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*Irsa Fatima Makhdoom**
*Najma Iqbal Malik**
*Mohsin Atta***

Construction and Validation of Challenging Job Demands Scale

Abstract: Challenging job demands are those which require the use of high energy and thus may impair health but bring positive consequences too. The present study aimed to construct a measure for challenging job demands for university teachers.

Methods: The study is based upon the model developed by Makhdoom and Malik (2018) which proposed three challenging job demands including Regulatory Load, Social Load, and Cognitive Demands. On the basis of the literature review, Time Pressure was also studied as a factor. First of all, the authors created an initial item pool of 19 items which were categorized into four factors. The finalized item pool was administered on two independent samples drawn from various universities of Pakistan. In the first stage, the university teachers (N = 201) from three universities of the Punjab province were approached. EFA concluded three-factor and 13 items, which were then administered upon a sample of university teachers (N = 600).

Results: The CFA confirmed the three-factor structure of challenging job demands including Time Pressure, Cognitive Demands and Social Load. All the fit indices were within an acceptable range. The values of factor loadings and Cronbach Alpha justified the internal consistency and psychometric soundness of the newly developed measure.

Discussion: The study concludes a psychometrically sound scale to measure challenging job demands in university teachers which will be helpful in future studies. The limitations of the study along with suggestions for future research and important theoretical and practical implications are discussed.

Keywords: *Challenging job demands, time pressure, cognitive demands, social load, university teachers*

INTRODUCTION

The Job Demands / Resource Model (Demerouti et al., 2001) is one of the most widely used and welcomed model of job burnout. It explains the process of burnout and engagement and their relationship with other organizational outcomes via motivational and health impairment process. According to the model there are certain bad things (i.e. job demands) which hamper the performance and badly affect the health; and certain good things (i.e., job resources) which reduce the effects of demands and positively affect performance and health. However, later revisions in the model concluded that all job demands are not equal as certain job demands are bad only while others bring positive consequences too along with being tiresome. The former demands are called hindering job demands while latter are named as challenging job demands (Schaufeli & Taris, 2014; Van den Broeck et al., 2010).

Since the traditional definition of job demands literally meant anything that impairs health and brings

negative outcomes, most of the job demands studied under this umbrella term, were hindering job demands. The positive outcomes of challenging job demands were largely ignored. However, a stream of research began to flow with the differentiation of the two offering many job demands as challenging for example, workload, cognitive demands, learning demands, job responsibility, job complexity etc (Meyer & Hünefeldt, 2018; Tadic et al., 2015; Van den Broeck et al., 2010) and several positive outcomes and correlates were found associated with these demands e.g., increased task and contextual performance (Laethem et al., 2019), higher positive affect and daily work engagement (Tadic et al., 2015), workaholism, work engagement, flourishing, job crafting and job satisfaction (Robledo et al., 2019) etc. Turning towards their relationship with burnout, the hindering job demands were found as positive predictors of burnout whereas, it was found that challenging job demands have little if any relationship with exhaustion but do not significantly predict burnout (see e.g., Van den Broeck et al., 2010).

* University Of Sargosha

** University Of Sargosha, ORCID iD: 0000-0002-3521-1014

Corresponding author: Najma Iqbal Malik, najmamalik@gmail.com

The differentiation of the two job demands raised the question of their measurement. The common tradition among researchers was to measure the particular job demand with already developed measure for that particular construct. For instance, Van den Broeck et al. (2010) studied emotional demands, work-home interference (as hindering job demand), workload and cognitive demands (as challenging job demands) by items from previously developed measures by Kristensen et al. (2005); Geurts et al. (2005); van der Doef and Maes (1999); and van Veldhoven and Meijman (1994) respectively (as cited in Van den Broeck et al., 2010). Laethem et al. (2019) studied workload and cognitive demands with the items extracted from the scales of Spector and Jex (1998), Pejtersen et al. (2010), and de Jonge et al. (2007). Rodell and Judge (2009) compiled items from previously developed scales to measure challenge and hindrance stressors. With this scale, they measured four demands including time urgency, workload, job complexity and job responsibility as challenging while four demands i.e., role ambiguity, role conflict, red-tape and hassles as hindering job demands. Every demand was measured by two items each.

Another addition to the measures of challenge vs hindrance stressors was the scale developed by Podsakoff (2007) who constructed a scale in order to measure challenge and hindrance stressors faced at workplace. He concluded work pace, workload, job responsibility and job complexity as challenge stressors while role conflict, role ambiguity, resource inadequacies, organizational politics, interpersonal conflict, administrative hassles, and job insecurity as hindrance stressors. The scale was psychometrically sound with excellent fit indices. However, as Podsakoff (2007) himself confessed, some important factors were neglected in the study (e.g., organizational commitment and creative performance).

In terms of Self-Determination Theory (Ryan & Deci, 2000), the challenge stressors concluded by Podsakoff (2007) could serve as a means of fulfilling the need of autonomy and competence. However, what they neglected was need of relatedness. The scale constructed by Podsakoff (2007) thus neglected the job demands which were related to social aspects of the tasks. Such tasks are even more important for a population like university teachers who have to work with people all the time and whose job give room for challenging demands which are more *social* in nature. The importance to measure social aspects of challenging demands is even greater for a collectivistic culture like ours where others may have more effects on our lives than those in individualistic culture. The present study aims at constructing and validating a scale to measure challenging job demands in a sample of university teachers. The present work is an extension of the qualitative work by Makhdoom and Malik (2018), who studied a sample of university teachers qualitatively and found three job demands as challenging including social load, regulatory load and cognitive demands. However, in this study, time pressure was also included as a challenging job demand based on literature review.

Cognitive job demands are those job demands which need higher order cognitive skills to complete the task. These job demands require learning new skills, facing new tasks and dealing with unlearned things (Meyer & Hünefeld, 2018). Besides causing fatigue and affecting health, these demands positively affect performance of the employees and promote their satisfaction (Layer et al., 2009; Meyer & Hünefeld, 2018). These demands serve as means to fulfill competence. The next job demand to be studied as challenging is time pressure. Time pressure is experienced when one has to complete a task within a certain limit of time. It elicits eustress and is considered as challenging as it often results in completion of the task. Along with other positive outcomes it enhances engagement, promotes job satisfaction, and fosters proactive behavior (Urbach & Weigelt, 2019; Malik, 2015; Schmitt et al., 2015). The next job demand is social load. Social load includes those job demands which require interaction with others at work. Interaction with others, although initially was perceived as negative (Maslach et al., 2001), can turn to be a challenging job demand in a work setting like academia. Interaction with others at work can be challenging but also can act as a micro-break and thus as an energy management strategy (Fritz et al., 2011). Similarly, it offers a platform for learning, problem solving, personal recognition and a source of public relations. Further, in terms of self-determination theory (Ryan & Deci, 2000) it serves as a means of fulfilling the need of relatedness and belongingness. Therefore, it ultimately is perceived as beneficial for the employees and thus can be included in challenging job demands.

Finally, there is regulatory load. The regulatory load is the challenging job demand which arises when the employee has to fulfill some kind of administrative responsibilities. These include the duties assigned where all or major part of responsibility lies with the employee. This is similar to job responsibility which is previously studied as a challenge stressor eliciting eustress (McCaughey et al., 1994; Cavanaugh et al., 2000). This may help in fulfilling the need of autonomy. The definitions of the constructs are summarized in Table 1.

To conclude, challenging job demands include those job demands which besides being physically distressing and energy depleting, bring positive consequences to the employees. Such job demands require continuous physical effort and thus, result in energy depletion; however, these bring many positive outcomes for example, these may foster personal growth, bring rewards and enhance performance (Laethem et al., 2019; Ohly & Fritz, 2010). The present study aims at constructing a scale to measure challenging job demands in a sample of university teachers.

MATERIALS AND METHOD

First of all, the researchers identified three challenging job demands experienced by university teachers using in-depth interviews and focus group discussions. The thematic analysis resulted in three challenging job

Table 1. Constructs and Definitions of Challenging Job Demands

Construct	Definition	Reference
Time Pressure	Stress which arises from the less difference between the time needed to complete a task and time actually available for the task	Chatterjee, 2016; Kayaalp, 2014
Cognitive Demands	Those on the job tasks which besides being hectic and exhausting, require learning new skills, result in personal developments and include solving unpredictable problems	Meyer & Hünefeld, 2018
Regulatory Load	Job demands arising from some administrative and other like responsibilities resulting in physical and emotional fatigue but have a capacity for personal growth	Concept derived from Responsibility (Cavanaugh et al., 2000)
Social Load	Job demands that require interaction with others and hence result in personal growth	Makhdoom and Malik (2018)

demands i.e., cognitive demands, social load and regulatory load (for detail, see the earlier published article i.e., Makhdoom & Malik, 2018). Based on strong literature support, time pressure was also included in the list of challenging job demands. The university teachers were asked to identify particular instances of these job demands. The literature available on these demands along with verbatim of interviews and focused group discussions was reviewed and an initial item pool of 19 items was formulated. These 19 items were then discussed in a committee for content adequacy and the questionnaire was finalized for administration (See Table 2 for a complete list of items).

SAMPLE

The scale was applied on two independent samples of university teachers. The two samples were approached from various departments of public sector universities. Sample I was approached from three public sector universities ($N = 201$) from Punjab while Sample II was approached from five public sector universities of Punjab and Islamabad ($N = 600$). The teachers were approached personally in their universities. The detail of the samples is summarized in Table 3. The age range for Sample I was 25 to 54 years of age with $M = 36.76$ and $SD = 7.97$ and for Sample II was 34 to 63 years with $M = 41.33$ and $SD = 5.24$

Table 2. The List of Items Finalized for EFA

Challenging Job Demand	Item Code	Item No.	Item
Time Pressure	CJDS1	1	I have to do lot of work during duty.
Time Pressure	CJDS2	2	I have to do many types of tasks simultaneously
Time Pressure	CJDS3	3	I feel that there are too many tasks against very short time
Time Pressure	CJDS4	4	I feel that I have to increase my speed to complete my tasks.
Social Load	CJDS5	5	Nature of my responsibility at job is such that I have to attend meetings at my department
Social Load	CJDS6	6	Nature of my responsibility at job is such that I have to remain in contact with students
Social Load	CJDS7	7	Nature of my responsibility at job is such that I have to remain in contact with students outside the classroom
Social Load	CJDS8	8	Nature of my responsibility at job is such that I have to remain in contact with students after my duty hours.
Social Load	CJDS9	9	Nature of my responsibility at job is such that I have to attend meetings at my department
Social Load	CJDS10	10	For office work, I have to meet people outside the organization.
Social Load	CJDS11	11	Nature of my responsibility at job is such that I have to meet families of students.
Regulatory Load	CJDS12	12	I have had to manage extra administrative responsibilities of my department for long period (at least one semester)
Regulatory Load	CJDS13	13	I have to become coordinator of different committees of my department
Regulatory Load	CJDS14	14	My job provides me such opportunities where I perform those tasks which I have never done before.

Challenging Job Demand	Item Code	Item No.	Item
Regulatory Load	CJDS 15	15	During job I organize projects (seminars, workshops), where major part of responsibility lies on me.
Regulatory Load	CJDS 16	16	During job, I have to be a part of project organizing team.
Cognitive Demands	CJDS 17	17	During job I have to perform such tasks that require a lot of cognitive effort
Cognitive Demands	CJDS18	18	During job I have to perform such tasks that require long-term attention
Cognitive Demands	CJDS19	19	During job I have to perform such tasks that include research related activities.

Note. The item codes in bold represent the finalized list of items after EFA and CFA.

Table 3. Demographic Characteristics of Study Variables in two Samples

Demographic Variables	Sample I (N = 201)		Sample II (N = 600)	
	f	%	f	%
Gender				
Male	109	54.2	350	58
Female	92	45.8	250	42
Total	201	100	600	100
Designation				
Lecturer	96	47.8	295	49
Assistant Professor	93	46.3	257	42
Associate Professor and Above	12	5.9	48	8
Faculty				
Social Sciences	45	22.3	130	21.2
Natural Sciences	51	25.2	151	25.1
Arts and Humanities	59	29.35	73	12
Business administration	26	13	70	11.67
Computer Sciences	20	10	85	14.17
Agriculture & Animal Sciences	–	–	91	15.17

INSTRUMENTS

In order to confirm the convergent and discriminant validity, Oldenburg Burnout Inventory and DUWAS-10 were used along with the newly developed measure. The brief description of the two is as follows:

Oldenburg Burnout Inventory (Halbesleben & Demerouti, 2005). The Oldenburg Burnout Inventory is a sound measure of burnout. It measures two dimensions of burnout including disengagement and exhaustion. The scale consists of 16 items where both the sub-scales are measured with 8 items each. The items are to be responded on a 4-point Likert scale ranging from strongly agree to strongly disagree. The scale contains 8 reverse scoring items and the scores obtained through it can be used to describe level of exhaustion, disengagement, and burnout itself. The scale is a reliable measure of burnout as its reliability (as reported by Reis et al., 2015) ranges from 0.63 (for total scale) to 0.87 (for exhaustion).

Dutch Work Addiction Scale (DUWAS-10). The DUWAS-10 (Schaufeli et al., 2009) is a 10-item measure of workaholism. The scale measures two dimensions of workaholism including working excessively and working compulsively (5 items for each scale). The scale is to be responded on a 4-point Likert scale ranging from totally disagree to totally agree. The higher scores on a sub-scale indicate higher level of that particular type of workaholism. The scale is a reliable measure of workaholism as the Cronbach alpha, as reported by Schaufeli et al. (2009), is .78 for both the sub-scales. In the present study, only total score of DUWAS-10 is used as an indicative of level of workaholism among participants.

PROCEDURE

After identifying the initial factor structure qualitatively (see Makhdoom and Malik, 2018) and having literature searched, the researchers classified challenging job demands into four categories. Afterwards, the uni-

versity teachers were contacted to identify the stances where they face/d particular challenging job demands. The responses collected from the teachers were then discussed in a committee. After finalizing the items on the four sub-scales, the questionnaire was finalized in two further stages including Exploratory Factor Analysis and Confirmatory Factor Analysis. The detail of the two stages is summarized in following section:

EXPLORATORY FACTOR ANALYSIS

This stage of the study aimed at exploring the initial factor structure of the newly constructed scale. In order to obtain the factor structure, exploratory factor analysis was run on the scale. Exploratory factor analysis was carried out in order to explore the factor structure of the Challenging Job Demands Scale. Maximum likelihood method with direct oblimin rotation method was used in order to explore the factor structure of the scale. Initially, the number of factors was not fixed, and EFA produced a four factor structure of the scale; however, when the items based on low communalities were removed, a three factor structure emerged, which explained 45.72% cumulative variance.

First of all, Kaiser-Meyer Olkin test was used to ensure the adequacy of sample size. The value of .80 suggests the excellent sample adequacy as suggested by Kaiser (1974). Moreover, the Bartlett's test of Sphericity was also found to be statistically significant ($\chi^2(171) = 1386.13, p = .000$) suggesting the suitability of data for further analysis. The values of skewness and kurtosis suggested that the data was normally distributed. The communalities of the selected items were considerably high (i.e., greater than .3).

The scree plot depicts the Eigen values of the factors emerging from the data on Challenging Job Demands Scale. It is evident from the figure that the questionnaire contains four distinct factors after which the Eigen values "level off". Therefore, first of all a four-factor structure was observed in EFA. However, when items loading on multiple factors and weak items were removed, a three factor structure emerged.

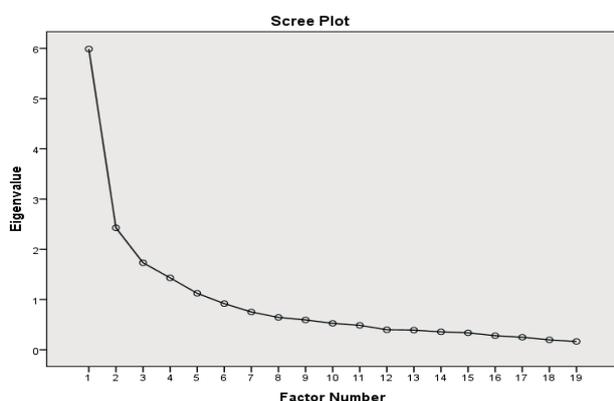


Figure 1. Screeplot for the Analysis of Challenging Job Demands Scale

Table 4. Exploratory Factor Analysis (EFA) with Direct Oblimin Showing Three Factor Structure of Challenging Job Demands Scale (N = 201)

Item Code	Item no.	Cognitive Demands	Time Pressure	Social Load
CJDS1	1	.13	.62	.18
CJDS2	2	.20	.61	.26
CJDS3	3	.26	.82	.24
CJDS4	4	.23	.69	.19
CJDS5	5	.08	-.07	.41
CJDS6	6	.32	.21	.27
CJDS7	7	.00	.05	.64
CJDS8	8	.04	.03	.73
CJDS9	9	-.04	.07	.61
CJDS10	10	.00	.01	.55
CJDS11	11	.10	.21	.17
CJDS12	12	.49	.21	.42
CJDS13	13	.45	.28	.51
CJDS14	14	.49	.24	.53
CJDS15	15	.65	.18	.30
CJDS16	17	.61	.10	.62
CJDS17	17	.81	.29	.72
CJDS18	18	.72	.22	.72
CJDS19	19	.33	.45	.37
Eigen Values		5.45	2.12	1.41
% of variance explained		30.28	11.78	7.86
Cumulative variance		27.58	39.91	45.72

The Table 4 outlines the results of factor loadings obtained through EFA for the Challenging Job Demands Scale. As expected, item number 1, 2, 3, and 4 loaded on one factor with high factor loadings ranging from .61 to .82. The factor was named as Time Pressure. Item number 6, 11, 12, 13 and 14 were removed from the scale because of lower communalities and loading on multiple factors. Item number 5, 7, 8 and 9, and 10 constituted a factor with high factor loadings ranging from .41 to .73. Based on the item contents, the factor was labeled as Social Load. The items which were supposed to load on cognitive load and regulatory load merged on a single factor and thus item number 15, 16, 17, and 18 constituted the third factor which was titled as Cognitive Demands.

CONFIRMATORY FACTOR ANALYSIS

In next step, the finalized 13 items scale was administered on a sample of university teachers. The data obtained was then analyzed through AMOS. The results of the CFA are portrayed in Figure 2.

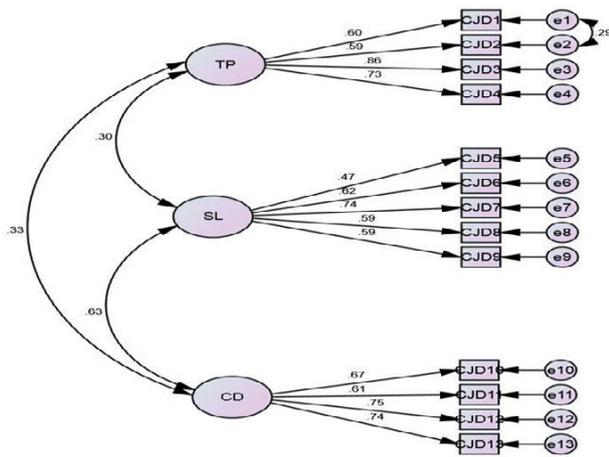


Figure 2. Factor Structure of Challenging Job Demands Scale through CFA

The Figure 2 portrays the three factor structure of the Challenging Job Demands Scale. All the items show good factor loadings except item number; however, the factor structure is good. All the fit indices are excellent including SRMR = .04; CMIN/df = 2.86; GFI = .96; AGFI = .94; NFI = .93; TLI = .94; CFI = .95; RMSEA = .05, PCLOSE = n.s.; SRMR = .03. The factor loadings of the scale obtained in CFA is shown in Table 5.

The Table 5 summarizes the factor loadings of the items on Challenging Job Demands Scale. The CFA confirms the factor structure obtained through EFA. It is shown in the table that Cognitive Demands contains four items whose loadings range from .61 to .75; Social Load contains 5 items and the factor loadings obtained through CFA range from .47 to .74; and finally, there is Time Pressure which contains four items and the factor loadings range from .59 to .86.

At this stage the reliability, correlations of the sub-scales and correlation with the measure of burnout were also observed. The results are summarized in following table.

The Table 6 depicts relationship pattern among challenging job demands, job burnout and its dimensions. As expected, the sub-scales were significantly related to one another and had very weak and non-significant

Table 5. Standardized Factor Loadings for the Three Factor Structure of the Challenging Job Demands Scale in University Teachers

Item Code	Item no.	Cognitive Demands	Time Pressure	Social Load
CJDS1	1		.60	
CJDS2	2		.59	
CJDS3	3		.86	
CJDS4	4		.73	
CJDS5	5			.47
CJDS7	6			.62
CJDS8	7			.74
CJDS9	8			.59
CJDS10	9			.59
CJDS15	10	.67		
CJDS16	11	.61		
CJDS17	12	.75		
CJDS18	13	.74		

relationship with the constructs of burnout. A weak but significant negative relationship of cognitive demands (a challenging job demand) was observed with exhaustion component of burnout. Further, as shown in Table, Time Pressure, Social Load and Cognitive Demands all positively correlate with workaholism with the strongest of the three correlations was observed for the relationship of time pressure and workaholism. Finally, the three factors of the newly constructed scale are found internally consistent as their reliabilities, as measured through Cronbach Alpha, were good ranging from .74 to .81.

DISCUSSION

The study was aimed at constructing and validating an instrument to measure the challenging job demands. The study was conducted in two phases. After constructing

Table 6. Inter-correlations and Cronbach Alpha for Study Variables (N = 600)

Variables	1	2	3	4	5	6	7	Cronbach Alpha
1. Time Pressure	–	.25***	.25***	-.02	-.04	-.03	.47***	.81
2. Social Load	–	–	.48***	-.00	-.02	-.01	.10*	.74
3. Cognitive Demands	–	–	–	-.08*	-.02	-.06	.12*	.79
4. Exhaustion	–	–	–	–	.55***	.88***	.01	.54
5. Disengagement	–	–	–	–	–	.88**	.01	.58
6. JB Total	–	–	–	–	–	–	.01	.71
7. Workaholism	–	–	–	–	–	–	–	.69

*p < .05. **p < .01. ***p < .001.

an initial item pool for scale of 19 items, the factor structure was assessed and confirmed in two phases. In first phase exploratory factor analysis revealed a three factor-structure including Time Pressure, Social Load and Cognitive Demands and 13 items with 4, 5 and 4 items retained on the three factors respectively. The same factor structure was confirmed in the second phase which was aimed at Confirmatory Factor Analysis. All the fit indices were above the accepted range as suggested by Hooper et al. (2008) which suggest that scale is psychometrically sound. Further, the factors of the newly developed scale positively and significantly correlate with each other which is an indicator that the scale has construct validity.

The factor loadings of all the items were fairly high, i.e., higher than .55 (except for a single item of Social Load). Although the item was having relatively lower factor loading but deleting the item didn't affect the other fit indices. Moreover, the item was important indicator of social load the teachers would have to face at their workplace; therefore, it was decided to keep the item. Moreover, the factors were internally consistent as the Cronbach Alpha ranged from .74 to .81 which is a good range for reliable measures (Taber, 2018)

In order to ensure its discriminant validity, the correlation of sub-scales of Challenging Job Demands Scale with burnout and its dimensions was observed. The results are in line with expectations and previous research. Traditionally, the job demands (both challenging and hindering) have been previously studied as positive predictors of burnout because they cause physical and psychological fatigue. However, the negativity of these demands is reduced when they result in personal growth and learning. Moreover, these demands serve as a means to psychological need fulfillment and thus result in more job satisfaction (Giebe & Rigotti, 2020). Previous research has also supported this notion; see e.g. Giebe & Rigotti, 2020 and Van den Broeck et al., 2010 who observed non-significant relationship of certain challenging job demands and exhaustion component of burnout.

The convergent validity was assessed by finding correlation of challenging job demands with workaholism. The scores obtained through DUWAS-10 were correlated with the scores obtained through the factors of newly developed scale including Time Pressure, Social Load and Cognitive Demands. The results show that all the three cognitive demands are positively related with workaholism with the highest value for the relationship of time pressure and workaholism. The results are in line with the theoretical and empirical literature available on the relationship of the two. It is not contrary to expectations that the academicians who face more cognitive demands, enjoy their work, thus perform more and more work related tasks and ultimately become workaholics. Molino et al. (2015) previously observed that there is a positive relationship between cognitive demands and workaholism. Similarly, those who experience more time pressure may also get involved in more and more thinking about work-related issues (i.e., work-related rumination; for a detailed discussion see Garst et al., 2000).

CONCLUSIONS

The present study was an attempt to construct and validate a measure of challenging job demands for university teachers. The scale consists of 13 items which are categorized into three factors including Time Pressure, Social Load and Cognitive Demands. The literature on the nature of challenging job demands particularly from JD-R model and the Self Determination Theory (Ryan & Deci, 2000) supports the factors of the scale. Moreover, the fit indices of the scale are stronger enough to justify its psychometric soundness. Finally, the correlations of the factors of challenging job demands with other constructs (i.e., job burnout and workaholism) are also theory consistent hence favoring the convergent and discriminant validities of the Challenging Job Demands Scale.

IMPACT OF THE STUDY

The newly developed scale is a valuable addition in literature of organizational psychology in general and in the literature of JD-R model in particular. The scale is a valid and psychometrically sound measure of challenging job demands. At theoretical grounds it expands the challenging job demands by adding social load as a new challenging job demand. The previously studied demands act as means of satisfying the need of competence and autonomy, however, social load is proposed as a challenging job demand which, along with satisfying the need of competence and autonomy, may helpful for the need satisfaction of relatedness in organizational context.

LIMITATIONS AND SUGGESTIONS

Although the developed scale is a valuable addition in the existing measures of JD-R model, the study is not void of certain limitations. The major limitation of the present study is the narrowness of its population. The scale was constructed and validated on samples of university teachers; however, the scale, with minor adaptation, can be validated for the whole service industry. Therefore, the scale should be validated on a broader sample of service industry. Moreover, the study proposes that the challenging job demands may be helpful in psychological need satisfaction; however, the proposition is not empirically tested in the present study. Therefore, future researchers should empirically test this proposition. Finally, the present study concluded social load and cognitive demands as challenging which may serve as means to fulfill need of competence and relatedness; however, the psychological need of autonomy is still to be added in this context. The future researchers should focus on identifying challenging demands which may serve as means to fulfill the need of autonomy.

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