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JD-R model on psychological well-being and the moderating effect of job discrimination in the model

Findings from the MIDUS

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Psychological
well-being

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Abstract

Purpose – The purpose of this study was to investigate the moderating effect of chronic job discrimination on the relationships among job demands, job resources, personal resources and psychological well-being among aged workers.

Design/methodology/approach – This study used “National Survey of Midlife Development in the United States (MIDUS Refresher)” data collected from 862 aged workers in the United States from 2011-2014. A moderated multiple regression analysis was adopted.

Findings – The results of the multiple regression analysis show that skill discretion, self-esteem, optimism and active coping had positive effects on psychological well-being, while chronic job discrimination had a negative effect on psychological well-being. Co-worker support, supervisor support, job demands and decision-making authority were not significant. Among the interaction terms, the moderating effect between optimism and chronic job discrimination was significant.

Originality/value – Based on the results, this study offers implications for understanding the effects of job discrimination in the workplace among aged workers and their perceived psychological well-being, in the context of job demands and resources (JD-R) model.

Keywords Optimism, Psychological well-being, Personal resources

Paper type Research paper

Introduction

Among the different kinds of discrimination, ageism is one that anyone can experience and suffer from. As the American workforce grows older, age discrimination at work is becoming an increasingly critical topic. Ageism is institutionalized and persists as a tacit influence in the workplace, even though no significant relationship between aging and task performance or creativity has been found (Wiener and Keller, 2011). Nevertheless, stereotypes about aged workers are mostly negative (Wiener and Keller, 2011). For example, managers are prejudiced toward aged employees (Chiu *et al.*, 2001), and aged employees receive more negative evaluations than younger workers do (Kulik *et al.*, 2000). Furthermore, aged workers who perform poorly are more likely than younger workers to be demoted, while low-performing younger workers are more likely than older workers to be encouraged to attend training (Rupp *et al.*, 2006). Most discrimination studies that consider ageism, however, remain limited to general prejudice (Nelson, 2011) or concentrate on employees' general physical and mental health (Bostwick *et al.*, 2014). Few studies have described the effects of job discrimination at work on work-related psychological outcomes (Wiener and Keller, 2011).



According to the job demands-resources (JD-R; Bakker and Demerouti, 2007) model, an increase in positive personal resources and job resources or a decrease in negative job demands enhance both organizational outcomes and individual job performance. Psychological well-being predicts job performance (Wright and Cropanzano, 2000). However, establishing certain environmental conditions does not always guarantee an improvement in employees' performance. As a negative predictor of psychological well-being (Schmitt *et al.*, 2014), perceived chronic job discrimination can be considered a moderating variable influencing the relationships in the JD-R model. Various studies (Bayl-Smith and Griffin, 2014; Dubbelt *et al.*, 2016; Lazarus and Folkman, 1984; Noh and Kaspar, 2003) have found that chronic job discrimination has significant relationships with job demands, job resources and work engagement.

However, despite ample evidence that chronic job discrimination negatively affects the psychological well-being of employees, there have been no theories or empirical studies that consider chronic job discrimination as a moderating variable of work environment. This study contributes to a better understanding of the effects of aged workers' chronic job discrimination in the workplace on the workers' perceived psychological well-being.

Literature review

Conceptualization of psychological well-being

Psychological well-being has two facets: eudaimonic well-being and hedonic well-being (Ryan and Deci, 2000). The eudaimonic well-being refers to the purposeful aspect of psychological well-being (Johnson *et al.*, 2018), and Ryff developed six dimensions of eudaimonic well-being that widely used until recently (Yoon, Coburn and Spence, 2018). The hedonic well-being refers to the subjective feelings of happiness, subjective well-being and positive emotions (Johnson *et al.*, 2018). This study utilizes Ryff's (1989) six dimensions of psychological well-being with a view to conceptualize psychological well-being broadly. Ryff's (1989) six dimensions of psychological well-being are advantageous because they can measure the psychological well-being of individuals using multiple components. In particular, Ryff (1991) suggested that components of psychological well-being change depending on whether individuals are young, middle-aged or older adults. This indicates that the approach is suitable for determining the psychological well-being of any person.

According to Ryff's (1989) six-factor model, psychological well-being consists of the following dimensions: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life and self-acceptance. An employee with autonomy is "self-determining and independent; able to resist social pressures to think and act in certain ways; regulates behavior from within; evaluates self by personal standards" (p. 1072). Environmental mastery refers to "a sense of mastery and competence in managing the environment" (Ryff, 1989, p. 1072). An employee who has environmental mastery "controls [a] complex array of external activities; makes effective use of surrounding opportunities; [and is] able to choose or create contexts suitable to personal needs and values" (Ryff, 1989, p. 1072). Personal growth refers to an employee's feeling of continued development; the employee:

Sees [him]self as growing and expanding; is open to new experiences; has [a] sense of realizing his or her potential; sees improvement in [him]self and behavior over time; and is changing in ways that reflect more self-knowledge and effectiveness (Ryff, 1989, p. 1072).

Positive relations with others refers to "warm, satisfying, trusting relationships with others", and an employee who has positive relations with others "is concerned about the welfare of others; capable of strong empathy, affection, and intimacy; [and] understands

give and take of human relationships” (Ryff, 1989, p. 1072). Purpose in life refers to “goals in life and a sense of directedness”; an employee who has this “feels there is meaning to present and past life; holds beliefs that give life purpose; [and] has aims and objectives for living” (Ryff, 1989, p. 1072). Self-acceptance refers to a positive attitude and the ability to acknowledge and accept multiple aspects of the self and the past (Ryff, 1989).

Conceptualization of job demands and job/personal resources

The JD-R model explains the relationship between psychological well-being and job demands and resources through the dual processes of job demands-burnout and job resources-engagement. The JD-R model (Demerouti *et al.*, 2001) includes two working conditions: job demands and job resources. Job demands refer to:

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 refer to:

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).

Some examples of job resources are interpersonal and social relations (e.g. supervisor and co-worker support), the organization of work (e.g. decision-making participation) and the level of the task (e.g. skill variety) (Bakker and Demerouti, 2007; Bakker *et al.*, 2004).

Xanthopoulou *et al.* (2007) extended the JD-R model by considering personal resources based on Fredrickson’s (2003) broaden-and-build theory. Like job resources, personal resources are crucial for psychological well-being (Hobfoll, 2002; Luthans *et al.*, 2005). Personal resources refer to “aspects of the self that are generally linked to resiliency” (Hobfoll *et al.*, 2003, p. 632). Personal resources include self-efficacy, organizational-based self-esteem, optimism (Xanthopoulou *et al.*, 2007) and active coping (Weigl *et al.*, 2010). Self-esteem refers to “the degree to which organizational members believe that they can satisfy their needs by participating in roles within the context of an organization” (Pierce *et al.*, 1989, p. 625). Optimism refers to “an individual’s positive psychological state of development characterized by [...] making a positive attribution about succeeding now and in the future” (Luthans *et al.*, 2007, p. 3). Finally, 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).

Conceptualization of job discrimination

Job discrimination refers to perceptions of:

Substantive and statistically demonstrable differences in treatment [or unequal treatment] in terms of impact reactions, procedural justice beliefs [...] or outcome decisions that can be shown to be substantially different between the majority and protected minority group(s) (Anderson, 2011, p. 230).

Harris *et al.* (2017) reviewed 26 relevant studies on stereotypes about older workers and found that stereotypes and perceptions were negative, although positive and negative beliefs coexisted. In 23 studies, older workers perceived as lacking in productivity and ability, based on a negative perception of their ability to use new technologies and their

physical and mental capacity (Harris *et al.*, 2017). It also has been recognized that the willingness to training and promotion of older workers is low, which acts as a barrier to participation in training and development (Harris *et al.*, 2017). Finally, 18 studies reported negative perceptions of older workers in recruitment, retirement, training and retention, and these beliefs were found not only by co-workers but also by managers and employers (Harris *et al.*, 2017). Employees may experience job discrimination for a variety of reasons, including gender, race, age, disability status and sexual orientation. Employees may also experience more complex forms of job discrimination because of their demographic characteristics. For instance, older women may experience discrimination at work because of gender inequality and age stereotypes or a combination of the two. In this regard, the study operationally defines chronic job discrimination as accumulated perceptions or experiences of unfair and unequal treatment in the workplace that may be based on various factors, including race, gender and age.

The relationships between psychological well-being and job demands and job/ Personal resources

According to the JD-R model, the combination of high job resources and low job demands improves performance (Bakker and Demerouti, 2007) and predicts employee well-being regardless of occupation (Bakker and Leiter, 2010). Karasek's (1979) JDC model supports the idea that low job demands and high job control enhance psychological well-being. Based on Karasek's model, Pelfrene *et al.* (2002) demonstrated empirically that job control (skill discretion and decision authority) and social support alleviate the adverse effects of high strain on psychological well-being. Jonge *et al.* (2001) found that job characteristics such as job demands and organizational support also influence psychological well-being. Many researchers have agreed that there is a positive relationship between social support and well-being (Kong *et al.*, 2013). Pisanti *et al.*'s (2011) study empirically showed that low job demands, high skill discretion and high supervisor support were relatively stable predictors of well-being. Therefore, this study proposes the following hypotheses based on those studies comprising the rationale for the JD-R model:

H1. Job demands have a negative effect on psychological well-being.

H2. Job resources (skill discretion [2a], decision authority [2b], Co-worker support [2c] and supervisor support [2d]) have a positive effect on psychological well-being.

Many studies have shown that personal resources enhance employee well-being (Tims *et al.*, 2013). For example, Schmutte and Ryff (1997) demonstrated that Ryff's six dimensions of psychological well-being had a strong correlation with the personal characteristics of elderly adults. In many studies, self-esteem has been shown to have a high correlation with well-being (Kong *et al.*, 2013). In the JD-R model, self-esteem and optimism are regarded as personal resources, and self-esteem and optimism are known as independent variables of work engagement and burnout (Alarcon, 2011; Xanthopoulou *et al.*, 2007; Xanthopoulou *et al.*, 2009). Avey *et al.*'s (2010) research demonstrating that psychological capital (PsyCap; consisting of efficacy, hope, optimism and resilience) positively influenced employee well-being over time indirectly shows that self-esteem may affect psychological well-being. Optimism in particular has been shown to enhance well-being in the elderly (Ju *et al.*, 2013). Fox's (2000) study showed that high self-esteem was more closely related to greater well-being than low self-esteem was. Bakker and Demerouti (2008) proposed active coping as well as PsyCap as personal resources. Coping strategies are an important contributor to

employees' well-being especially in adverse situations (Welbourne *et al.*, 2007), and perceived discrimination depends on the coping strategies deployed (Lazarus and Folkman, 1984). Many empirical studies (McConaghy and Caltabiano, 2005) have shown that active coping is closely related to well-being. In particular, Carmel *et al.* (2016) demonstrated that coping behaviors predicted the subjective well-being of aged adults over time, and Kling, Seltzer, and Ryff (1997) revealed that coping predicted Ryff's six dimensions of psychological well-being over time. The following hypotheses are thus proposed:

H3. Personal resources (self-esteem [*3a*], optimism [*3b*] and active coping [*3c*]) have a positive effect on psychological well-being.

The relationship between psychological well-being and job discrimination

Mistreatment resulting from discrimination undermines employees' psychological well-being (Schmitt *et al.*, 2014). Extensive research (Pascoe and Smart Richman, 2009; Schmitt *et al.*, 2014) has shown that there is a negative relationship between discrimination and psychological well-being. For example, Pascoe and Smart Richman's (2009) meta-analysis reviewed 134 studies published between 1986 and 2007, while Schmitt *et al.*'s (2014) meta-analysis examined 328 correlational and 54 experimental studies published before 2012. The results of both meta-analyses showed that there is negative relationship between discrimination and psychological well-being. This negative relationship was found in both cross-sectional and longitudinal research and across a broad range of well-being measurements, regardless of the type of discrimination investigated (Schmitt *et al.*, 2014). I thus propose the following:

H4. Job discrimination has a negative effect on psychological well-being.

The role of job discrimination in the JD-R model

Lazarus and Folkman (1984) and Noh and Kaspar (2003) reported that job resources may mitigate job discrimination. Dubbelt *et al.* (2016), on the other hand, empirically showed that gender discrimination had a negative effect on the job demands and job resources of women. The relationship between discrimination and job resources is different in these two studies, but it seems clear that the two variables are closely related. Volpone and Avery (2013) operationally defined perceived sex/race/age discrimination as a job demand, which implies that job discrimination is a job-related variable that needs to be addressed within the context of the JD-R model. Although it did not rely on the JD-R model, Bayl-Smith and Griffin's (2014) study showed that perceived age discrimination negatively affected work engagement, which is the outcome variable of job demands and resources. Therefore, this study assumes that job discrimination, as a negative moderator in the JD-R model, could worsen employees' psychological well-being as one of the causes of a loss spiral. I, thus, propose the following:

H5. Job discrimination has a moderating effect on the relationship between psychological well-being and job demands.

H6. Job discrimination has a moderating effect on the relationship between psychological well-being and job resources (skill discretion [*6a*], decision authority [*6b*], co-worker support [*6c*] and supervisor support [*6d*]).

- H7. Job discrimination has a moderating effect on the relationship between psychological well-being and personal resources (self-esteem [7a], optimism [7b] and active coping [7c]).

Method

Sample

The population of the MIDUS Refresher study is noninstitutionalized English-speaking adults in the USA. The MIDUS Refresher study (see ICPSR 36532) consists of a national probability sample of 3,577 people. Among the respondents, the present study excluded adults who are not currently working or are under 40 years of age ($n = 1,215$). This study defines an aged worker as more than 40 years old workers based on the Age Discrimination in Employment Act (ADEA), which prohibits employment discrimination of more than workers over 40 years old. In addition, the MIDUS Refresher data consist of two parts: phone interview data and self-administered survey data. This study used all of the self-administered survey data with the exception of some demographic items. Because some respondents only participated in the phone interviews, this study excluded all of these data from the analysis ($n = 872$). Data that did not respond to more than one variable was considered missing data, and there was a total of 10 such cases. The percentage of missing data was only 1.15 per cent, and it was treated by listwise deletion. Therefore, the final number of samples in this study was 862. With regard to gender, the proportions of men (49.7 per cent) and women (50.2 per cent) were similar. All the respondents were between 40 and 75 years of age. With respect to race, most of the respondents were white (83.6 per cent). More than half of the respondents were married (67.5 per cent). Although 193 respondents (22.4 per cent) refused or did not provide information about their sexual orientations, a majority of respondents (74.6 per cent) identified as heterosexual.

Measures

Psychological well-being

Psychological well-being was measured using Ryff's (1989) six dimensions. Each subscale consists of seven items measured using a seven-point Likert scale ranging from (1) strongly disagree to (7) strongly agree. An example of the autonomy measurement is: "I am not afraid to voice my opinions, even when they are in opposition to the opinions of most people". An example of the environmental mastery measurement is: "In general, I feel I am in charge of the situation in which I live". The personal growth measurement included the item: "For me, life has been a continuous process of learning, changing, and growth". The positive relations with others measurement included the item: "People would describe me as a giving person, willing to share my time with others". An example of the purpose in life measurement is: "Some people wander aimlessly through life, but I am not one of them", while an example of the self-acceptance measurement is: "I like most parts of my personality".

Job demands and job/personal resources

Job demands and resources were measured with a composite scale derived from four studies that had examined job characteristics and psychological work stress (Bosma *et al.*, 1997; Karasek and Theorell, 1990; Karasek *et al.*, 1981; Schwartz *et al.*, 1988). The composite scale consisted of five subscales: skill discretion, decision authority, co-worker support, supervisor support and demands. Skill discretion was measured using three items, one of which was: "How often does your job provide you with a variety of things that interest you?"

Decision authority had six items, including: "How often do you have a choice in deciding how you do your tasks at work?" Co-worker support consisted of two items, including: "How often do you get help and support from your co-workers?" Supervisor support had three items, one of which was: "How often do you get help and support from your immediate supervisor?" Finally, demands consisted of five items, including: "How often do you have too many demands made on you?" All of the above were measured using a 5-point Likert scale ranging from (1) never to (5) all of the time.

Personal resources were measured by self-esteem, optimism and active coping. Self-esteem was measured using a scale developed by [Rosenberg \(1965\)](#). This scale consisted of seven items, including "I wish I could have more respect for myself" and was measured using a seven-point Likert scale ranging from (1) strongly disagree to (7) strongly agree. Optimism was measured using a scale developed by [Scheier and Carver \(1985\)](#). It consisted of three items, including "I'm always optimistic about my future," and was measured using a five-point Likert scale ranging from (1) disagree a lot to (5) agree a lot. Active coping was measured using a scale developed by [Carver et al. \(1989\)](#). This scale had four items, including "I take direct action to get around the problem" and was measured by a four-point Likert scale ranging from (1) not at all to (4) a lot.

Chronic job discrimination

Chronic job discrimination was measured with a scale developed by [Williams et al. \(1997\)](#). This scale included six items, the examples are: "How often do you think you are unfairly given the jobs that no one else wanted to do?" "How often do you feel that you are ignored or not taken seriously by your boss?" Chronic job discrimination was measured using a five-point Likert scale ranging from (1) never to (5) once a week or more. Therefore, a high score meant the respondent experienced a high level of job discrimination.

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 0.50 or more. The CFA showed that all of the items met the criterion (factor loading > 0.50) except for decision authority 6, self-esteem 1 and 4, autonomy 4 and 7, environmental mastery 2 and 5, personal growth 1, 2, and 7, purpose in life 1 and 7. The items were eliminated. To test the internal consistency reliability of each variable, Cronbach's alpha (α) was measured. The Cronbach's alpha values for the variables ranged from 0.69 to 0.88, which are considered acceptably reliable ($\alpha \geq 0.60$; [Van de Ven and Ferry, 1980](#)).

Descriptive statistics and correlations

Table I shows the means, standard deviations, Cronbach's α and correlations among the study variables. The correlations between independent variables, including chronic job discrimination, ranged from $r = -0.42$ to $r = 0.59$, which indicated that there was no potential problem with multicollinearity (i.e. $|r| \geq 0.9$; [Kilne \(2011\)](#); $|r| \geq 0.85$; [Lei and Wu, 2007](#)). However, this study required product terms, which are likely to cause problems of multicollinearity. Therefore, this study checked for multicollinearity problems with VIF values and tolerance values through collinearity diagnostics in the moderated regression analysis.

Table I.
Reliability,
descriptive statistics,
and correlations
($n = 862$)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Skill discretion	1														
2. Decision authority	0.57***	1													
3. Job demands	0.22***	0.18***	1												
4. Co-worker support	0.25***	0.12***	-0.15***	1											
5. Supervisor support	0.20***	0.12**	-0.30***	0.53***	1										
6. Self-esteem	0.20***	0.18***	-0.16***	0.19***	0.18***	1									
7. Optimism	0.24***	0.21***	-0.09**	0.19***	0.17***	0.59***	1								
8. Active coping	0.20***	0.17***	0.02	0.12***	0.07	0.35***	0.36***	1							
9. Job discrimination	-0.16***	-0.18***	0.37***	-0.27***	-0.42***	-0.22***	-0.17***	-0.05	1						
10. Autonomy	0.09*	0.14***	-0.09*	0.04	0.01	0.47***	0.32***	0.30***	0.30***	-0.03	1				
11. Mastery	0.23***	0.21***	-0.23***	0.19***	0.16***	0.71***	0.56***	0.33***	-0.27***	0.52***	0.52***	1			
12. Personal growth	0.20***	0.13***	-0.09***	0.24***	0.19***	0.62***	0.51***	0.32***	-0.25***	0.34***	0.64***	0.64***	1		
13. Positive relation	0.29***	0.23***	-0.04	0.18***	0.15***	0.62***	0.55***	0.39***	-0.19***	0.40***	0.64***	0.63***	0.63***	1	
14. Purpose in life	0.32***	0.23***	-0.05	0.19***	0.18***	0.68***	0.55***	0.37***	-0.23***	0.42***	0.69***	0.68***	0.73***	0.73***	1
15. Self-acceptance	0.28***	0.22***	-0.08*	0.22***	0.14***	0.79***	0.62***	0.32***	-0.24***	0.47***	0.78***	0.69***	0.70***	0.78***	0.78***
A	0.69	0.84	0.75	0.73	0.88	0.86	0.75	0.76	0.75	0.72	0.80	0.77	0.81	0.82	0.87
M	3.55	3.54	3.01	3.61	3.56	5.67	3.82	3.16	1.84	5.15	5.34	5.67	5.88	5.88	5.32
SD	0.76	0.81	0.66	0.81	0.93	1.26	0.83	0.53	0.74	1.06	1.09	1.03	1.05	1.15	1.21

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

Moderated regression analysis

To test the moderating effect of chronic job discrimination, a hierarchical regression consisting of three steps was conducted (Table II). The first phase (Model 1) examined the effects of the independent variables on the dependent variables. Next, the effects of the independent variables and the moderator of chronic job discrimination on the dependent variables (Model 2) were investigated. The final phase analyzed the effects of the independent variables, moderator and eight interactional variables on the dependent variables (Model 3).

According to the results of hierarchical regression, Model 1 ($F = 213.92, p < 0.001$), Model 2 ($F = 193.75, p < 0.001$) and Model 3 ($F = 103.32, p < 0.001$) were statistically significant. As the independent variables were added, R^2 increased from 0.686 (Model 1) to 0.690 (Model 2) and from 0.690 to 0.694 (Model 3). The results of Model 1 indicate that skill discretion ($\beta = 0.08, p < 0.01$), self-esteem ($\beta = 0.61, p < 0.001$), optimism ($\beta = 0.20, p < 0.001$) and active coping ($\beta = 0.09, p < 0.001$) had positively significant effects on psychological well-being. However, co-worker support, decision authority, job demands and supervisor support were not significant.

In Model 2, skill discretion ($\beta = 0.07, p < 0.01$) had a positive effect on psychological well-being, which supports *H2a*. Self-esteem ($\beta = 0.61, p < 0.001$), optimism ($\beta = 0.20, p < 0.001$) and active coping ($\beta = 0.42, p < 0.001$) also had positive effects on psychological well-being, thereby fully supporting *H3*. The newly added chronic job discrimination had a negative effect on psychological well-being ($\beta = -0.08, p < 0.001$), thus supporting *H4*. However, job demands, decision authority, co-worker support and supervisor support were not significant, thus contradicting *H1, H2b, H2c* and *H2d*.

In Model 3, skill discretion ($\beta = 0.07, p < 0.05$), self-esteem ($\beta = 0.61, p < 0.001$), optimism ($\beta = 0.21, p < 0.001$), active coping ($\beta = 0.09, p < 0.001$) and chronic job discrimination ($\beta = -0.09, p < 0.001$) were still statistically significant; however, decision authority, job demands, co-worker support, and supervisor support were not significant at 0.05 level. Among the interaction terms, optimism \times chronic job discrimination was significant ($\beta = -0.06, p < 0.05$), thus supporting *H7b*. Multicollinearity between variables did not occur (tolerance = 0.48 to 0.83; VIF = 1.21 to 2.11).

A graph of the interaction effect between optimism and chronic job discrimination is presented in Figure 1. The psychological well-being of an aged worker in a situation of high chronic job discrimination is lower than that of an aged worker in a situation of low chronic job discrimination. The higher the optimism of employees, the higher their psychological well-being. Especially in a situation of high job discrimination, optimism increased psychological well-being. However, optimism does not change psychological well-being significantly in a low job discrimination situation.

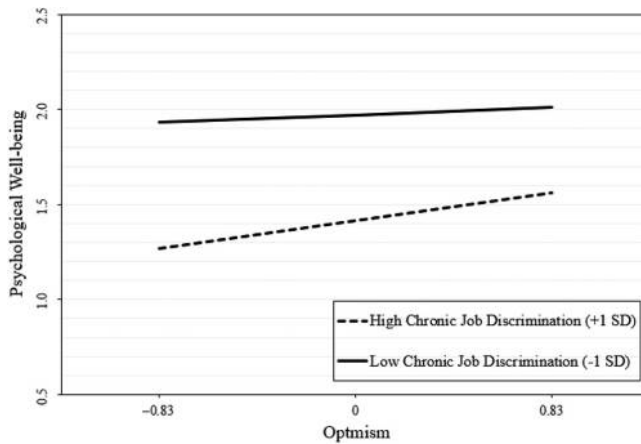
Discussion

The first research question sought to examine the effects of job demands, job resources and personal resources on psychological well-being. The findings of this study support previous studies' results that skill discretion, as a component of work characteristics, improves psychological well-being (Pisanti *et al.*, 2011; Van Veldhoven *et al.*, 2005). Unexpectedly, however, the results of this study indicated that the effect of decision authority on psychological well-being was not significant. Although skill discretion and decision authority are components of decision latitudes in the JDC model (Karasek, 1979), the two variables have been found to produce different results, as in the present study. For example, skill discretion has been found to have an adverse effect on depression, anxiety, emotional

Table II.
Moderated
regression

Model	Model 1		Model 2		Model 3		Tolerance	VIF	
	b	S.E.	β	b	S.E.	β			b
Intercept	1.24	0.18		1.49	0.20		1.50	0.20	
Skill discretion	0.09	0.03	0.08**	0.08	0.03	0.07**	0.08	0.03	0.07*
Decision authority	0.03	0.03	0.02	0.01	0.03	0.01	0.01	0.03	0.01
Job demands	-0.04	0.03	-0.03	-0.01	0.03	-0.01	-0.00	0.03	-0.00
Co-worker support	0.05	0.03	0.04	0.05	0.03	0.04	0.05	0.03	0.05
Supervisor support	-0.03	0.02	-0.03	-0.05	0.03	-0.05	-0.05	0.03	-0.05
Self-esteem	0.44	0.02	0.61***	0.43	0.02	0.61***	0.43	0.02	0.61***
Optimism	0.22	0.03	0.20***	0.22	0.03	0.20***	0.23	0.03	0.21***
Active coping	0.16	0.04	0.09***	0.17	0.04	0.10***	0.16	0.04	0.09***
Job discrimination				-0.10	0.03	-0.08**	-0.11	0.03	-0.09***
Skill discretion \times CJD							-0.04	0.04	-0.03
Decision authority \times CJD							-0.03	0.04	-0.02
Job demands \times CJD							0.03	0.04	0.02
Co-worker support \times CJD							0.00	0.04	0.00
Supervisor support \times CJD							0.03	0.03	0.03
Self-esteem \times CJD							0.03	0.02	0.03
Optimism \times CJD							-0.07	0.04	-0.06*
Active coping \times CJD							0.03	0.05	0.01
R^2 (ΔR^2)		0.686			0.690 (0.004)				0.694 (0.004)
F		213.92***			193.75***				103.32***

Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$



Psychological
well-being

Figure 1.
The relationship
between optimism
and psychological
well-being moderated
by job discrimination

exhaustion, while decision authority has not (Griffin *et al.*, 2007; Rafferty *et al.*, 2001). This aspect has enabled scholars to separate the two variables (Van der Doef and Maes, 1999). As skill discretion refers to an employee's opportunity to utilize specific job skills in the while working (Häusser *et al.*, 2010), decisions depend on individual ability and the range of the decisions' impact is limited to certain tasks. As decision authority includes task-related decisions like timing and method control (Häusser *et al.*, 2010) as well as the task itself, the range of the decisions' impact is wider than that of skill discretion. Therefore, the results suggest that the extent of autonomy in task-related decisions could act as a burden on employees.

The results of this study also revealed that personal resources such as active coping and optimism had positive effects on psychological well-being, but job demands, co-worker support and supervisor support did not. These results are interpreted as indicating that the effects of personal resources on psychological well-being are statistically significant after controlling for job demands and job resources, suggesting that personal resources are a relatively more important variable in predicting the psychological well-being of aged workers. These results support previous research results showing that positive personal resources impact desirable outcomes such as well-being (Bakker and Demerouti, 2007; Lyubomirsky *et al.*, 2005). More specifically, the results support several studies' findings that as personal resources, active coping (Penley *et al.*, 2002; Welbourne *et al.*, 2007) and optimism (Ju *et al.*, 2013) enhance psychological well-being. These findings suggest that the JD-R model remains an effective model for explaining the psychological well-being of aged workers.

The second research question aimed to examine the effects of job discrimination on psychological well-being. The results of this study indicate that chronic job discrimination has a negative effect on psychological well-being, which supports the results of previous research (Pascoe and Smart Richman, 2009; Schmitt *et al.*, 2014; Williams *et al.*, 2003). The third research question sought to examine the moderating effect of chronic job discrimination on the relationship between job demands, job resources, personal resources and psychological well-being. The results of this study indicated that the moderating effect between optimism and chronic job discrimination on psychological well-being was significant. Put simply, the psychological well-being of the aged worker was higher when the level of job discrimination the worker faced was low than when the level of job

discrimination was severe. Psychological well-being increased as optimism increased in both situations. However, as optimism increased, the degree (slope) of psychological well-being's increase was greater when job discrimination was severe than when it was not. This result suggests that optimism plays a crucial role in maintaining or improving the psychological well-being of aged workers, especially in situations of severe job discrimination. Taken together, these results support the study's assumption that chronic job discrimination can moderate the JD-R model. However, as Model 3 showed that the change in R^2 was very small ($\Delta R^2 = 0.004$) compared to Model 2 despite the addition of the eight interaction terms, the practical significance of the moderating effect of chronic job discrimination is hard to judge at present. Therefore, additional research on the moderating effect of job discrimination in the JD-R model needs to be conducted. The graph of the interaction effect between optimism and chronic job discrimination also showed ordinal interaction, which requires attention when interpreting the practical significance of the moderating effect. Ordinal interaction means that the two lines of the interaction effect graph are neither parallel nor intersecting, which occurs when one main effect (optimism in this study) is stronger than the other main effect (chronic job discrimination in this study). This result was expected based on the moderated multiple regression results indicating that the regression coefficient of optimism was much higher than that of chronic job discrimination. The moderating effect of chronic job discrimination was statistically significant but weak, and thus, the generalizability of the moderating effect should not be strongly asserted based solely on the results of the present study.

Theoretical implications

The JD-R model is evolving gradually. The initial JD-R model described the relationship between job performance, job demands and job resources as a dual process of work engagement and burnout (Demerouti *et al.*, 2001). Since then, personal resources have been added as complementary independent variables to job resources (Xanthopoulou *et al.*, 2007). The consequences explained by the JD-R model have been extended to include work attitudes (e.g. organizational commitment) and employee well-being (Bakker and Demerouti, 2017). Job crafting has also been added. Job crafting predicts future job demands, job resources and personal resources and has a negative effect on burnout and a positive effect on job engagement (Tims *et al.*, 2013). Lee *et al.* (2016) showed that the JD-R model can also be extended to the area of career development. According to Lee *et al.* (2016), career-related job and personal resources predict career-related outcome variables (e.g. career satisfaction and commitment) through work engagement. Through these various studies, the JD-R model has become increasingly expansive and complex.

The results of this study demonstrate that chronic job discrimination as an environmental factor moderates the relationships between the variables within the JD-R model. To date, little interest has been shown in studying chronic job discrimination within the context of the JD-R model. Although the JD-R model is effective in explaining the perceived psychological well-being of aged workers, it has not been able to explain chronic job discrimination that can occur as a negative result of aging and the globalization of the workforce. The results of this study contribute to the continued theoretical expansion of the JD-R model by showing that chronic job discrimination can moderate the relationships between variables in the JD-R model. Job discrimination should be considered in that it can buffer or mitigate the relationships among variables in the JD-R model.

Practical implications

This study provides information that can be used to aid organizations in establishing work environments conducive to improving the psychological well-being of their aged workers. First, an organization should provide aged workers with opportunities to learn a variety of new skills that are of interest and encourage them to use their high levels of expertise at work. Skill discretion means management and control over the use of skills (Karasek *et al.*, 1981), and organizations, supervisors and co-workers should respect the experienced skills of aged workers. Their skills can be valuable resources in situations such as on-the-job training, particularly if the skills are relevant to current tasks.

Second, while personal resources have been regarded as consistent personal traits, this study's results indicate that personal resources can be developed and managed (Xanthopoulou *et al.*, 2007) by increasing positive job resources according to COR theory and by sharing positive emotions such as joy, interest and contentment (Bakker and Leiter, 2010) based on the broaden-and-build theory of positive emotions (Fredrickson, 2001). Training programs for the promotion of personal resources thus need to be provided. In the meantime, outplacement programs can help companies to relieve the psychological anxiety of employees because of aging and increase these employees' psychological and emotional stability. The results of this study suggest that programs can be designed to promote self-esteem, optimistic thinking and coping strategies to support the psychological well-being of aged workers.

Finally, job enrichment has been proposed to maintain employees' well-being (Jalonen *et al.*, 2015). For example, it involves experiencing diverse tasks and learning new ones by implementing job rotations to develop employees' skills (Jalonen, 2015). However, this intervention can cause higher job demands, such as increased workload, and to bring employees to a situation where they need to make more decisions. In this regard, job crafting intervention, which takes into account the proactive modification job design such as a viewpoint of their job, the form or quantity of tasks, social interactions of the employees (Lee and Lee, 2018), may be more effective. Several empirical studies on job crafting intervention has been shown to influence employee well-being (Heuvel *et al.*, 2015) and performance (Van Wingerden *et al.*, 2017). As suggested in the intervention model of Bakker and Demerouti (2014), at the organizational level, job design and training should be provided to decrease job demands and increase job and personal resources. However, it is difficult to fully consider the characteristics and individual differences of older workers, and thus, strength-based intervention and job crafting intervention at the individual level will fill this gap.

Limitations

First, this study used only one variable as a sub-variable of job demands, job demands might not have been addressed as comprehensively as job resources or personal resources was. Variables such as work overload, time pressure and role ambiguity could be included among the variables of job demands in future studies, thereby providing additional information on the job demands that should be reduced to improve the psychological well-being of aged workers. Second, this study focused on aged workers (those workers 40 years or older) in the USA. Therefore, it is not possible to generalize from the results of the study to populations of workers under 40 years of age or workers living in other countries.

Recommendations for future research

First, future research needs to consider adopting a longitudinal design. In order to clarify causal relationships between variables, it is necessary to utilize longitudinal data. In particular, as chronic job discrimination is the result of prolonged and cumulative discrimination, longitudinal changes need to be measured to capture the attributes of chronic job discrimination properly. Second, future research needs to include minority individuals such as LGBT+ individuals and racial minorities in the sample to consider the various causes of job discrimination. Alternately, a study on complex job discrimination resulting from two or more causes could be conducted. Third, future studies should adopt multi-level analysis. Job discrimination can be considered in terms of organizational-level atmospheres as well as individual perceptions, and psychological well-being may be differently perceived by aged workers in various organizations. Multi-level analysis is needed to account for these differences.

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Further reading

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