

# AN ANALYSIS OF WORK ENGAGEMENT BASED ON THE JOB DEMAND-RESOURCES (JD-R) MODEL: EMPIRICAL FINDINGS UNDER WORK-FROM-HOME ENVIRONMENTS

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The significance role of work engagement has generated considerable interest within the academic and practitioner communities. This study examined the job demand-resources (JD-R) model under work from home environment during the COVID-19. The author hypothesized that (Hypothesis 1) job resources increase work engagement both directly and indirectly mediated by personal resources in the work-from-home environments, (Hypothesis 2) job demands strengthen exhaustion. Hypotheses were tested among 648 remote workers who utilized on a regular basis compared with total 10,000 workers ages from 15 to 69 years old in Japan, utilizing the data survey conducted by Persol Research and Consulting (2020). The annual survey has been conducted since 2017. Results of a series of structured equation model analysis showed that the most increased observed variable of job resources (i.e., autonomy, social support, supervision coaching, and professional development) was autonomy and job resources increased work engagement (i.e., vigor, dedication, and absorption). Hypothesis 1 was partially supported. Job demands (i.e., workload, emotional demands, emotional dissonance, and organizational changes) strengthened exhaustion (i.e., anxiety, sadness, anger, fatigue, and confusion) under work from home environment compared to office workers. Hypothesis 2 was supported. Implications from theoretical and practical viewpoints for verification of JD-R model, big data of 10,000 samples, data source in Japan, and work from home environment were discussed.

**Key Words :** *work engagement, job demand-resources model, work-from-home, exhaustion, autonomy*

## 1. INTRODUCTION

Work engagement has called significant interests from academic and business communities. For instance, the Ministry of Health, Labor and Welfare of Japan (MHLW) issued the labor economics white paper (2018)<sup>1</sup> that introduced the concept of work engagement to the Japanese readers for the first time. The next white paper (2019)<sup>2</sup> devoted the volume of 82 pages, one-third of the total paper, as the special issue of work engagement. In these two white papers, the MHLW placed the job demand-resources (JD-R) model as the framework for administering work engagement and posited that under labor shortages and high demands of work, it is the key to utilize work resources such as decent work, willingness to work, and work-life balance in full.

Since its first appearance in the literature, the JD-R model (Demerouti et al., 2001) has gained popularity among researchers. The current version of

the model proposes that high job demands lead to strain and health impairment (the health impairment process), and that high resources lead to increased motivation and higher productivity (the motivational process) (Schaufeli et al., 2014)<sup>3</sup>. The practical use of JD-R model in combination with its broad scope and flexibility presumably accounts for the proliferation in both research and practice. Empirical findings on the JD-R model have been accumulated worldwide, yet it is not the case for Japanese employment settings. Thus far, scholars in Japan have not made enough effort to investigate the validity of the theory in the national and regional work environments.

Despite that practitioners all over the world have given positive aspiration to work engagement, this enthusiasm was interrupted by the COVID-19 pandemic. It forced the practice of work-from-home (WFH) to reduce the risk of infection among employees. According to the Japan Institute for

Labour Policy and Training (JILPT) panel survey regarding the impact of COVID-19 on work and daily life (3<sup>rd</sup> wave, 2020)<sup>4</sup>), 29.0% of workers in Japan have experienced WFH, of which 60.9% continue it as of February, 2020. Looking at the starting period of WFH, 19.0% of WFH workers experienced this practice before pandemic, prior to the declaration of emergency state in April, 2020. While, 72.0% experienced it for the first time during the first state of emergency, indicating that many employees started WFH unwillingly by the spread of infection.

The present study tries to examine the JD-R model under WFH environment during the COVID-19. Specifically, the objective of this study is to examine the validity of job demand-resources (JD-R) model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001) by the data of employees working in the new style away from office in the period of COVID-19 pandemic.

The next two sections of this paper provide a literature review and hypotheses development, while the fourth section justifies the methodology employed and test the hypotheses. We present results in the fifth section, while the last three sections discuss implications of the study, limitation, and conclusion.

## 2. LITERATURE REVIEW

### (1) Work engagement

The term ‘engagement’ is characterized by energy, involvement, and efficacy which are considered the direct opposites of the three burnout dimensions, i.e., exhaustion, cynicism, and lack of professional efficacy (Maslach et al., 1997)<sup>5</sup>). By the influence of positive psychology that focuses on human strengths and optimal functioning rather than weaknesses and malfunctioning (Seligman & Csikszentmihalyi, 2000)<sup>6</sup>), the concept of work engagement has emerged from the research in burnout, a field of traditional negative psychology. It is to cover the entire spectrum running from employee ill-being (burnout) to employee well-being (Maslach et al., 2001)<sup>7</sup>).

According to Schaufeli et al. (2002)<sup>8</sup>), work engagement is defined as ‘a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption (p.74).’ Vigor is characterized by high levels of energy and mental resilience while working, the willingness to invest effort in one’s work, and persistence even in the face of difficulties. Dedication indicates a sense of significance, enthusiasm, inspiration, pride, and challenge. Absorption is portrayed by being fully concentrated and deeply engrossed in one’s work, whereby time passes quickly, and one has difficulties

with detaching oneself from work (p.74-75). The concept of engagement has been contrasted to burnout in academic and practical sense. Burnout refers to a state of exhaustion and cynicism toward work, while engagement is defined as a positive motivational state of vigor, dedication, and absorption (Bakker et al., 2014)<sup>9</sup>). Engaged employees are enthusiastically involved in their work and show high levels of energy (Bakker et al., 2008)<sup>10</sup>).

Measuring work engagement, Schaufeli et al. (2003)<sup>11</sup>) developed the Utrecht Work Engagement Scale (UWES). UWES includes three subscales representing vigor, dedication, and absorption by a total of 17 items. The shortened version (UWES-9, Schaufeli et al., 2006)<sup>12</sup>) and international versions (Japanese version, Shimazu et al., 2008, Dutch version, 2003, English version, 2003, German version, 2003, French version, 2003, Norwegian version, 2003, Swedish version, 2003, Finnish version, 2003, Spanish version, 2003, Greek version, 2003, Russian version, 2003, Portuguese student version, 2003, Chinese version, 2003) have been developed. UWES became one of the most popular scales for measuring work engagement internationally.

As the UWES has been widely spread, the pros and cons has been argued among the scholars. Questions have arisen over the factorial validity of the scale; some studies suggest that a three-factor model is superior to a single-factor, unidimensional model (e.g., Bakker et al., 2008<sup>13</sup>); Schaufeli et al., 2006)<sup>14</sup>), and others criticize that the three-factor structure is ambiguous (e.g., Sonnentag, 2003)<sup>15</sup>), or that the models are equivalent (Hallberg et al., 2006)<sup>16</sup>). The field is clearly divided over the meaning of engagement and how best to measure it. Nevertheless, Schaufeli et al.’s (2002)<sup>17</sup>) perspective appears to be the most popular and well researched (Hakanan et al., 2010)<sup>18</sup>), and to underlie engagement interventions to date.

Studies of work engagement have reported its positive effects on diverse outcomes in work settings: job satisfaction (Hoppock, 1935)<sup>19</sup>), organizational commitment (Meyer et al., 1991)<sup>20</sup>), organizational citizenship behavior (OCB: Organ, 1988)<sup>21</sup>), job performance (Austin et al., 1992<sup>22</sup>); Campbell 1990<sup>23</sup>); Murphy et al., 1995<sup>24</sup>); Schmidt et al., 1992<sup>25</sup>), employee health (Beehr et al., 1978<sup>26</sup>); Frese 1985<sup>27</sup>); Ivancevich, 1986<sup>28</sup>); Ivancevich et al., 1980<sup>29</sup>); Warr, 1987<sup>30</sup>); Weitz, 1970<sup>31</sup>), and well-being (Diener, 1984<sup>32</sup>). Among others, work engagement functions as positive actions and opposites to burnout, thus, leading to productive behaviors.

## **(2) Job demand-resources (JD-R) model**

The present study employs the JD-R model as a theoretical framework. Karasek (1979)<sup>33)</sup> originally developed the job demand-control model that can explain the relationship between working conditions and mental ill-being (i.e., stress and psychological strain). This model postulates that both demanding jobs and individual decisions interactively bring about mental strain. It means that no matter how strong the mental stress, it is a product of pressure from job and the decisions individual workers made in the process. The major implication of this interactive relationship is that allowing wide range of worker discretion can reduce mental strain without affecting job demands and organizational performance.

Demerouti et al. (2001)<sup>34)</sup> expanded Karasek's (1979)<sup>33)</sup> job demand-control model and the demand-control-support model (Johnson & Hall, 1988)<sup>35)</sup> to scrutinize more complex relationship between work-related stress and burnout. According to Demerouti et al. (2001)<sup>34)</sup>, job demands bear physical and mental exhaustion when available resources on the job are scarce. Both job demands and limited job resources lead to disengagement and turnover interactively, contributing to diminished job performance.

Looking at the personal resources belonging to individuals, e.g., self-efficacy (Bandura, 1977)<sup>36)</sup>, self-esteem (Haltiwanger, 1989<sup>37)</sup>; Harter, 1982<sup>38)</sup>), and optimism (Scheier & Carver, 1985<sup>39)</sup>; 1993<sup>40)</sup>), Xanthopoulou et al. (2007)<sup>41)</sup> proposed that personal resources, together with job demands and job resources, can not only decrease physical and mental exhaustion but increase work engagement effectively.

Further development shifted our sights to the positive side of worker attitudes. The early JD-R model (Demerouti et al., 2001)<sup>42)</sup> considered only demands and resources in job side to explain employee burnout. Bakker and Demerouti (2008)<sup>13)</sup> have expanded a theoretical scope to work engagement to look at the positive organizational behavior like work engagement and job performance. Taking job demands and resources into consideration as the condition of successful job performance, together with personal resources available to individual workers, the model suggests that the combination of work conditions and employee factors affect the level of work engagement and performance at work.

Consequently, the JD-R theory has been a leading theory that can summarize the precedents of mental ill-being as well as positive behavior in work settings comprehensively (Lesener, Gusy & Wolter, 2019<sup>43)</sup>; Schaufeli & Taris, 2014)<sup>44)</sup>.

Job demands in this model includes any kind of

physical, psychological, social, and organizational demands required for completing the job, e.g., work pressure, mental and emotional demands, and physical strains. While job resources refer to any kind of physical, psychological, social, or organizational assets and supports available to employees, such as autonomy, performance feedback, social support, supervisory coaching, etc. In addition, employee skills and abilities usable for controlling and giving impacts on working environment have been introduced in the model as personal resources. Such personal attributes like optimism, self-efficacy, self-esteem, and resilience (Holling, 1973)<sup>45)</sup> are classified in this category.

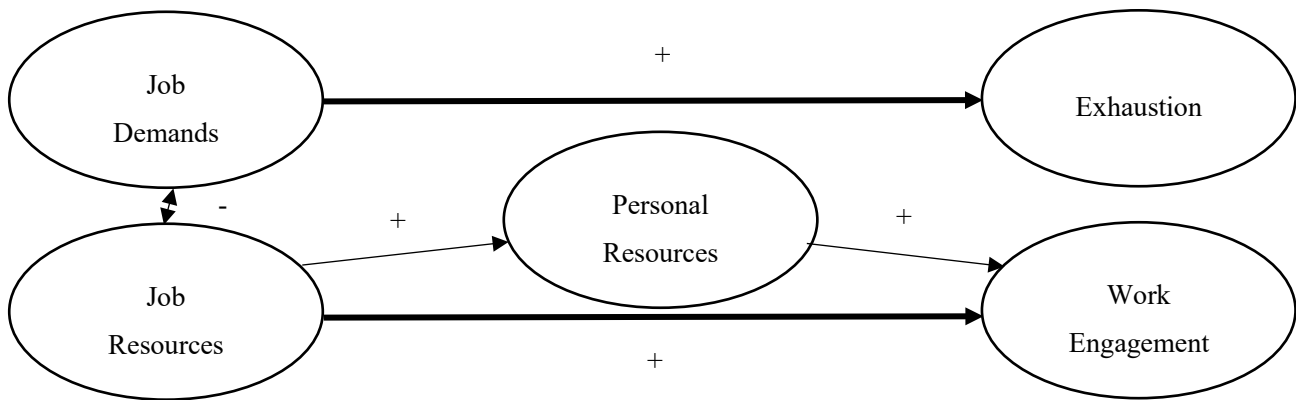
Bakker et al. (2008)<sup>13)</sup> diagrammatically depicted the well-known model of work engagement. Two groups of resources, i.e., job resources and personal resources, work together to determine the level of work engagement, moderated by the level of job demand. In other words, job and personal resources have positive impacts on being engaged only when job demands are high. Facing easy tasks with low job demands, no extra-resources in job and personal sides are needed, then employees experience no engagement in work.

The model also hypothesizes that two groups of resources exert influence on job performance by a mediation of work engagement. It means that resources are generally a precondition of successful performance such that engaged employees who have sufficient resources can achieve high performance, while resources are used in vain when employees are disengaged. Finally, the model postulated a loop to be fed back to resources. Employees who are engaged and performing well can create their own resources, which foster engagement over time and create a positive spiral.

## **(3) Work-from-home**

The dictionary of human resources management (Oxford University Press, Heery & Noon, 2017)<sup>46)</sup> defines working-from-home (WFH) as a style where employees do not commute to an office but do their job from home. It's a form of flexible working that enables employees to perform their regular work tasks from home, using information and telecommunication technology that allows instant communication anywhere at any time.

The Productivity Commission of Australian Government (2021) published a public report regarding WFH<sup>47)</sup>. According to the paper, most workers want to WFH, at least some of the time, avoiding commuting time and efforts. Corporate preferences to WHF over office work are largely dependent on the balance between productivity and costs of WFH.



**Fig. 1** Analytical model based on Xanthopoulou et al. (2007)<sup>41)</sup> with the hypotheses.

Nonetheless, the COVID-19 pandemic forced many workers and companies to experiment with WFH. Pros and cons of WFH were recognized by both workers and organizations.

Considering the Conservation of Resources (COR) theory (Hobfoll, 1989<sup>48)</sup>, 2002<sup>49)</sup>, Pulido-Martos et al. (2021)<sup>50)</sup> found that changing of working conditions from face-to-face to full or hybrid telework relocated the roles of job resources, such as peer support, and personal resources, such as vigor at work, to be fit to the pandemic situations.

WFH creates a new stress related to the digital and remote environment, which makes it difficult to be relaxed at home in non-working hours. The perceived mingling of work and home domains can result in unfavorable emotional responses, which in turn deplete available resources (Beal et al., 2005)<sup>51)</sup>.

### 3. HYPOTHESES

This study focuses on work engagement in the WFH environment with reference to the JD-R model. Based on the previous theoretical analyses, we hypothesized:

Hypothesis 1: Job resources increase work engagement both directly and indirectly mediated by personal resources in the WFH environment.

Hypothesis 2: Job demands strengthen exhaustion in the WFH environment.

**Fig.1** shows the analytical model drawn from Xanthopoulou et al. (2007)<sup>41)</sup>. Two hypotheses were shown in the bold lines. In this model, the job demands and job resources were antecedent factors of work engagement and exhaustion. The personal resources were set as a mediator functioning in between job resources and work engagement.

## 4. METHOD

### (1) Data collection

This study utilized data surveyed by Persol Research and Consulting (2020)<sup>52)</sup>. This consulting firm has conducted the fixed-point annual survey of 10,000 workers since 2017. The data were collected in February 2020 from 10,000 Japanese workers ranging 15 to 69 years of age. It includes 648 workers who are working remotely on a regular basis. The survey participants represent the national population in terms of sex and ages.

The survey covers such topics as skill development, working styles, employee mindsets, and working conditions. Specifically, questions asked in the questionnaire include basic attribute, current job, organizational culture, nature of job, work engagement, career change experience, capability, values, skill development, learning environment, job stress, anxiety for nursing care, and so forth. The data was archived by the Institute of Social Science, University of Tokyo. The authors borrowed it for a research purpose.

### (2) Measures

This study employed the framework of JD-R model developed by Xanthopoulou et al. (2007)<sup>41)</sup>. The previous study specified the JD-R model with three groups of predictors: 1) job demands (i.e., workload, emotional demands, emotional dissonance, and organizational changes), 2) personal resources (i.e., organizational-based self-esteem, optimism, self-efficacy), and 3) job resources (i.e., autonomy, social support, supervision coaching, and professional development). The model identified two groups of outcomes: 1) exhaustion (i.e., anxiety, sadness, anger, fatigue, and confusion), and 2) work engagement (i.e., vigor, dedication, and absorption). This study tries to investigate the relationships between predictors and outcomes by structural equation modeling (SEM) analyses.

**Table 1** Mean values, standard deviations, and correlations for each variable (N = 10,000)

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1 Workload	1.86	.834	-							
2 Emotional demands	2.39	.695	.042**	-						
3 Emotional dissonance	2.02	.878	.005	.608**	-					
4 Organizational changes	3.09	.719	.158**	-.108**	-.219**	-				
5 Autonomy	3.14	.817	.074**	-.507**	-.455**	.287**	-			
6 Social support	3.10	.686	.050**	-.496**	-.513**	.406**	.510**	-		
7 Supervisory coaching	2.96	.895	-.003	-.555**	-.458**	.231**	.685**	.581**	-	
8 Professional development	3.34	1.01	.166**	-.217**	-.282**	.347**	.437**	.387**	.256**	-
9 OBSE	3.13	.925	.011	-.522**	-.405**	.217**	.727**	.521**	.848**	.282**
10 Optimism	3.31	.818	-.063**	-.500**	-.394*	.132**	.532**	.454**	.559**	.268**
11 Self efficacy	3.42	.765	.045*	-.319**	-.262**	.261**	.516**	.369**	.362**	.370**
12 Anxiety	2.54	1.05	.150**	.109**	-.018**	.199**	-.038**	.045**	-.024*	.093**
13 Sadness	2.13	.999	.127**	.141**	.010**	.150**	-.132**	-.029**	-.107**	-.013
14 Anger	2.24	.973	.184**	.126**	.037**	.162**	-.066**	-.055**	-.124**	.015
15 Fatigue	2.66	1.08	.155**	.188**	.076**	.167**	-.110**	-.035**	-.115**	.028**
16 Confusion	2.31	.958	.127**	.025**	-.075**	.204**	-.008	.077**	.027**	.056**
17 Vigor	2.99	1.05	-.051**	-.437**	-.381**	.144**	.450**	.394**	.429**	.304**
18 Dedication	3.30	1.02	-.006	-.321	-.284**	.155**	.425**	.329**	.351**	.328**
19 Absorption	3.20	1.04	.010	-.343	-.320**	.194**	.430**	.347**	.355**	.331**

	9	10	11	12	13	14	15	16	17	18
1 Workload										
2 Emotional demands										
3 Emotional dissonance										
4 Organizational changes										
5 Autonomy										
6 Social support										
7 Supervisory coaching										
8 Professional development										
9 OBSE	-									
10 Optimism	.577**	-								
11 Self efficacy	.454**	.550**	-							
12 Anxiety	-.078**	-.152**	-.082**	-						
13 Sadness	-.187**	-.275**	-.204**	.718**	-					
14 Anger	-.144**	-.230**	-.079**	.576**	.663**	-				
15 Fatigue	-.145**	-.223**	-.091**	.632**	.625**	.581**	-			
16 Confusion	-.038**	-.111**	-.116**	.653**	.663**	.532**	.643**	-		
17 Vigor	.403**	.473**	.485**	-.071**	-.150**	-.117**	-.204**	-.049**	-	
18 Dedication	.371**	.461**	.587**	-.061**	-.180**	-.113**	-.150**	-.085**	.669**	-
19 Absorption	.362**	.427**	.529**	-.019	-.126**	-.082**	-.126**	.025*	.701**	.715**

Note. OBSE=Organizational-Based Self-Esteem. Range of scale is in parentheses. Cronbach's alphas are on diagonal. \*\*p < .01, \*p < .05.

**Table 2** Results of SEM

Model	$\chi^2$	df	P	GFI	AGFI	CFI	RMSEA
Model 1: Xanthopoulou et al. (2007) model Workers (N = 10,000)	16,350.8	146	.000	.834	.784	.847	.105
Model 2: Workers (N = 10,000)	6,861.7	84	.000	.911	.873	.926	.090
Model 3: Remote workers (N = 648)	598.6	84	.000	.883	.833	.922	.097

Note. EFA=exploratory factor analysis; GFI=goodness-of fit index; AGFI=adjusted goodness-of fit index; CFI=comparative fit index; RMSEA=root means square error of approximation.

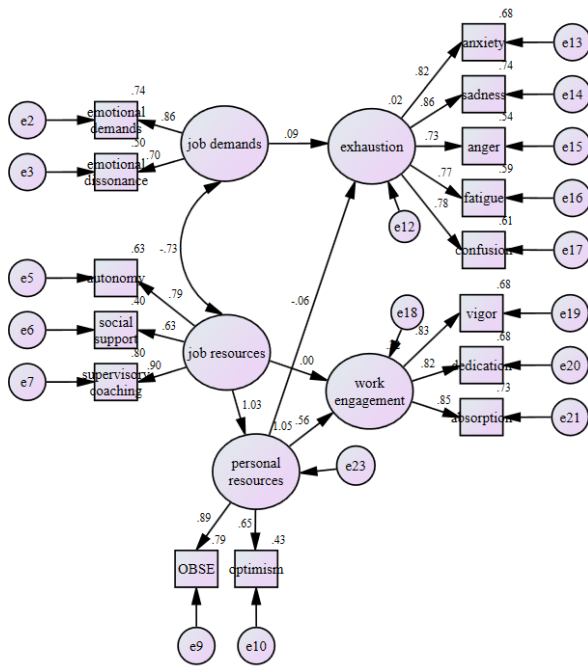


Fig.2 the expanded JD-R model, N=10,000 workers.

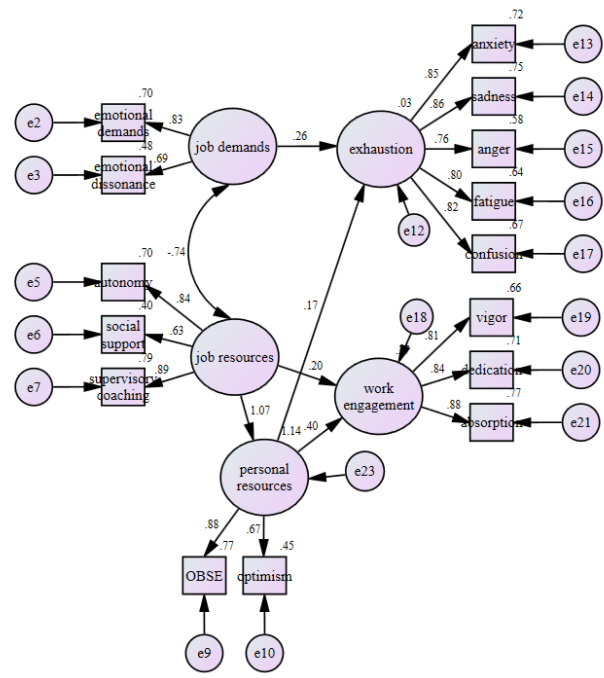


Fig.3 the expanded JD-R model, N=648 remote workers.

## 5. RESULTS

### (1) Descriptive statistics

Means, standard deviations, and correlations between variables, as well as the internal consistencies of the scales are presented in **Table 1**.

### (2) Results of SEM analyses

Results of SEM analysis regarding Xanthopoulou et al.' (2007)<sup>41</sup>) model (Model 1, N = 10,000) with 19 variables showed that the model did not fit well to the data ( $\chi^2 = 16,350.8$ ,  $df = 146$ ,  $GFI = .834$ ,  $AGFI = .784$ ,  $CFI = .847$ ,  $RMSEA = .105$ ), as presented in the **Table 2**. By an exploratory factor analysis, 15 out of 19 variables were screened in the second model. This Model 2 (N = 10,000, **Fig.2**) fit well to the data of office workers ( $\chi^2 = 6,861.7$ ,  $df = 84$ ,  $GFI = .911$ ,  $AGFI = .873$ ,  $CFI = .926$ ,  $RMSEA = .090$ ). For remote workers, Model 3 (N = 648, **Fig.3**) also fit well ( $\chi^2 = 598.6$ ,  $df = 84$ ,  $GFI = .883$ ,  $AGFI = .833$ ,  $CFI = .922$ ,  $RMSEA = .097$ ).

Comparing the Models 2 and 3, results found that among job resources (i.e., autonomy, social support, supervision coaching, and professional development), autonomy was the most important observed variable and that job resources strengthened work engagement (i.e., vigor, dedication, and absorption) directly. The latent variable of job resources to work engagement increased from .00 to .20 standardized estimates. This is mainly caused by increase of autonomy observed variable from .63 to .70 standardized estimates. On the other hand, indirect effect from job resources through personal

resources to work engagement decreased from 1.59 to 1.47 standardized estimates. This is largely due to small changes of OBSE and optimism. Therefore, Hypothesis 1 was partially supported. Similarly, job demands (i.e., workload, emotional demands, emotional dissonance, and organizational changes) strengthened exhaustion (i.e., anxiety, sadness, anger, fatigue, and tangle). The latent variable of job demands to exhaustion gained from .09 to .26 standardized estimates under WFH environment as compared to office workers. This is presented by decreasing of emotional demands from 8.6 to 8.3 standardized estimates. Hypothesis 2 was supported.

## 6. DISCUSSION

### (1) Theoretical implications

The theoretical implications of this study were threefold. First, the JD-R model presented and tested by Xanthopoulou et al. (2007)<sup>41</sup>) was verified again through empirical findings of this study. Results of Model 2 showed that factors were all related in the same directions as the original model.

Second, the JD-R model was tested with the large data of 10,000 workers in Japan. The composition of sex and ages were followed by the national census, indicating that the data represented the reality of labor force in Japan.

Lastly, this study focused on the comparison between working-from-home workers and all types of workers. For both groups of workers, Hypothesis 1 was partially supported and Hypothesis 2 was supported under WFH environment. Therefore, this

study made a significant contribution to the theoretical development of JD-R model with expansion.

## (2) Practical implications

The practical significance of this study is that reducing job demands is the key to manage people under WFH environment. Although adequate job demands have a positive effect on work engagement, exceeded job demands strengthen exhaustion. Therefore, managers need to pay more attention to job quantity and quality as well as the level of exhaustion, particularly at the period of pandemic. HR staffs need to develop people management skills in order to take care of all employees working in office and working remotely.

Furthermore, fulfilling job resources is an important factor for performing jobs properly in WFH environment. Remote working is an irreversible trend of work styles since COVID-19. Providing autonomy and delegation is an ideal direction for maintaining individual performance in remote work settings. Teamwork and social support from coworkers are the sources of assistance for remote workers. Supervisory coaching helps employees achieve successful performance independently. All those practices function as resources that individual workers can make use of in either working in office or at home.

## 7. LIMITATIONS AND FUTURE RESEARCH

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This study has certain limitations that need to be acknowledged. First, because this study used a survey data secondly, measures did not match variables of Xanthopoulou et al.' (2007)<sup>41)</sup> model exactly. Consequently, the Model 1 did not find a good fit. Modification to Models 2 and 3 by exploratory factor analyses were required to fit well to the data. Such modification may damage the validity and usefulness of the original theory.

Secondly, although this study compared between WFH workers and workers, data did not cover full period of COVID-19 pandemic. Data was collected in February 2020 when COVID-19 had just outspread. Consequently, respondents who experienced WFH were only 648 out of 10,000 workers. Potential remote works may not be allowed to WFH owing to insufficient network and digital environment, and to inadequate home office. The next survey administered in 2021 may provide more realistic information regarding the effects of pandemic.

## 8. CONCLUSION

This study focused attention on the mechanism how to increase work engagement based on the JD-R model by comparing WFH and traditional work settings. In conclusion, this study made an important contribution to the theory of job demand and resources under the influence of pandemic.

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