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A Moderating Effect of Social Support between Job Strain and Depressed Affect: a Cross-Sectional Study among Employees in the United States

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A Moderating Effect of Social Support between Job Strain and Depressed Affect: a Cross-Sectional Study among Employees in the United States

A dissertation submitted in partial satisfaction of the

requirements for the degree Master of Science

in Environmental Health Sciences

by

Timothy Alan Matthews

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ABSTRACT OF THE THESIS

A Moderating Effect of Social Support Between Job Strain and Depressed Affect:

a Cross-Sectional Study of Workers in the United States

by

Timothy Alan Matthews

Master of Science in Environmental Health Sciences

University of California, Los Angeles, 2020

Professor Jian Li, Chair

Objective: To examine the independent and interactional effects of job strain and social support on depressed affect among United States employees.

Methods: Using cross-sectional data from the Mid-life in the United States, a nationally representative population-based study, the independent and combined effects of high versus low job strain and low versus high social support on depressed affect were examined with multivariate logistic regression analysis in 1858 employees.

Results: After adjusting for relevant confounders, high job strain and low social support were significantly associated with depressed affect, respectively. Job strain and social support exhibited a potentially additive interaction wherein employees with both high job strain and low social support had a significantly higher odds ratio for depressed affect [OR and 95% CI = 2.63 (1.59, 4.33)], compared to the reference group (low job strain and high social support).

Conclusions: Social support may buffer the adverse mental health effects of job strain.

The thesis of Timothy Alan Matthews is approved.

Yifang Zhu

Wendie Robbins

Jian Li, Committee Chair

University of California, Los Angeles

2020

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List of Acronyms

Acronym/Abbreviation	**Definition**
CIDI-SF	Composite International Diagnostic Interview-Short Form
CI	Confidence interval
CVD	Cardiovascular disease
JCQ	Job Content Questionnaire
JDCS	Job-demand-control-support
MIDUS	Mid-life in the United States
OR	Odds ratio
RDD	Random digit dial
SAQ	Self-administered questionnaire
WHO	World Health Organization

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Introduction

A substantial body of research evidence has identified an association between psychosocial work factors and depression, or depressive symptoms[1–10]. Job strain, defined as the combination of high job demand and low job control, and workplace social support are core facets of the psychosocial work environment that have been demonstrated to influence mental health and depressive symptoms[11,12]. Depression is a critical issue of public health significance, with extensive and pervasive effects in the workplace with regard to productivity loss[13], workplace accidents[14], and impaired cognitive function[15]. While the term "depression" refers to the clinical syndrome of major depressive disorder, psychiatric research has drawn a distinction between clinical depression itself and the symptoms of depression, such as depressed affect[16]. As a depressive symptom that reflects the mood-related component of depression, depressive affect may have utility as a screening tool or index for depression. Subthreshold manifestations of depression such as depressed affect are associated with the same risk factors as clinical depression[17].

The aim of this study is to examine the independent and interactional effects of job strain and workplace social support on depressed affect among employees in the United States. These associations will be explored through the Mid-life in the United States (MIDUS II) dataset, a large, nationally representative, population-based sample comprised of American employees across an extensive range of occupations[18]. The wide breadth of the MIDUS II dataset with regard to demographic and occupational characteristics offers considerable research utility and gives this study distinct strength, especially in comparison with prior work assessing the

relationship between job strain, workplace social support, and depressive symptoms in singular professions, such as dentists[8], nurses[1,12], and office workers[5].

We hypothesize that job strain and workplace social support are independently associated with depressed affect, wherein employees with high job strain are more likely to experience depressed affect than employees with low job strain, and employees with low social support are more likely to exhibit depressed affect than those high social support. In addition, we hypothesize that workplace social support will exhibit effect modification of the relationship between job strain and depressed affect – job strain and social support will interact to produce a combined effect where employees with both high job strain and low social support will have markedly elevated depressed affect, compared to employees with low job strain and high social support.

Theory: Job Strain, Social Support, and Depression

The relationship between psychosocial work characteristics and health consequences has been explored by a variety of conceptual models and theoretical frameworks. First put forward in 1979, Karasek's job strain model proposes a model of work stress, where mental strain arises due to the combination of high job demands and low job control[19]. This triggers psychoneuroendocrinological arousal and further adverse impacts on mental and physical health; these effects have been substantiated by a preponderance of evidence spanning the domains of cardiovascular disease (CVD)[20,21], health-related quality of life[22,23], health behaviors[24,25], and obesity[26]. A subset of the empirical evidence supporting Karasek's job strain model focusses on the relationship between job strain and depression – results from large longitudinal analyses consistently indicate that job strain increases the risk of depression[7,10,11,27] . These adverse

impacts of job strain and the resultant depressive symptoms have been linked to further consequences, including substance abuse[1] and productivity losses amounting to billions of dollars per year[13].

Job strain is defined as the combination of high job demand and low job control, where job demand is operationalized as the response to a series of survey questions about demands faced at work, and job control is operationalized as the combination of decision authority and skill discretion, as assessed by questions about the level of control and skill development employees experience at work.

In 1988, Johnson and colleagues proposed the job-demand-control-support (JDCS) model, also known as the iso-strain model, which elaborates upon Karasek's model of job strain by integrating the critical psychosocial work characteristic of social support in the workplace, including coworker support and supervisor support[28]. The JDCS model combines the work characteristics of job demand, job control, and social support in order to better represent the influence of psychosocial work factors on a range of health outcomes. This expanded JDCS model puts forward the iso-strain hypothesis, which predicts that workers who experience high demands, low control, and low social support (or isolation) will be subjected to the worst health outcomes[28,29]. The JDCS model and iso-strain hypothesis have been validated by a substantial degree of empirical evidence – iso-strain is consistently associated with adverse health outcomes, including CVD[28,30], decreased psychological well being[29,31], and depression[32]. Furthermore, a burgeoning literature suggests a protective effect of workplace social support on job strain; for instance, research evidence demonstrates that high levels of workplace social support are able to attenuate the adverse effects of job strain with regard to work performance, job satisfaction[33],

and depression[2]. Workplace social support networks are a critical determinant of work-related health outcomes.

The original job strain model and the extended JDCS model are theoretical frameworks that inform and support the methodological approach for this study with regard to investigating the associations between job strain and workplace social support with depressed affect in a large and nationally representative sample of employees in the US, which has not been examined previously.

Methods

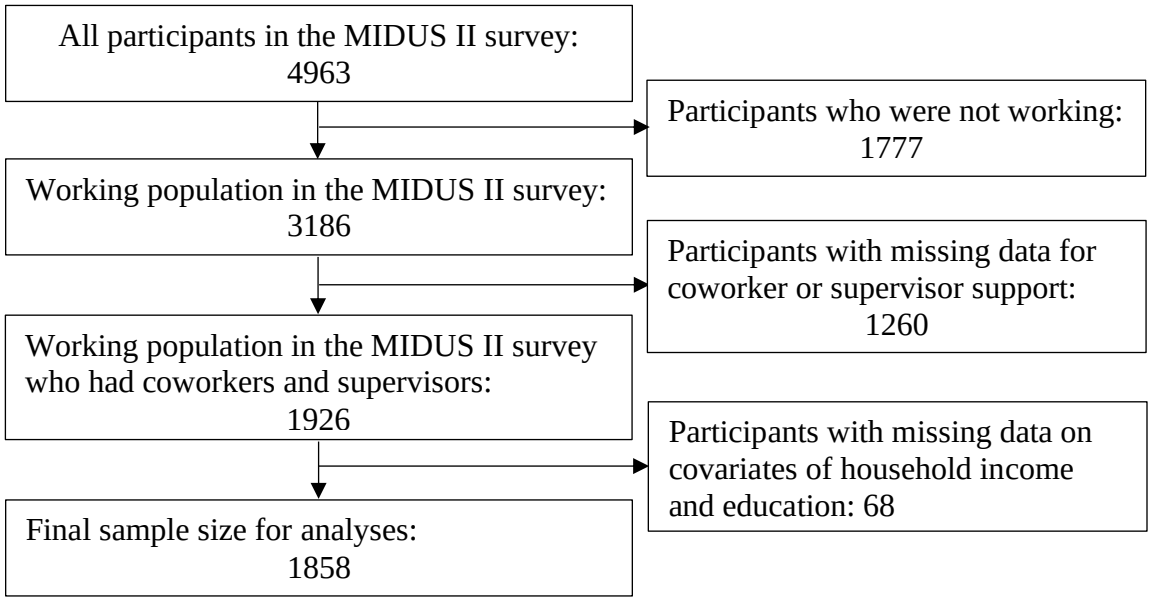
Study Population

Data from the MIDUS II study were used for this study[18]. The MIDUS II study was a follow-up study of the MIDUS I study, a national survey of 7108 Americans carried out by the MacArthur Midlife Research Network from 1995-1996. The broad objective of the MIDUS study series was to examine the behavioral and psychosocial factors involved in physical and mental health. Data collection was primarily based on random digit dial (RDD) phone interviews and an extensive self-administered questionnaire (SAQ) assaying a wide range of variables, including sociodemographic information, physical and mental health status, and work characteristics. The total sample size of the MIDUS II study was 4963.

The full MIDUS II dataset was pared down to exclude individuals with missing data on core variables and relevant covariates. Statistical analysis was limited to participants who were employed and had complete data for the variables of job demand, job control, coworker support, supervisor support, and depressed affect, as well as the covariates of household income and education. Data for the remaining covariates of age, sex, marital status, current smoking, alcohol

consumption, and exercise were complete for all participants. The final sample size used for analysis was 1858. The process used for data cleaning is shown in Figure 1.

Figure 1. Selection of Participants for Inclusion in Data Analysis



Main exposures – work characteristics

The key exposures used for assessing work characteristics were a series of questions on the SAQ focused on the domains of skill discretion, decision authority, job demands, coworker support, and supervisor support. These questions regarding job strain and workplace social support have been used in prior analyses of the MIDUS II study data[34]. The MIDUS II survey questions for job control, job demand, and workplace social support are similar to those of the Job Content Questionnaire (JCQ) developed by Karasek[35]. The JCQ has been demonstrated to be valid and reliable across multiple demographics and occupations[35–39].

Job strain was defined as per Karasek's job strain model, namely the combination of job demands with job control[19]. Job demand was assessed using 5 items, asking "How often: (1) do you have to work intensively, that is, you are very busy trying to get things done, (2) do different

people or groups at work demand things from you that you think are hard to combine, (3) do you have too many demands made on you, (4) do you have enough time to get everything done", and (5) "do you have a lot of interruption?".

Job control was defined as the combination of skill discretion and decision authority[19]. Skill discretion was assessed with 3 items, asking "How often: (1) do you learn new things at work, (2) does your work demand a high level of skill or expertise", and (3) "does your job provide you with a variety of things that interest you?". Decision authority was evaluated with 6 items, asking (1) "On your job, how often do you have to initiate things – such as coming up with your own ideas, or figuring out on your own what needs to be done, (2) how often do you have a choice in deciding how you do your tasks at work, (3) how often do you have a choice in deciding what tasks you do at work, (4) how often do you have a say in decisions about your work, (5) how often do you have a say in planning your work environment – that is, how your workplace is arranged or how things are organized", and (6) "how often do you control the amount of time you spend on tasks?".

Workplace social support was defined as the combination of coworker support and supervisor support. Coworker support was assessed with 2 items, asking "How often: (1) do you get help and support from your coworkers" and (2) "how often are your coworkers willing to listen to your work-related problems?". Supervisor support was measured with 3 items, asking "How often: (1) do you get the information you need from your supervisor or superiors, (2) do you get help and support from your immediate supervisor", and (3) "is your immediate supervisor willing to listen to your work-related problems?".

Response categories for the work characteristics of skill discretion, decision authority, job demand, coworker support, and supervisor support were based on a five-point Likert scale:

(1) all of the time, (2) most of the time, (3) sometimes, (4) rarely, and (5) never. Therefore, the score ranges for job demand, job control, and social support were 6-25, 12-45, and 5-25, respectively.

Job demand was dichotomized at the median (=15) for analysis, creating groups for high and low job demand. Job control was also dichotomized at the median (=33), creating groups for high and low job control. The sample-specific medians were chosen as the cut-off point. Job strain was hence operationalized as the combination of both high job demand and low job control. Based on this categorization, 21% of participants experienced high job strain.

For workplace social support, responses for coworker support and supervisor support were summed to create a variable for total social support. Social support was dichotomized using the lower tertile (=17) as the cut-off point, creating categories for high and low social support. The sample-specific median and lower tertile were chosen as cut-off points.

In order to test the interaction between job strain and social support in accordance with the iso-strain model, a composite variable featuring the different combinations of job strain and social support was constructed, with categories for (1) low job strain and high social support, (2) low job strain and low social support, (3) high job strain and high social support, and (4) high job strain and low social support.

Outcome – depressed affect

Depressed affect was defined by participant responses to telephone interview questions about depressive symptoms, culminating in a binary outcome variable for depressed affect. The MIDUS II study used the World Health Organization (WHO) Composite International

Diagnostic Interview-Short Form (CIDI-SF), a scale shown to have high specificity and sensitivity, to assess depressed affect[40,41].

Participants who responded affirmatively to the question "During the past 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?" were asked further questions about their periods of depressed mood.

Specifically, participants were asked "During two weeks in the past 12 months, when you felt sad, blue, or depressed, did you (1) lose interest in most things, (2) feel more tired out or low on energy than is usual, (3) lose your appetite, (4) have more trouble falling asleep than usual, (5) have a lot more trouble concentrating than usual, (6) feel down on yourself, no good, or worthless, and (7) think a lot about death?".

Participants were also asked "During that time, did the feelings of being sad, blue, or depressed usually last all day long, most of the day, about half the day, or less than half the day?" with a 4-point Likert response scale: (1) all day long, (2) most of the day, (3) about half the day, and (4) less than half the day, and "During the two weeks when these feelings were worst, how often did you feel this way?", with a 3-point Likert response scale: (1) every day, (2) almost every day, or (3) less often than that.

Participants who responded affirmatively to at least four of the items about their period of depressed mood and said that it lasted "all day long" or "most of the day" and that they felt that way "everyday" or "almost everyday" were counted as having depressed affect, comprising a dichotomized scale for depressed affect.

Covariates

Several covariates relevant to risk of depressed affect were adjusted for in the analysis, encompassing sociodemographic measures[42–50] and health behaviors[51–55]. In detail, age (<40; 40 to 59; and ≥ 60 years old), sex, race (white; African American; Asian/Native American/Pacific Islander/Other), marital status (married; never married; divorced/widowed/separated/other), education (high school or less; some college; university or more), household income (<$60 000; $60 000 to $99,999, ≥ $100 000), current smoking, alcohol consumption (no drinking; moderate drinking – up to two drinks per day for men and one drink per day for women; heavy drinking – more than moderate drinking)[56,57], and frequency of vigorous leisure-time physical exercise (low; moderate; high) were included in the analysis as possible confounding variables.

Statistical Analysis

First, descriptive summary statistics of the study sample were obtained. Second, prevalence of depressed affect by job strain and social support was examined, and the differences were determined by χ^2 test. Third, the independent associations of job strain and social support with depressed affect were tested via a series of multivariate logistic regression models, and were expressed as odds ratios (ORs), with 95% confidence intervals (CIs). Further multivariate logistic regression models were applied to investigate the combined effects of job strain and social support on depressed affect. Model I included adjustments for the covariates of age and sex, Model II added further adjustment for race, marital status, education, and income, and Model III additionally adjusted for smoking, alcohol consumption, and physical exercise. The synergy index and 95% CI were calculated to examine the interactional effects of job strain and social support[58]. Data were prepared using the R Studio software package, and statistical analysis was completed using the SAS University Edition software package.

This study was reviewed and approved for exemption by the University of California, Los Angeles Institutional Review Board.

Results

The characteristics of the study sample are shown in Table 1. The sample of 1858 participants was predominantly middle-aged, with the majority of participants falling into the age category of 40-59. The sample consisted of roughly equal numbers of males and females. Most participants were married and white. The majority of participants had at least some college education, with 45% completing 4 years or more of college education. About a third of participants each reported engaging in a low, moderate, or high frequency of vigorous leisure-time physical activity. Most participants were non-smokers.

The overall prevalence of depressed affect was 7.7%. The prevalence of depressed affect was significantly higher in groups of high job strain and low social support, respectively. Notably, in the iso-strain group (high job strain + low social support) the prevalence was the highest, at 13.90% (see Table 2).

Table 3 shows the independent analyses, revealing a significant association between high job strain and depressed affect (OR =1.74), and between low social support and depressed affect (OR = 1.76). These associations remained robust throughout the adjustment procedures (see Table 3).

The interaction analyses demonstrated that the combination of low job strain and low social support resulted in significantly higher odds of depressed affect (OR = 2.63). This strong association remained throughout adjustment procedures. The results suggest a potential additive interaction between job strain and social support (the synergy index was around one and confidence intervals encompassed one). These joint effects of job strain and social support on depressed affect are shown in Table 4.

Table 1. Characteristics of the Sample Population (n = 1858)

Study Variables	Category	Subcategory	*N* (%)
Sociodemographic	Age	< 40	243 (13.08)
		40-59	1331 (71.64)
		≥ 60	284 (15.29)
	Sex	Male	885 (47.63)
		Female	973 (52.37)
	Race	White	1706 (91.82)
		African American	66 (3.55)
		Asian/Native American/Pacific Islander/Other	86 (4.63)
	Marital status	Married	1341 (72.17)
		Never married	171 (9.20)
		Divorced/Separated/Widowed/Other	346 (18.62)
	Education	High school or less	489 (26.32)
		Some college	535 (28.79)
		University or more	834 (44.89)
	Household income	< 60,000	699 (37.62)
		60,000-99,999	587 (31.59)
		≥ 100,000	572 (30.79)
Health behaviors	Current smoker	Yes	283 (15.23)
		No	1575 (84.77)

	Alcohol consumption	No	627 (33.75)
		Moderate	769 (41.39)
		Heavy	462 (24.87)
	Physical exercise	Low	693 (37.3)
		Moderate	573 (31.38)
		High	582 (31.32)
Work characteristics	Job Strain	Low	1462 (78.69)
		High	396 (21.31)
	Social support	Low	569 (30.62)
		High	1289 (69.38)
Mental health	Depressed affect	Yes	143 (7.70)
		No	1715 (92.30)

Table 2. Prevalence of Depressed Affect by Job Strain and Social Support

Psychosocial work characteristics	Groups	Cases (%)	*p* value
Job strain	Low	97 (6.63)	0.001
	High	46 (11.62)	
Social support	High	84 (6.52)	0.004
	Low	59 (10.37)	
Job strain + Social support	Job strain low + Social support high	64 (5.93)	0.0009
	Job strain low + Social support low	33 (8.64)	
	Job strain high + Social support high	20 (9.57)	
	Job strain high + Social support low	26 (13.90)	

Differences were determined by χ_2 test.

Table 3. Associations of Job Strain and Social Support with Depressed Affect (ORs and 95% CI)

Total Sample		Model I	Model II	Model III
Job Strain	Low	1	1	1
	High	1.73 (1.19, 2.51)**	1.71 (1.17, 2.50)**	1.74 (1.19, 2.55)**
Social support	High	1	1	1
	Low	1.74 (1.22, 2.48)**	1.72 (1.20, 2.46)**	1.76 (1.22, 2.52)**

CI, confidence interval; OR, odds ratio. Logistic regression, ***P*<0.01. Model I: adjustment for age and sex; Model II: Model I + additional adjustment for race, marital status, education, and household

income; Model III: Model II + additional adjustment for smoking, alcohol consumption, and physical exercise.

Table 4. Joint Effects of Job Strain and Social Support on Depressed Affect (ORs and 95% CI)

Total Sample	Model I	Model II	Model III
Job Strain low + Social Support high	1	1	1
Job Strain low + Social Support low	1.59 (1.02, 2.47)*	1.56 (0.99, 2.43)	1.58 (1.01, 2.47)*
Job Strain high + Social Support high	1.54 (0.90, 2.62)	1.50 (0.88, 2.57)	1.52 (0.89, 2.60)
Job Strain high + Social Support low	2.52 (1.54, 4.13)***	2.53 (1.54, 4.16)***	2.63, (1.59, 4.33)***
Synergy index	1.35 (0.45, 4.10)	1.45 (0.46, 4.59)	1.49 (0.48, 4.61)

CI, confidence interval; OR, odds ratio. Logistic regression, *P<0.05, ***P<0.001. Model I: adjustment for age and sex; Model II: Model I + additional adjustment for race, marital status, education, and household income; Model III: Model II + additional adjustment for smoking, alcohol consumption, and physical exercise.

Discussion

The objective of this study was to examine the independent and interactional associations between job strain and social support and depressed affect. The results indicated significant independent associations between job strain and social support with depressed affect, as well as significant combined associations of job strain and social support with depressed affect. The findings suggested that social support may moderate the relationship between job strain and depressed affect – the associations of job strain with depressed affect were stronger among employees with low social support than employees with high social support.

The results are consistent with previously established findings that demonstrate a significant association between job strain and clinical depression. A meta-analysis involving over 27 000 individuals reported that job strain was associated with an increased risk of clinical depression across sociodemographic subgroups[7]. A systematic review of the relationship between the work environment and depressive outcomes found that job strain and social support had a significant impact on the development of depressive symptoms, with more studies showing an effect of job strain and fewer studies showing an effect of social support[10]. Furthermore, a report by the Swedish Council on Health Technology Assessment found that individuals who experience occupational exposures such as job strain and low social support develop more depressive symptoms than those who are not subjected to such exposures[4]. Ultimately, these results may be in part explained by the JDCS model, which posits that a confluence of psychosocial work factors, namely the combination of high job demand, low job control, and low social support, leads to adverse health outcomes[28].

Strengths

This study exhibits strengths that are founded on the population and measures used in the MIDUS II study. The MIDUS II study sample was large, nationally representative, and featured a broad and diverse range of occupations, with over 800 occupational categories represented, increasing confidence in the generalizability of the results. Furthermore, the study featured robust measures evidenced to be valid and reliable; the exposure measures of job strain and social support were similar to Karasek's well-established JCQ[35], and the outcome measure of depressed affect was based on the strongly substantiated WHO CIDI-SF[41].

Limitations

This study has several limitations. First, we cannot make causal inferences regarding the association between iso-strain (high job demand, low job control, and low social support) and depressed affect in US workers due to the cross-sectional nature of the data. Secondly, because the purpose of the study was to examine effect modification of workplace social support on depressed affect, employees who had no coworkers or supervisors were excluded from the sample. Thirdly, this study examined workplace social support, and while we adjusted for marital status, which may capture some of the social support outside of work, we did not account for other psychosocial factors outside of work, such as family stress or family social support. A robust body evidence suggests that such factors may affect mental health, and future research including these factors is warranted[59–65].

Another limitation results from the categorization of participants as having depressed affect based on answers to telephone interview questions rather than a professional diagnosis of clinical depression made by a trained psychotherapist or psychiatrist. While the WHO CIDI-SF

has high sensitivity and specificity[41], the interview questions only captured all participants who were experiencing depressed affect during the past 12 months, whereas lifetime history of depression and the number of episodes of depression were not assessed. As discussed earlier, depressed affect is a depressive symptom, which is not the same as clinical depression[16,17].

Conclusions

The findings from this study demonstrate that the association between work stress, as defined by Karasek's original job strain model, with depressed affect is, to some extent, modified by workplace social support, as defined by the extended JDCS model, in a large sample of United States employees. The results of this study implicate workplace social support as a potential key factor in buffering the effects of work stress and its adverse mental health impacts with regard to depression. Workplace social support posits a promising locus of the psychosocial work environment to emphasize for workplace stress reduction interventions and health promotion programs targeting employee mental health.

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