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Work Strain, Health, and Absenteeism: A Meta-Analysis

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Work strain has been argued to be a significant cause of absenteeism in the popular and academic press. However, definitive evidence for associations between absenteeism and strain is currently lacking. A theory focused meta-analysis of 275 effects from 153 studies revealed positive but small associations between absenteeism and work strain, psychological illness, and physical illness. Structural equation modeling results suggested that the strain–absence connection may be mediated by psychological and physical symptoms. Little support was received for the purported volitional distinction between absence frequency and time lost absence measures on the basis of illness. Among the moderators examined, common measurement, midterm and stable sources of variance, and publication year received support.

Keywords: absenteeism, health, strain, work stress

There has been a surging research interest in work stressors and strain, asserted to be negative contributors to organizational effectiveness, particularly as they result in excessive absenteeism. Corporations in the United States are said to lose over $8,000 per person annually (Wilkerson, 1998), while costs to employers in the United Kingdom are estimated to be between £353 and £381 million per year (Mackay, Cousins, Kelly, Lee, & McCaig, 2004). Despite the accumulation of research concerning the medical model of absenteeism, wherein the stress process unfolds to give rise to absenteeism due to illness, there is presently no theory-driven quantitative synthesis of the literature to substantiate these connections. Methodological variation and diverse theoretical viewpoints across primary research studies preclude the succinct extraction of evidence for connections among indicators of stress and absenteeism. The purpose of this article is to use meta-analysis to make inferences about the role of absenteeism within the stress process, testing hypotheses using accumulated research. For earlier narrative reviews on the topic, readers are directed to Harrison and Martocchio (1998) and Johns (1997, 2002).

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Constructs, Concepts, and Variables

Our treatment of stress in this investigation was guided to some extent by Cooper, Dewe, and O'Driscoll's (2001) critical review of the stress literature, suggesting a need to shift focus from detailed, debated descriptions of what stress is toward an explication of how related elements can be integrated in advancing knowledge about the stress process. As an imprecise concept comprising several different constructs (McGrath, 1976), stress may be seen as a process representing an individual's perceptual, psychological, physical and behavioral responses that are triggered by workplace factors or stressors. This conceptualization is not at odds with that adopted in the transactional process model of stress (cf. Lazarus, 1990; Schuler, 1982), a model that Cooper et al., (2001) believe provides an organizing framework for the development of future research and theory.

Beehr and Newman's (1978) facet analysis of job stress identifies a myriad of elements (e.g., psychological health) and variables (e.g., depression) representative of the construct, and which may be seen as indicators of stress. Kahn and Byosiere's (1992) later review reveals that some indicators (e.g., burnout, somatic complaints) have been more frequently examined in primary research albeit with much variation in terminology. For example, some indicators have been collectively referred to as strain (e.g., Podsakoff, LePine, & LePine, 2007), whereas others have been categorized as psychological strain (e.g., Halbesleben, 2006), physical health (e.g., Schat, Kelloway, & Desmarais, 2005), or psychological and physical well-being (e.g., Mckee-Ryan, Song, Wanberg, & Kinicki, 2005). The terms health or illness

have also been used, as Danna and Griffin's (1999) conceptualization of health includes depression, anxiety, and psychosomatic symptoms, while Fleming and Baum (1987) refer only to hypertension and heart disease in their discussion of the health consequences of stress.

Despite these disagreements, there is a general substantive understanding of these concepts as being related to stress (Kahn & Byosiere, 1992). In this investigation, we use three broad conceptual categories labeled work strain, psychological illness, and physical illness to represent an individual's perceptual, psychological, and physical responses to work stressors, with absenteeism from work being the behavioral response of concern. These categorizations are somewhat aligned with first- and second-level responses associated with the transactional process model of stress, allowing for a consideration of the temporal ordering of various responses without which an understanding of stress could become overly complex (Parker & DeCotiis, 1983).

Work Strain

We regard work strain as reflecting an individual's subjective evaluation of work as threatening or harmful to oneself (Holroyd & Lazarus, 1982; Melamed, Shirom, Toker, Berliner, & Shapira, 2006). It may be seen as a response that is immediate or proximal to the exposure to stressors. This conceptualization and operationalization addresses Parker and DeCotiis's (1983) definitional criticisms, in that it maintains a link to the immediate work context. It also fulfills Edwards's (1992) articulated requirement to use measures that are commensurate with a specific element of interest (in our case, work-related factors). Measures requiring individuals to report on the frequency or amount of strain, tension, or pressure experienced specifically with respect to work-related factors (e.g., Spielberger & Reheiser's Job Stress Survey, 1994) are categorized as work strain. Despite a rising interest in the positive aspects of work stress and strain (e.g., Podsakoff et al., 2007), strain is viewed as an adverse individual experience in this study, which is consistent with the majority of absenteeism research (e.g., Hackett, Bycio, & Guion, 1989). In addition, the focus is on understanding chronic work strain, similar to the majority of studies in this area (Beehr & Franz, 1987). Acute indicators (i.e., symptoms experienced in the context of short-term distressing events) are coded separately and examined post hoc.

Psychological and Physical Illness

The label illness is used to represent an individual's psychological and physical responses to initial perceptions of threat or work strain as defined above (Holroyd & Lazarus, 1982). Such responses have also been regarded as a manifestation of failing attempts to effectively address initial strain (Lazarus, 1990) and hence may be seen as responses that are distal with respect to the exposure of stressors. Maes and Schlosser (1987), for example, found among asthma patients a strong negative association between ineffective coping reactions and well-being. Similarly, Pierce and Molloy (1990) reported that teachers in a high burnout group exhibited a significantly greater number of ineffective, regressive coping behaviors in dealing with stressful situations than those in a low burnout group.

We acknowledge the distinction between signs (e.g., objective criteria such as x-ray reports) and symptoms (e.g., based on patient self-report) of illness (Cohen & Williamson, 1991), but focus on the latter in this examination as research in this area has largely relied on self-report assessments. Consistent with recent literature (e.g., Mckee-Ryan et al., 2005; Schat al., 2005) we distinguish between psychological symptoms (e.g., depression) and physical symptoms (e.g., headaches, stomach problems) of illness. With the exception of burnout, items of measures that were categorized as psychological or as physical illness did not reference one's immediate work. Burnout, however, was included among measures of psychological illness, because of the large volume of literature suggesting an understanding of burnout as a prolonged response to chronic workplace stressors (Maslach, Schaufeli, & Leiter, 2001), as a condition thought to develop over time (Leiter, 1993), and as being distinct from initial appraisals (Melamed et al., 2006).

Absenteeism

Absenteeism is defined as the failure to report for scheduled work (Johns, 2002) and has been operationalized in a variety of ways in primary research. Records-based or self-report indices of attitudinal (number or rate of single day absences), frequency (number of times absent or rate of this kind of absence), and time lost absence (total number of days or rate of days absent) are the most commonly used individual-level measures of absenteeism (Chadwick-Jones, Nicholson, & Brown, 1982). Because absenteeism is a low base-rate behavior, absence

days are aggregated over varying time periods (e.g., 3 months to a year) to indicate the total amount of absenteeism or the rate of absenteeism over that particular period. In the discussion to follow, the term *absence* is used in a general sense. Reference to a particular measure of absenteeism (e.g., time lost) is made whenever it is theoretically relevant.

Relevant Theory and Hypotheses

Examinations of work strain or illness and absenteeism are typically categorized under the process umbrella of absenteeism models, in which the former are commonly theorized *causes* of absence. Several conditions are relevant to making inferences about the causal influence of *x* on *y* (cf. Campbell, 1967; Cook, Campbell, & Peracchio, 1990). First, *x* and *y* should covary if causality operates. Despite much speculation in the popular and business press and a number of isolated correlation coefficients, no empirical summary of this covariation is currently available for stress and absence. Next, credence in the causal impact of *x* on *y* is strengthened when *x* precedes *y* temporally and when the possibility of reversed causality is confronted. Although the existence of predictive and postdictive research designs facilitates inferences concerning these matters, two full waves of measurement, a rarity in primary absenteeism research (Johns, 2003), are necessary to fully inform conclusions about causality. Nevertheless, an examination of predictive and postdictive effects provides some insight into the possibility that absence might influence strain and illness as well. (cf. Harrison, Newman, & Roth, 2006). Finally, causal inferences are bolstered when a third variable, *z*, that covaries with *x* or *y* can be accounted for or ruled out. Despite limitations on the extent to which the effects of such variables can be isolated and examined in a meta-analysis, this investigation considers several potential substantive and methodological influences on strain and illness in relation to absenteeism. Figure 1 presents a framework for understanding this connection, as explored in our research.

Absence as Withdrawal From the Workplace

Hill and Trist (1955) were perhaps the first to suggest that work-related strain prompts individuals to escape or withdraw from the workplace by going absent. Narrative reviews around the medical model

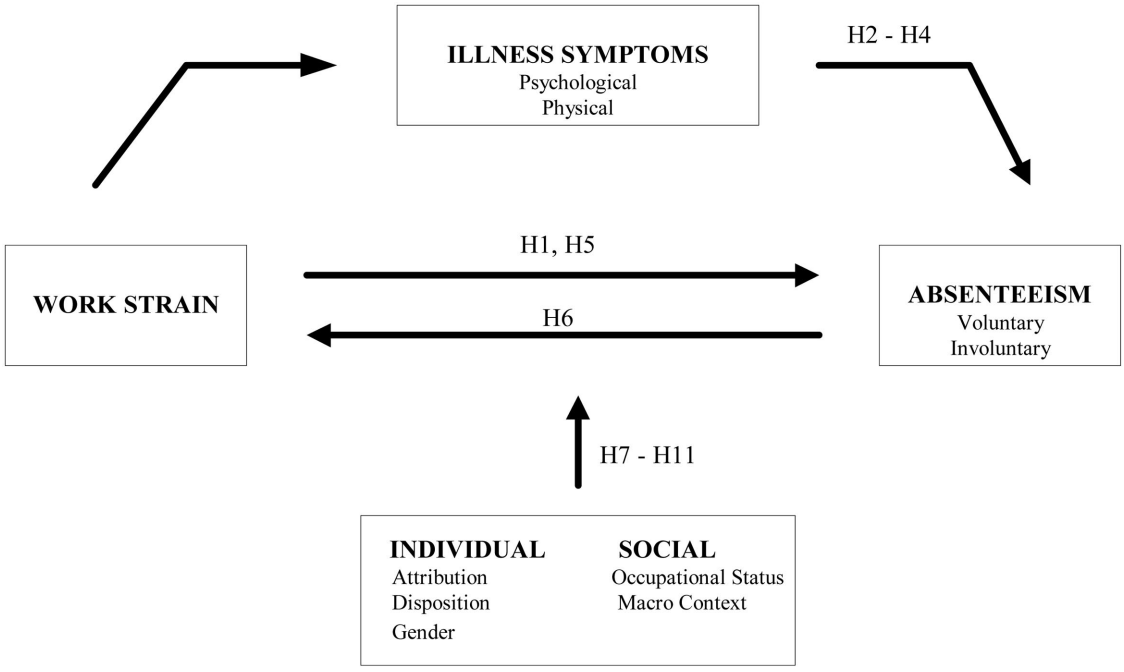


Figure 1. A framework for understanding the work strain–absence association.

of absenteeism suggest that absence results from an inability to attend work primarily due to illness or a weakened state of well-being (e.g., Johns, 2002). This proposition remains virtually untested (Johns, 1997) as the temporal precedence of strain or illness has not always been maintained in empirical studies, with little investigation into the mediating processes connecting strain and absenteeism (Harrison & Martocchio, 1998).

The basic propositions of Cohen and Williamson's (1991) stress-illness pathways model suggest that stressful events trigger psychological and physical changes in an individual that weaken immune functioning and give rise to disease. Individuals are thought to exhibit adaptive coping efforts that have the capacity to reduce or increase experienced strain, depending on their effectiveness (Edwards, 1992; Lazarus, 1990). Aspinwall and Taylor (1997) suggest that individuals choose between specific coping strategies, depending on the degree or extent of the perceived problem, using small efforts to address small problems and greater efforts to deal with larger problems. As psychological and physical symptoms reflect the depletion of coping resources (Hockey, 1993; Melamed et al., 2006), escalated levels of psychological and physical illness may reflect an increasing burden of the stressful experience on the individual. Indeed, Evans and Edgerton (1991) demonstrated that stressful life events first gave rise to tension and negative mood states, contributing to the later onset of colds.

Therefore, an individual experiencing strain at work might initially engage in cognitive coping such as reappraising the situation. If these efforts are unsuccessful in reducing the strain, psychological (e.g., fatigue, anxiety) or physical (e.g., sleep disturbances, stomach ulcers) symptoms may manifest. At the awareness of a greater burden, the individual might expend greater efforts to cope such as problem solving, taking a break from work by going absent, or seeking medical attention. Although absence has infrequently been cited as a coping strategy, it can be regarded as such because time away from work affords the opportunity to offset or minimize the cumulative effects of work strain (cf. Hackett & Bycio, 1996). There is some empirical evidence supporting the views presented above. For example, Baba, Galerpin, and Lituchy (1999) found support for burnout and depression as pathways through which work strain influenced absenteeism intentions.

As suggested earlier, we propose a mediation model in which the association between work strain and absence is sequentially mediated by psychological and physical illness symptoms. We acknowledge that elements in the theorized sequence can also reciprocally influence each other. For the sake of simplicity a unidirectional perspective is adopted here. In using three broad categories of work strain, psychological illness, and physical illness, we recognize the loss of specificity in detailing the exact nature of influence of a particular symptom on another and on absenteeism. Consequently, our proposed mediation model should be seen as a generalization of the connections between responses.

Hypothesis 1: The association between work strain and subsequent absence is positive.

Hypothesis 2: The association between psychological illness and subsequent absence is positive.

Hypothesis 3: The association between physical illness and subsequent absence is positive.

Hypothesis 4: Illness partially mediates the work strain–absence association such that its effect is transmitted sequentially through symptoms of psychological illness and physical illness.

Types of Absence

Time lost absence measures are regarded as involuntary, because longer absences are thought to result from factors (e.g., illness, family problems) beyond a person's control (Steers & Rhodes, 1978), whereas frequency and attitudinal measures are considered voluntary because such absences are shorter in duration and thought to reflect factors within an employee's control (Fox & Scott, 1943). Hackett and Guion's (1985) two-factor solution for absence measures, and negative correlations between frequency and time lost absence measures (Smulders, 1980) appear to support this bidimensionality. However, there is much skepticism about the processes suggested to underlie voluntary and involuntary absence (Martocchio & Harrison, 1993; Steel, 2003).

Based on the proposed mediation through illness, one might expect stronger strain/illness-absence associations for time lost in comparison to frequency measures of absenteeism because of a greater degree of correspondence between the former absence measure and its strain or illness antecedent (cf. Ajzen & Fishbein, 1977). However, there is evidence to suggest that sick leave may have nonmedical or voluntary determinants (e.g., deciding to be absent). For example, a company's sick leave policies can significantly

influence the extent to which employees take absence (Deery, Erwin, Iverson, & Ambrose, 1995). Burton, Lee, and Holtom (2002) specifically measured illness absence and the ability to attend, but found the two variables to be poorly correlated. In addition, Youngblood (1984) reported total time lost absence due to illness was significantly associated with the value that an individual placed on nonwork time. Therefore, many factors are likely to weaken the distinction between frequency and time lost absence indices in terms of underlying voluntary or involuntary processes. The moderating influence, if any, of the strength of the association between frequency and time lost absence measures is examined post hoc.

> *Hypothesis 5:* The magnitude of strain–absence and illness-absence associations does not differ across frequency and time lost absenteeism measures.

The Restorative Model of Absence

As a coping behavior, absence might provide employees with an opportunity to recharge, allowing for the replenishment of depleted resources (Staw & Oldham, 1978; Hobfoll, 1989). Empirical evidence for the beneficial effects of respite such as vacations (e.g.,Westman & Eden, 1997) and even reserve duty for military personnel (Etzion, Eden, & Lapidot, 1998) suggests that it might be the mere change of venue that is important in lowering prior levels of burnout. With respect to the restorative function of absenteeism, we might expect a negative association between prior absence and strain or illness. However, a closer perusal of postdictive studies (i.e., those in which strain or illness is measured after absenteeism) points to a relationship that is counter to the propositions of the restorative model. For example, Manning and Osland (1989) found predictive associations of absence and psychological symptoms to be negative while postdictive ones were positive, although small. Hardy, Woods, and Wall (2003) also found little support for the moderating influence of absenteeism on the association between psychological symptoms at Times 1 and 2, suggesting that absence offered little alleviation of symptoms.

The coping literature distinguishes between emotion-focused and problem-focused coping, the latter being more effective in reducing distress, especially when the source is controllable as in the case of typical work stressors such as role overload and challenging work (Lazarus, 1990; Tamres, Janicki, & Helgeson, 2002). Although the literature has not specifically categorized absence as problem- or emotion-focused, Haccoun and Dupont's (1987) examination of the kinds of activities that people engaged in on an unscheduled day off (e.g., entertainment, family, trips, maintenance, and relationships) suggests that absence might not be problem-focused. Furthermore, in reviewing the implications of work respite research (most dealing with vacations) for the coping function of absenteeism, Johns (in press) concluded "the short half-life of positive vacation effects coupled with the apparent need for real relaxation and positive reflection while on vacation do not speak encouragingly for the stress relieving properties of a quick day or two absent from work."

Regardless of its coping potential, accompanying consequences of being absent, such as increased job responsibilities (Jackson & Schuler, 1985), job dissatisfaction (Tharenou, 1993), disrupted coworker relationships (Goodman & Leyden, 1991), and lower performance ratings (Bycio, 1992) can potentially exacerbate an employee's experience of strain upon return to work. Consequently, preabsence strain levels can remain unchanged such that absence prevents the further escalation of strain on the individual (Hackett & Bycio, 1996). Therefore, a weak association between prior absence and subsequent work strain and illness is likely. The following is hypothesized in postdictive studies.

> *Hypothesis 6:* The association between prior absence and work strain and illness is positive, but small.

Third Variable Influences on the Strain/Illness–Absence Associations

While theoretical and methodological significance guided the identification of the individual and contextual factors discussed below, a study-level examination of their potential influence was another reason for focusing on them. For the sake of clarity, each factor is discussed separately; possible combined influences of two or more factors are acknowledged.

Role of attribution. As self-report measures of absenteeism, strain, and illness are often used in research, the potential influence of causal attribution is heightened (e.g., Folger & Belew, 1985; Johns, 1994a). Illusory correlations between work strain or illness and absenteeism can result from the use of implicit theories to justify behavior or reactivity to item characteristics (Folger & Belew, 1985; Heider, 1958; Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Because absenteeism is generally regarded as

mildly deviant behavior, individuals have been consistently found to justify absence, using illness as a socially acceptable explanation (e.g., Johns, 1999; Nicholson & Payne, 1987). Thus, having reported one's own absence level, a socially acceptable rationale (e.g., strain or illness-related) is provided. Vice versa, having reported one's level of strain, a corresponding "appropriate" level of absenteeism is called for. Asking employees about absenteeism and illness within the same questionnaire or having them report on absence *due to sickness* contributes to item priming effects, prompting individuals to respond in a way that strengthens the apparent association between absenteeism and related variables (Harrison & Martocchio, 1998; Salancik, 1994). As the operation of attribution or perceptual influences is most likely in retrospective accounts of some event (Podsakoff et al., 2003), the following hypothesis is offered.

> *Hypothesis 7:* The average strain/illness-absence association based on retrospective self-report measures of absence is stronger than that based on retrospective records-based absence.

Dispositional influences. Findings demonstrating the temporal and cross-situational stability of absenteeism (e.g., Harrison & Price, 2003) have led to the recognition that individuals might be predisposed or prone to be absent (Johns, 2001). Indeed, absenteeism has been linked to dispositional variables such as low positive affect (Iverson & Deery, 2001), low conscientiousness (Conte & Jacobs, 2003), and Type A Behavior Pattern (Jamal & Baba, 1991) to name a few. The appraisal of stressors as threatening can also be influenced by the motivational and cognitive aspects of personality (Wiebe & Smith, 1997). Negative affectivity and neuroticism have received the most attention in this regard (e.g., Costa & McCrae, 1985; Stone & Costa, 1990). Evidence for stable sources of variance in any behavior is based on the demonstration of consistency in behavior across situations (Mischel, 1968). Epstein and O'Brien (1985) explained how aggregating behaviors across a wide range of time or situations allows for an estimation of the underlying stability of a person's disposition. Consistent with this logic, Harrison and Martocchio (1998) suggested that stable dispositional sources of variance are more likely to be detected when longer absence aggregation periods are used. Chronic work strain, on the other hand, is considered to be a midterm source of variance, likely detected when 6- to 12-month absence aggregation periods are used, because work stressors fluctuate temporally (LaCroix & Haynes, 1987).

> *Hypothesis 8:* Reflecting stable dispositional sources of variance, the work strain–absence effect is positively associated with absence aggregation periods.

Role of gender. The finding that women tend to be absent from work more than men has been pervasive absenteeism research (Côté & Haccoun, 1991; Patton & Johns, 2007). A variety of social and psychological explanations that women are exposed to adverse conditions which contribute to their vulnerability to experience strain, or that they are socialized to seek respite in the face of difficulty have been advanced (e.g., Jick & Mitz, 1985; Kandrack, Grant, & Segall, 1991). We argue that women cope differently with stressful situations than men do. Stronger negative associations between absenteeism and job satisfaction in samples with a larger proportion of women suggest that women have lower thresholds for dissatisfying work conditions, prompting their forthcoming escape from work in comparison to men (Hackett, 1989). Women are also more likely than men to be absent in response to a cold or flu episode (Leigh, 1983). Thus, mindful of the change in level of analysis, there is reason to expect the strain/illness–absence association to become stronger as the proportion of women in a study increases.

> *Hypothesis 9:* The positive strain/illness–absence association increases with the percentage of women in a sample.

Role of occupational status. In general, blue-collar workers have been found to exhibit higher levels of absenteeism in comparison to those occupying higher status occupations (e.g., Feeney, North, Head, Canner, & Marmot, 1997). One plausible explanation is that individuals of low socioeconomic groups have a diminished reserve capacity to cope with adverse conditions due to a lack of adequate structural (e.g., health care), interpersonal (e.g., well-developed social networks), and intrapersonal (e.g., high self-esteem) resources for coping with adverse situations (Gallo & Matthews, 2003; Twenge & Campbell, 2002). It has also been suggested that low status occupational groups are more likely to see absence as legitimate (Nicholson & Johns, 1985), and to justify it using acceptable external reasons such as illness (e.g., Harvey & Nicholson, 1999) because of

diminished control over their use of work time (Johns & Nicholson, 1982). On the other hand, managers and professionals are likely to view absence as illegitimate, resulting in guilt over the use of absence even for legitimate physical ailments (Nicholson & Johns, 1985). Employees in such occupations might also be socialized to exhibit resilience in the face of stressful situations (Barley & Knight, 1992) and might find less need for time away from work because of their greater control over the use of work time (Addae & Johns, 2002). Occupational status is used as a proxy for social–cultural factors; however, we acknowledge that any observed effects might also result from underlying correlates (e.g., attitudes, beliefs, and job features such as role demands, physical working conditions, and work schedules).

Hypothesis 10: The strain/illness–absence association decreases as occupational status increases.

Macro contextual influences. With the increased attention to individual wellbeing and mental health through organizational and government efforts to understand and prevent stress-related effects (Sauter, Murphy, & Hurrell, 1990; World Health Organization, 2000), is it possible that organizational interventions and policies have succeeded in reducing strain and absence over the years, attenuating their observed connection? Meta-analyses (e.g., Bauer, Amelio, LaGanke, & Baltes, 2002; DeGroot & Kiker, 2003) offer contradictory evidence on the impact of work wellness programs on absenteeism. However, a social information processing explanation points to a possible increase in the strain/illness-absence effect over the years, because formally and informally conveyed information about strain and illness may have increased their salience to individuals (Salancik & Pfeffer, 1978; Johns, 2006). Indeed, Barley and Knight (1992) suggest that people have become more comfortable with stating that they are experiencing strain, an expression that is essentially symbolic, having little to do with underlying psycho-physiological changes. Several other studies also suggest that certain psychological symptoms may have acquired, over the years, some legitimacy as reasons for being absent (e.g., Hackett et al., 1989; Johns & Xie, 1998). Using a study's publication year as a proxy for some of the macro contextual changes described above, the following is expected.

Hypothesis 11: The strain/illness–absence association increases with chronological time.

Methodology

Literature Search

After some experimentation, the search rule (absenteeism *and* stress *or* strain *or* illness *or* health) was used to locate articles in various electronic databases (ABI Inform, PsycInfo, SocioFile, and MedLine), followed by a manual perusal of previous reviews on the topic (e.g., Beehr & Newman, 1978; Johns, 1997). Stress-related journals (*Journal of Advanced Nursing*, *Work & Stress*, *International Journal of Stress Management*, *and Stress Medicine*) were also reviewed. Relevant unpublished doctoral dissertations, which appeared in the electronic search results, were obtained through *Digital Dissertations* or interlibrary loans. As earlier reviews suggested a paucity of work stress research prior to 1975, the search covered the period from 1975 to December 2003. The above search process yielded approximately 3,600 articles and abstracts, which included about 93 dissertations and 630 non-English articles in a variety of languages. For cost and quality control reasons, only studies presented in English were examined.

As a meta-analysis on low back pain and absenteeism already exists (Martocchio, Harrison, & Berkson, 2000), studies examining this physical ailment were excluded. Those retained for inclusion used individual-level measures and analyses, examined absenteeism from work rather than from school or other activities, examined work strain rather than stressors, used employee rather than student samples, and used uncontaminated illness measures (i.e., the measure did not contain an item assessing absence due to illness). Finally, each study reported either zero-order correlations between the variables of interest or sufficient statistical information to permit such calculations. The screening process yielded 137 studies (115 published and 22 dissertations), containing 275 effects included in the main meta-analysis of correlations. Whenever a study did not report a required statistic, an attempt was made to contact the authors. Of the 16 authors contacted, three were able to supply the requested information. Relevant studies reporting the odds ratio (OR), a statistic used to estimate the association between two dichotomous variables, were retained and analyzed separately. This was possible when a study met the above inclusion criteria and reported cell frequencies. Of a total of 96 such studies, only 16 provided the required information that enabled the calculation of OR.

Data Coding

Given the wide variation in measures used to capture the stress process, care was taken to avoid subjective interpretation in coding a measure as work strain, psychological illness, or physical illness. In accordance with the conceptualizations offered earlier, measures coded as work strain included the Occupational Stress Indicator (Cooper, Sloan, & Williams, 1987), job-induced anxiety (House & Rizzo, 1972) and the Nursing Stress Scale (Gray-Toft & Anderson, 1981). Many studies created their own measure of perceived strain, and they were coded as such if respondents were asked to rate the amount of stress, strain, pressure, or tension caused by their job in general or various aspects of their work. For studies that did not report details of a scale, some discretion was used in determining its inclusion. Measures coded as psychological illness included the General Health Questionnaire (GHQ, Goldberg, 1972), the Maslach Burnout Inventory (MBI, Maslach & Jackson, 1981), and the Center for Epidemiologic Studies-Depression scale (CES-D, Radloff, 1977). Examples of physical illness measures included the Somatic Complaints Index (Caplan, Cobb, French, Van Harrison, & Pinneau, 1980), the somatic symptoms subscale of the GHQ (Goldberg, 1972), and the Cornell Medical Index (Brodman, Erdmann, & Wolff, 1960).

Many studies used measures containing items of both psychological and physical symptoms; these were coded as measures of psychosomatic illness and were examined separately. In coding psychological illness, trait measures for some variables (e.g., negative affectivity, anxiety) were excluded from the analysis. Studies examining the influence of stress-management or absence interventions were included, but were coded as postintervention associations. Corresponding somewhat with the occupational groupings used by Caplan et al., (1980) codes were used to distinguish between samples of blue-collar (e.g., assembly line worker), low-level white-collar (e.g., technicians, secretaries, clerks, supervisors), and high-level white-collar (e.g., managers, accountants, engineers, professors) occupational samples.

Coding accuracy. The first author coded all studies. To obtain an estimate of the accuracy of coding, a random sample of 20 published studies was selected for recoding by a doctoral-level student who was given an orientation and practice session. As an article could take up to 40 minutes to code, only items that were directly pertinent to the hypotheses were chosen for recoding. In assessing coder agreement, a cutoff of .75 for kappa, κ, (cf. Orwin, 1994) was used. All items with the exception of research design ($\kappa = .50$) met the criterion; nevertheless, all coding discrepancies were resolved through discussion. With respect to research design it was agreed that a postdictive code was to be used when respondents were asked to rate current strain or illness and past absence. If the reporting period overlapped with the absence aggregation period by 25% or more, the study was coded as cross-sectional.

Meta-Analytic Procedure

The Comprehensive Meta-Analysis software (Borenstein & Rothstein, 1999) was used to synthesize the compiled effects. As the focus was on correlations, mean differences were used to calculate *d* and then converted to *r* for independent groups designs, using procedures outlined in Cortina and Nouri (2000). This focus on independent group comparisons is consistent with the correlational nature of most absenteeism research, in which between-subjects differences have been of primary interest (Johns, 2003). The average reliabilities for measures of work strain ($r_{xx} = .791$, $k = 36$), psychological illness ($r_{xx} = .832$, $k = 58$), physical illness ($r_{xx} = .799$, $k = 27$), frequency/attitudinal absence ($r_{yy} = .530$, $k = 3$), and time lost absence ($r_{yy} = .532$, $k = 8$) were used to correct aggregated effects for attenuation. Because of the small number of absence reliability estimates in our examination, the averaged time lost and frequency absence reliability ($r_{yy} = .531$) was used to correct for attenuation in the dependent variable. This figure is very close to Hackett and Guion's (1985) mean reliability of .51 for absence frequency based on 27 coefficients. Consistent with previous meta-analyses of absenteeism (e.g., Bycio, 1992; Farrell & Stamm, 1988; Hackett, 1990; Martocchio, 1989), effects were not corrected for range restriction, because of problems in first defining the population to which the effect is to be generalized and then obtaining estimates of the variance of a particular variable in this population (Sackett & Yang, 2000). Biserial correlations obtained from *d* conversions were not corrected for dichotomization because such corrections assume a normal distribution underlying the continuous variable (Hunter & Schmidt, 1990a,1990b), which is not the case with absence distributions. Several analyses were conducted around issues concerning levels of analysis, sample independence, publication bias, transformation of absence measures, and bidirectionality of

effects. The results did not identify any concerns, and are available from the authors.

Results

A sample of 275 effects from 115 published studies and 22 dissertations was available for an analysis of correlations. These effects represented varied occupations and work settings. These included the medical profession (nurses, doctors, technologists), manufacturing/ production (engineers, technicians), education (teachers, counselors), social work (social workers, personal care workers), blue-collar occupations (assembly line workers, miners, welders, cleaners, bakers, sewing machine operators), administration (clerks, secretaries, managers, directors), government (civilian and military employees), retail (sales persons, customer service representatives), and security-related fields (security guards, firefighters, police). The average sample mean for age was 37.54 years ($SD = 4.54$), while the average female composition across samples was 51.9% ($SD = 30.63$).

Absence as Withdrawal From the Workplace

As presented in Table 1, the overall associations between absenteeism and work strain ($r_{obs} = .09$, $r_{corr} = .15$, $k = 56$), psychological illness ($r_{obs} = .13$, $r_{corr} = .20$, $k = 128$), and physical illness ($r_{obs} = .14$, $r_{corr} = .22$, $k = 65$) are positive and significant, but small (Cohen, 1988). The observed effect for work strain is significantly smaller than that for psychological illness ($Z = 2.50$, $p < .01$) and physical illness ($Z = 2.67$, $p < .01$), providing some evidence for discriminant validity among our categorizations. An examination of effects across different measures coded as work strain (when at least three studies reported its use) provides some support for their combination in this synthesis ($r_{corr} = .08$, $k = 3$, $N = 1784$ using Cooper et al.'s [1987] OSI subscale; $r_{corr} = .09$, $k = 3$, $N = 921$ using Gray-Toft and Anderson's [1981] Nursing Stress Scale; $r_{corr} = .11$, $k = 7$, $N = 2548$ using Kahn et al.'s [1964] job tension index; $r_{corr} = .11$, $k = 5$, $N = 1188$ using Parker and Decotiis's [1983] job stress measures; $r_{corr} = .08$, $k = 3$, $N = 774$ using Peters et al.'s [1980] job frustration scale). These effects did not differ significantly from each other.

As reported in Table 2, the overall effects in predictive studies for work strain, psychological illness, and physical illness remain positive, and are even larger for work strain ($r_{obs} = .26$, $r_{corr-} = .40$, $k = 6$) and physical illness ($r_{obs} = .17$, $r_{corr} = .25$, $k = 5$) in comparison to their full-sample counterparts. The nonzero positive confidence intervals for each overall effect provide support for Hypotheses 1, 2, and 3. Although no hypotheses were offered in relation to specific illnesses, these are broken down by type of illness and research design in Table 3 for the interested reader.

Mediating Role of Illness

Following procedures outlined in Viswesvaran and Ones (1995), structural equation modeling (SEM) was used to test the sequential mediation of psychological and physical illness on the work strain–absence association (Hypothesis 4). This analysis required a correlation matrix of effects among work strain, psychological illness, physical illness, and absenteeism. Therefore, additional data (whenever reported in the sample of meta-analyzed studies) was

Table 1
Associations Between Main Variables of Interest and Absenteeism (All Studies)

	k (# effects)	N	Observed r	Corrected r	90% Credibility interval	% Artifacts	95% Confidence interval
Work strain	56	18,630	.093	.145	−.08 to .37	29.52	.06 to .12
Frequency	14	3,373	.106	.165	−.15 to .48	23.06	.03 to .18
Time lost	40	14,743	.087	.136	−.05 to .33	35.36	.06 to .12
Psychological illness	128	66,679	.133	.201	.04 to .36	39.14	.12 to .15
Frequency	37	16,319	.144	.219	−.00 to .44	28.46	.11 to .18
Time lost	86	46,890	.124	.188	.06 to .32	47.23	.11 to .14
Physical illness	65	50,632	.144	.220	−.01 to .45	20.68	.12 to .17
Frequency	24	18,570	.147	.225	−.01 to .46	20.25	.10 to .19
Time lost	40	31,929	.142	.217	−.01 to .45	20.65	.11 to .17

Table 2
Associations Between Strain/Illness and Absenteeism by Research Design

	k (# effects)	*N*	Observed *r*	Corrected *r*	90% Credibility interval	% Artifacts	95% Confidence interval
			Predictive studies				
Work strain	6	1,214	.255	.398	.20 to .60	55.70	.16 to .35
Frequency	4	994	.275	.431	.27 to .59	63.85	.17 to .38
Time lost	2	220	.158	.247	.12 to .37	80.31	.03 to .29
Psychological illness	29	7,848	.100	.152	−.01 to .31	50.10	.07 to .13
Frequency	12	3,520	.091	.138	−.02 to .30	46.80	.04 to .14
Time lost	17	4,328	.108	.163	.01 to .32	53.49	.06 to .15
Physical illness	5	2,133	.166	.254	.19 to .32	84.60	.12 to .21
Frequency	4	1,861	.155	.238	.17 to .31	82.50	.11 to .20
Time lost	1						
			Postdictive studies				
Work strain	37	11,182	.080	.126	−.08 to .33	34.58	.05 to .11
Frequency	9	2,320	.026	.041	.01 to .08	95.87	−.01 to .07
Self-report	5	1,156	.022	.035	−.04 to .11	83.59	−.04 to .08
Records	4	1,164	.031	.048	—	100.00	−.03 to .09
Time lost	27	8,740	.089	.139	−.05 to .33	37.65	.05 to .13
Self-report	20	6,743	.116	.181	.01 to .35	43.93	.08 to .16
Records	7	1,997	−.000	−.001	—	100.00	−.04 to .04
Psychological illness	81	47,389	.138	.209	.06 to .36	40.07	.12 to .15
Frequency	19	9,300	.159	.242	.01 to .47	29.94	.11 to .21
Self-report	5	3,272	.246	.372	.14 to .60	33.07	.15 to .34
Records	14	6,028	.112	.170	.06 to .28	59.43	.08 to .15
Time lost	57	34,619	.126	.191	.07 to .31	49.59	.11 to .14
Self-report	37	30,204	.127	.192	.07 to .31	28.09	.11 to .15
Records	20	4,415	.115	.174	.04 to .31	63.31	.08 to .15
Physical illness	36	25,581	.165	.253	.06 to .44	31.86	.14 to .19
Frequency	11	8,371	.201	.308	.16 to .46	47.15	.15 to .25
Self-report	4	3,230	.194	.297	.05 to .55	22.53	.08 to .31
Records	7	5,141	.205	.315	—	100.00	.18 to .23
Time lost	23	15,527	.145	.228	.03 to .43	27.15	.11 to .18
Self-report	17	12,718	.165	.254	.09 to .42	36.71	.13 to .21
Records	7	4,359	.096	.146	−.04 to .34	25.25	.03 to .16
			Cross-sectional studies				
Work strain	12	5,535	.079	.124	−.08 to .32	28.756	.02 to .13
Frequency	1						
Time lost	10	5,084	.078	.121	−.08 to .32	26.71	.02 to .13
Psychological illness	18	11,442	.134	.203	.03 to .37	32.67	.09 to .17
Frequency	6	3,499	.158	.239	.04 to .44	30.82	.08 to .23
Time lost	12	7,943	.123	.187	.03 to .34	36.09	.08 to .17
Physical illness	24	22,918	.118	.181	−.08 to .44	13.10	.07 to .16
Frequency	9	8,338	.091	.139	−.11 to .38	12.94	.02 to .16
Time lost	15	14,580	.133	.204	−.06 to .47	14.07	.08 to .19

compiled to estimate the work strain–psychological illness ($k = 14$), work strain–physical illness ($k = 12$), and psychological-physical illness ($k = 21$) effects through separate meta-analyses.

The compiled correlation matrix of true or corrected effect sizes (see Table 4), using variable reliabilities along its diagonal and a harmonic mean sample size ($N = 478.74$), was used for this set of analyses. As Cudeck (1989) discusses, covariance matrices are more appropriate for testing structural equation models, and incorrect parameter estimates and fit indices can result when correlation matrices are analyzed. We accounted for this potential issue by calculating covariances based on the correlations reported in Table 4, using standardized estimates of the *SD*s for each variable in the matrix.

We estimated standardized *SD*s for each measure used in primary studies that clearly described the

Table 3
Associations Between Absenteeism and Each Coded Illness Category

	k	N	Observed *r*	Corrected *r*	90% Credibility interval	% Artifacts	95% Confidence interval
Anxiety	3	452	.063	.095	−.08 to .26	58.84	−.06 to .18
Acute stress/illness	6	13,993	.059	.090	−.06 to .23	14.53	.04 to .08
Burnout	6	1,277	.250	.377	—	100.00	.20 to .30
Emotional exhaustion	24	11,080	.120	.181	−.02 to .38	29.45	.08 to .16
Predictive	6	1,040	.068	.102	—	100.00	.01 to .13
Postdictive	15	7,005	.133	.200	−.04 to .45	22.76	.08 to .19
Depersonalization	11	1,970	.077	.117	−.07 to .30	51.14	.01 to .14
Predictive	4	612	.053	.081	—	100.00	−.03 to .13
Postdictive	7	1,358	.088	.133	−.09 to .35	40.93	.00 to .17
Lack of personal accomplishment	11	1,970	.111	.168	.04 to .29	69.66	.06 to .17
Predictive	4	612	.192	.290	—	100.00	.12 to .27
Postdictive	7	1,358	.075	.113	.03 to .19	83.63	.02 to .13
Depression	13	20,437	.130	.197	—	100.00	.12 to .14
Predictive	3	386	.189	.286	—	100.00	.09 to .29
Postdictive	8	17,227	.121	.183	—	100.00	.11 to .14
Fatigue	3	1063	.324	.489	.12 to .86	23.78	.13 to .52
Negative mood	3	471	−.015	−.023	−.18 to .13	61.72	−.13 to .10
Physical composite	49	25,795	.165	.253	.12 to .39	52.37	.14 to .19
Predictive	5	2,133	.166	.255	.24 to .27	84.60	.13 to .21
Postdictive	30	20,790	.163	.249	.13 to .37	52.23	.14 to .19
Psychological composite	50	24,747	.143	.216	.08 to .35	47.76	.12 to .16
Predictive	8	4,713	.094	.141	−.03 to .32	29.20	.03 to .15
Postdictive	33	18,099	.152	.230	.21 to .25	97.79	.14 to .17
Psychosomatic/ill health	20	9,601	.205	.310	.06 to .56	27.66	.15 to .26
Predictive	4	735	.152	.229	.05 to .41	54.19	.04 to .26
Postdictive	6	2,126	.170	.257	—	100.00	.13 to .21
Other*	19	27,535	.113	.172	−.09 to .44	10.08	.06 to .16

* Represents varied illnesses such as colds/flu, sleep problems, stomach problems, and headaches.

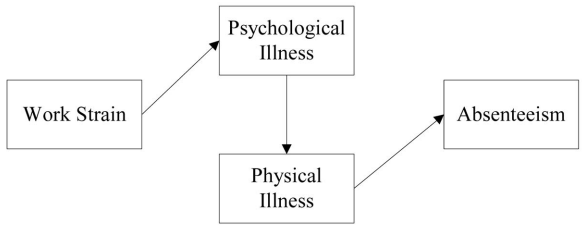
measure (particularly for the predictor variables) in sufficient detail to permit an understanding of the scale's range of possible values, and reported the standard deviation for the measure. Using a seven-point rating scale, the average weighted *SD*s for work strain, psychological illness, and physical illness measures were estimated as 0.986 ($k = 19$ studies), 1.049 ($k = 35$), and 1.036 ($k = 22$) respectively. For absenteeism, the average weighted *SD* of frequency absence measures (i.e., the number of times an individual is likely to be absent in a 12-month period) was estimated as 2.43 ($k = 30$). These estimates were used in the calculation of covariances between the variables. Two sets of SEM analyses using the correlation and covariance matrices were conducted. As expected, results based on the correlation matrix tended to yield smaller standard errors for the parameter test statistics and larger model fit indices (MacCallum & Austin, 2000). Nevertheless, both sets of results essentially yielded the same decisions when used to compare the various models that were tested. We report the results obtained using the covariance matrix as input.

Table 4
Correlation Matrix Input for Structural Equation Modeling to Test Mediation

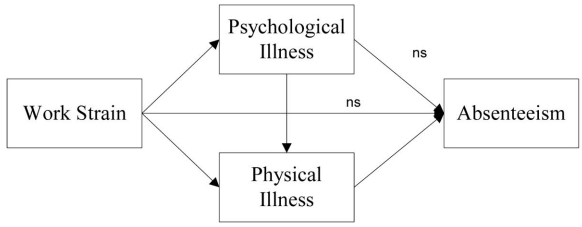
	1	2	3	4
1. Work strain	.791			
2. Psychological illness	.462	.832		
3. Physical illness	.423	.576	.799	
4. Absence	.145	.201	.220	.531

Note. Harmonic $N = 473.62$; Reliabilities on diagonal.

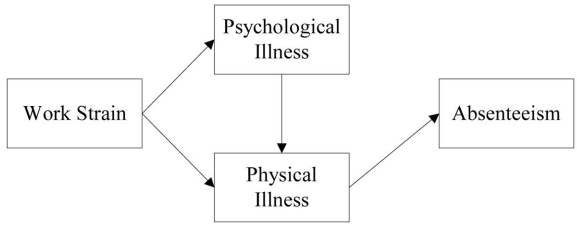
In testing our proposed distal mediation model, the models chosen for comparison were guided by discussions in Mathieu and Taylor (2006) and Fletcher (2006). We first tested an indirect effect model to determine support for indirect paths (see Figure 2). The obtained low chi-square value and high fit indices suggest that the model fits the data well [chi-



Indirect Effect Model (Chi-square = 27.609, df = 3, NFI = 0.923, CFI =0.93, RMR = .061)



Fully Saturated Model



Partial Mediation Model (Chi-square = 4.683, df = 2, NFI = 0.987, CFI = 0.992, RMR = .029)

Figure 2. Models compared using structural equation modeling.

square = 27.609, *df* = 3, Normed Fit Index (NFI) = .923, Comparative Fit Index (CFI) = .930, Root Mean-Square Residual (RMR) = .061]. In addition, each indirect path (work strain–psychological illness, psychological illness–physical illness, and physical illness–absence) was significant at the .05 level. To determine evidence for full versus partial mediation, we examined a fully saturated model showing all possible direct and indirect paths. Support for a full mediation model would require the work strain–absence, work strain–physical illness, and psychological illness-absence to be nonsignificant.

Although the fully saturated model could not be tested for overall fit, several observations are notable. First, the total indirect effect (.11) exceeded the direct effect of work strain on absence (.04), providing additional evidence for mediation. In addition, the indirect paths tested remained significant, while the direct work strain–absence path and the path from psychological illness to absence were nonsignificant. However, the path from work strain to physical illness was significant, which provides support for a partial rather than a full mediation model. As the link between work strain and physical illness is substantively viable (e.g., Mckee-Ryan et al., 2005; Segerstrom & Miller, 2004), we added a direct path from

work strain to physical illness and tested a partial mediation model (see Figure 2), comparing it against the indirect effect model. A significant chi-square difference test (χ^2 difference = 22.75, $df = 1$), together with the lower chi-square value, higher fit indices, and lower RMR obtained for the partial distal mediation model (4.683, $df = 2$, NFI = 0.987; CFI = 0.992, RMR = .029) suggest that it fits the data well.

Type of Absenteeism

Hypothesis 5 predicted no difference in the magnitude of effects for frequency and time lost measures of absenteeism. This hypothesis was confirmed by nonsignificant Z tests comparing overall frequency and time lost effects for work strain ($r_{frq} = .11$, $k = 14$; $r_{tlost} = .09$, $k = 40$, $Z = .456$, $p > .05$), for psychological illness ($r_{frq} = .14$, $k = 37$; $r_{tlost} = .12$, $k = 86$, $Z = 1.08$, $p > .05$), and for physical illness ($r_{frq} = .15$, $k = 24$, $r_{tlost} = .14$, $k = 40$; $Z = 0.18$, $p > .05$). Even when comparisons included only measures of absenteeism aimed at capturing sickness absence or stress-related absence, effects for time lost and frequency measures of absence were not significantly different from each other.

The Restorative Model of Absence

In testing for Hypothesis 6, postdictive effects were compared across self-report and records-based absence measures, to control for the possible operation of common method variance. For the work strain–absence association, the average effect based on records-based absence is not significantly different from zero, while that based on self-reported absence is significantly positive ($r_{srep} = .16$, $k = 25$, $r_{rec} = .04$, $k = 12$). For psychological illness ($r_{srep} = .22$, $k = 45$, $r_{rec} = .16$, $k = 36$) and physical illness ($r_{srep} = .26$, $k = 22$, $r_{rec} = .24$, $k = 14$), both sets of effects are significantly positive. These findings provide some support for Hypothesis 6 and work against the restorative model of absenteeism.

Third Variable Influences on the Work Strain/Illness–Absence Association

To maximize clarity in interpreting moderator results, possible confounds were first identified by examining a correlation matrix of all relevant variables (see Table 5), and then controlled for using hierarchical regression analysis (cf., Hunter & Schmidt, 1990a, 2004; Russell & Gilliland, 1995). As with the analyses reported earlier, the following results include only effects for work strain, psychological illness, and physical illness (i.e., acute stress/illness and psychosomatic illness effects were removed from the data set). Whenever a hypothesis involved only a subsample of effects (e.g., the influence of disposition was restricted to work strain effects only), con-

Table 5
Correlation Matrix for Moderator Variables and Study Characteristics

	1	2	3	4	5	6	7	8	9	10	11	12
1. Effect size												
2. Absence measure	−.265**											
3. Absence type	−.070	.354**										
4. Research design	.009	−.200**	−.117									
5. Aggregation period	.080	.111	.009	.089								
6. Gender	−.167*	−.009	−.001	−.102	−.100							
7. Health care	−.015	−.109	.018	−.181**	−.075	.286**						
8. Occupation status	.112	−.248**	−.234**	−.076	.177*	.245**	.135					
9. Sample size	−.025	−.083	−.021	.113	.254**	−.098	−.062	−.240**				
10. Year	.233**	−.236**	−.043	−.012	.196**	−.029	.035	.069	.112			
11. Type of effect	.086	−.075	−.009	.119	.375**	−.134*	.146*	.061	.067	−.013		
12. Postintervention	−.217**	.241**	.101	.034	−.022	.052	.024	−.110	−.088	−.021	−.097	
13. Age	.052	−.297**	−.121	.117	.188*	−.033	−.019	.214*	.095	.234	.132	−.255**

Note. $86 \leq N \leq 249$.
Abs. measure (1 = *records*, 0 = *self-report*), abs. type (1 = *frequency*, 0 = *time lost*), research design (1 = *predictive*, 2 = *postdictive*, 3 = *cross-sectional*), health care (1 = *yes*, 0 = *no*), occupational status (1 = *blue collar* to 6 = *higher white collar*), type of effect (1 = *point biserial*, 0 = *bivariate*), postintervention (1 = *yes*, 0 = *no*).
* $p < .05$. ** $p < .01$.

founds were identified by examining the correlation matrix based on that set of effects. As the magnitude of a variable's influence remained unchanged even when age was controlled for, only analyses without age are reported to minimize power loss due to a large amount of missing data for the mean age of the sample. The zero-order correlations between a control or moderator variable and an effect were corrected using procedures elaborated in Huffcutt and Woehr (1999). Both sets of results are reported for each variable examined below.

As the influence of attribution was more likely to manifest when self-report retrospective absence measures were used, a significant negative association between absence measure (coded 0 = self-report, 1 = records) and strain/illness-absence effects ($\beta = -.30$, $\Delta R^2 = .07$, $p < .01$; for corrected associations, $\beta = -.36$, $\Delta R^2 = .10$, $p < .001$), after controlling for the type of absence measure, length of absence aggregation period, health care sample, occupational status of sample, publication year of study, and presence of some intervention program provides support for Hypothesis 7. A test for dispositional influences (Hypothesis 8) revealed nonsignificant results for linear ($\beta = .05$, *ns*; for corrected associations, $\beta = .06$, *ns*) and nonlinear ($\beta = .01$, *ns*; for corrected associations, $\beta = .03$, *ns*) associations between absence aggregation periods (1 month to 12 months) and strain–absence effects. As these analyses were limited to strain–absence effects, range restriction for absence aggregation periods (1–12 months) may have played some role in these findings. For the sake of comparison, the linear influence of absence aggregation periods on illness-absence effects was found to be positive ($\beta = .18$, $\Delta R^2 = .02$, *ns*; for corrected associations, $\beta = .21$, $\Delta R^2 = .02$, *ns*), suggesting either the influence of stable illness conditions or of disposition.

Counter to the prediction that women are more likely to respond to strain or illness with absenteeism (Hypothesis 9), the percentage of women in a study's sample was found to have a nonsignificant but negative association with strain/illness–absence effects after controlling for variables related to gender ($\beta = -.16$, $\Delta R^2 = .02$, *ns*; for corrected associations, $\beta = -.18$, $\Delta R^2 = .03$, *ns*). The possible moderating influence of health care samples and age were examined to find little difference in the results except for a change in direction for health care samples ($r = .05$, $p = .80$, $n = 24$). The influence of occupational status, coded as: *mostly blue-collar* = 1, *blue-collar* = 2, *mostly lower-white* = 3, *all lower-white* = 4, *mostly higher-white* = 5, and *all higher-white* = 6 (where the term "mostly" represents samples comprising approximately 70% or more of the respective occupational category), was also found to be nonsignificant ($\beta = -.06$, *ns*; for corrected associations, $\beta = -.07$, *ns*) as was the potential moderating influence of health care samples on this association. Finally, a small but positive association for publication year and strain/illness-absence effects was found ($\beta = .12$, $\Delta R^2 = .01$, $p = .03$ one-tailed; for corrected associations, $\beta = .13$, $\Delta R^2 = .02$, $p = .02$ one-tailed), providing some support for Hypothesis 11.

Additional Analyses

A separate meta-analysis of ORs was conducted on a total of 17 effects from 16 studies published in epidemiological and medical journals. These included eight effects for psychological illness, eight for physical illness, and one for psychosomatic illness. Using the Mantel-Haenszel summary estimate, the average positive and nonzero ORs for psychological illness (OR = 2.90, $k = 8$) and physical illness (OR = 1.72, $k = 8$) suggest that those in the illness/severe illness group are more likely to be absent/have higher absence than those in the no illness/less severe illness groups. The log OR was converted to d ($d = .588$ for psychological illness; $d = .299$ for physical illness) and then to point biserial correlations (cf., Haddock, Rindskopf, & Shadish, 1998) to find that the resulting average effect for physical illness ($r_{pb} = .139$) is comparable to the overall physical illness effect reported in Table 1, while the psychological illness effect ($r_{pb} = .263$) is somewhat larger than its Table 1 counterpart. However, this larger effect simply mirrors the larger average d-converted psychological illness effect ($r_{pb} = 0.23$) obtained in the main meta-analysis. These findings consolidate those reported earlier, providing support for the generalizability of the illness-absence effect across the disciplines of psychology, organizational behavior, and epidemiology.

Discussion

One of the criticisms of meta-analysis is its limited capacity to contribute to theory development in a field, partly due to its focus on the estimation of an effect's magnitude (Shadish, 1996) and a lack of preplanned objectives (Cooper, 2003). The present research addresses both criticisms by employing a theory-focused approach in building and testing substantive questions about absenteeism from work as it

relates to strain. Our findings advance knowledge about absenteeism in several ways. First, accumulated evidence for only small-to-modest connections among work strain, illness, and absenteeism disputes popular claims that strain from work and related illness account for 60% to 70% of all work time lost (Adams, 1987; Cartwright, 2000). Confidence intervals (CIs) constructed around corrected upper boundary estimates ($.25 \leq r_{corr} \leq .54$) suggest that work strain accounts for between six and 29% of the variance in absenteeism. Similarly, the 95% CI range for upper bound corrected physical illness-absence effects ($.18 \leq r_{corr} \leq .32$) suggests that illness accounts for a maximum of only 10% of the variance in absenteeism. This finding resonates single-study findings that little variance in absenteeism is explained by work strain and shows that strain is not more highly correlated with absence than are a variety of other work experiences and attitudes (Johns, 2008). Why is the strain–absence connection not stronger? Johns (2008) argues that absence is an ineffective coping or buffering mechanism (as we illustrate), that sources of strain often compel attendance rather than absence, and that absence is more likely to occur in response to acute strain rather than the more chronic form typically assessed in work stress research.

Second, in comparison to the many extant published meta-analyses exploring absenteeism and other behaviors and attitudes, this examination is among the very few that theoretically articulates the role of absenteeism. Is absence a mere reaction to a noxious workplace or is it a response to illness? And, is it an effective response? We weave a behavioral theory about the connections among work strain, illness, and absenteeism, and maximize the use of available data by separating predictive and postdictive effects in an effort to shed light on these possible connections. We do, however, acknowledge that inferences about causality are limited by the methodological nature of our data. While we do have a strong theoretical basis for arguing that work strain and absence are indirectly connected via psychological and physical illness, our inferences would be stronger had we maintained the temporal ordering of variables in testing this theory. We did consider including only predictive effects in testing for mediation, but were able to find only two predictive effects for the work strain–physical illness and psychological–physical illness associations, while there was no such effect for the strain–psychological illness association.

With tentative support for partial illness mediation, we have some insight into the events likely to unfold at the onset of felt strain. Absence is viewed as a response to depleting cognitive, emotional, or physical coping resources. However, the generally small amount of variance explained by our theorized mediators leads to the recognition that strain and absenteeism may be connected by a series of events, each of which may be influenced by external random factors such as impending work deadlines, weather conditions, or flu virus (Fichman, 1999; Mohr, 1982). In addition, absence control systems to get people to come to work may have constrained these associations. Indeed, the effects obtained in this study are about the same as for absence and job satisfaction, suggesting that people are inclined to attend work in the face of strain.

We also acknowledge that the strong association between psychological and physical illness does not rule out the possibility that self-reports of physical illness are amplified by psychological states, and might have no bearing on underlying physiological pathology. However, this is a problematic issue even in the medical profession, where diagnosticians must carefully weigh patient symptom self-reports against objective signs of an illness (Cohen & Williamson, 1991; Wiebe & Smith, 1997).

Third, our findings lend some clarity to the restorative model of absenteeism. When attributional influences are accounted for, absence has no apparent effect on subsequent work strain, but a positive association with illness providing little support for the restorative function of absenteeism. Within our theoretical framework, this finding suggests that early withdrawal in response to strain might temporarily benefit employees, helping them recharge and feel better equipped for dealing with work stressors. On the other hand, later withdrawal in response to weakened psychological and physical states might exacerbate an individual's condition. An examination of smaller absence-illness effects found in a set of postdictive studies using shorter measurement intervals between absence and illness measures ($r_{obs} = .07$, $k = 6$, 95% CI $= -.04$ to .19) suggests that absence has the potential to alleviate such states, but its effects might be short-lived. Therefore, absenteeism might play more of a maintenance rather than restorative role, as supported in Hackett and Bycio's (1996) idiographic examination.

Fourth, our findings on the voluntary-involuntary absence distinction probably represent the best extant evidence concerning this purported distinction as it is grounded in illness. Little support was found for the assumption that time lost absence measures are more reflective of illness than frequency measures, draw-

ing attention to other plausible substantive factors. For example, voluntary and involuntary factors could underlie both absence measures; a sick employee (involuntary factor) might decide (voluntary factor) that a single absence day is sufficient for recovery. Another plausible explanation concerns the construct validity of psychological and physical self-report measures. Self-report measures of illness in comparison to verified illness assessments (Cohen & Williamson, 1991) are highly influenced by circumstantial factors and short-term cognitive or affective states; hence their lowered validity as measures of pathological illness may have also contributed to the lack of difference between frequency and time lost absenteeism.

Finally, our findings with respect to moderators provide strong evidence for the role of attribution in the measurement of absenteeism, reinforcing Johns's (1994a) concern over the failure to account for self-report versus records-based absence effects in previous meta-analyses. Findings with respect to disposition, although nonsignificant, raise confidence in saying that workplace stressors more or less contribute to withdrawal from work. The prediction that women are more likely than men to escape the workplace when stressed or ill was not supported. Exploratory moderator analyses suggested that women in health care settings might react differently to absenteeism in response to strain or illness; however, the small number of estimates available for this group precludes strong conclusions. Clearly, gender as a potential moderator deserves further exploration.

Of the two contextual moderators (occupational status and macro social change), macro social change (operationalized as publication year) was the only factor that received support, with the strain/illness-absence association increasing over the years. Chronological year was used as a proxy for the social legitimacy of strain claims and absence-taking. Consequently, explanations for this finding do not rule out the operation of other influences. For example, the proliferation of stress management programs in organizations over the years could have lowered the levels of stress indicators and absence, constraining their association. In fact, a small set of postintervention illness-absence effects obtained from studies that implemented some stress intervention was significantly smaller ($r = .03$, $k = 5$, $Z = 1.90$, $p < .05$) than those obtained in studies without such interventions ($r = .14$, $k = 116$). In addition, other factors such as changing employment conditions or absenteeism rates over the years cannot be ruled out. Tougher publication criteria could have also inflated the effect if studies reporting stronger effects tend to be selected for publication over others. However, the zero-order association between year and effect size continues to remain positive ($r = .29$, $p = .06$) when unpublished dissertations are examined separately. The nonsignificance of occupational status is attributed to the restricted range of values in the predictor variable such that only three percent of the effects was represented by higher white-collar samples, essentially limiting the comparison to that between blue- collar and lower white-collar employees.

Limitations

Constrained to some degree by the state of primary research, our investigation is not without limitations. Stress is a complex process and has rarely, if ever, been empirically examined as such in primary research (Cooper et al., 2001). While we tried to address this issue by integrating isolated estimated effects of related elements within a theoretical model that provides more insight into their connections with organizational consequences (i.e., absenteeism), we acknowledge that at the aggregated level the mediation model tested in this research represents a simplified generalization of the stress process. Our mediation results are constrained to some degree by the nature of our data (e.g., heterogeneous effects resulting from variations in study, measurement and sample characteristics). We also acknowledge that a meta-analysis best estimates variance rather than tests process (cf. Fichman, 1999). Idiographic and qualitative examinations would typically provide more insight into the theorized sequential unfolding of responses to work stressors. Again, our research was constrained by the greater number of between-subjects versus within-subjects research designs employed in primary research.

Another limitation pertains to the low reliability of absenteeism, which may have resulted in overcorrecting for attenuation in this variable, thereby inflating the corrected effects. We point out, however, that behavioral criteria often exhibit attenuated reliability (Austin & Villanova, 1992) and that corrected effects only decrease as the reliability of absence increases. The reliability estimates obtained in this study are not much different from those reported in Hackett and Guion's (1985) meta-analysis, $r_{yy} = .51$, $k = 27$ (frequency); $r_{yy} = .66$, $k = 29$ (time lost). When we used a weighted average of their estimates and ours ($r_{yy} = .578$) to correct for overall associations, only a minor decrease in effect sizes was evident ($r_{corr} = .136$ for work strain; $r_{corr} = .191$ for psychological

illness; r_{corr} = .211 for physical illness). Consequently, a substantive association between absenteeism and each theorized predictor remains.

A third limitation pertains to the examination of reverse causation and third variable influences. Although there is some evidence for such influences, stronger inferences are likely to come from studies using longitudinal, two-wave panel designs that allow for the control of true changes in the variables of interest, variables that are constant over time such as gender, status, or disposition, and reverse causal influences. In addition, other sources of bias (e.g., subjective measures, questionnaire item content, research context, social desirability) deserve attention as well (see Podsakoff et al., 2003). Finally, we were unable to distinguish between strain due to hindrance stressors (e.g., role ambiguity or office politics) and challenge stressors (e.g., high workload or responsibility). Podsakoff et al. (2003) reported that the former were more highly correlated with a composite of withdrawal behaviors than the latter. However, both were positively related to various indicators of strain. However, both were positively related to various indicators of strain.

Implications for Practice and Research

It has been well advertised that absenteeism due to work strain is costly to organizations. Although the effects obtained in this study are small, the upper-bound work strain–absence effects based on financial estimates reported by CCH Inc (2002). translate to annual losses of up to $17,400 (i.e., $60,000 × 0.29) for small companies and up to $1.13 million for larger companies. These figures are likely to be higher when indirect costs such as health insurance claims, legal claims, lost productivity, and overtime wages are taken into consideration, suggesting that organizations still have reason to be concerned about stress and related absenteeism in the workplace. However, our findings seem to support Unckless et al.'s (1998) meta-analytic results pointing to stress-intervention programs as being ineffective in resolving absenteeism problems. Given the influence of attributional and voluntary factors on absenteeism, our findings suggest that managers might, instead, consider programs that allow employees more flexibility over the use of their work time (Harrison, Johns, & Martocchio, 2000). Strong meta-analytic effects for flextime schedules on reducing absenteeism (r_{obs} = .42) suggest that nonwork factors requiring flexibility in work arrangements might have stronger influences on absenteeism than work-related ones (Baltes, Briggs, Huff, Wright, & Neuman, 1999).

While we present a comprehensive articulation and indirect examination of absenteeism as a response to strain, more direct validation is likely to come from studies that are attentive to the temporal unfolding or timing of events (Martocchio et al., 2000) and those that incorporate the coping mechanisms theorized earlier. Attention must also be paid to the influence of context (e.g., innovative organizational wellness policies) in changing the meaning of absence (cf. Harrison et al., 2000). Both absence and strain mean different things to different people (Cooper et al., 2001; Johns & Nicholson, 1982); consequently, a focus on person-centered methodological approaches is recommended. Finally, a lack of support for the distinction between frequency and time lost absence measures in terms of illness points to a focus on Nicholson's (1977) justifiability factors or on correlates of short- and long-duration absences.

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