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The effects of job demands, job resources, and personal resources on the psychological well-being of middle-aged workers in the United States: assessing latent profile differences

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Abstract
The purpose of this study is to better understand the psychological well-being of aged workers in the job demands-resources model. We conducted a latent profile analysis on job demands, job resources, and personal resources using responses of 1018 middle-aged adults from the National Survey of Midlife Development in the United States (MIDUS 3) dataset. Results suggested four latent profiles. Differences in the research variables between the profiles were examined using analysis of variance. Multiple regression analyses were conducted to compare the effects of the antecedents on well-being between the latent profiles. Implications for both HRD researchers and professionals are discussed.

Keywords Job demands · Job resources · Personal resources

Résumé
Les effets des demandes du travail, des ressources du travail, et des ressources personnelles sur le bien-être psychologique de travailleurs d'âge moyen aux Etats-Unis : Evaluation des différences de profils latents Le but de cette étude est de mieux comprendre le bien-être psychologique de travailleurs âgés dans le modèle demande-ressource du travail. Nous avons construit une analyse de profil latent sur les demandes du travail, les ressources du travail, et les ressources personnelles en utilisant les réponses de 1,018 adultes d'âge moyen à partir des données du *National Survey of Midlife Development* (« sondage national du développement de milieu de vie ») aux Etats-Unis (MIDUS 3). Les résultats suggèrent quatre profils latents. Les

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différences de variables de recherche entre les profils ont été examinées en utilisant une analyse de variance. Des régressions multiples ont été conduites pour comparer les effets des antécédents sur le bien-être entre les profils latents. Des implications pour les chercheurs en DRH et les professionnels sont discutées.

Zusammenfassung

Die Auswirkungen von Arbeitsanforderungen, Arbeitsressourcen und persönlichen Ressourcen auf das psychologische Wohlbefinden von Arbeitnehmenden mittleren Alters in den USA: Bewertung latenter Profilunterschiede Der Zweck dieser Studie ist es, das psychologische Wohlbefinden älterer Arbeitnehmenden im Arbeitstätigkeit-Anforderungen-Ressourcen-Modell besser zu verstehen. Wir führten eine latente Profilanalyse zu Arbeitsplatzanforderungen, Arbeitsressourcen und persönlichen Ressourcen durch, wobei wir die Antworten von 1.018 Erwachsenen mittleren Alters aus dem Datensatz der National Survey of Midlife Development in the United States (MIDUS 3) verwendeten. Die Ergebnisse legten vier latente Profile nahe. Unterschiede zwischen den Profilen in Hinblick auf die Forschungsvariablen wurden mittels Varianzanalyse untersucht. Multiple Regressionsanalysen wurden durchgeführt, um die Auswirkungen verschiedener Einflussfaktoren auf das Wohlbefinden zwischen den latenten Profilen zu vergleichen. Mögliche Schlussfolgerungen für HRD-Forschende und Praktizierende werden diskutiert.

Resumen

Los efectos de las demandas laborales, los recursos laborales y los recursos personales en el bienestar psicológico de los trabajadores de mediana edad en los Estados Unidos: Evaluación de las diferencias de perfil latentes El propósito de este estudio es comprender mejor el bienestar psicológico de los trabajadores de edad madura dentro del modelo laboral de demandas y recursos. Se llevó a cabo un análisis de perfil latente sobre las demandas laborales, los recursos laborales y los recursos personales, utilizando las respuestas de 1.018 adultos de mediana edad procedentes del conjunto de datos de la Encuesta Nacional sobre el Desarrollo de la Mediana Edad en los Estados Unidos (*Midlife Development in the United States - MIDUS 3*). Los resultados sugirieron la presencia de cuatro perfiles latentes. Las diferencias existentes en las variables de investigación entre los perfiles se examinaron mediante análisis de varianza. Se realizaron análisis de regresión múltiple para comparar los efectos de los antecedentes sobre el bienestar entre los perfiles latentes. Se discuten las implicaciones para los investigadores y profesionales del Departamento de Recursos Humanos (*HRD*).

Introduction

Many variable-centered empirical studies based on the job demands-resources model (JD-R; Bakker & Demerouti, 2007) have focused on the importance of establishing a better work environment for improved employee performance and well-being. The variable-centered approach has provided a number of important insights,

but there are also some fundamental limitations (see Keller et al., 2017). For example, variable-centered studies focus on the relationships between variables (e.g., correlations and predictions), and thus explanations and interpretations of unexpected results may be limited. According to Lee (2019), the effects of the components of decision latitudes (skill discretion and decision authority) are sometimes contradictorily, indicating that skill discretion has a positive effect on psychological well-being while decision authority does not. Although job resources such as decision authority are expected to contribute to improved employee psychological well-being, variable-centered studies based on the JD-R model have highlighted the difficulty of interpreting such results in a different way from the results of previous studies. However, there may be an alternative explanation for the cause of the problem since the person-centered approach assumes that a sample includes subpopulations of people with homogeneous characteristics. For example, there may be a better interpretation using latent profile analysis (LPA) if two groups that have similar levels of skill discretion but different levels of decision authority are identified in the sample.

Even though many previous studies have shown that the effect of skill discretion on psychological well-being is positively significant, scholars and practitioners cannot guarantee that all employees will experience this positive impact in the same way. For example, the effects of skill discretion on the psychological well-being of employees with high personal resources such as self-esteem and those without may be very similar or not at all. This limitation has been at least partially resolved by researchers who have considered the effects of various moderators. However, most variable-centered studies have tended to concentrate on one or two specific moderators (see Keller et al., 2017). Given that there may be interactions within job resources variables or interactions between job resources and personal resources (see Bakker & Demerouti, 2017; Lee & Eissenstat, 2018), the results of Lee's (2019) study may only be accepted in very limited conditions such as when job resources and personal resources do not interact but interact with chronic job discrimination. Most researchers who have focused on moderator(s) do not deny that there may be other potential interactions in their studies. However, because it is practically very complicated to create hypotheses about three or more interactions and interpret the results of these interactions, such limited studies are generally accepted. It is also difficult to conduct a complex interaction study because it requires a large sample in order to model the interactions and estimate them properly. However, this problem can be solved using a different, person-centered approach.

One of the representative methods of the person-centered approach, LPA aims to identify the subpopulations in a sample based on observed scores (Howard & Hoffman, 2017). Applying LPA to this study, we can identify several subpopulations characterized by different levels of job demands, job resources, and personal resources. The research model of this study was developed based on the JD-R model, but it also relied on Karasek's (1979) job demands-control (JDC) model and the job characteristics theory in selecting research variables and comparing our findings and results to previous studies. This study focuses specifically on aged workers, recognizing that the American workforce is growing older and a better understanding of this population is needed. Indeed, despite ample evidence that job demands negatively affect psychological well-being and that job resources and personal

resources positively affect psychological well-being, few studies have described the psychological well-being of aged workers using the JD-R model. In this regard, the purpose of this study is to identify aged workers' work environment profiles based on the JD-R model and to examine how these profiles are associated with the workers' psychological well-being. In doing so, this study contributes to a better understanding of aged workers' perceived psychological well-being and the JD-R model.

Job demands and resources model

According to the JD-R model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), job demands, job resources, and personal resources are all work environment variables. Job demands are defined as "those physical, social, or organizational aspects of the job that require sustained physical and/or psychological effort on the part of the employee, and are therefore associated with certain physiological and/or psychological costs" (Demerouti et al., 2001, p. 501). Job resources are defined as "those physical, psychological, social, or organizational aspects of the job that may (a) reduce job demands and the associated physiological and psychological costs, (b) are functional in achieving work goals, and (c) stimulate personal growth, learning and development" (Demerouti et al., 2001, p. 501). Finally, personal resources are defined as "aspects of the self that are generally linked to resiliency" (Hobfoll, Johnson, Ennis, & Jackson, 2003, p. 632). This study divided job characteristics (see Bosma et al., 1997; Karasek & Theorell, 1990; Karasek, Baker, Marxer, Ahlbom, & Theorell, 1981; Schwartz, Pieper, & Karasek, 1988) into job demands and job resources. Specifically, demands were considered to be job demands, and skill discretion, decision authority, co-worker support, and supervisor support were taken to be job resources. Skill discretion refers to "whether [a person] can use judgment and assert control over his use of skill within the process itself" (Karasek et al., 1981, p. 697). Decision authority refers to "the working individual's potential control over job-related decision making" (Karasek, et al., 1981, p. 697). Co-worker support and supervisor support are operationally defined as awareness of help and support from one's co-workers and supervisor, respectively.

Personal resources in the JD-R model include self-esteem, optimism, and active coping (see Lee, 2019; Weigl et al., 2010; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). Optimism is defined as "an individual's positive psychological state of development characterized by… making a positive attribution about succeeding now and in the future" (Luthans, Youssef, & Avolio, 2007, p. 3). Xanthopoulou et al. (2007) suggested including organizational-based self-esteem in the JD-R model, but according to Hobfoll (2002), self-esteem is a personal resource based on the conservation of resources theory since it is one of the most powerful personal resources associated with psychological well-being (Lee, 2019). Self-esteem is defined as "the degree to which organizational members believe that they can satisfy their needs by participating in roles within the context of an organization" (Pierce, Gardner, Cummings, & Dunham, 1989, p. 625). Active coping is defined as "problem-oriented and persistent behavior to overcome or constructively deal with the causes of personally distressing or dissatisfying circumstances" (Weigl

et al., 2010, p. 143). Rijk, Blanc, Schaufeli, and Jonge (1998) argued that active coping should be included in the JD-C model, and that coping is related to the subjective well-being (Carmel, Raveis, O' Rourke, & Tovel, 2017) and psychological well-being of aged adults (Lee, 2019).

Several previous studies have indirectly suggested that the JD-R model should be elaborated on with a focus on aged workers by showing that aged workers have a different pattern than young workers. For example, in Liebermann, Wegge, and Müller's (2013) study, the expected retention of young workers (under 50) was affected by either job demands or job resources depending on their employment status, while older workers (over 50) considered both of these resources as well as health. In addition, older workers used more active coping strategies than younger workers (Hertel, Rauschenbach, Thielgen, & Krumm, 2015) and were less affected by strain than younger workers (e.g., Ng & Feldman, 2010). Using the data of 3617 individuals aged 25 years to 104 years, Orth et al. (2010) showed that self-esteem followed a quadratic curve that increased with age and then decreased after age 60. These findings suggest that the JD-R model needs to be enhanced by including age.

Psychological well-being

There are two traditions in the study of well-being: the hedonic perspective and the eudaimonic perspective (Ryan & Deci, 2000). Psychologists who take the hedonic perspective define well-being as physical and psychological pleasures (Kubovy, 1999) or displeasure (pain) (Kahneman, Diener, & Schwarz, 1999). Most studies adopting the hedonic perspective have measured subjective well-being (SWB), using the variables of satisfaction with life, the presence of positive emotions, and the absence of negative emotions, as well as measured happiness, which is a combination of these three variables (Kahneman et al., 1999; Ryan & Deci, 2000). Yet psychologists who adhere to the eudaimonic perspective consider well-being to be a concept distinct from happiness (Ryan & Deci, 2000). For example, Ryff and Keyes (1995) defined psychological well-being as a multidimensional concept distinct from SWB. This study adopts the eudaimonic perspective, drawing especially on Ryff's (1989) six dimensions of psychological well-being. These dimensions have been found to be suitable for measuring the psychological well-being of all adults, including middle-aged and older adults (Ryff, 1991). The six dimensions include autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance (see Ryff, 1989).

Antecedents of psychological well-being

Many empirical studies have shown that job demands, job resources, and personal resources influence psychological well-being (Tims, Bakker, & Derks, 2013). Job demands have a negative effect on psychological well-being (Bakker & Demerouti, 2007; Jonge et al., 2001; Karasek, 1979; Pisanti, Van der Doef, Maes, Lazzari, & Bertini, 2011). Job resources have a positive effect on psychological well-being (Bakker & Demerouti, 2007; Tims et al., 2013). More specifically, skill discretion,

decision authority, coworker support, and supervisor support have been found to enhance psychological well-being (Jonge et al., 2001; Kong, Zhao, & You, 2013; Pelfrene et al., 2002; Pisanti et al., 2011). Self-esteem (Kong et al., 2013), optimism (Avey, Luthans, Smith, & Palmer, 2010), and active coping (Carmel et al., 2017; Welbourne, Eggerth, Hartley, Andrew, & Sanchez, 2007) have been shown to have a positive effect on psychological well-being.

However, studies that consider several variables have not yielded consistent results. For example, Pisanti et al.'s (2011) study showed mixed results: The effects of decision authority, supervisor support, and co-worker support on well-being were significant, but not all variables were significant for all sub-dimensions of well-being. This inconsistency does not mean that job demands, job resources, and personal resources are not related to psychological well-being, however. In a variable-centered study, it is possible that there are differences in the relative influence of each independent variable. This study assumes that each individual has different levels of job demands, job resources, and personal resources. Thus, we hypothesized that aged workers can be categorized into more than two distinct subgroups based on their job demands, job resources, and personal resources levels. We expected identified latent profiles to differ in job demands, job resources, and personal resources, and that the effects of job demands, job resources, and personal resources on psychological well-being would be different for each profile.

Method

Sample

This study utilized phone interview and self-administered survey data from the National Survey of Midlife Development in the United States (MIDUS 3) collected from 2013–2014. The population of the MIDUS 3 study is English-speaking middle-aged adults (adults over 40 years old) in the United States (see http://midus.wisc.edu). The MIDUS 3 dataset (see ICPSR 36346; https://www.icpsr.umich.edu/icpsrweb/NACDA/studies/36346) consists of 3,294 middle-aged adults. This study excluded those who are not currently working, leaving 1,384 respondents' data available for use. It also excluded those who had only participated in the phone interviews, causing the sample size to decrease to 1018. The demographics of the respondents are presented in Table 2.

Measures

Job demands, job resources, and personal resources

Job demands and resources were measured with five job characteristic scales: skill discretion, decision authority, co-worker support, supervisor support, and demands (see Bosma et al., 1997; Karasek & Theorell, 1990; Karasek et al., 1981; Schwartz et al., 1988). Skill discretion was measured using three items, one of which was:

"How often do you learn new things at work?" Decision authority was measured using six items, one of which was: "How often do you have a choice in deciding what tasks you do at work?" Co-worker support was measured using two items, one of which was: "How often are your coworkers willing to listen to your work-related problems?" Supervisor support was measured using three items, one of which was: "How often do you get the information you need from your supervisor or superiors?" Lastly, demands was measured with five items, one of which was: "How often do you have to work very intensively?" All of the items were measured using a 5-point Likert scale ranging from (1) never to (5) all of the time.

Personal resources were measured with three scales: self-esteem (Rosenberg, 1965), optimism (Scheier & Carver, 1985), and active coping (Carver, Scheier, & Weintraub, 1989). Self-esteem had seven items, including "I take a positive attitude toward myself," and was measured using a 7-point Likert scale ranging from (1) strongly disagree to (7) strongly agree. Optimism had three items, including "I expect more good things to happen to me than bad," and was measured using a 5-point Likert scale ranging from (1) disagree a lot to (5) agree a lot. Active coping had four items, including "I concentrate my efforts on doing something about it," and was measured using a 4-point Likert scale ranging from (1) not at all to (4) a lot.

Psychological well-being

Psychological well-being was measured with Ryff's (1989) scale. The scale consists of six variables: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. Each variable was measured using a 7-point Likert scale ranging from (1) strongly disagree to (7) strongly agree. A sample item for autonomy is: "I judge myself by what I think is important, not by the values of what others think is important." A sample item for environmental mastery is: "I am quite good at managing the many responsibilities of my daily life." A sample item of personal growth is: "I have the sense that I have developed a lot as a person over time." A sample item of positive relations with others is: "Most people see me as loving and affectionate." A sample item of purpose in life measurement is: "I enjoy making plans for the future and working to make them a reality." Finally, a sample item of self-acceptance is: "In general, I feel confident and positive about myself."

Analysis

First, LPA was used to identify latent profiles based on job demands, job resources, and personal resources. To determine the number of latent profiles, Akaike Information Criterion (AIC; Akaike, 1974), Bayesian Information Criterion (BIC; Schwarz, 1978), a sample size-adjusted BIC (ABIC; Sclove, 1987), entropy, the Lo-Mendell-Rubin adjusted likelihood ratio test (LMR LRT; Lo, Mendel, & Rubin, 2001), and the bootstrapped likelihood ratio test (BLRT; McLachlan & Peel, 2000) were considered. A model with relatively low values of AIC, BIC, and ABIC and with an entropy value closer to 1 is known to be more accurate than other models. LMR

LRT and BLRT are Chi squared difference test indices between a model with k profiles and a model with k-1 profiles, and the model with k profiles is considered better when the indices are significant. For this reason, a model with lower AIC, BIC, and ABIC values and a higher entropy value than those of other models should be selected among models in which LMR LRT and BLRT are statistically significant. The selected model is thus the model with the optimal number of latent profiles. Since this study assumed that at least two subpopulations can exist depending on levels of job demands, job resources, and personal resources, models were compared by increasing the number of profiles from a model with two latent profiles. After the optimal number of profiles was determined, the mean differences in job demands, job resources, and personal resources scores among the profiles was analyzed using ANOVA (a *t* test is performed if only two profiles are identified). Finally, multiple regression analyses were conducted to compare the effects of job demands, job resources, and personal resources on psychological well-being according to the unique characteristics of the latent profiles. We used the Statistical Package for the Social Sciences (SPSS. IBM SPSS Statistics for Windows, Version 22.0) and Mplus software (Muthén & Muthén, 1998–2017) for all analyses.

Results

Testing validity and reliability

Before analyzing the data, the validity and reliability of the measurements were assessed. In this study, the factor loading criterion was set at .50 or more. The CFA showed that all of the items met the criterion (factor loading > .50) except for autonomy 2, 3, and 7, personal growth 1, 2, and 7, positive relations with others 1, purpose in life 1, self-esteem 1 and 4, and decision authority 6. The items were eliminated. To test the internal consistency reliability of each variable, Cronbach's alpha (α) was measured. The Cronbach's alpha values were considered reliable ($\alpha \geq .70$) except for autonomy. The reliability of autonomy was relatively low ($\alpha = .62$), but the sub-variables of the dependent variable were aggregated and then used in the analysis. The overall reliability of the dependent variable was .94. The reliability coefficients of each variable are shown in Table 1.

Descriptive statistics and correlation analysis

Means, standard deviations, reliability, and correlations among the research variables are presented in Table 1.

Latent profile analysis

To identify the number of latent profiles based on job demands, job resources, and personal resources, this study compared five models' fit indices according to the number of latent profiles each model included; this number ranged from two to six

Table 1 Mean, standard deviations, reliability, and correlations among research variables (n = 1018)

Variable	1	2	3	4	5	6	7	8	10	11	12	13	14	15
1. Job demands	.78													
2. Skill discretion	.27***	.71												
3. Decision authority	.14***	.51***	.83											
4. Co-worker support	− .02	.21***	.13***	.71										
5. Supervisor support	− .25***	.18***	.16***	.45***	.87									
6. Self-esteem	− .14***	.17***	.15***	.15***	.18***	.85								
7. Optimism	− .08**	.18***	.14***	.13***	.17***	.51***	.70							
8. Active coping	− .00	.21***	.18***	.15***	.12***	.30***	.32***	.76						
10. Autonomy	− .07*	.14***	.15***	.12***	.13***	.46***	.25***	.33***	.62					
11. Mastery	− .23***	.22***	.22***	.20***	.25***	.71***	.51***	.33***	.48***	.81				
12. Personal growth	− .09**	.29***	.19***	.18***	.17***	.62***	.45***	.38***	.40***	.63***	.77			
13. Positive relation	− .13***	.20***	.13***	.25***	.26***	.55***	.39***	.32***	.30***	.61***	.61***	.77		
14. Purpose in life	− .11**	.31***	.24***	.19***	.20***	.67***	.49***	.42***	.41***	.72***	.74***	.64***	.83	
15. Self-acceptance	− .14***	.28***	.22***	.18***	.21***	.78***	.56***	.34***	.46***	.78***	.68***	.63***	.78***	.86
M	3.56	3.62	3.56	3.64	2.90	5.77	3.90	3.14	5.24	5.47	5.88	5.77	5.63	5.44
SD	.76	.82	.79	.90	.68	1.23	.78	.54	1.13	1.07	1.05	1.02	1.09	1.15

*$p < .05$, **$p < .01$, ***$p < .001$

Table 2 Models' fit indices according to the number of latent profiles

Number of profiles	Log likelihood	AIC	BIC	ABIC	LMR LRT	BLRT	Entropy
2 (Model 1)	− 9173.40	18396.81	18519.95	18440.54	< .01	< .001	.79
3 (Model 2)	− 9014.40	18096.80	18264.27	18156.28	< .001	< .001	.75
4 (Model 3)	− 8929.29	17944.57	18156.37	18019.80	< .05	< .001	.78
5 (Model 4)	− 8886.85	17877.70	18133.83	17968.67	> .05	< .001	.70
6 (Model 5)	− 8814.18	17750.36	18050.82	17857.08	> .05	< .001	.73

AIC akaike information criterion, *BIC* Bayesian information criterion, *ABIC* sample-size adjusted BIC, *LMR LRT* Lo–Mendell–Rubin adjusted likelihood ratio test, *BLRT* parametric bootstrapped likelihood ratio test

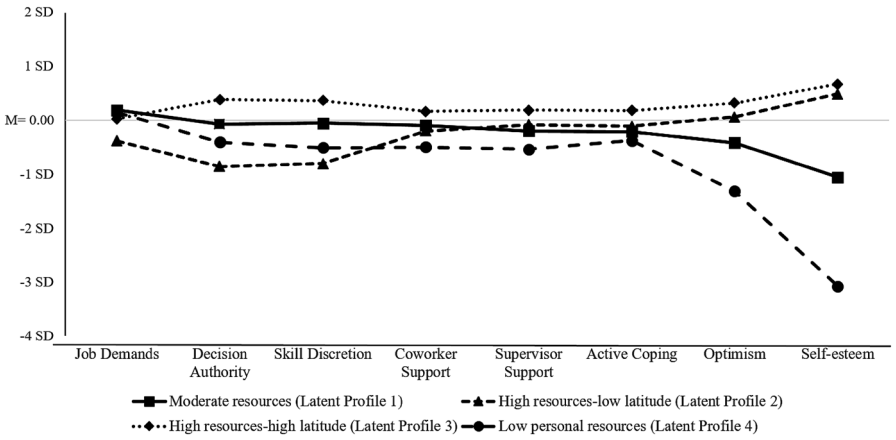

Figure 1 Distribution of criteria variables for each latent profile

(see Table 2). The AIC, BIC, and ABIC values decreased from Model 1 to Model 5, but the *p* value of BLRT was not significant at the .05 level in Model 4 or Model 5. Therefore, Model 3 was considered the best.

The four identified latent profiles are depicted in Figure 1. The figure was created based on standardized scores (M = 0, SD = 1). This study labeled the four profiles as follows: moderate resources (Profile 1), high resources-low latitude (Profile 2), high resources-high latitude (Profile 3), and low personal resources (Profile 4). The moderate resources profile was characterized by moderate levels of job demands, job resources, and personal resources. The number of middle-aged workers falling within the moderate resources profile was 251, representing 24.66% of the total sample. The average posterior probability was .85. The high resources-low latitude profile was characterized by high levels of personal resources and low levels of latitude (skill discretion and decision authority). The number of middle-aged workers falling within the high resources-low latitude profile was 177, representing 17.39% of the total sample. The average posterior probability was .82. The high resources-high latitude profile was characterized by high levels of job resources and personal

resources. The number of middle-aged workers who fell within the high resources-high latitude profile was 535, representing 52.55% of the total sample. The average posterior probability was .90. Finally, the low personal resources profile was characterized by extremely low levels of personal resources. The number of middle-aged workers who fell within the low personal resources profile was 55, representing 5.40% of the total sample. The average posterior probability was .93.

ANOVA was used to analyze the differences in the scores of the criteria variables among the four latent profiles (see Table 3). The results showed that there were no differences in job demands among the four groups, but there were differences among the groups for the other variables. For example, for decision authority and skill discretion, there was a significant difference between the high resources-low latitude profile and the high resources-high latitude profile, while for optimism and self-esteem, there was a significant difference between the low personal resources profile and the high resources profile (i.e., Profile 2 and 3). These results imply that individuals belonging to each group have different levels of job resources and personal resources.

The demographic characteristics of the whole sample and each group are shown in Table 4. Specific demographic variables did not prominently appear in individuals in each profile. For example, relatively older age people did not have a particular profile, but the age of individuals in each profile was evenly distributed.

Multiple regression analysis for each latent profile

This study conducted multiple regression analyses for each latent profile to compare the effects of job demands, job resources, and personal resources on psychological well-being across the profiles (see Table 5). Before multiple regression analyses, we analyzed the effect of profile differences on psychological well-being. We first created three dummy variables with the moderate resources profile as the reference group (dummy 1: high resources-low latitude versus reference group; dummy 2: high resources-high latitude versus reference group; and dummy 3: low personal resources versus reference group). All the effects of the dummy variables were statistically significant. Specifically, the high resource-low latitude profile ($\beta = .153$, $p < .001$) and high resources-high latitude profile ($\beta = .307$, $p < .001$) showed higher psychological well-being than the moderate resources profile, but the low personal resources profile ($\beta = -.091$, $p < .01$) showed lower psychological well-being than the moderate resources profile.

The results show that the effect of self-esteem on psychological well-being was statistically significant across the entire sample and in all latent profiles. However, the effects of decision authority and supervisor support on psychological well-being were not significant. As expected, the effects of the remaining variables on psychological well-being were different for the various latent profiles. For example, job demands had a negative effect on psychological well-being, but the effect was not significant for the high resources-low latitude profile or the low personal resources profile. The high resources-low latitude profile had the lowest job demands score among the profiles. It can be inferred that because of their low latitude, aged workers

Table 3 Means and standard deviations of relevant variables for individual profiles

Variable	Moderate resources	High resources-low latitude	High resources-high latitude	Low personal resources	*F-ratio*	Post-hoc
Job demands	2.97 (.73)	2.85 (.61)	2.88 (.69)	2.92 (.69)	1.26	1,2,3,4
Decision authority	3.30 (.82)	3.50 (.81)	3.80 (.78)	3.68 (.75)	24.49***	1,2 < 2,4 < 4,3
Skill discretion	3.33 (.78)	3.47 (.60)	3.70 (.76)	3.51 (.83)	15.64***	1,2,4 < 4,3
Coworker support	3.50 (.80)	3.45 (.76)	3.65 (.76)	3.43 (1.01)	4.24**	2,4,1 < 4,1,3
Supervisor support	3.49 (.93)	3.56 (.87)	3.74 (.87)	3.59 (1.00)	5.08**	1,2,4 < 2,4,3
Active coping	3.03 (.51)	3.00 (.51)	3.23 (.52)	3.24 (.65)	14.16***	2,1,4 < 4,3
Optimism	3.68 (.81)	3.87 (.60)	4.06 (.71)	3.48 (1.24)	20.24***	4,1 < 2 < 3
Self-esteem	5.29 (1.32)	5.05 (.89)	6.04 (.96)	4.51 (2.25)	49.92***	4 < 1 < 2,3
PWB	5.23 (.92)	5.59 (.74)	5.79 (.76)	4.87 (1.51)	36.67***	4 < 1 < 2 < 3

**$p < .01$; ***$p < .001$

Table 4 Demographic Information for Sample and Individual Profiles

Variables	Whole (n = 1018)		Moderate resources (n = 251)		High resources-low latitude (n = 177)		High resources-high latitude (n = 535)		Low personal resources (n = 55)	
	N	%	n	%	n	%	n	%	n	%
Gender										
Male	479	47.1	118	47.0	83	46.9	249	46.5	29	52.7
Feale	539	52.9	133	53.0	94	53.1	286	53.5	26	47.3
Age										
40s	178	17.5	48	19.1	28	15.8	94	17.6	8	14.5
50s	451	44.3	114	45.4	87	49.2	222	41.5	28	50.9
60s	303	29.8	68	27.1	50	28.2	170	31.8	15	27.3
70s	76	7.5	20	8.0	9	5.1	43	8.0	4	7.3
80s or more	10	1.0	1	.4	3	1.7	6	1.1	0	.0
Marital status										
Married	716	70.3	164	65.3	124	70.1	390	72.9	38	69.1
Separated	16	1.6	4	1.6	2	1.1	8	1.5	2	3.6
Divorced	137	13.5	40	15.9	22	12.4	70	13.1	5	9.1
Widowed	52	5.1	11	4.4	12	6.8	26	4.9	3	5.5
Never married	97	9.5	32	12.7	17	9.6	41	7.7	7	12.7
Education level										
Junior high school	24	2.4	2	.8	4	2.3	17	3.2	1	1.8
High school	372	36.5	106	42.2	84	47.5	162	30.3	20	36.4
Associate degree	101	9.9	28	11.2	17	9.6	51	9.5	5	9.1
Bachelor's degree	302	29.7	64	25.5	48	27.1	171	32.0	19	34.5
Master's degree	156	15.3	36	14.3	18	10.2	96	17.9	6	10.9
Ph.D. degree	61	6.0	14	5.6	6	3.4	37	6.9	4	7.3
Missing	2	.2	1	.4	0	.0	1	.2	0	.0
Occupation/industry										
Management, financial	248	24.4	56	22.3	46	26.0	135	25.2	11	20.0
Professional	327	32.1	66	26.3	46	26.0	190	35.5	25	45.5
Service	114	11.2	28	11.2	19	10.7	59	11.0	8	14.5
Sales	57	5.6	15	6.0	13	7.3	26	4.9	3	5.5
Office	143	14.0	44	17.5	30	16.9	66	12.3	3	5.5
Farming, fishing, forestry	2	.2	0	.0	0	.0	2	.4	0	.0
Construction, extraction	17	1.7	3	1.2	2	1.1	12	2.2	0	.0
Maintenance, repair	27	2.7	8	3.2	8	4.5	10	1.9	1	1.8
Production	36	3.5	16	6.4	7	4.0	11	2.1	2	3.6
Transportation	44	4.3	15	6.0	6	3.4	21	3.9	2	3.6
Armed forces	3	.3	0	.0	0	.0	3	.6	0	.0
Tenure										
~ 5 years	231	22.7	54	21.5	46	26.0	119	22.2	12	21.8
6–10 years	213	20.9	52	20.7	30	16.9	119	22.2	12	21.8
11–20 years	262	25.7	59	23.5	50	28.2	137	25.6	16	29.1

Table 4 (continued)

Variables	Whole (n = 1018)		Moderate resources (n = 251)		High resources-low latitude (n = 177)		High resources-high latitude (n = 535)		Low personal resources (n = 55)	
	N	%	n	%	n	%	n	%	n	%
21–30 years	182	17.9	48	19.1	38	21.5	90	16.8	6	10.9
31–40 years	90	8.8	27	10.8	6	3.4	51	9.5	6	10.9
41 years–	27	2.7	4	1.6	4	2.3	17	3.2	2	3.6
Missing	13	1.3	7	2.8	3	1.7	2	.4	1	1.8

Table 5 Results of multiple regressions by the latent profiles

Variables	Whole sample	Moderate resources	High resources-low latitude	High resources-high latitude	Low personal resources
	β	β	β	β	β
Job demands	− .09***	− .21**	− .09	− .11**	.12
Decision authority	.02	.06	− .03	.01	.15
Skill discretion	.12***	.33***	.03	.09*	.06
Co-worker support	.06**	.06	.07	.07	.14
Supervisor support	.03	− .07	.06	.03	.03
Self-esteem	.62***	.28***	.57***	.47***	.53***
Optimism	.14***	.12	.30***	.14***	− .01
Active coping	.15***	.34***	.10	.17***	.39**

*$p < .05$, **$p < .01$, ***$p < .001$

belonging to this profile are more likely to be responsible for relatively simple and repetitive tasks. Of course, additional information about the jobs of the respondents would be needed to confirm this assumption, but it is reasonable to believe that latitude and job demands may be low if the job characteristics are simple. In addition, this profile had a uniquely non-significant effect for the effect of active coping on psychological well-being. It is accordingly possible to assume that this profile may not include workers in complex work environments that require active coping. On the other hand, the low personal resources profile can be regarded as a single profile because it included more than 5% of the whole sample. However, the number of the respondents who fell within this profile is not enough, so careful interpretation of the results is needed. Above all, it is important to recognize that aged workers belonging to this profile may exist in organizations and require active management and support to improve their extremely low levels of personal resources. Finally, the effect of optimism on psychological well-being was significant across the entire sample as well as for the high resources-low latitude and high resources-high latitude profiles. However, the effect was not significant for the moderate resources profile or low

personal resources profile. These two profiles had lower levels of optimism than the other profiles, and there was no statistical difference in optimism scores between the two profiles. Therefore, it can be inferred that the two profiles did not show optimism as having a significant effect.

Discussion

The main purpose of this study was to identify whether aged workers can be divided into two or more groups based on their levels of job demands, job resources, and personal resources. LPA showed that four different latent profiles existed in the sample; ANOVA showed that there were statistically significant differences in job resources and personal resources, but not job demands, among the four latent profiles. Although no direct comparison is possible because there are no studies using the same criteria variables as this study, the fact that two or more latent profiles have been identified in previous studies using work condition variables indirectly supports the assumptions and results of this study. For example, Van den Broeck, De Cuyper, Luyckx, and De Witte (2012) identified four clusters (e.g., "demanding," "resourceful," "poor," and "rich" jobs) based on levels of job demands and job resources. Meanwhile, Keller et al. (2017) found two profiles (e.g., a "low stressors and high resources" profile and a "high stressors and low resources" profile) based on levels of stressors and resources. The high resources-low latitude profile (Profile 2) of this study has a pattern similar to the "resourceful" jobs cluster and the "low stressors and high resources" profile in that it features low job demands and relatively high job resources. The low personal resources profile (Profile 4) of this study likewise shows a pattern similar to the "demanding" jobs cluster and the "high stressors and low resources" profile in that it features relatively high job demands and relatively low job resources. On the other hand, Bujacz, Bernhard-Oettel, Rigotti, Magnusson Hanson, and Lindfors (2018) found four types: the "supporting" type characterized by low job demands and high autonomy, "constraining" type characterized by low job demands and autonomy, "demanding" type characterized by high job demands and low autonomy, and "challenging" type characterized by high job demands and autonomy. The high resources-high latitude profile (Profile 3) of this study has a pattern similar to the "supporting" type in that job demands are relatively low and latitude is high. In addition, the high resource-low latitude profile (Profile 2) of this study has a pattern similar to the "constraining" type in that it features low job demands and latitude.

Most studies based on the JD-R model have reported that job demands have a negative relationship with both job resources and personal resources, and job resources and personal resources have a positive relationship. Therefore, two latent profiles can be expected from the correlation: a profile showing high job demands, low job resources, and low personal resources and a profile showing low job demands, high job resources, and high personal resources. However, the results of this study's LPA show that there are latent profiles with more diverse patterns. For example, the moderate resources profile (Profile 1) shows job demands, job resources, and personal resources that are close to average, although

job demands are slightly higher than average and personal resources are slightly lower than average. This pattern is hard to imagine when considering the negative relationship between job demands and job/personal resources. However, since gain spirals and loss spirals can exist among the three variables, the balanced pattern of the first profile may be best understood using the principle of reciprocal causation (see Schaufeli & Taris, 2014). Karasek (1979) labeled this type of job an "active" job, which is characterized by high stressors and high resources. The patterns of the high resources-low latitude and high resources-high latitude profiles (Profiles 2 and 3, respectively) are similar overall, but there is a large difference in decision latitude. The two patterns are difficult to explain with existing theories. One possible explanation is that one profile is likely to consist of aged workers performing complex tasks that require substantial decision-making, while the other profile is likely to consist of those workers engaged in simple repetitive tasks. However, since the complexity and simplicity of tasks are not considered in this study, additional studies are needed to test this hypothesis.

On the other hand, the low personal resources profile (Profile 4) has a similar level of job demands compared to Profile 1, but job resources are relatively low and personal resources are much lower. Based on the similarity of patterns, the following longitudinal research question can be established: Aged workers belonging to Profile 1 may shift over time into Profile 4 if the workers experience decreases in job resources and personal resources. Conversely, with an increase in job resources and personal resources, a person in Profile 4 can switch to the more balanced pattern of Profile 1. The person also may switch to another profile, or the existing pattern may be maintained. Previous longitudinal studies using LPA have shown that pattern changes occur (e.g., Tuominen-Soini & Salmela-Aro, 2014). These results suggest that with appropriate intervention on the part of an organization as well as individual growth, individuals in a particular profile that is considered problematic (i.e., the low personal resources profile in this study) can switch into a more desirable state.

The pattern hierarchy of the four latent profiles is clearly distinguished in the three personal resources variables. In other words, the high resources-high latitude profile (Profile 3) was the highest in active coping, optimism, and the self-esteem; the high resources-low latitude profile (Profile 2) was the second-highest in all three variables; the moderate resources profile (Profile 1) was the third-highest in all three variables; and the low personal resources profile (Profile 4) was lowest in all three variables. However, the four job resources variables showed mixed results among the various latent profiles with the exception of the high resources-high latitude profile. For example, the high resources-low latitude profile showed the lowest decision authority and skill discretion, but it had the third-highest coworker support and the second-highest supervisor support. This implies that aged workers can have different levels of job resources. Logically speaking, perceived coworker support and supervisor support are likely related to one another, but it is not necessary that they are both simultaneously high or that they are both simultaneously low. If more diverse job resources were measured, the correlation between job resources would probably be positive, but it can be expected that the degree would vary.

Implications

Recognizing the possibility of various subgroups within a population has the following theoretical and practical implications. Theoretically, this study suggests that it is necessary for scholars to use the JD-R model to further develop the dynamic relationship among job demands, job resources, and personal resources. Work engagement and burnout were once perceived as opposing concepts, but now scholars recognize that the two concepts are not necessarily mutually exclusive (Maslach, 2003). Nevertheless, the two concepts are still perceived as incompatible because work engagement is associated with desirable outcomes and burnout is associated with negative outcomes. However, a recent study (see Moeller, Ivcevic, White, Menges, & Brackett, 2018) has identified highly engaged-exhausted and moderately engaged-exhausted profiles. Given the correlation between job resources and personal resources, job and personal resources are generally expected to be at similar levels, but the high resources-low latitude profile and the low personal resources profile in this study showed unique patterns that have been difficult to find in conventional variable-centered studies.

One possible explanation for this result is that the antecedents of job resources and personal resources are different. The driver of job resources is the job, and the driver of personal resources is the individual. Job resources and personal resources are both kinds of resources and have been reported to have a positive correlation in previous studies. However, regardless of the level of one's personal resources (e.g., no matter how positive a person), job resources can be scarce (e.g., support from the supervisor) or vice versa. On the other hand, extremely low decision latitudes in the high resources-low latitude profile seem unusual because of the expected positive correlation between job resources and decision latitude. Using the same logic, however, different levels of job resources can emerge. For example, coworker support and supervisor support are expected to be at similar levels in terms of social support, but depending on the relationship with one's coworkers or supervisor, the level of perceived support may be very different. Therefore, JD-R theory needs to be considered in light of the independence of resources, and there should be further theoretical work illuminating the relationship among various resources that individuals can have.

The results of this study offer organizations practical implications for devising interventions that consider individual differences in job demands, job resources, and personal resources. Using JD-R theory, Bakker and Demerouti (2014) proposed an intervention model based on the target and level of intervention required. According to the model, at the individual level, job crafting interventions are needed to reduce job demands and improve job resources, and strength-based interventions are needed to improve personal resources. At the organizational level, job design is needed to reduce job demands and improve job resources, and training is needed to improve personal resources. The results of this study suggest that the four interventions need to be combined organically by extending the focus of the model, originally developed from the perspective of variables and levels, to the individual.

Job redesign refers to "a structural intervention at the organizational level that aims to change the source of employee wellbeing—their job demands and job

resources" (Bakker & Demerouti, 2014, p. 18). For example, Bakker, Oerlemans, and ten Brummelhuis (2016) suggested that employees should fill out JD-R questionnaires and then HRD scholars and practitioners can configure personal JD-R profiles based on these results to provide the employees with personalized feedback. However, as the results of this study imply, employees' personal resources, as well as their levels of job demands and job resources, should be considered. Even if organizations provide the same level of support in terms of job demands and job resources, differences in the personal resources of employees can produce completely different results. On the other hand, job crafting refers to "the physical and cognitive changes individuals make to the task or relational boundaries of their work" (Wrzesniewski & Dutton, 2001, p. 179). According to Bakker and Demerouti (2014), employees can proactively craft job demands and job resources in the workplace. However, changes in job duties cannot be divorced from job characteristics. As the results of this study suggest, employees with low latitudes are unlikely to be able to change their jobs. Moreover, job crafting may look different depending on personal resources such as self-efficacy. In other words, it is hard to imagine that interventions such as job design and job crafting have the same positive effect on all employees' well-being. Organizations need to try to provide a variety of interventions for their employees, but at the same time, the organizations need to shift their perspective to detect the differences in the profiles of their employees and to provide them with customized interventions.

Limitations

First, this study utilized secondary data collected from self-reported surveys. Thus, this study has the limitation of self-reported cross-sectional data, which may produce common method variance or common method bias. For the same reason, some variables including optimism were measured using some of the original measurements. Another limitation caused by the use of secondary data is the inability to fully use the items of the measurement. However, the possibility of generalizing from the findings was maximized by using national-level sample data. Second, because this study used only one variable as a sub-variable of job demands, job demands may not have been addressed as comprehensively as job resources or personal resources. Variables such as work overload, time pressure, and role ambiguity could be included as sub-variables of job demands in future studies, thereby providing additional insight into what job demands that should be reduced to improve the psychological well-being of aged workers. Finally, in this study, some of the personal resources were used in a general context (e.g., self-esteem) rather than organizational-based personal resources (e.g., organizational-based self-esteem). Self-esteem is expected to be highly related to organizational-based self-esteem, but the two variables are not completely interchangeable concepts. Nevertheless, it is an encouraging finding that the personal resources in the general context showed considerable variation among aged workers, and organizational support to address such a gap should still be considered. We recommend that future studies consider personal resources in an organizational context.

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