

The Job Demand-Control-Support Model and Employee Wellbeing: A Meta-Analysis of Previous Research

Fawad Asif

SZABIST, Islamabad Campus

Uzma Javed and Saquib Yusaf Janjua

COMSATS University, Islamabad

The objective of this study is to examine the effect of JDC/JDCS model on two indicators of employee wellbeing, namely job satisfaction and job-related anxiety. We searched for published and unpublished research using *EBSCO*, *Emerald*, *Elsevier*, *PsycInfo*, and *PsychLit* to locate relevant articles, conference abstracts, and theses. From a pool of 46 studies based on JDC/JDCS model, 19 published studies on the outcomes of interest (job satisfaction and job-related anxiety) were selected. Required data on the study characteristics, sample size, sample characteristics, methods, measures, methodologic quality, and correlation coefficients were extracted from each study. Meta-analytic procedures developed for analysing correlation coefficients were used to generate a pool of true score correlations which were then subjected to structural equations modeling to test the hypothesized relationships in MPlus. We found support for the additive effects of JDC/JDC model on both indicators of employee wellbeing. Where job demands was a stronger predictor of job-related anxiety, job resources (such as job control and social support) were consistent predictors of job satisfaction. Social support has stronger implications for reducing job-related anxiety and increasing job satisfaction.

Keywords. JDC/JDCS, employee wellbeing, job satisfaction, job-related anxiety, meta-analysis, MASEM.

Employee wellbeing is not just a health issue (Diener, Scollon & Lucas, 2003). There is a growing perception that higher employee wellbeing is also in the best interests of their organizations (Black, 2008; Waddel & Burton, 2006). Employee satisfaction with their work and place of work may affect their citizenship behaviour at work, customer loyalty, turnover rates, profitability and performance

Fawad Asif, Uzma Javed and Saquib Yusaf Janjua, Department of Management Sciences, COMSATS University, Islamabad Campus, Pakistan.

Correspondence concerning this article should be addressed to Fawad Asif, SZABIST, Islamabad Campus, Pakistan. E-mail: fawadasif@yahoo.com

(Harter, Schmidt, & Hayes, 2002). Two strands of research can be observed in studies of employee wellbeing: (1) a stress perspective, and (2) a positive feelings perspective. Proponents of the stress perspective (French, Kaplin, & Harrison, 1982) argue that when work demands exceed resources, employees experience an undesirable state (anxiety or stress) that hinders their performance. Those adopting the positive feelings perspective (Warr, 1999) argue that when work demands match resources, employees experience positive emotional states that accentuate their performance. However, the stress perspective has received more attention in the fields of occupational psychology and organizational behaviour. The seminal work of Karasek (1979), *job demand-control model*, has provided the guiding framework for much of this work.

The work environment can play an important role in promoting wellbeing since employees spend a significant portion of their lives at work. The job demand-control-support (JDCS) model has been regarded as the most widely researched models on the relationship between work environment characteristics and employee wellbeing. The JDCS model identifies three important features in the psychological work environment such as job demands, job control and social support (Johnson & Hall, 1988; Karasek, 1979; Karasek & Theorell, 1990). The model proposes that, a combination of high job demands and low job control (high-strain jobs) and low social support (high iso-strain jobs) may result in stress reactions such as, high job-related anxiety and low job satisfaction. On the other hand, low-strain jobs (low job demands and high control) or low iso-strain jobs (low demands, high control and high social support) will lead to higher employee wellbeing. A number of studies have empirically tested the model and its hypotheses using a variety of psychological, behavioural and health related outcomes.

A number of specific narrative reviews have been published earlier (Kristenen, 1995; Schnall, Landsbergis, & Baker, 1994; van der Doef & Maes, 1998, 1999). Schnall et al. (1994) and Kristenen (1995) reviewed JDC/JDCS studies only on epidemiological outcomes and reported that studies largely support the hypothesized relationships. On the other hand, Van der Doef and Maes (1998) reviewed JDC(S) studies examining only physical health outcomes. They reported mixed findings for the hypothesized relationships. In another review, Van der Doef and Maes (1999) examined previous research on JDC/JDCS model and psychological wellbeing. A broad array of outcomes were examined including job satisfaction, work satisfaction, anxiety, depression, psychological distress, psychological strain, general psychological wellbeing, mental health, life satisfaction

etc. they argues that JDC/JDCS model is not unequivocally supported in these studies. Only longitudinal studies of JDC/JDCS model found that the conclusions of their review do not vary significantly from previous reviews. Since these reviews are only narrative, the authors could only distinguish supportive studies from non-supportive studies and compare their characteristics to draw conclusions. Meta-analysis is a collection of statistical methods that are useful in reviewing and evaluating empirical research. Combining the results from already published empirical studies, which are based on different data sets and methods, can help in providing more insights and greater explanatory power than plainly listing individual results (Stanley, 2001). Furthermore, meta-analytic procedures can be combined with structural equation modeling technique to provide a powerful approach for testing theories in social sciences (Viswesvaran & Ones, 1995). In this approach, the estimated true score correlations between the variables of interest are established through meta-analysis procedures (Hunter & Schmidt, 1990). These true score correlations are then analysed with the help of structural equations modeling to test the proposed hypotheses from the theory (Viswesvaran & Ones, 1995).

This study differs from previous research in a way that first, it brings together previous research on JDC/JDCS model and employee wellbeing using meta-analysis, and then using the meta-analysis results, performs a test of the proposed impact of three job characteristics (included in JDC/JDCS model) on employee wellbeing indicators using structural equation modeling. The combination of meta-analysis (MA) and structural equation modeling (SEM) techniques is called MASEM technique. In doing MASEM, first correlation matrices are synthesized across studies using meta-analysis techniques and then the pooled correlation matrix is analysed using structural equation modeling techniques to explore the relationship among variables using the pooled correlation matrix (Viswesvaran & Ones, 1995). Given the integrative nature of this technique, many researchers have used it in in various research contexts to explore questions not addressed in any previous single study. (e.g., Colquitt et al., 2000; Earnest et al., 2011; Klein, 2001; Robbins et al. 2009).

Here, first we briefly describe the JDC/JDCS model and their central hypotheses. Subsequently, we present the procedures used for identifying and analysing the studies, the attention will be given to the outcomes of interest for this study. Implications for this study will be discussed followed by the future research directions.

JDC/JDCS Model

The research on employee wellbeing has been guided by JDC/JDCS model put forward by Karasek (Karasek, 1979; Karasek & Theorell, 1990). The initial model, JDC, was based on two work characteristics namely 'job demands' and 'job control'. The model hypothesized that a combination of high job demands and low job control will result into a strain that is detrimental for employee wellbeing. This hypothesis is also called strain hypothesis. The extended version of this model, JDCS, includes a third work characteristic, namely social support. The model proposes that a combination of high job demands and low levels of job control and social support will result into stress and isolation, which is detrimental for employee wellbeing.

Previous research has defined job demands as the characteristics of the work including tough task requirements, workload demands, work pace/intensity and time pressure (Demerouti et al., 2001). Others have also seen job demands as perceived lack or loss of personal resources (i.e., mental or emotional capacity) to cope with the work requirements (Hobfoll, 2001). In other words, greater work burden, task overburdening, inadequate infrastructure is all connected to work demands.

Job control is defined as 'having control over tasks and conduct during the working day' (Karasek, 1979; p, 289). Generally, job control has been operationalized in extant research as decision authority or work autonomy (Ganster & Fusilier, 1989; Spector, 1986) allowing individual employee to intervene directly to change the aspects of work or task at hand (e.g., Rothbaum, Weisz, & Snyder, 1982; Spector, 2002). As a result, job control may reduce the perceptions regarding excessive job demands.

Social support, on the other hand, has been defined as *helpful social interaction available from co-workers and/or supervisors in terms of task assistance for coping with work-related problems* (Karasek & Theorell, 1990). Extent research has examined supervisor support, as a useful resource, more frequently as an indicator of social support. Supervisor support can affect job demands in two ways: (1) they can provide task related assistance, feedback and advise to employees, and (2) they are directly responsible for delegating tasks to employees. Thus, positive relationships with supervisors can directly influence reduction in task related demands, extension in deadlines, and availability of resources for task accomplishment (Hobfoll, 2001; Luchman & González-Morales, 2013). Thus, both job control and supervisor support have been regarded as job resources (Bakker &

Demerouti, 2007; Demerouti et al., 2001) or aspects of work environment allowing employees to deal with work demands (Bakker & Demerouti, 2007).

Both strain and iso-strain hypotheses are regarded as critical to employee wellbeing. However, previous studies do not clearly indicate whether the consequences on employee wellbeing are the result of additive effects of job demands, control and social support or the interactive effects. It is also not clear from previous studies, whether the consequences for employee wellbeing could be entirely attributable to either high job demands or lack of control and social support (Alfredsson, Spetz, & Theorell, 1985; Hammar, Alfredsson, & Theorell, 1994). It is to be noted here that the practical implications for both additive and buffer effects are different. Evidence for moderating effects of job control and social support imply increasing job control and social support, without any concerns for the level of job demands. On the other hand, if the consequences on employee wellbeing were the result of additive effects of job demands (exclusively), control or social support, increasing job control and social support will have no benefit. High job demands would continue to have their consequences for employee wellbeing. Therefore, it is important to distinguish between these two approaches regarding additive or interactive effects.

The present study will examine the additive effects only for meta-analysis. In doing so, it focuses on answering two key questions.

1. Is there support for the additive effects of JDC model on the two indicators of employee wellbeing, namely job satisfaction and job-related anxiety?
2. Is there support for the additive effects of JDSC model on the two indicators of employee wellbeing, namely job satisfaction and job-related anxiety?

Method

The meta-analysis involves the inclusion of all three-job characteristics that have previously been investigated in the literature on employee wellbeing (Van der Deoff & Maes, 1999). It thereby attempts to synthesise substantial literature, not only allowing studies to yield greater explanatory power, but also permitting the drawing of much stronger practical implications. To achieve these objectives, Viswesvaran and Ones' (1995) two-step methodology is used by combining meta-analytic methods with structural equation modelling (SEM), yielding a further (methodological) development of the extant literature.

Literature Search

Hunter and Schmidt's (1990) three-step procedure was adopted for the collection of relevant literature. The first step involved scanning the electronic databases *EBSCO*, *ABI/inform*, *Emerald*, *Elsevier*, *PsycInfo*, and *PsychLit*, for empirical studies published since 1990. The time restriction was made to assemble more recent studies on the relationships between JDC/JDCS and employee wellbeing. The second step involved a manual search of journals that regularly publish studies on Karasek's model, job satisfaction and job-related anxiety. Finally, the reference lists of previously published review articles (e.g. Van der Doef & Maes, 1999) on the same topic were searched for appropriate additional studies.

Inclusion Criteria

To be included, a study had to report zero-order correlations with the relevant variables. It did not include studies that reported only regression coefficients, as the unique contribution of relevant variables could not be calculated. This meta-analysis was limited to only two indicators of wellbeing-job satisfaction and job-related anxiety. Furthermore, in an attempt to include a large sample of studies in the analysis, for cases where zero-order correlations were not reported, emails were sent to the authors concerned to obtain these correlations. In total, 19 research papers were identified, providing usable data for 20 independent samples. A summary of these studies is included in Table I for review and meta-analysis.

MASEM Procedures

The present study employed Viswesvaran and Ones' (1995) two-step methodology by combining meta-analytic (MA) methods with structural equation modelling (SEM) techniques, called MASEM.

In the first step, Hedges and Olkin's (1985) meta-analysis procedure was adopted to estimate a pooled correlation matrix from the sample of existing studies. In addition, confidence intervals were computed for each estimated correlation. Following Cohen (1977), a weighted mean correlation of 0.10 was considered a weak effect, 0.30 as moderate effect and 0.50 as a strong effect size (Javed, 2010). Furthermore, heterogeneity was tested using Q statistic (Hedges & Olkin, 1985), I^2 (Higgins, Thompson, Deeks & Altman, 2003), and τ^2 statistic (Hedges & Vevea, 1998). A significant Q statistic indicated

the presence of heterogeneity; a *cut-off* of 25%, 50% and 75% for I^2 values indicated a low, moderate and high heterogeneity respectively (Leandro, 2005); and τ^2 not equal to zero indicated heterogeneity. Lastly, publication bias was assessed using the fail-safe N method (Schmidt, Hunter, Pearlman & Hirsch, 1985). All analyses were conducted using the 'Comprehensive Meta-Analysis' software developed by Borenstein, Hedges, Higgins and Rothstein (2005).

In the second step, the estimated pooled correlation matrix was analysed using *Structural equation modelling (SEM)* technique to test the hypothesized effects. MPlus (Version 5.2) is used to analyse data since it is one of the most powerful SEM packages and handles continuous as well as categorical/dichotomous data. The meta-analysis produced a correlation matrix with varied sample sizes as the number of studies that were used to estimate each correlation in the meta-analysis varied. Following the procedures of Viswesvaran and Ones (1995), the harmonic mean of the sample sizes across the different cells in the correlation matrix was used for analysis. The hypotheses were tested using path analysis techniques.

Results and Discussion

Study Characteristics

Table 1 gives a summary of all the included studies and their findings with respect to the JDC/JDCS hypotheses. In all 19 samples (Table 1), the JDC/JDCS model was tested in relation to employee wellbeing. Of these samples, 11 examined JDC/JDCS effects on job satisfaction, three studies (8, 13 and 19) examined their effect on job-related anxiety and another five studies (3, 7, 12, 17 and 18) examined the impact of JDC/JDCS on both job satisfaction and job-related anxiety. Only one sample employed a longitudinal design (13). Two samples consisted an analysis based only on female data (10 and 19); three samples reported data only on men (4, 7 and 8) whereas, remaining samples had mixed data for both men and women. Owing to the small number of men and women only samples, we could not perform a moderator analysis to see the differences in relationships based on sample characteristics.

Table 1
Summary of reviewed studies

S. No	Study	Population	JDC/ JDCS	Design	Measurement of JDC/ JDCS	Outcomes	Remarks
1.	Amick, and Celentano (1991)	4903 postal workers	JDCS	CS		Job satisfaction	Only main effects were significant. Co-worker support is not significant.
2.	Chay (1993)	117 entrepreneurs and employees (61.5% male)	JDCS	CS	Karasek (1979) and ISEL (Cohen <i>et al.</i> , 1985) for social support.	Job satisfaction	Only main effects were significant. No evidence for interaction effects.
3.	De Jonge and Schaufeli (1998)	1437 healthcare providers (83% women)	JDCS	CS	Maastricht Autonomy Questionnaire Work pressure scale Social support scale	Anxiety Job satisfaction	Significant main effects for demand and support on Anxiety and job satisfaction.
4.	Dwyer and Ganster (1991)	90 blue collar employees (all men)	JDC	CS	Caplan <i>et al.</i> (1975), Ganster (1989).	Job satisfaction	Only significant main effects. Interaction effects were not significant.
5.	Fletcher and Jones (1993)	2274 employees (985 women and 1289 men)	JDCS	CS	Karasek (1979) for demand and control; Payne and Fletcher (1983) for support.	Job satisfaction	Interaction effects were significant.

Continued...

S. No	Study	Population	JDC/ JDCS	Design	Measurement of JDC/ JDCS	Outcomes	Remarks
6.	Humphris, and Peacock (1992)	44 clinical dental staff	JDC	CS		Job satisfaction	Only significant main effects.
7.	Kushnir and Melamed (1991)	798 workers (all men)	JDC	CS	Quinn <i>et al.</i> (1971) for job demands and Karasek (1979) for job control	Anxiety Job satisfaction	Only job control significantly predicted anxiety and job satisfaction. No evidence for interaction effects as well as for the effects of workload.
8.	Landsbergis <i>et al.</i> (1992)	297 employees (all men)	JDCS	CS	Job content survey by Karasek	Anxiety	Only additive effects of control and support for anxiety. No interaction effects.
9.	Mansell and Brough (2005)	352 public sector employees (66% men) 282 dentists (73% men)	JDC	CS	Karasek (1979) and Jackson <i>et al.</i> (1993) measures of job characteristics	Job satisfaction	Significant main effects of demand and control. Limited support for interaction effects.
10.	Melamed, Kushnir and Meir (1991)	267 social workers (all women)	JDCS	CS	Caplan <i>et al.</i> (1975) and Karasek (1979)	Job satisfaction	Main additive effects only. No interaction effects.
11.	Moyle (1995)	143 employees	JDCS	CS	Karasek (1979) and Landsbergis <i>et al.</i> (1992)	Job satisfaction	Main additive effects only.

Continued...

S. No	Study	Population	JDC/ JDCS	Design	Measurement of JDC/ JDCS	Outcomes	Remarks
12.	Mullarkey, Jackson, Wall, Wilson, and Grey- Taylor (1997)	72 operators	JDC	CS	Jackson et al. (1993) and Wall et al. (1995)	Anxiety Job satisfaction	No additive effects of demand and control. Significant interaction effects of control.
13.	Parkes (1991)	147 graduates (Study 2)	JDC	L	Karasek (1979) JCQ	Anxiety	Only significant main effects of job demands on anxiety.
14.	Parkes, and von Rabenau (1993)	145 hospital employees	JDC	CS	Karasek (1979) JCQ and House (1981)	Job satisfaction	No additive effects of demand on job satisfaction. Significant DC interaction effects.
15.	Parkes, Mendham and von Rabenau (1994)	145 healthcare workers (study 1)	JDC	CS		Job satisfaction	Significant main effect of support, and DC interaction.
16.	Schmidt, Meijman, Scholten, van Oel, and Oort-Marburger (1993)	115 musculoskeletal patients discharged from rehabilitation center and have a paid job	JDC	CS	Dutch questionnaire	Job satisfaction	No additive effects of demand on job satisfaction.
17.	Wall, Jackson, Mullarkey, and Parker (1996)	1451 manufacturing employees	JDC	CS	Jackson et al. (1993) and Warr, Cook and Wall (1979)	Anxiety Job satisfaction	Significant main and interaction effects.

Continued...

S. No	Study	Population	JDC/ JDCS	Design	Measurement of JDC/ JDCS	Outcomes	Remarks
18.	Warr (1990)	839 men and 847 women	JDC	CS		Anxiety Job satisfaction	Significant main additive effects.
19.	Williams, Barefoot, Blumenthal, Helms, Luecken, Pieper, Siegler, and Suarez (1997)	152 employees (all women)	JDC	CS		Anxiety	Significant main additive effects of demand and control.

Meta-Analysis. The results of the meta-analysis are given in Table 2. These results indicate moderate correlations ($0.2 \leq r < 0.4$) between job demands, job control and supervisor support.

We examined two indicators of employee wellbeing namely job satisfaction and job related anxiety. The correlations between job characteristics and job satisfaction suggest that both job control and supervisor support are significantly and positively related to job satisfaction ($r = 0.29, p < 0.01$; $r = 0.35, p < 0.01$), whereas, job demands is negatively correlated with job satisfaction ($r = -0.12, p < 0.05$). On the other hand, job control and supervisor support are significantly and negatively related to job-related anxiety ($r = -0.13, p < 0.05$; $r = -0.19, p < 0.01$), whereas, job demands is positively correlated with job-related anxiety ($r = 0.28, p < 0.01$). Overall, it is clear that job characteristics have a significant moderate impact on employee wellbeing. Here, findings also suggest that job demands are a better predictor of job-related anxiety while job control and supervisor support are better predictors of job satisfaction.

Most of the relationships derived from the meta-analysis indicated the presence of heterogeneity (Significant $Q, I^2 > 50\%$, $\tau^2 > 0$). Thus, the random effects were estimated for all effect sizes.

The meta-analysis results revealed three important findings. First, the number of studies on the link between job characteristics and job satisfaction were much larger than the number of studies on the link between job characteristics and job-related anxiety. Second, the effect sizes for the hypothesized relationships between job control, supervisor support and job satisfaction ($0.29 < r < 0.35$) were larger compared to the relationship between these job control, supervisor support and job-related anxiety ($-0.13 < r < -0.22$). Third, the effect size for the hypothesized relationships between job demands and job related anxiety ($r = 0.28, p < 0.01$) was larger than the effect size for the hypothesized relationships between job demands and job satisfaction ($r = -0.12, p < 0.05$).

Table 2

Meta-Analytic results for job characteristics, Job satisfaction, and Job-related Anxiety

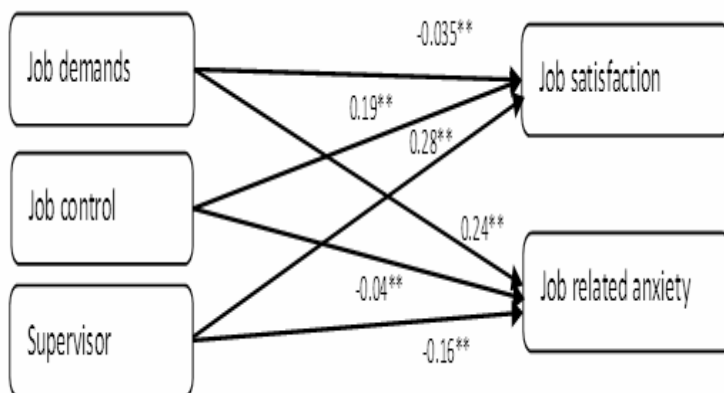
Relationships	K	N	Fail Safe N	r	Fisher Z (SE)	95% CI	Z value	Q(df)	I ²	τ^2
<u>Job Satisfaction (JS)</u>										
JD x JS	16	14176	1328	-0.12*	-0.11* (0.04)	(-0.21, -0.09)	-4.03*	328.55* (24)	95.54	0.04
JC x JS	16	14176	1526	0.29**	0.31** (0.04)	(0.19, 0.42)	12.03**	270.14* (25)	93.25	0.03
SS x JS	6	9141	712	0.35*	0.36** (0.03)	(0.27, 0.51)	14.01**	293.06* (21)	90.14	0.02
<u>Job-related Anxiety (Anx)</u>										
JD x Anx	8	6040	786	0.28**	0.28** (0.04)	(0.19, 0.35)	9.05**	151.21* (15)	88.57	0.02
JC x Anx	8	6040	604	-0.13*	-0.13* (0.03)	(-0.24, -0.09)	-5.34*	164.63* (12)	91.82	0.02
SS x Anx	2	1734	-	-0.22**	-0.23** (0.04)	(-0.36, -0.12)	-12.08**	221.01* (21)	89.58	0.02

Results for random effect model are given. r is combined effect size of correlation coefficients. SE is standard errors for Fisher's Z.

JD = Job demands, JC = Job control, and SS = Social support.

* is significant at 5%, ** is significant at 1%.

SEM Analysis. To test the hypothesized relationship of job characteristics and employee wellbeing, SEM analysis was used. To test the proposed hypothesis, the direct link between three job characteristics and employee wellbeing was estimated (Figure 1).



Note. χ^2 (df) = 36.52* (1), CFI = 0.98, GFI = 0.99, RMSEA = 0.045.

Figure 1. Path model linking job characteristics and employee wellbeing.

Table 3

Estimates of Path Model

Hypothesized Relationships	Job satisfaction		Job-related anxiety	
	Estimate	CR	Estimate	CR
JD	-0.035	-2.67**	0.243	18.06**
JC	0.197	14.61**	-0.043	-2.97**
SS	0.282	20.84**	-0.161	-11.54**
χ^2 (df)	36.52* (1)			
CFI	0.98			
GFI	0.99			
RMSEA	0.045			

*Significant at $p = 1\%$; CR = critical ratio.

Standardized results are reported.

JD = Job demands, JC = Job control, and SS = Social support.

Table 3 reports the results of path analysis. Results show that *job demands* are negatively associated with *job satisfaction* ($\beta = -0.035$, $p < 0.01$) and positively associated with *anxiety* ($\beta = 0.243$, $p < 0.01$) and despite the levels of control and social support demands have their independent detrimental effects on job satisfaction and job-related

anxiety. Results also reveal that *job demands* have more profound effects on *job-related anxiety* than *job satisfaction*. While both *job control* and *social support* have significant positive effects on *job satisfaction* ($\beta = 0.197, p < 0.01$; $\beta = 0.282, p < 0.01$) and negative effects on *job-related anxiety* ($\beta = -0.043, p < 0.01$; $\beta = -0.161, p < 0.01$); the effects are larger for *job satisfaction*. Lastly, *social support* showed a more promising effect on both *job satisfaction* and *job-related anxiety* than *job control*. Thus we can conclude that *job demands* are important in predicting the negative feelings while *social support* is an important resource in enhancing the positive feelings as well as reducing the negative feelings.

Almost all the studies included in this meta-analysis have tested the strain hypothesis of the JDC model. The results of MASEM analysis show that working in a high-strain job (i.e. high job demands, low control and social support) is found to be associated with lower job satisfaction and higher job-related anxiety. The iso-strain hypothesis of the JDCS model, which states that employees working in a high demands, low control and low social support job will experience the lowest level of wellbeing, was examined only in seven studies. The results showed that working in high iso-strain job is found to be associated with lower satisfaction and higher job-related anxiety. Since a majority of studies were cross-sectional and zero-order correlations were analysed, it is more reasonable to describe the support for JDC/JDCS model in terms of associations between JDC/JDCS and employee wellbeing. Given a small number of studies reported data for female and male only samples, the moderating effects of gender on the support for (iso) strain hypothesis could not be examined.

For organizational policy, the study implies that increased job control and supervisor support are important for improving employee wellbeing. These findings stress the significance of developing organizational interventions, which may include redesigning existing jobs to give employees more control regarding important aspects of their work and social support to manage working-life. Future research should focus on determining which interventions are most likely to increase such control and support.

Though job demands showed a small impact on job satisfaction, it should not be ignored in redesigning work for employees. The management should exercise care while re-designing work for employees as *job demands* have stronger impact on *job-related anxiety*, which is detrimental for *employee wellbeing*. Thus, policy makers might work with managers and employees to think of ways of

benefiting from the challenging work without adversely affecting wellbeing.

Conclusions

While both JDC and JDCS models were included in this review, a distinction was made for the additive and buffer hypothesis and only additive hypotheses were examined in this review. The buffer hypotheses were excluded from review as researchers do not report the correlations related to interactive terms in their articles and it is hard to extract their independent effects from regression results.

Limitations and Future Recommendations

The present analysis is a just first step towards synthesizing the empirical literature related to job characteristics (such as job demand, control and social support) and their impact on employee wellbeing. Few limitations, however, are notable in this work. In particular, it is highly restrictive in the selection of employee wellbeing indicators. The main reason for this shortfall is the limited amount of extant research on various indicators of employee wellbeing in the context of job characteristics as discussed in the literature section of this article. Furthermore, the present analysis is based on the analysis of data extracted from cross-sectional primary studies, which makes it impossible to make strong statements about the direction of causality. Finally, the number of samples used to calculate effect sizes for each relationship examined in this study (Oswald & Johnson, 1998) are small due to few studies reported the required data.

In future studies, the various hypothesis of the JDC/JDCS model may be examined concurrently, so that both the additive and interactive effects of demands, control, and social support can be examined and that too in the longitudinal studies to firmly establish the causal relationships. The model can be examined in relation to HPWS, since earlier research (Ramsay, Scholarios & Harley, 2000) argues that HPWS may induce excessive work demands.

References

- Alfredsson, L., Spetz, C. L., & THEORELL, T. (1985). Type of occupation and near-future hospitalization for myocardial infarction and some other diagnoses. *International Journal of Epidemiology*, 14(3), 378-388.

- Bakker, A. B., & Demerouti, E. (2007). The job demands-resources model: State of the art. *Journal of managerial psychology, 22*(3), 309-328.
- Black, C. (2008). Working for a Healthier Tomorrow: Review of the health of Britain's working age population. London: TSO.
- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2005). *Comprehensive Meta-Analysis, Version 2*. Englewood, NJ: Biostat.
- Cohen, J. (1977). *Statistical power analysis for the behavioral sciences* (Rev. ed.). Hillsdale, NJ, US: Lawrence Erlbaum Associates, Inc.
- Colquitt, J. A., LePine, J. A., & Noe, R. A. (2000). Toward an integrative theory of training motivation: A meta-analytic path analysis of 20 years of research. *Journal of Applied Psychology, 85*, 678-707.
- De Jonge, J., & Schaufeli, W. B. (1998). Job characteristics and employee well-being: A test of Warr's Vitamin Model in health care workers using structural equation modeling. *Journal of Organizational Behavior, 38*7-407.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The Job Demands Resources model of burnout. *Journal of Applied Psychology, 86*, 499-512.
- Diener, E., Scollon, C. N., & Lucas, R. E. (2003). The evolving concept of subjective well-being: The multifaceted nature of happiness. *Advances in Cell Aging and Gerontology, 15*, 187-219.
- Earnest, D. R., Allen, D. G., & Landis, R. S. (2011). A meta-analytic path analysis of the mechanisms linking realistic job previews and turnover. *Personnel Psychology, 64*, 865-897.
- French, J. R. P., Caplan, R. D., & Van Harrison, R. (1982). *The mechanisms of job stress and strain*. New York: Wiley.
- Ganster, D. C., & Fusilier, M. R. (1989). Control in the workplace. *International Review of Industrial and Organizational Psychology, 4*, 235-280.
- Hammar, N., Alfredsson, L., & THEORELL, T. (1994). Job characteristics and the incidence of myocardial infarction. *International Journal of Epidemiology, 23*(2), 277-284.
- Harter, J. K., Schmidt, F. L., & Hayes, T. L. (2002). Business-unit-level relationship between employee satisfaction, employee engagement, and business outcomes: A meta-analysis. *Journal of Applied Psychology, 87*(2), 268-279
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. San Diego, CA: Academic.
- Hedges, L. V., & Vevea, J. L. (1998). Fixed and Random Effect models in Meta-Analysis. *Psychological Methods, 3*(4), 486- 504.
- Higgins, J., Thompson, S., Deeks, J., & Altman, D. (2003). Measuring inconsistency in meta-analyses. *British Management Journal, 32*7, 557-560.

- Hobfoll, S. E. (2001). The influence of culture, community, and the nestedself in the stress process: Advancing conservation of resources theory. *Applied psychology, 50*(3), 337-421.
- Hunter, E., & Schmidt, L. (1990). *Methods of Meta-analysis: Correcting error and bias in research findings*. London: Sage Publications.
- Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health, 78*(10), 1336-1342.
- Karasek Jr, R. A. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*(2), 285-308.
- Karasek, R., & Theorell, T. (1990). *Healthy work*. New York: Basic Books.
- Klein, S. A. (2001). Measuring, estimating, and understanding the psychometric function: A commentary, *Perception & Psychophysics 63*(8), 1421-1455.
- Kristensen, T. (1995). The demand control support model: Methodological challenges for future research. *Stress and Health, 11*(1), 17-26.
- Leandro, G. (2005). Meta-analysis in medical research. Retrieved from <http://www.myilibrary.com/browse/open.asp?id=19708&loc=8>.
- Luchman, J. N., & González-Morales, M. G. (2013). Demands, control, and support: A meta-analytic review of work characteristics interrelationships.
- Ramsay, H., Scholarios, D., & Harley, B. (2000). Employees and high-performance work systems: Testing inside the black box. *British Journal of Industrial Relations, 38*(4), 501-531.
- Robbins, S. B., Oh, I., Le, H., & Button, C. (2009). Intervention effects on college performance as mediated by motivational, emotional, and social control factors: Integrated meta-analytic path analyses. *Journal of Applied Psychology, 94*, 1163-1184.
- Rothbaum, F., Weisz, J. R., & Snyder, S. S. (1982). Changing the world and changing the self: A two-process model of perceived control. *Journal of Personality and Social Psychology, 42*(1), 5.
- Schmidt, F. L., Hunter, J. E., Pearlman, K., & Hirsch, H. R. (1985). Forty questions about validity generalization and meta-analysis. *Personnel Psychology, 38*, 697-798.
- Schnall, P. L., Landsbergis, P. A., & Baker, D. (1994). Job strain and cardiovascular disease. *Annual Review of Public Health, 15*(1), 381-411.
- Spector, P. E. (1986). Perceived control by employees: A meta-analysis of studies concerning autonomy and participation at work. *Human Relations, 39*(11), 1005-1016.
- Spector, R. E. (2002). Cultural diversity in health and illness. *Journal of Transcultural Nursing, 13*(3), 197-199.

- Stanley, T. D. (2001). Wheat from chaff: Meta-analysis as quantitative literature review. *The Journal of Economic Perspectives*, *15*(3), 131-150.
- Van der Doef, M., & Maes, S. (1998). The job demand-control (-support) model and physical health outcomes: A review of the strain and buffer hypotheses. *Psychology and Health*, *13*(5), 909-936.
- Van der Doef, M., & Maes, S. (1999). The job demand-control (support) model and psychological well-being: A review of 20 years of empirical research. *Work & Stress*, *13*(2), 87-114.
- Viswesvaran, C., & Ones, D. (1995). Theory testing: Combining psychometric meta-analysis and structural equations modeling. *Personnel Psychology*, *48*(4), 865- 885.
- Waddell, G., & Burton, A. K. (2006). *Is work good for your health and wellbeing?* London: TSO.
- Warr, P. (1999). Wellbeing and the workplace. In D. Kahneman, E. Deiner, & N. Schwarz (Eds.), *Wellbeing: The foundations of hedonic psychology* (pp.392-412). New York: Russell Sage.

Received August 30th, 2017

Revision received December 4th, 2017