1   O*NET defined demands and resources and associations with stress, burnout, and

2   engagement

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6   Abstract

7   O*NET work characteristics were rated in terms of relevance, perception of demand, and

8   perception as resource.

9   *Keywords:* keywords

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O*NET defined demands and resources and associations with stress, burnout, and

engagement

The job demands-resources model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) and later job demands-resources theory (Bakker & Demerouti, 2017) have inspired a plethora a study on the process and experience of job stress and employee motivation in recent decades. In the current project, we draw attention to a basic question regarding a key assumption we make regarding this process - that of the objective nature of job characteristics as either demands or resources. The major contribution of this project is to document whether job context and characteristics (pulled from O*NET) can simultaneously be classified as resources and as demands. We further present descriptive information regarding which job context and characteristics are rated the highest across jobs.

The Job demands-Resources Theory

The job demands-resources theory is an extension of the well-known job demands-resources model put forth by Demerouti and colleagues in 2001 (Demerouti et al., 2001). The job demands-resources model had been so heavily studied that a number of meta-analyses have been possible (e.g., (Crawford, LePine, & Rich, 2010); (Halbesleben, 2010); (Nahrgang, Morgeson, & Hofmann, 2011)). The theory generated by the model integrates both the job design and job stress literatures to help explain the conditions under which a job would result in employee stress vs. motivation (Bakker & Demerouti, 2014). Per the job demands-resources theory, both work environment and job characteristics can be modeled via job demands and resources. Demerouti et al. (2001) define job demands broadly as 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). Resources, on the other hand, are 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). Experiencing an element of one's job as a resource or demand activates one of two
distinct processes: either health impairment (demands) or motivation (resources; (Bakker
& Demerouti, 2014). Job characteristics perceived to be demanding are effortful are
frequently associated with negative outcomes such as exhaustion (e.g., Bakker, Demerouti,
& Schaufeli, 2003). On the other hand, job characteristics perceived as resources (fulfil
psychological needs) are associated with positive organizational outcomes like engagement
and motivation (Bakker, Hakanen, Demerouti, & Xanthopoulou, 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 or 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, Beehr, and Love
(2011), for example, studied workload, role ambiguity, and role conflict demands, and
found while that each could be appraised primarily as challenges or hindrances demands,

62 they could also simultaneously be perceived as being both a challenge and hinderance to

63 different degrees. While their study did include resources, it nonetheless points to

64 individual difference on how people perceive stressors at work. Although part of a much

65 larger study on retirement, Sonnega, Helppie-McFall, Hudomiet, Willis, and Fisher (2018)

66 compared self-reported (subjective) ratings of degree of physical demand, stress, and need

67 for intense concentration from the Health and Retirement Study with objective ratings

68 from O*Net. Correlations physical demand (r = .52), stress (r = .10), and need for intense

69 concentration (r = .14), again suggesting perhaps that our objective ratings of job demands

70 (and resources) may be subject to a greater level of individual difference than assumed.

71 Next considering resources, Schmitz, McCluney, Sonnega, and Hicken (2019) captured

72 subjective and objective resources in their study of retirement also. Correlations of

73 composite variables for the resources of autonomy (r = .12), recognition of work (r = .07),

74 decision freedom (r = .08), and advancement (r = -.01), while significant, certainly do not

75 reflect high levels of overlap. We do acknowledge as well, that demands and resources are

76 not necessarily consistent across days, or seasons, for many employees. Downes, Reeves,

77 McCormick, Boswell, and Butts (2021) meta-analysis addresses this reality in depth,

78 although it is beyond the scope of this project.

79 **Current Study and Hypotheses**

80   The current study aims to explore the degree to which job context and job

81 characteristic items from O*Net are considered demands and resources. Given theoretical

82 and empirical findings, it seems quite plausible that our apriori assignment of job elements

83 to a "demand" or "resource" category may be too simplistic. We aim to document a list of

84 the highest rated demands and resources, as well as information on overlap of job

85 characteristics as demands and resources, in addition to addressing the following

86 predictions.

87 **Current Study and Research Questions for other studies + notes**

88   **Study 2 Introduction: Correlates with Engagement and Stress**

89   Research on the job demands-resources model (Demerouti et al., 2001) and later job

90 demands-resources theory (Bakker & Demerouti, 2017) highlight the importance of work

91 characteristics on the experience of motivation and strain, which clearly have an impact on

92 job performance. In this paper, we extend this critical research to that of the distinction

93 between challenge and hinderance demands (and resource) in the workplace, and how they

94 relate to two important organizational outcomes: engagement and stress. Prior to

95 presenting the current study in detail, we provide a brief overview of the relevant theories

96 and relevant empirical work on this topic.

97 **The Job demands-Resources Theory**

98   The overarching context for this study is that of the job demands-resources theory,

99 which is an expansion of the well-studied job demands-resources model (Demerouti et al.,

100 2001). One of the major advantages of the job demands-resources theory is that it allows

101 us to model both work environment and job characteristics via job resources and demands.

102 *Resources* include physical, psychological, social, or organizational aspects of the job that

103 may help an employee achieve work goals, reduce job demands, or promote personal growth

104 and development (Demerouti et al., 2001). In contrast, demands include components of a

105 job that require sustained effort, and as such, produce psychological or physiological strain

106 (e.g., high work pressure is frequently cited as a common demand; Demerouti et al. (2001)).

107   Cognitively, the perception of an element of one's job as a resource or demand

108 activates one of two distinct processes: either health impairment (resulting from demands)

109 or motivation (resulting from resources) (Bakker & Demerouti, 2014). Pertinent to the

110 current study, demanding job characteristics are frequently often associated with negative

111 outcomes (e.g., Bakker et al., 2003), whereas job characteristics deemed resources have

been associated with positive organizational outcomes like engagement and motivation
(Bakker et al., 2007).

The Essential Role of Appraisal

As implied in the last paragraph, job context and characteristics are "assigned" or
appraised as demands or resources. Although some research on job demands in particular
is based on apriori classifications of demands (Searle & Auton, 2015), the classification of a
work characteristic as a demand or resource is largely subjective by nature (e.g., an
employee could most certainly perceive being a public figure as a resource or as a demand.
The stress process speaks to how such individual difference in appraisal is possible. Lazarus
and Folkman (1984) presented the transactional theory of stress and coping, which states
that people cognitively appraise stimuli in their environments on a continuous basis. Via
this process, meaning is assigned to stimuli – if appraised as threatening, challenging, or
possibly harmful, the resulting emotional distress initiates coping. The cycle of appraisal
then continues based on the action to cope with the stressor (Lazarus & Folkman, 1984).

The Challenge-Hinderance Framework

Although there is a tendency to attach a negative connotation to the word "stress",
Selye (1936) defined stress as a response to change, which is quite non-specific. We return
to the employed public figure for this next section. It is quite probable that two employees
would be called upon to serve as a spokesperson for their organization in a time of need.
One may appraise the circumstance as an opportunity to positively influence others, while
the other may plausibly feel paralyzed by the task. Cavanaugh, Boswell, Roehling, and
Boudreau (2000) delineated between two forms of demands – that of *challenge* and
hinderance demands. Challenge demands promote mastery, personal growth, and future
gains. Hinderance demands, in contrast, inhibit growth, learning and goal achievement.
This particular distinction has been of value in determining what demands are related to

137 various outcomes, whereby challenge stressors are typically associated with positive

138 outcomes, and hinderance stressors, negative outcomes (e.g., Cavanaugh et al. (2000)).

139 However, one of the key questions we need to ask as researchers pertains to the very basic

140 consideration of appraisals.

141   We next consider the empirical evidence on this topic. The first obvious question is

142 whether people perceive demands as challenges vs. hinderances, or whether all demands are

143 under a larger "demands" category. Evidence suggests the employees do, in fact,

144 distinguish between challenge and hinderance stressors (e.g., Bakker & Sanz-Vergel, 2013;

145 Gerich, 2017; Webster et al., 2011). For example, Bakker and Sanz-Vergel (2013) found

146 that perceived work pressure as a hinderance demand, and emotional demands as more of a

147 challenge demand. Webster et al. (2011) approached this question with three common

148 workplace demands: workload, role ambiguity, and role conflict. They found while that

149 each could be appraised primarily as challenges or hinderances demands, they could also

150 simultaneously be perceived as being both a challenge and hinderance to different degrees.

151 While their study did include resources, it nonetheless points to the possibility that

152 demands might be differentially appraised and related to outcomes (e.g., Podsakoff,

153 LePine, & LePine, 2007). The challenge-hinderance framework has, in fact, been associated

154 with a wide variety of organizational outcomes ranging from affective variables like job

155 satisfaction, to motivation, performance, and well-being. A sampling of variables and

156 relationships are described below to provide a sense of scope of the work that has been on

157 this topic. For example, Cavanaugh et al. (2000), in a study of managers, found that

158 challenge demands were positively related to job satisfaction and negatively related to job

159 search behaviors, while hinderance demands demonstrated the opposite pattern. In

160 contrast, Abbas and Raja (2019) found that challenge and hinderance stressors were *both*

161 positively related to strain and turnover intensions. We also have some evidence that

162 challenge-hinderance appraisals are related to engagement in the expected direction

163 whereby hinderance appraisals are negatively associated with engagement and challenge

164 appraisals are positively associated with it (Crawford et al., 2010). Challenge and

165 hinderance appraisals have also been shown to relate to citizenship and counterproductive

166 performance, although indirectly via emotions like anxiety (Rodell & Judge, 2009). Lastly,

167 Gerich (2017) concluded that employee well-being was also, in part, explained by appraised

168 challenge or hinderance demands such that working conditions of time pressure, qualitative

169 demands, responsibility, and interruptions, were partially mediated by challenge and

170 hinderance demands. We even have sufficient evidence to explore outcomes associated with

171 challenge and hinderance stressors meta-analytically at this point. Podsakoff et al. (2007)

172 supported the original assertion of Cavanaugh et al. (2000) with regard to work outcomes

173 such that challenge stressors were positively related to job satisfaction and organizational

174 commitment, and negatively related to both turnover intentions and actual turnover. The

175 opposite pattern of relationship was observed for hinderance stressors.

176 **Current Study and Hypotheses**

177 Given the abundance of theoretical and empirical support for the connection between

178 resources and positive organizational outcomes, and between demands and negative

179 resources, we sought to explore whether or not the appraisal of a demand as a challenge or

180 hinderance would be related *differently* to two organizational outcomes: engagement (a

181 positive affective experience defined as a fulfilling, work-related state of mind characterized

182 by vigor, dedication, and absorption, schaufeli2002measurement], workplace stress ("an

183 individual state characterized by a combination of high arousal and displeasure", p. 15,

184 Pejtersen, Kristensen, Borg, & Bjorner, 2010) and burnout ["'The degree of physical and

185 psychological fatigue and exhaustion that is perceived by the person as related to his/her

186 work", p. 197; Kristensen, Borritz, Villadsen, and Christensen (2005);negative affective

187 experiences). Drawing on the job demands-resources theory and the challenge-hinderance

188 framework, we propose that job elements appraised as "challenge demands" (i.e., promote

189 mastery, personal growth, and future gains) would activate (be related to) a positive state

190 – that of engagement. In contrast, elements of one's job appraised as a hinderance demand

191 (i.e., inhibit growth, learning and goal achievement) would activate a negative state – here,

192 stress.

193   These are extra sources below if we want more information. The intro is getting a

194 little bit long for this one. Edwards, Franco-Watkins, Cullen, Howell, and Acuff Jr (2014)

195 (this one is interesting – manipulated challenge and hinderance stress by offering

196 money/taking it away based on the correctness of their decisions - of university students

197 and measured outcomes... potentially include this in the discussion section i) Kim and

198 Beehr (2018) Searle and Auton (2015) Tuckey et al. (2015) Webster, Beehr, and

199 Christiansen (2010)

Methods

Participants

202   Of the 785 Prolific panel individuals who initially accessed the survey link, 112

203 indicated that they were not interested, had more than 200 missing responses, or had 20 or

204 more identical consecutive sequential responses (Yentes & Wilhelm, 2021). Applying a

205 further screen regarding attention checks (there were four attention checks embedded

206 throughout, asking respondents to indicate a specific answer) resulted in the retention of

207 568 respondents who constitute the current SIOP sample. 13.57% had been in their

208 referent job less than 6 months, 19.20% between 6 months and a year, 49.12% between one

209 and five years, 13.27% between 5 and 10 years, and 4.87% more than 10 years.

210   Ages ranged from 18 to 65 with an average of 28.18 years old (SD = 7.53). The

211 survey offered a free-field gender identity category, although the sample predominantly

212 self-identified as female (52.58%) or male (46.83%). Jobs were classified into the

213 International Standard Classification of Occupations (ISCO) via the package labourR

214 (Kouretsis, Bampouris, Morfiris, & Papageorgiou, 2020). We further grossly categorized

215 these classifications into "knowledge" ($n = 320$) versus "service" ($n = 214$) occupations

216 with knowledge workers being ISCO classifications of: 1) Professionals, and 2) Managers.

Methods

218   We evaluate associations between the antecedants and proximal outcomes of the Job

219 Demands-Resources model (Bakker & Demerouti, 2017; Bakker et al., 2003; Demerouti et

220 al., 2001). Specifically we focus on job engagement, job stress, and burnout with a U.S.

221 workforce representative sample.

222   burnout and stress components (correlations),

223   *Hypothesis 1a*: Job characteristics appraised as resources will be positively

224   associated with engagement.

225   *Hypothesis 1b*: Job characteristics appraised as resources will be negatively

226   associated with stress.

227   *Hypothesis 1c*: Job characteristics appraised as resources will be negatively

228   associated with burnout.

229   *Hypothesis 2a*: Job characteristics appraised as challenge demands will be

230   positively associated with engagement.

231   *Hypothesis 2b*: Job characteristics appraised as challenge demands will be

232   negatively associated with stress.

233   *Hypothesis 2c*: Job characteristics appraised as challenge demands will be

234   negatively associated with burnout.

235   *Hypothesis 3a*: Job characteristics appraised as hinderance demands will be

236   negatively associated with engagement.

237   *Hypothesis 3b*: Job characteristics appraised as hinderance demands will be

238   positively associated with stress.

239   *Hypothesis 3c*: Job characteristics appraised as hinderance demands will be

240   positively associated with burnout.

241   **Study 3**

242   In an attempt to integrate the O*NET taxonomy within the orientation of the Job

243   Demands-Resources (Bakker & Demerouti, 2017; Bakker et al., 2003; Demerouti et al.,

244   2001), a series of evaluations were made that used: 1) O*NET terminology (both descriptor

245   and response option), 2) JD-R influenced ratings of demand, challenge, or hindrance. The

246   outcome of this integration is a cross-walk between the Department of Labor classifications

247   and the I-O literature steeped JD-R. While O*Net provides thorough documentation of

248   information associated with job analyses, one of the remaining limitations is its lack of

249   connection to theory. Given the popularity of the Job Demands-Resources Theory (JD-R;

250   Demerouti et al., 2001) in exploring questions related to everything from motivation to job

251   design, we aim to explore the intersection between perceptions of job demands and

252   resources, and the broad set of job characteristics provided on O*Net. In an attempt to

253   integrate the O*Net taxonomy within the orientation of the JD-R framework (Bakker &

254   Demerouti, 2017; Bakker et al., 2003; Demerouti et al., 2001), a series of evaluations were

255   made that used: 1) direct O*Net terminology (both descriptor and response option), and

256   2) JD-R influenced ratings of demand, challenge, or hindrance. Prior to a description of

257   results, a brief overview of both the JD-R theory and O*Net is provided.

258   ##The Job demands-Resources Theory

The overarching context for this study is that of the job demands-resources theory, which 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) (Bakker & Demerouti, 2014). Pertinent to the current study, demanding job characteristics are frequently often associated with negative outcomes (e.g., **???**), whereas job characteristics deemed resources have been associated with positive organizational outcomes like engagement and motivation (**???**).

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 identified, 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

285 experienced I/O psychologists over the summer to update the content for the Industrial

286 and Organizational Psychologist listing on O*Net

287 (https://www.onetonline.org/link/summary/19-3032.00). These data, and the tools

288 provided for free on the website (e.g., Career Exploration Tools, "My Next Move for

289 Veterans", "My Next Move", Toolkit for Business) are frequently used by counselors,

290 students, human resources departments, and researchers to assist potential applicants

291 discover the skills and training they need for the job of their choice, and also employers

292 with information with which to craft job descriptions and help employees determine what

293 skills are needed for promotion.

294 **Current Study**

295   Interestingly, we have not yet integrated this practical and accessible resource within

296 the JD-R framework. This paper aims to provide such a crosswalk or integration of the

297 theory and practical occupations-focused data on O*Net. Several broad research questions

298 are examined across jobs: >*Research Question 1*: Which O*Net job characteristics are

299 consistently rated as job resources? >*Research Question 2*: Which O*Net job

300 characteristics are consistently rated as challenge demands? >*Research Question 3*: Which

301 O*Net job characteristics are consistently rated as hinderance demands?

302   The other distinct possibility we expect we may observe is wide variability in the

303 assignment of some job characteristics within the JD-R framework. In fact, a growing body

304 of evidence suggests people may not universally experience job characteristics as challenges

305 or hinderances (e.g., (Bakker & Sanz-Vergel, 2013); [cavanaugh2000empirical]; (Gerich,

306 2017); (Podsakoff et al., 2007); (Webster et al., 2011)). Thus, a fourth question of interest

307 explores just that possibility. Research Question 4: Which O*Net job characteristics show

308 wide variability in assigned JD-R classification of resource, challenge, or hinderance.

Results

Average rating of each category by item and focus on the ones with low SDs.

Discussion

Could be another piece of info onet uses along with descriptions – could list resource
challenge hinderance

Materials

Characteristics, Demands, and Resources.   We used 98 statements taken from
O*NET "activity" and "context" classifications. We retained 41 "work activity"
classifications which O*NET groups into categories of "Information Input" (5 statements),
"Interacting with Others" (17 statements), "Mental Processes" (10 statements) and "Work
Output" (9 statements). 57 "work context" statements grouped into "Interpersonal
Relationships" (14 statements), "Physical Work Conditions" (30 statements), and
"Structural Job Characteristics" (13 statements).

These "desriptors" have response categories see for example. We used the O*NET
wording to capture characteristics of relevance for each respondent. Subsequent to these
self evaluations, each respondent who agreed that the element had *at least some relevance*
to their job was also asked to rate that element 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 hinderance
that can inhibit personal growth, learning, and work goal attainment.

Our intent was to use O*NET

331   **Burnout and Stress.**   Were taken from the Copenhagen Psychosocial

332 Questionnaire (Burr et al., 2019). There were 4 burnout items and 3 stress items.

333   Engagement Demographics

Procedure

335   Qualtrics panel

Data analysis

337   We used R (Version 4.0.3; R Core Team, 2020) and the R-packages *careless* (Version

338 1.1.3; Yentes & Wilhelm, 2021), *labourR* (Version 1.0.0; Kouretsis et al., 2020), *papaja*

339 (Version 0.1.0.9997; Aust & Barth, 2020), and *tinylabels* (Barth, 2021) for all our analyses.

340   **Results**

341   **Discussion**

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Table 1

Scale intercorrelations (outcome variables).

	1	2	3	4	5	6	7	M	SD
1. absorption	-							3.80	0.80
2. vigor	.66***	-						4.10	0.87
3. dedication	.63***	.66***	-					4.23	1.14
4. cognitive	.76***	.78***	.89***	-				3.94	0.86
5. affective	.80***	.83***	.85***	.83***	-			3.96	1.05
6. behavioral	.80***	.77***	.74***	.70***	.75***	-		4.25	0.79
7. burnout	-.22***	-.43***	-.29***	-.37***	-.37***	-.22***	-	3.04	0.87
8. stress	-.14***	-.40***	-.25***	-.30***	-.31***	-.18***	.70***	2.59	0.97

Note. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$