicate studies included in the meta-analysis.


Educational and Psychological Measurement, 58, 119-128.


*Orpen, C. (1985). The effects of need for achievement and need for independence on the


273-284.


Footnotes

1 We considered decades as a logical break-point for the operationalization of this construct. However, as there have only been a small number of studies since 2000 that have tested relationships with job satisfaction, we felt that analyzing 2000-2004 as a separate data point would result in unstable effect sizes, leading to erroneous conclusions. Thus, the 1990-1999 and 2000-2004 were combined together for analyses.

One could also argue that results should be analyzed in five-year (or smaller) increments, rather than ten-year increments. A major problem with this approach is that it reduces the number of studies (and the concurrent sample size) at each level of the independent variable. Thus, this sampling process increases the instability of the results and comparatively over-weights small $k$, small $n$ categories.
Table 1
Interrelationships of Work Design Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Autonomy $r$, $r_c$ (95% CI)</th>
<th>Skill Variety $r$, $r_c$ (95% CI)</th>
<th>Task Variety $r$, $r_c$ (95% CI)</th>
<th>Task Significance $r$, $r_c$ (95% CI)</th>
<th>Task Identity $r$, $r_c$ (95% CI)</th>
<th>Feedback from Job $r$, $r_c$ (95% CI)</th>
<th>Interdependence $r$, $r_c$ (95% CI)</th>
<th>Feedback from Others $r$, $r_c$ (95% CI)</th>
<th>Social Support $r$, $r_c$ (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill Variety</td>
<td>.47, .64 (.43, .50)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>100, 58350</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task Variety</td>
<td>.34, .46 (.23, .44)</td>
<td>.47, .52 (.42, .52)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>21, 8877</td>
<td>2, 974</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>.36, .50 (.33, .38)</td>
<td>.44, .62 (.41, .47)</td>
<td>.40, .52 (.23, .57)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>100, 41837</td>
<td>78, 37758</td>
<td>8, 2885</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Task Identity</td>
<td>.39, .55 (.36, .42)</td>
<td>.26, .37 (.22, .29)</td>
<td>.27, .39 (.18, .36)</td>
<td>.27, .39 (.23, .30)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>111, 43427</td>
<td>80, 36334</td>
<td>16, 5881</td>
<td>83, 37435</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback from Job</td>
<td>.38, .53 (.35, .40)</td>
<td>.36, .50 (.33, .39)</td>
<td>.30, .40 (.21, .38)</td>
<td>.38, .56 (.35, .42)</td>
<td>.35, .49 (.32, .38)</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>110, 44390</td>
<td>79, 36256</td>
<td>15, 5765</td>
<td>80, 37082</td>
<td>92, 41108</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interdependence</td>
<td>.19, .29 (.08, .29)</td>
<td>.39, .61 (.32, .47)</td>
<td>.14, .18 (.06, .22)</td>
<td>.31, .50 (.27, .36)</td>
<td>.13, .19 (.05, .21)</td>
<td>.26, .41 (.19, .33)</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>33, 19733</td>
<td>23, 16448</td>
<td>11, 4695</td>
<td>25, 51700</td>
<td>28, 17889</td>
<td>28, 17889</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feedback from Others</td>
<td>.35, .48 (.28, .42)</td>
<td>.27, .37 (.23, .32)</td>
<td>.07, .10 (.03, .12)</td>
<td>.25, .36 (.21, .30)</td>
<td>.21, .31 (.16, .26)</td>
<td>.40, .57 (.35, .45)</td>
<td>.23, .33 (.17, .29)</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>38, 19915</td>
<td>34, 18987</td>
<td>5, 1788</td>
<td>35, 19101</td>
<td>37, 17410</td>
<td>43, 17953</td>
<td>21, 14850</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Support</td>
<td>.24, .32 (.21, .27)</td>
<td>.21, .27 (.18, .23)</td>
<td>.17, .22 (.10, .25)</td>
<td>.27, .41 (.26, .28)</td>
<td>.18, .24 (.10, .25)</td>
<td>.22, .27 (.14, .30)</td>
<td>.34, .49 (.31, .38)</td>
<td>.31, .38 (.25, .37)</td>
<td>--</td>
</tr>
<tr>
<td>$k, N$</td>
<td>43, 42668</td>
<td>10, 19680</td>
<td>9, 3339</td>
<td>9, 37908</td>
<td>12, 4444</td>
<td>13, 13153</td>
<td>12, 40181</td>
<td>5, 1240</td>
<td></td>
</tr>
</tbody>
</table>

Note: $r$ = uncorrected meta-analytic correlation; $r_c$ = correlation corrected for unreliability; 95% CI = 95% confidence interval around $r$; $k$ = number of studies for specific correlation; $n$ = total number of people in the studies for specific correlation.
## Table 2

Correlations between Work Characteristics and Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Autonomy</th>
<th>Skill Variety</th>
<th>Task Variety</th>
<th>Task Significance</th>
<th>Task Identity</th>
<th>Feedback from Job</th>
<th>Interdependence</th>
<th>Feedback from Others</th>
<th>Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
<td>$r, r_c$</td>
</tr>
<tr>
<td></td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
<td>(95% CI)</td>
</tr>
<tr>
<td><strong>Behavioral Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance – Objective</td>
<td>.14, .17</td>
<td>-.03, -.03</td>
<td>-.02, -.02</td>
<td>.05, .06</td>
<td>.09, .09</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>9, 1185</td>
<td>3, 344</td>
<td>5, 613</td>
<td>7, 760</td>
<td>8, 874</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance – Subjective</td>
<td>.18, .23</td>
<td>.06, .07</td>
<td>.21, .23</td>
<td>.16, .23</td>
<td>.13, .17</td>
<td>.14, .20</td>
<td>.14, .18</td>
<td>.22, .28</td>
<td>.05, .06</td>
</tr>
<tr>
<td>$k, N$</td>
<td>42, 7886</td>
<td>26, 5374</td>
<td>2, 918</td>
<td>20, 3503</td>
<td>25, 8055</td>
<td>26, 5241</td>
<td>8, 2200</td>
<td>9, 1584</td>
<td>7, 1785</td>
</tr>
<tr>
<td>Absenteeism</td>
<td>-.13, -.15</td>
<td>-.06, -.07</td>
<td>-.06, -.09</td>
<td>.05, .06</td>
<td>-.08, -.10</td>
<td>-.06, -.09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>12, 2972</td>
<td>11, 2288</td>
<td>8, 1706</td>
<td>10, 2154</td>
<td>11, 2211</td>
<td>4, 853</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Turnover</td>
<td>.00, .01</td>
<td>-.07, -.09</td>
<td>-.02, -.03</td>
<td>.00, .00</td>
<td>-.01, -.02</td>
<td>-.11, -.17</td>
<td>-.22, -.34</td>
<td>-.28, -.34</td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>21, 7721</td>
<td>20, 7549</td>
<td>17, 6355</td>
<td>17, 6355</td>
<td>20, 6720</td>
<td>5, 1178</td>
<td>8, 1453</td>
<td>8, 1792</td>
<td></td>
</tr>
<tr>
<td><strong>Role Perceptions Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Role Ambiguity</td>
<td>-.19, -.23</td>
<td>-.06, -.08</td>
<td>-.07, -.08</td>
<td>-.03, -.03</td>
<td>-.09, -.09</td>
<td>-.36, -.43</td>
<td>.03, .03</td>
<td>-.28, -.54</td>
<td>-.25, -.29</td>
</tr>
<tr>
<td>$k, N$</td>
<td>21, 8186</td>
<td>7, 2538</td>
<td>10, 3167</td>
<td>7, 1369</td>
<td>11, 2873</td>
<td>14, 12351</td>
<td>4, 2216</td>
<td>5, 1350</td>
<td>14, 13858</td>
</tr>
<tr>
<td>Role Conflict</td>
<td>-.14, -.17</td>
<td>.01, .02</td>
<td>-.00, .05</td>
<td>.04, .06</td>
<td>-.12, -.17</td>
<td>-.27, -.32</td>
<td>-.03, -.03</td>
<td>-.23, -.27</td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>14, 5400</td>
<td>7, 2515</td>
<td>5, 978</td>
<td>7, 1346</td>
<td>8, 2036</td>
<td>8, 10369</td>
<td>2, 415</td>
<td>11, 1196</td>
<td></td>
</tr>
<tr>
<td><strong>Well-Being Outcomes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>-.08, -.10</td>
<td>.00, .01</td>
<td>-.02, -.03</td>
<td>-.07, -.09</td>
<td>-.26, -.32</td>
<td></td>
<td>-.20, -.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>14, 4414</td>
<td>5, 1021</td>
<td>5, 1021</td>
<td>5, 1021</td>
<td>6, 9470</td>
<td></td>
<td>9, 12570</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>-.18, -.23</td>
<td>-.10, -.14</td>
<td>.04, .05</td>
<td>-.13, -.17</td>
<td>-.15, -.21</td>
<td>-.06, -.09</td>
<td>-.25, -.32</td>
<td>-.20, -.25</td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>13, 12240</td>
<td>6, 1673</td>
<td>4, 1008</td>
<td>4, 1008</td>
<td>6, 1212</td>
<td>3, 1098</td>
<td>7, 1170</td>
<td>11, 7989</td>
<td></td>
</tr>
<tr>
<td>Burnout / Exhaustion</td>
<td>-.25, -.30</td>
<td>-.26, -.31</td>
<td>-.24, -.29</td>
<td>-.23, -.28</td>
<td>.09, .10</td>
<td>-.14, -.17</td>
<td>-.26, -.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>14, 14825</td>
<td>3, 890</td>
<td>2, 756</td>
<td>2, 756</td>
<td>3, 1130</td>
<td>2, 322</td>
<td>18, 10647</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overload</td>
<td>.02, .02</td>
<td>.33, .38</td>
<td>.32, .38</td>
<td>.08, .10</td>
<td>-.10, -.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>7, 2961</td>
<td>4, 992</td>
<td>3, 587</td>
<td>4, 2520</td>
<td>9, 3190</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: $r =$ uncorrected meta-analytic correlation; $r_c =$ correlation corrected for unreliability; 95% CI = 95% confidence interval around $r$; $k =$ number of studies for specific correlation; $n =$ total number of people in the studies for specific correlation.
<table>
<thead>
<tr>
<th>Autonomy</th>
<th>Skill Variety</th>
<th>Task Variety</th>
<th>Task Significance</th>
<th>Task Identity</th>
<th>Feedback from Job</th>
<th>Interdependence</th>
<th>Feedback from Others</th>
<th>Social Support</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
<td>$r_c$ (95% CI)</td>
</tr>
<tr>
<td>Satisfaction –</td>
<td>.37, .48</td>
<td>.32, .42</td>
<td>.35, .46</td>
<td>.31, .41</td>
<td>.23, .31</td>
<td>.33, .43</td>
<td>.23, .33</td>
<td>.32, .42</td>
</tr>
<tr>
<td>$k, N$</td>
<td>175, 75364</td>
<td>111, 48795</td>
<td>27, 8480</td>
<td>108, 84141</td>
<td>121, 49973</td>
<td>126, 60272</td>
<td>41, 53993</td>
<td>39, 18851</td>
</tr>
<tr>
<td>Satisfaction –</td>
<td>.51, .69</td>
<td>.46, .61</td>
<td>.34, .49</td>
<td>.25, .35</td>
<td>.41, .55</td>
<td>.24, .33</td>
<td>.08, .11</td>
<td>.43, .50</td>
</tr>
<tr>
<td>Growth</td>
<td>(.48, .54)</td>
<td>(.43, .49)</td>
<td>(.30, .38)</td>
<td>(.22, .28)</td>
<td>(.38, .44)</td>
<td>(.20, .28)</td>
<td>(-.01, .18)</td>
<td>(.38, .49)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>32, 17602</td>
<td>31, 15941</td>
<td>29, 15395</td>
<td>30, 15603</td>
<td>31, 15941</td>
<td>9, 9370</td>
<td>7, 8824</td>
<td>3, 1987</td>
</tr>
<tr>
<td>Satisfaction –</td>
<td>.30, .40</td>
<td>.16, .22</td>
<td>.25, .31</td>
<td>.18, .25</td>
<td>.16, .22</td>
<td>.31, .41</td>
<td>.14, .19</td>
<td>.37, .49</td>
</tr>
<tr>
<td>Supervisor</td>
<td>(.27, .33)</td>
<td>(.13, .19)</td>
<td>(.17, .33)</td>
<td>(.14, .21)</td>
<td>(.13, .19)</td>
<td>(.27, .34)</td>
<td>(.09, .18)</td>
<td>(.32, .42)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>31, 20157</td>
<td>21, 12482</td>
<td>5, 2631</td>
<td>19, 12531</td>
<td>25, 14246</td>
<td>25, 14246</td>
<td>13, 11694</td>
<td>14, 11109</td>
</tr>
<tr>
<td>Satisfaction –</td>
<td>.31, .47</td>
<td>.26, .39</td>
<td>.27, .43</td>
<td>.16, .26</td>
<td>.27, .41</td>
<td>.25, .41</td>
<td>.44, .65</td>
<td>.35, .44</td>
</tr>
<tr>
<td>Coworker</td>
<td>(.27, .35)</td>
<td>(.23, .28)</td>
<td>(.24, .29)</td>
<td>(.14, .19)</td>
<td>(.24, .30)</td>
<td>(.21, .29)</td>
<td>(.35, .54)</td>
<td>(.29, .42)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>17, 13479</td>
<td>15, 11052</td>
<td>13, 10740</td>
<td>16, 11818</td>
<td>16, 11818</td>
<td>10, 11071</td>
<td>7, 9759</td>
<td>4, 2753</td>
</tr>
<tr>
<td>Satisfaction –</td>
<td>.20, .27</td>
<td>.12, .16</td>
<td>.14, .19</td>
<td>.09, .13</td>
<td>.08, .12</td>
<td>.19, .26</td>
<td>.10, .16</td>
<td>.26, .33</td>
</tr>
<tr>
<td>Compensation</td>
<td>(.16, .23)</td>
<td>(.07, .16)</td>
<td>(.10, .18)</td>
<td>(.07, .11)</td>
<td>(.04, .12)</td>
<td>(.16, .22)</td>
<td>(.09, .12)</td>
<td>(.21, .30)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>18, 14765</td>
<td>15, 11191</td>
<td>3, 2417</td>
<td>14, 48676</td>
<td>16, 12237</td>
<td>17, 12406</td>
<td>11, 46541</td>
<td>7, 9512</td>
</tr>
<tr>
<td>Satisfaction –</td>
<td>.13, .19</td>
<td>.09, .15</td>
<td>.23, .32</td>
<td>.08, .14</td>
<td>.12, .20</td>
<td>.22, .37</td>
<td>.08, .15</td>
<td>.25, .43</td>
</tr>
<tr>
<td>Promotion</td>
<td>(.08, .18)</td>
<td>(.05, .14)</td>
<td>(.18, .28)</td>
<td>(.07, .09)</td>
<td>(.09, .16)</td>
<td>(.14, .30)</td>
<td>(.07, .10)</td>
<td>(.13, .37)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>8, 3559</td>
<td>6, 1926</td>
<td>2, 1633</td>
<td>5, 37331</td>
<td>7, 2692</td>
<td>7, 2692</td>
<td>5, 37894</td>
<td>3, 1510</td>
</tr>
<tr>
<td>Org</td>
<td>.30, .37</td>
<td>.23, .28</td>
<td>.34, .44</td>
<td>.18, .21</td>
<td>.29, .33</td>
<td>.34, .39</td>
<td>.51, .62</td>
<td></td>
</tr>
<tr>
<td>Commitment</td>
<td>(.25, .35)</td>
<td>(.18, .28)</td>
<td>(.30, .37)</td>
<td>(.13, .23)</td>
<td>(.23, .34)</td>
<td>(.32, .35)</td>
<td>(.47, .55)</td>
<td></td>
</tr>
<tr>
<td>$k, N$</td>
<td>15, 6420</td>
<td>9, 4799</td>
<td>6, 39463</td>
<td>9, 4781</td>
<td>8, 4665</td>
<td>3, 36128</td>
<td>12, 69313</td>
<td></td>
</tr>
<tr>
<td>Job</td>
<td>.23, .30</td>
<td>.24, .30</td>
<td>.26, .36</td>
<td>.14, .19</td>
<td>.20, .26</td>
<td>.16, .20</td>
<td>.13, .17</td>
<td>.16, .20</td>
</tr>
<tr>
<td>Involvement</td>
<td>(.19, .27)</td>
<td>(.19, .29)</td>
<td>(.21, .32)</td>
<td>(.10, .18)</td>
<td>(.15, .25)</td>
<td>(.08, .24)</td>
<td>(.07, .20)</td>
<td>(.02, .35)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>20, 6502</td>
<td>18, 6060</td>
<td>15, 5197</td>
<td>19, 6282</td>
<td>19, 6282</td>
<td>9, 2585</td>
<td>4, 861</td>
<td>5, 1493</td>
</tr>
<tr>
<td>Internal Work</td>
<td>.27, .38</td>
<td>.30, .42</td>
<td>.30, .45</td>
<td>.17, .26</td>
<td>.29, .42</td>
<td>.21, .33</td>
<td>.22, .31</td>
<td>.11, .13</td>
</tr>
<tr>
<td>Motivation</td>
<td>(.25, .29)</td>
<td>(.27, .33)</td>
<td>(.27, .33)</td>
<td>(.15, .19)</td>
<td>(.27, .32)</td>
<td>(.19, .24)</td>
<td>(.18, .26)</td>
<td>(.02, .19)</td>
</tr>
<tr>
<td>$k, N$</td>
<td>48, 20835</td>
<td>47, 19098</td>
<td>41, 18362</td>
<td>44, 19013</td>
<td>44, 19013</td>
<td>13, 10298</td>
<td>15, 10186</td>
<td>12, 2944</td>
</tr>
</tbody>
</table>

**Critical Psychological States**

| Experienced | .41, .60 | .44, .62 | .45, .68 | .24, .37 | .37, .53 | .21, .32 | .28, .38 |
| $k, N$ | 22, 11225 | 23, 11274 | 24, 11444 | 24, 11444 | 22, 11225 | 7, 8824 | 7, 8824 |
| Knowledge of Responsibility | .38, .58 | .33, .49 | .32, .51 | .27, .43 | .33, .49 | .15, .24 | .22, .32 |
| $k, N$ | 23, 11366 | 22, 11225 | 22, 11225 | 22, 11225 | 22, 11225 | 7, 8824 | 7, 8824 |

**Work Design Meta-Analysis**
## Table 3

Mediation Tests for the Motivational Characteristics

<table>
<thead>
<tr>
<th>Hypothesized Mediator</th>
<th>Performance - Subjective</th>
<th>Satisfaction - Job</th>
<th>Internal Work Motivation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>R²</td>
<td>β</td>
</tr>
<tr>
<td>Autonomy</td>
<td>Unmediated</td>
<td>.23</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Mediated</td>
<td>.19</td>
<td>.02</td>
</tr>
<tr>
<td>Skill Variety</td>
<td>Unmediated</td>
<td>.42</td>
<td>.18</td>
</tr>
<tr>
<td>Task Significance</td>
<td>Unmediated</td>
<td>.23</td>
<td>.05</td>
</tr>
<tr>
<td>Task Identity</td>
<td>Unmediated</td>
<td>.17</td>
<td>.03</td>
</tr>
<tr>
<td>Feedback from Job</td>
<td>Unmediated</td>
<td>.20</td>
<td>.04</td>
</tr>
<tr>
<td>All Three Mediators</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>Unmediated</td>
<td>.23</td>
<td>.05</td>
</tr>
<tr>
<td></td>
<td>Mediated</td>
<td>.07</td>
<td>.02</td>
</tr>
<tr>
<td>Skill Variety</td>
<td>Unmediated</td>
<td>.42</td>
<td>.18</td>
</tr>
<tr>
<td>Task Significance</td>
<td>Unmediated</td>
<td>.23</td>
<td>.05</td>
</tr>
<tr>
<td>Task Identity</td>
<td>Unmediated</td>
<td>.17</td>
<td>.03</td>
</tr>
<tr>
<td>Feedback from Job</td>
<td>Unmediated</td>
<td>.20</td>
<td>.04</td>
</tr>
</tbody>
</table>

*Note:* Empty cells represent non-significant relationships between the work characteristic and the outcome.
### Table 4
Incremental Regression Results for Outcomes

<table>
<thead>
<tr>
<th>Behavioral Outcomes</th>
<th>Motivational Characteristics</th>
<th>Social Characteristics</th>
<th>Total $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 1 $R^2$</td>
<td>Step 2 $R^2$</td>
<td></td>
</tr>
<tr>
<td>Performance – Objective</td>
<td>.07</td>
<td>.07</td>
<td></td>
</tr>
<tr>
<td>Performance - Subjective</td>
<td>.12</td>
<td>.14</td>
<td>.26</td>
</tr>
<tr>
<td>Absenteeism</td>
<td>.06</td>
<td>.01</td>
<td>.07</td>
</tr>
<tr>
<td>Turnover Intentions</td>
<td>.01</td>
<td>.25</td>
<td>.26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitudinal Outcomes</th>
<th>Motivational Characteristics</th>
<th>Social Characteristics</th>
<th>Total $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Step 1 $R^2$</td>
<td>Step 2 $R^2$</td>
<td></td>
</tr>
<tr>
<td>Satisfaction - Job</td>
<td>.33</td>
<td>.10</td>
<td>.43</td>
</tr>
<tr>
<td>Satisfaction - Supervisor</td>
<td>.25</td>
<td>.28</td>
<td>.54</td>
</tr>
<tr>
<td>Satisfaction - Coworker</td>
<td>.29</td>
<td>.23</td>
<td>.52</td>
</tr>
<tr>
<td>Satisfaction - Compensation</td>
<td>.11</td>
<td>.06</td>
<td>.17</td>
</tr>
<tr>
<td>Satisfaction - Growth</td>
<td>.56</td>
<td>.32</td>
<td>.88</td>
</tr>
<tr>
<td>Satisfaction - Promotion</td>
<td>.21</td>
<td>.14</td>
<td>.34</td>
</tr>
<tr>
<td>Org Commitment</td>
<td>.24</td>
<td>.21</td>
<td>.45</td>
</tr>
<tr>
<td>Job Involvement</td>
<td>.15</td>
<td>.00</td>
<td>.15</td>
</tr>
<tr>
<td>Internal Work Motivation</td>
<td>.27</td>
<td>.02</td>
<td>.29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Role Perception Outcomes</th>
<th>Motivational Characteristics</th>
<th>Social Characteristics</th>
<th>Total $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role Ambiguity</td>
<td>.28</td>
<td>.24</td>
<td>.53</td>
</tr>
<tr>
<td>Role Conflict</td>
<td>.22</td>
<td>.09</td>
<td>.31</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Well-Being Outcomes</th>
<th>Motivational Characteristics</th>
<th>Social Characteristics</th>
<th>Total $R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>.15</td>
<td>.05</td>
<td>.20</td>
</tr>
<tr>
<td>Stress</td>
<td>.14</td>
<td>.10</td>
<td>.23</td>
</tr>
<tr>
<td>Burnout / Exhaustion</td>
<td>.17</td>
<td>.04</td>
<td>.21</td>
</tr>
<tr>
<td>Overload</td>
<td>.26</td>
<td>.07</td>
<td>.33</td>
</tr>
</tbody>
</table>

*Note: Motivational characteristics are: Autonomy, Skill Variety, Task Variety, Task Significance, Task Identity, and Feedback from Job. Social characteristics are: Interdependence, Feedback from Others, Social Support. Only those work characteristics that appear with population correlations in Table 2 are included in specific regressions.*
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interdependence</td>
<td>.24</td>
<td>.25</td>
<td>.37</td>
</tr>
<tr>
<td>Feedback from Others</td>
<td>.42</td>
<td>.34</td>
<td>.28</td>
</tr>
<tr>
<td>Social Support</td>
<td>.32</td>
<td>.36</td>
<td>.47</td>
</tr>
<tr>
<td><strong>Motivational Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autonomy</td>
<td>.47</td>
<td>.47</td>
<td>.48</td>
</tr>
<tr>
<td>Skill Variety</td>
<td>.39</td>
<td>.45</td>
<td>.34</td>
</tr>
<tr>
<td>Task Variety</td>
<td>.34</td>
<td>.45</td>
<td>.37</td>
</tr>
<tr>
<td>Task Significance</td>
<td>.38</td>
<td>.41</td>
<td>.43</td>
</tr>
<tr>
<td>Task Identity</td>
<td>.29</td>
<td>.34</td>
<td>.29</td>
</tr>
<tr>
<td>Feedback from Job</td>
<td>.41</td>
<td>.42</td>
<td>.44</td>
</tr>
</tbody>
</table>
Figure 1
