

JD-R Theory: Using the Content of the O*Net

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The Job Demands-Resources Theory [JD-R; Demerouti et al. (2001)] has received wide support across contexts and varied research questions. We add to this literature via two routes: by utilizing some of the job characteristics in the popular O*Net, and by focusing on perceptions of all characteristics as demands/resources. Specifically, we explore the interaction between perceptions of job demands and resources on the outcome of stress across a wide range of occupations. Here, respondents made a series of evaluations that used: direct O*Net terminology (both descriptor and response option), and JD-R influenced ratings of demand and hindrance stressors. Prior to a description of results, a brief overview of both the JD-R theory, the stress appraisal process, and O*Net, is provided.

The Job demands-Resources Theory

The job demands-resources theory is an expansion of the well-studied job demands-resources model (Demerouti et al., 2001). One of the major advantages of the job demands-resources theory is that it allows us to model both work environment and job characteristics via job resources and demands, which are thoroughly documented by job in O*Net. *Resources* are defined as physical, psychological, social, or organizational aspects of the job that may help an employee achieve work goals, reduce job demands, or promote personal growth and development (Demerouti et al., 2001). *Demands*, on the other hand, include components of a job that require sustained effort, and as such, produce psychological or physiological strain (e.g., high work pressure; Demerouti et al. (2001)).

Cognitively, the perception of an element of one's job as a resource or demand activates one of two unique processes: health impairment (resulting from demands) or motivation [resulting from resources; A. B. Bakker and Demerouti (2014)]. Demanding job characteristics are frequently associated with negative outcomes (e.g., A. Bakker et al.,

2003), whereas job characteristics deemed resources have been associated with positive organizational outcomes like engagement and motivation (A. B. Bakker et al., 2007). Our focus is on whether or not having more resources serves as a buffer to the demand-stress relationship. One of the stickier elements of this question surrounds the subjective nature of demands/resources, which we address next.

Objective vs. Subjective Nature of Demands and Resources: The Role of Appraisal

Searle and Auton (2015) note that much of our research on workplace demands is based on apriori classifications of demands. For instance, we assume that generally, time pressure is a negative demand on an employee. However, the stress experience, or process, described early on by Lazarus and Folkman (1984) is grounded in the assumption that individual appraisals of stressors/demands vary. Their transactional theory of stress and coping states that people continuously appraise stimuli in their environments. An appraisal is the cognitive process whereby meaning is assigned to a stimulus. If a stimulus is appraised as a stressor (threat, challenge, potentially harmful), emotional distress leads to coping of some kind. This action to cope is also associated with another appraisal about the outcome itself and the process continues if the outcomes is not appraised as favorable (Lazarus & Folkman, 1984). As such, the stress appraisal process suggests that classifying a job characteristic or environmental condition as an objective demand or resource might be in error.

We next consider the empirical evidence on the subjective nature of demands and resources. First, as hinted at above, some research suggests that job demands and resources may not be universally appraised or assigned as such. Starting with job demands, Webster et al. (2011) studied workload, role ambiguity, and role conflict demands, and found that while each could be appraised primarily as a challenge or hindrance demand, they could also simultaneously be perceived as being *both* a challenge and hindrance to different

degrees. While their study not did include resources, it documents individual differences in how people perceive stressors at work. Although not the primary focus of their paper, Sonnega et al. (2018) compared self-reported (subjective) ratings of degree of physical demand, stress, and need for intense concentration from the Health and Retirement Study with objective ratings from O*Net. Correlations physical demand ($r = .52$), stress ($r = .10$), and need for intense concentration ($r = .14$), again suggesting perhaps that our objective ratings of job demands (and resources) may be subject to a greater level of individual difference than we tend to think. While the above two studies provide evidence for variability in perception of demands, Schmitz et al. (2019) captured subjective and objective resources in their study of retirement. Correlations of composite variables for the resources of autonomy ($r = .12$, $p > .01$), recognition of work ($r = .07$, $p > .01$), and decision freedom ($r = .08$, $p > .01$), while significant, certainly do not reflect high levels of overlap. We do acknowledge as well, that demands and resources are not necessarily consistent across days, or seasons, for many employees. Downes et al. (2021) meta-analysis addresses this reality in depth, although it is beyond the scope of this project.

Thus, while it is cleaner to be able to categorize job characteristics as *either* a demand or a resource, the above research suggests that individual appraisal is an important consideration. It is quite possible that one person experiences high work pressure (commonly cited as a demand in the literature) as a hindrance stressor and thus experiences strain, and another thrives in a fast-paced pressured role and would thus find the environment motivating. Here, we asked respondents to rate all of the job characteristics in terms of hindrances and resources. consider the here whether perceptions of demands (specifically hindrance demands) and stress is

Why use the O*Net Resource?

Originally, the Advisory Panel for the Dictionary of Occupational Titles recommended a system that would "...promote the effective education, training,

counseling, and employment of the American workforce. It should accomplish its purpose by providing a database system that identifies, defines, classifies, and describes occupations in the economy in an accessible and flexible manner” (Dictionary of Occupational Titles (US) and Service (1993), p. 6). The result was the now commonly used O*NET. The Occupational Information Network (O*NET; onetonline.org) contains a comprehensive description of occupations (Peterson et al., 2001). This widely accessed database houses hundreds of standardized and occupation-specific descriptors most occupations in the US and these descriptions are continually updated. In fact, there was a call to work with experienced I/O psychologists over the summer to update the content for the Industrial and Organizational Psychologist listing on O*Net. These data, and the tools provided for free on the website (e.g., Career Exploration Tools, “My Next Move for Veterans,” “My Next Move,” Toolkit for Business) are frequently used by counselors, students, human resources departments, and researchers to assist potential applicants discover the skills and training they need for the job of their choice. It is also useful to employers by providing them with information with which to craft job descriptions and help employees determine what skills are needed for promotion.

Of greatest interest here are statements taken from O*NET “activity” and “context” classifications (e.g., items related to information input, interacting with others, physical work conditions, structural job characteristics). One of the first and basic questions is whether or not the categorical examples of “resources” and “demands” described in the Job Demands-Resources Theory (Demerouti et al., 2001), for example, are generally deemed resources or demands as we objectively define them. The next logical question surrounds how “universal” such ratings are. For instance, it is quite possible, given the theoretical and empirical evidence presented above, that there is wide variability in individual appraisal of work activities and context such that some people may rate a given activity as a resource and others a hindrance. A second study extends the findings from Study 1 to a potentially key moderator - job categories/classifications, examining whether ratings of

resources, challenge- and hindrance demands differ by job classification.

Methods

Participants

Methods

Participants

There were 568 respondents.

Participants.

- 568 respondents, 13.57% had been in their referent job less than 6 months, 19.20% between 6 months and a year, 49.12% between one and five years, 13.27% between 5 and 10 years, and 4.87% more than 10 years.
- Ages ranged from 18 to 65 with an average of 28.18 years old ($SD = 7.53$).
- Gender: female (52.58%) or male (46.83%).
- Job classifications: International Standard Classification of Occupations (ISCO) via the package `labourR` (**R-labourR?**), and further categorized into “knowledge” ($n = 320$) versus “skilled” ($n = 214$) occupations with knowledge workers being identified via ISCO classifications of: 1) professionals, and 2) managers.

The data for this study were collected through Prolific sample, 18 or older and holding a full-time or part-time job. Participants were asked to think about their primary job while answering the survey, and upon completion each participant was compensated in the amount of six US dollars.

Materials

We used 98 statements taken directly from O*Net’s “activity” and “context” classifications. Each of the 98 descriptors has potentially unique response categories, but scaling was consistently 1 (low) to 5 (high). Subsequent to these self-evaluations, respondents were asked to rate elements in terms of 1) ...this aspect of your job is a resource that can be functional in achieving work goals, reduce job demands, or stimulate personal growth/development, 2) ...this aspect of your job is a challenge that can promote mastery, personal growth, or future gains, and 3) ...this aspect of your job is a hindrance that can inhibit personal growth, learning, and work goal attainment.

Procedure

We used PROCESS for R Version 4.1.1 (Hayes, 2022) to assess the extent to which the relationship between demands and stress are moderated by resources.

Results

```
##
## ***** PROCESS for R Version 4.1.1 *****
##
##           Written by Andrew F. Hayes, Ph.D.  www.afhayes.com
##   Documentation available in Hayes (2022). www.guilford.com/p/hayes3
##
## *****
##
## PROCESS is now ready for use.
## Copyright 2022 by Andrew F. Hayes ALL RIGHTS RESERVED
## Workshop schedule at http://haskayne.ucalgary.ca/CCRAM
```

```

162 ##

163 ##

164 ## ***** PROCESS for R Version 4.1.1 *****

165 ##

166 ##           Written by Andrew F. Hayes, Ph.D.  www.afhayes.com

167 ##   Documentation available in Hayes (2022). www.guilford.com/p/hayes3

168 ##

169 ## *****

170 ##

171 ## Model : 1

172 ##       Y : stress

173 ##       X : overall.hindrance

174 ##       W : overall.resource

175 ##

176 ## Sample size: 568

177 ##

178 ##

179 ## *****

180 ## Outcome Variable: stress

181 ##

182 ## Model Summary:

183 ##           R      R-sq      MSE      F      df1      df2      p

184 ##      0.1311   0.0172   0.7790   3.2876   3.0000  564.0000   0.0205

185 ##

186 ## Model:

187 ##           coeff      se      t      p      LLCI      ULCI

188 ## constant      1.2688   1.0055   1.2618   0.2075   -0.7063   3.2439

```



```

189 ## overall.hindrance    0.8336    0.4031    2.0677    0.0391    0.0417    1.6254
190 ## overall.resource      0.3319    0.2518    1.3181    0.1880   -0.1627    0.8264
191 ## Int_1                 -0.1918    0.1024   -1.8725    0.0616   -0.3929    0.0094
192 ##
193 ## Product terms key:
194 ## Int_1 : overall.hindrance x overall.resource
195 ##
196 ## Test(s) of highest order unconditional interaction(s):
197 ##      R2-chng      F      df1      df2      p
198 ## X*W    0.0061    3.5064    1.0000   564.0000    0.0616
199 ## -----
200 ## Focal predictor: overall.hindrance (X)
201 ##      Moderator: overall.resource (W)
202 ##
203 ## Conditional effects of the focal predictor at values of the moderator(s):
204 ## overall.resource    effect      se      t      p      LLCI      ULCI
205 ##          3.2983    0.2010    0.0802    2.5065    0.0125    0.0435    0.3586
206 ##          3.7402    0.1163    0.0534    2.1759    0.0300    0.0113    0.2213
207 ##          4.2063    0.0269    0.0594    0.4535    0.6503   -0.0897    0.1435
208 ##
209 ## Moderator value(s) defining Johnson-Neyman significance region(s):
210 ##      Value    % below    % above
211 ##      3.8196   55.6338   44.3662
212 ##
213 ## Conditional effect of focal predictor at values of the moderator:
214 ## overall.resource    effect      se      t      p      LLCI      ULCI
215 ##          1.0149    0.6389    0.3003    2.1276    0.0338    0.0491    1.2288

```

216	##	1.2078	0.6020	0.2809	2.1433	0.0325	0.0503	1.1536
217	##	1.4006	0.5650	0.2615	2.1608	0.0311	0.0514	1.0785
218	##	1.5935	0.5280	0.2421	2.1807	0.0296	0.0524	1.0035
219	##	1.7863	0.4910	0.2228	2.2034	0.0280	0.0533	0.9287
220	##	1.9791	0.4540	0.2037	2.2293	0.0262	0.0540	0.8540
221	##	2.1720	0.4170	0.1846	2.2592	0.0243	0.0545	0.7796
222	##	2.3648	0.3801	0.1657	2.2937	0.0222	0.0546	0.7055
223	##	2.5577	0.3431	0.1470	2.3336	0.0200	0.0543	0.6318
224	##	2.7505	0.3061	0.1287	2.3791	0.0177	0.0534	0.5588
225	##	2.9434	0.2691	0.1108	2.4292	0.0154	0.0515	0.4867
226	##	3.1362	0.2321	0.0937	2.4784	0.0135	0.0482	0.4161
227	##	3.3290	0.1951	0.0778	2.5085	0.0124	0.0423	0.3479
228	##	3.5219	0.1582	0.0641	2.4667	0.0139	0.0322	0.2841
229	##	3.7147	0.1212	0.0543	2.2306	0.0261	0.0145	0.2279
230	##	3.8196	0.1011	0.0515	1.9642	0.0500	0.0000	0.2021
231	##	3.9076	0.0842	0.0507	1.6605	0.0974	-0.0154	0.1838
232	##	4.1004	0.0472	0.0545	0.8662	0.3867	-0.0599	0.1543
233	##	4.2933	0.0102	0.0644	0.1589	0.8738	-0.1163	0.1368
234	##	4.4861	-0.0267	0.0782	-0.3421	0.7324	-0.1803	0.1268
235	##	4.6790	-0.0637	0.0941	-0.6773	0.4985	-0.2485	0.1211
236	##	4.8718	-0.1007	0.1112	-0.9054	0.3656	-0.3192	0.1178
237	##							
238	##	Data for visualizing the conditional effect of the focal predictor:						
239	##	overall.hindrance	overall.resource	stress				
240	##	1.6667	3.2983	2.6985				
241	##	2.2894	3.2983	2.8237				
242	##	3.2416	3.2983	3.0151				

```

243 ##                1.6667                3.7402    2.7039
244 ##                2.2894                3.7402    2.7763
245 ##                3.2416                3.7402    2.8871
246 ##                1.6667                4.2063    2.7096
247 ##                2.2894                4.2063    2.7264
248 ##                3.2416                4.2063    2.7520
249 ##
250 ## ***** ANALYSIS NOTES AND ERRORS *****
251 ##
252 ## Level of confidence for all confidence intervals in output: 95
253 ##
254 ## W values in conditional tables are the 16th, 50th, and 84th percentiles.

```

255 #Results

256 A moderated regression including hindrances, resources, and the interaction between
 257 them was done using PROCESS, version 4.1.1. First, the overall regression model including
 258 mean hindrances, mean resources, and the interaction between the two variables was
 259 significant, $F(3, 564) = 3.29$, $p = .020$. The interaction between hindrance and resources
 260 (uncentered) revealed that the relationship between hindrances and stress was conditional
 261 on resources, $F(3, 564) = 3.51$, $p = .061$. As can be seen in Figure 1, those with fewer
 262 resources show a much stronger positive relationship between hindrances and stress than
 263 those with more resources. Upon exploring the interaction further, it was evident that this
 264 moderated effect happened at lower, but not higher levels of resources.

265 Next steps: 1) Make a prettier graph using ggplot. Note the percentiles that we
 266 graphed. 2) Or, could generate Johnson-Neyman Technique – shows specifically the range
 267 of W values that are significant. See p. 272 for visual and r-script. Table example on
 268 p. 286: includes variables, symbol, coeff, SE, t, p; below that, rsquared, MSE and f-string.

Discussion

References

- Bakker, A. B., & Demerouti, E. (2014). Job demands–resources theory. *Wellbeing: A Complete Reference Guide*, 1–28.
- Bakker, A. B., Hakanen, J. J., Demerouti, E., & Xanthopoulou, D. (2007). Job resources boost work engagement, particularly when job demands are high. *Journal of Educational Psychology*, 99(2), 274.
- Bakker, A., Demerouti, E., & Schaufeli, W. (2003). Dual processes at work in a call centre: An application of the job demands–resources model. *European Journal of Work and Organizational Psychology*, 12(4), 393–417.
- Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86(3), 499.
- Dictionary of Occupational Titles (US), A. P. for the, & Service, U. S. E. (1993). *The new DOT: A database of occupational titles for the twenty-first century*. US Department of Labor, Employment; Training Administration, US
- Downes, P. E., Reeves, C. J., McCormick, B. W., Boswell, W. R., & Butts, M. M. (2021). Incorporating job demand variability into job demands theory: A meta-analysis. *Journal of Management*, 47(6), 1630–1656.
- Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). The Guilford Press.
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer publishing company.
- Peterson, N. G., Mumford, M. D., Borman, W. C., Jeanneret, P. R., Fleishman, E. A., Levin, K. Y., Campion, M. A., Mayfield, M. S., Morgeson, F. P., Pearlman, K., & others. (2001). Understanding work using the occupational information network (o* NET): Implications for practice and research. *Personnel Psychology*,

295 54(2), 451–492.

296 Schmitz, L. L., McCluney, C. L., Sonnega, A., & Hicken, M. T. (2019). Interpreting
297 Subjective and Objective Measures of Job Resources: The Importance of
298 Sociodemographic Context. *International Journal of Environmental Research*
299 *and Public Health*, 16(17), 3058. <https://doi.org/10.3390/ijerph16173058>

300 Searle, B. J., & Auton, J. C. (2015). The merits of measuring challenge and
301 hindrance appraisals. *Anxiety, Stress, & Coping*, 28(2), 121–143.

302 Sonnega, A., Helppie-McFall, B., Hudomiet, P., Willis, R. J., & Fisher, G. G. (2018).
303 A Comparison of Subjective and Objective Job Demands and Fit With Personal
304 Resources as Predictors of Retirement Timing in a National U.S. Sample. *Work,*
305 *Aging and Retirement*, 4(1), 37–51. <https://doi.org/10.1093/workar/wax016>

306 Webster, J. R., Beehr, T. A., & Love, K. (2011). Extending the challenge-hindrance
307 model of occupational stress: The role of appraisal. *Journal of Vocational*
308 *Behavior*, 79(2), 505–516.

Table 1

Results from a regression analysis examining the moderation of resources on the relationship between hindrance demands and stress

Component	coeff	SE	t	p
Constant	1.27	1.01	1.26	0.21
Hindrance (X)	0.83	0.40	2.07	0.04
Resource (W)	0.33	0.25	1.32	0.19
Hindrance x Resource	-0.19	0.10	-1.87	0.06

Note. R^2 etc here

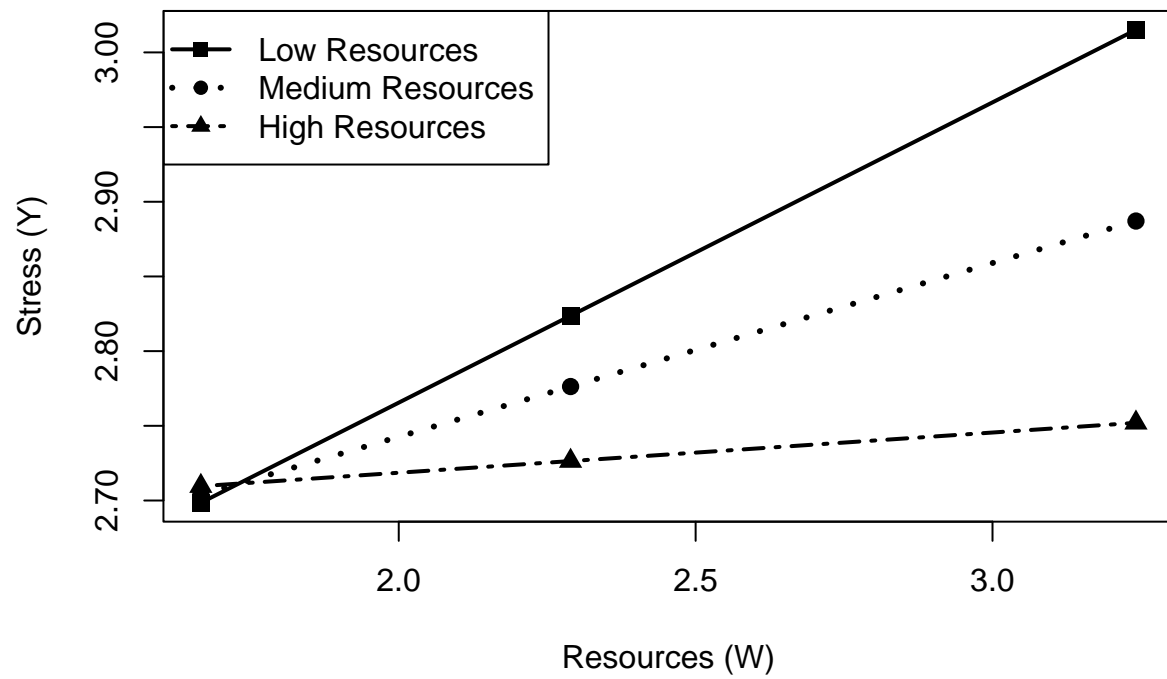


Figure 1. Interaction between hindrances and resources as predictors of stress