

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

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

The Job Demands-Resources Theory [JD-R; Demerouti et al. (2001)] has received wide support across contexts and varied research questions. We contribute to this literature by exploring the interaction between *perceptions* of job demands and resources on stress using the broad set of job characteristics provided on O*Net.

A series of evaluations were made 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. *Resources* include 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). In contrast, *demands* include components of a job that require sustained effort, and as such, produce psychological or physiological strain (e.g., high work pressure is frequently cited as a common demand; Demerouti et al. (2001)). Cognitively, the perception of an element of one's job as a resource or demand activates one of two distinct processes: either health impairment (resulting from demands) or motivation [resulting from resources; A. B. Bakker and Demerouti (2014)]. Pertinent to the current study, 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).

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

Searle and Auton (2015) note that the majority of the research on workplace demands is based on apriori classifications of demands. 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). 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 (limited) empirical evidence on this topic. First, some relatively recent research suggests that job demands and resources may not be universally appraised or assigned as such. Starting with job demands, Webster et al. (2011), for example, 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 did include resources, it nonetheless points to individual differences on how people perceive stressors at work. Although part of a much larger study on retirement, 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 assumed. Next considering resources, Schmitz et al. (2019) also 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.

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

91 what skills are needed for promotion.

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

104 **Methods**

105 **Participants**

106 There were 568 respondents.

107 **Participants.**

- 108 • 568 respondents, 13.57% had been in their referent job less than 6 months, 19.20%
 109 between 6 months and a year, 49.12% between one and five years, 13.27% between 5
 110 and 10 years, and 4.87% more than 10 years.
- 111 • Ages ranged from 18 to 65 with an average of 28.18 years old (SD = 7.53).
- 112 • Gender: female (52.58%) or male (46.83%).
- 113 • Job classifications: International Standard Classification of Occupations (ISCO) via
 114 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

```
138 ## Documentation available in Hayes (2022). www.guilford.com/p/hayes3
139 ##
140 ## *****
141 ##
142 ## PROCESS is now ready for use.
143 ## Copyright 2022 by Andrew F. Hayes ALL RIGHTS RESERVED
144 ## Workshop schedule at http://haskayne.ucalgary.ca/CCRAM
145 ##
146 ##
147 ## ***** PROCESS for R Version 4.1.1 *****
148 ##
149 ## Written by Andrew F. Hayes, Ph.D. www.afhayes.com
150 ## Documentation available in Hayes (2022). www.guilford.com/p/hayes3
151 ##
152 ## *****
153 ##
154 ## Model : 1
155 ## Y : stress
156 ## X : overall.hindrance
157 ## W : overall.resource
158 ##
159 ## Sample size: 568
160 ##
161 ##
162 ## *****
163 ## Outcome Variable: stress
164 ##
```

165 ## Model Summary:

166 ##	R	R-sq	MSE	F	df1	df2	p
167 ##	0.1311	0.0172	0.7790	3.2876	3.0000	564.0000	0.0205

168 ##

169 ## Model:

170 ##		coeff	se	t	p	LLCI	ULCI
171 ##	constant	1.2688	1.0055	1.2618	0.2075	-0.7063	3.2439
172 ##	overall.hindrance	0.8336	0.4031	2.0677	0.0391	0.0417	1.6254
173 ##	overall.resource	0.3319	0.2518	1.3181	0.1880	-0.1627	0.8264
174 ##	Int_1	-0.1918	0.1024	-1.8725	0.0616	-0.3929	0.0094

175 ##

176 ## Product terms key:

177 ## Int_1 : overall.hindrance x overall.resource

178 ##

179 ## Test(s) of highest order unconditional interaction(s):

180 ##	R2-chng	F	df1	df2	p	
181 ##	X*W	0.0061	3.5064	1.0000	564.0000	0.0616

182 ## -----

183 ## Focal predictor: overall.hindrance (X)

184 ## Moderator: overall.resource (W)

185 ##

186 ## Conditional effects of the focal predictor at values of the moderator(s):

187 ##	overall.resource	effect	se	t	p	LLCI	ULCI
188 ##	3.2983	0.2010	0.0802	2.5065	0.0125	0.0435	0.3586
189 ##	3.7402	0.1163	0.0534	2.1759	0.0300	0.0113	0.2213
190 ##	4.2063	0.0269	0.0594	0.4535	0.6503	-0.0897	0.1435

191 ##

192 ## Moderator value(s) defining Johnson-Neyman significance region(s):

193 ## Value % below % above

194 ## 3.8196 55.6338 44.3662

195 ##

196 ## Conditional effect of focal predictor at values of the moderator:

197 ##	overall.resource	effect	se	t	p	LLCI	ULCI
198 ##	1.0149	0.6389	0.3003	2.1276	0.0338	0.0491	1.2288
199 ##	1.2078	0.6020	0.2809	2.1433	0.0325	0.0503	1.1536
200 ##	1.4006	0.5650	0.2615	2.1608	0.0311	0.0514	1.0785
201 ##	1.5935	0.5280	0.2421	2.1807	0.0296	0.0524	1.0035
202 ##	1.7863	0.4910	0.2228	2.2034	0.0280	0.0533	0.9287
203 ##	1.9791	0.4540	0.2037	2.2293	0.0262	0.0540	0.8540
204 ##	2.1720	0.4170	0.1846	2.2592	0.0243	0.0545	0.7796
205 ##	2.3648	0.3801	0.1657	2.2937	0.0222	0.0546	0.7055
206 ##	2.5577	0.3431	0.1470	2.3336	0.0200	0.0543	0.6318
207 ##	2.7505	0.3061	0.1287	2.3791	0.0177	0.0534	0.5588
208 ##	2.9434	0.2691	0.1108	2.4292	0.0154	0.0515	0.4867
209 ##	3.1362	0.2321	0.0937	2.4784	0.0135	0.0482	0.4161
210 ##	3.3290	0.1951	0.0778	2.5085	0.0124	0.0423	0.3479
211 ##	3.5219	0.1582	0.0641	2.4667	0.0139	0.0322	0.2841
212 ##	3.7147	0.1212	0.0543	2.2306	0.0261	0.0145	0.2279
213 ##	3.8196	0.1011	0.0515	1.9642	0.0500	0.0000	0.2021
214 ##	3.9076	0.0842	0.0507	1.6605	0.0974	-0.0154	0.1838
215 ##	4.1004	0.0472	0.0545	0.8662	0.3867	-0.0599	0.1543
216 ##	4.2933	0.0102	0.0644	0.1589	0.8738	-0.1163	0.1368
217 ##	4.4861	-0.0267	0.0782	-0.3421	0.7324	-0.1803	0.1268
218 ##	4.6790	-0.0637	0.0941	-0.6773	0.4985	-0.2485	0.1211

```

219 ##                4.8718   -0.1007    0.1112   -0.9054    0.3656   -0.3192    0.1178
220 ##
221 ## Data for visualizing the conditional effect of the focal predictor:
222 ##   overall.hindrance overall.resource    stress
223 ##           1.6667           3.2983    2.6985
224 ##           2.2894           3.2983    2.8237
225 ##           3.2416           3.2983    3.0151
226 ##           1.6667           3.7402    2.7039
227 ##           2.2894           3.7402    2.7763
228 ##           3.2416           3.7402    2.8871
229 ##           1.6667           4.2063    2.7096
230 ##           2.2894           4.2063    2.7264
231 ##           3.2416           4.2063    2.7520
232 ##
233 ## ***** ANALYSIS NOTES AND ERRORS *****
234 ##
235 ## Level of confidence for all confidence intervals in output: 95
236 ##
237 ## W values in conditional tables are the 16th, 50th, and 84th percentiles.

```

238 #Results

239 A moderated regression including hindrances, resources, and the interaction between
 240 them was done using PROCESS, version 4.1.1. First, the overall regression model including
 241 mean hindrances, mean resources, and the interaction between the two variables was
 242 significant, $F(3, 564) = 3.29$, $p = .020$. The interaction between hindrance and resources
 243 (uncentered) revealed that the relationship between hindrances and stress was conditional
 244 on resources, $F(3, 564) = 3.51$, $p = .061$. As can be seen in Figure 1, those with fewer

resources show a much stronger positive relationship between hindrances and stress than those with more resources. Upon exploring the interaction further, it was evident that this moderated effect happened at lower, but not higher levels of resources.

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

Discussion

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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	0.4	2.07	0.04
Resource (W)	0.33	0.25	1.32	0.19
Hindrance x Resource	-0.19	0.1	-1.87	0.06

Note. R^2 etc here

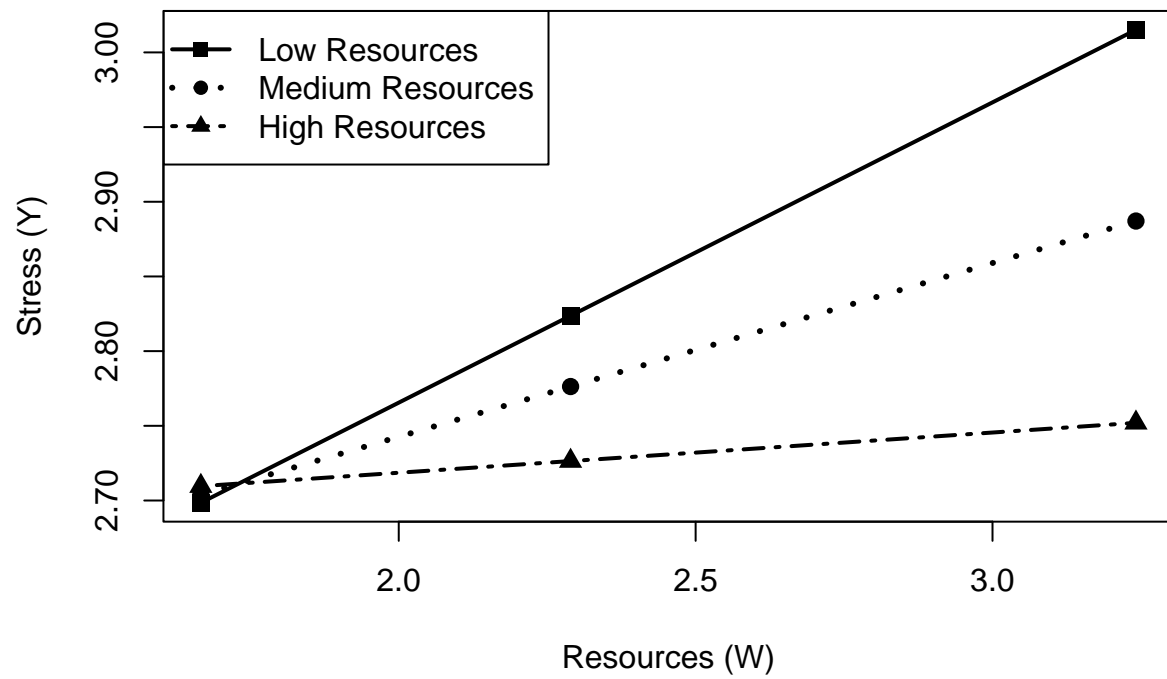


Figure 1. Interaction between hindrances and resources as predictors of stress