

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

## Stress, Work Ability, and an Aging Workforce: A Study Among Women Aged 50 and Over

**This is a pre print version of the following article:**

*Original Citation:*

*Availability:*

This version is available <http://hdl.handle.net/2318/1562844> since 2017-05-25T13:16:01Z

*Published version:*

DOI:10.1037/str0000031

*Terms of use:*

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

Running Head: Stress, work ability, and aging

Viotti, S., Guidetti, G., Loera, B., Martini, M., Sottimano, I., & Converso, D. (2017). Stress, work ability, and an aging workforce: A study among women aged 50 and over. *International Journal of Stress Management*, 24(Suppl 1), 98–121. <https://doi.org/10.1037/str0000031>

Stress, work ability, and an aging workforce. A study among women aged 50 or over.

Sara Viotti, Gloria Guidetti, Barbara Loera, Mara Martini, Ilaria Sottimano, Daniela  
Converso

Dipartimento di Psicologia, Università degli Studi di Torino

#### Author note

Sara Viotti, Postdoctoral researcher in Work and Organizational Psychology.

Gloria Guidetti, Ph.D. candidate.

Barbara Loera, Assistant Professor in Psychometrics.

Mara Martini, Postdoctoral researcher in Work and Organizational Psychology.

Ilaria Sottimano, Ph.D. candidate.

Daniela Converso, Associate Professor in Work and Organizational Psychology.

The present study was funded by the Municipality of Turin (Italy). Name of the project:  
“Qualità della vita organizzativa, promozione del benessere e contrasto del disagio  
psicosociale: una ricerca intervento con le educatrici/insegnanti del Settore  
Educativo del Comune di Torino.” Holder of the fund: Daniela Converso.

Corresponding concerning this article should be addressed to Sara Viotti, Dipartimento  
di Psicologia, Università degli Studi di Torino, Via Verdi 8, 10124 Torino, Italy. Contact:  
[sara.viotti@unito.it](mailto:sara.viotti@unito.it); [sara.viotti@gmail.com](mailto:sara.viotti@gmail.com)

## STRESS, WORK ABILITY, AND AGING

**Stress, work ability, and an aging workforce. A study among women aged 50 or over.**

## Abstract

Work ability is a central concept in studies concerning the health of the aging workforce. The aim of the present study was to understand the role of work ability in the Job Demands-Resources model and, specifically, to establish whether and through which mechanisms it operates as a personal resource in the health-impairment process. Two-hundred and two female kindergarten teachers aged 50 and over completed self-reporting questionnaires. Data analyses were performed using structural equation model (SEM) and moderated regression analyses. The findings indicated that work ability plays a mediating role in the relationship between job characteristics, i.e., job demands and job resources, and exhaustion. Conversely, the results showed that work ability did not moderate the relationship between job demands and exhaustion.

Overall, the results suggest that work ability can be appropriately considered a crucial resource, which can affect workers' health and well-being by supporting workers to deal with job demands and optimally use job resources. From a practical point of view, the findings suggest that organizations should implement monitoring actions and intervention programs aimed at fine-tuning job demands and job resources over the entire work life. This can promote the conservation of work ability and, thus, sustain workers' well-being into the latter stages of their careers.

*Keywords.* Work ability, aging workers, emotional exhaustion, Job Demands-Resources Model, Conservation of Resources Theory, kindergarten teacher.

## STRESS, WORK ABILITY, AND AGING

The Job Demands-Resources model (JD-R) (Bakker, Demerouti, & Sanz-Vergel, 2014; Demerouti, Bakker, Nachreine, & Schaufeli, 2001) is a well-established model that assumes that work characteristics, i.e., job demands and job resources, affect worker well-being through two main processes: (1) the health-impairment process, which postulates that job demands lead workers to deplete energy, and (2) the motivational process, which postulates that job resources activate a gain cycle of energy, sustaining job engagement. An important extension of the original JD-R model is the inclusion of personal resources (Bakker et al., 2014), which are those aspects linked to resiliency and individuals' sense of their ability to successfully control and impact their work environments (Hobfoll & Shirom, 2001). Typical examples of personal resources are aspects of the self such as self-esteem or optimism. As recently pointed out by Airila et al. (2014), health-related aspects such as work ability can also be appropriately considered to be personal resources. This is consistent with the WHO's conceptualization of health as capital in which individuals may invest in order to achieve positive future health outcomes (Williamson & Carr, 2009).

Generally speaking, the debate concerning the way in which personal resources affect the relationship between job characteristics and psychological outcomes (e.g., job well-being) is still open. The JD-R model (Demerouti et al., 2001) postulates that personal resources may operate either as a mediator or moderator in this relationship. The role of the personal resources describing aspects of the self in the JD-R model was extensively investigated in the literature. In this context, the mediating, rather than the moderating role received stronger support (Huang, Wang, & You 2015; Xanthopoulou, Bakker, Demerouti, & Schaufeli, 2007). On the other hand, there is a lack of studies aimed at understanding the role of health-related resources in the JD-R model, particularly with regards to the health-impairment process.

The present paper focuses on a specific health-related resource, i.e., work ability. The



## STRESS, WORK ABILITY, AND AGING

JD-R model (Bakker et al., 2014; Demerouti et al., 2001) and the Conservation of Resources theory (COR) (Hobfoll 1989; Hobfoll & Shirom 2001) were used as theoretical frameworks to test two main hypotheses about work ability in a sample of kindergarten teachers aged 50 years old and over. The first is that diminished work ability may decrease the level of well-being at work as a consequence of both a worker's inability to accomplish job demands and of exposure to reduced job resources. From a statistical point of view, this means that the influence that job demands and job resources have on workers' well-being is mediated by work ability. The second assumption is that those who have a higher level of work ability are less vulnerable to the detrimental effects of job demands on well-being than those who report a lower level of work ability. This means that the relationship between job demands and well-being changes as a function of the moderator, i.e., work ability. To the authors' knowledge, no studies have previously tested this specific relationship pattern.

## THEORETICAL BACKGROUND

According to Tuomi et al. (1991), work ability (or "work capacity") describes the physical and intellectual resources on which workers rely to meet the demands posed by their work. Work ability is a central concept to our understanding of stress in the workplace, particularly regarding the well-being of aging workers. Unlike other personal resources (e.g., self-esteem, etc.), the literature has highlighted how work ability tends to decrease as a function of age (Converso, Viotti, Sottimano, Cascio, & Guidetti, 2015; Czaja, Sharit, Ownby, Roth, & Nair, 2001; Ilmarinen, 2001). However, there are few studies that have focused on the mechanisms by which work ability affects the relationship between job characteristics and well-being among older workers (e.g., 50 and over workers).

Moreover, work ability was rarely included in previous studies that have used the JD-R model. The few studies that have incorporated work ability consider it to be a final

## STRESS, WORK ABILITY, AND AGING

outcome of the health-impairment process rather than a personal resource that operates as a mediator and/or a moderator between work characteristics and worker well-being. For example, Hakanen et al.(2006) provided evidence of the relationship between job demands and work ability via exhaustion. The idea that work ability may be more thoroughly considered in the JD-R model as a crucial personal health-related resource that can affect workers' health and well-being was recently introduced by the study from Airila et al. (2014). Exploring the role of work ability in the motivational process, Airila et al., (2014) found that work ability predicted the level of work engagement 10 years later. However, they did not explore the health-impairment process and addressed neither job demands nor typical outcomes of the health-impairment process such as exhaustion. Moreover, they did not test the hypothesis that work ability, as a personal resource, may operate as a mediator and or a moderator between job characteristics and health outcomes. McGognale et al. (2014) also studied work ability using the JD-R model, testing its mediating role in the relationship of job and personal characteristics with withdrawal behaviors from work in various working populations, including aging workers. Although this study provided insights on the role of work ability in affecting worker behaviors, it did not investigate the role of work ability on the relationship between job characteristics and the worker's psychological response (e.g., emotional exhaustion).

The present study may expand existing knowledge by illustrating whether and how a well-established model such as the JD-R can be re-tailored to study the development of stress responses among older workers, who are a growing population within workforce.

Finally, an added value of the present study is that it specifically focuses on female workers 50 and over. The literature has highlighted specific patterns among women with regards to the relationship between age and work ability. In a study carried out by Ilmarinen, Tuomi, and Klockars (1997), work ability decreased more among women who were exposed

## STRESS, WORK ABILITY, AND AGING

to the same physical demands as men. In the same study, the annual rate of decline in work ability was higher for women at the age of 51 than it was for men of the same age.

Furthermore, women over 50 have to deal with menopause, which is an important event that significantly impacts women and may negatively affect work ability (Geukes, van Aalst, Nauta, & Oosterhof, 2012). Domestic work was also found to negatively affect work ability and well-being among women (Rotembeng et al., 2008). Besides those mentioned, few studies have focused on aging women workers.

### **The conceptualization of job demands and job resources in the JD-R model**

In accordance with the JD-R model, the psychosocial factors in any work environment can be classified in two broad categories: job demands and job resources.

*Job demands* refer to those physical, psychological, social, and organizational aspects of the job that require sustained physical and/or psychological (cognitive and emotional) efforts or skills and are therefore associated with certain physiological and/or psychological costs. Although job demands are not necessarily negative, they are generally associated with costs because workers, in order to accomplish demands, are required to use personal resources (i.e., energy, time, etc.) that may not be recovered (Hobfoll & Shirom, 2001).

*Job resources* refer to those physical, psychological, social, and organizational aspects of the job that are used to achieve work goals and stimulate personal growth, learning, and development (Demerouti et al., 2001). The concept of a resource is central in the COR theory, which states that the prime human motivation is to obtain, maintain, and accumulate resources (Hobfoll, 1989). Resources are defined in the COR theory as “those entities that either are centrally valued in their own right or act as means to obtain centrally valued ends” (Hobfoll, 2002, p. 307).

According to the JD-R model, every occupation and work context has its own specific job demands and job resources. In the present study, job demands and job resources relevant

## STRESS, WORK ABILITY, AND AGING

to the work context of kindergarten teachers were considered.

### **Job demands and job resources of kindergarten teachers**

In accordance with what is highlighted in the kindergarten teaching literature, relational, mental, and physical demands were taken into account in the present study. The demanding nature of these teachers' relationships with both children and parents has been highlighted (Camerino et al., 2011; Hall-Kenyon, Bullough, MacKay, & Marshall, 2014; Whitaker, Dearth-Wesley, & Gooze, 2015). Kelly and Berthelsen (1995) demonstrated in a qualitative study that kindergarten teachers have high expectations to meet the needs of their children and their parents, believing that it is their responsibility to support the child's whole development (e.g., emotional, social, physical, and cognitive). In the same study, it was also found that teachers' feelings of stress were related to the mental demands of the many non-teaching tasks required of them (e.g., paperwork and buying materials), as well as their efforts to practice and utilize early childhood philosophy. Also, physical demands are an integral part of the child-care workday; kindergarten teachers are constantly required to lift, bend, or carry children, as well as sit on small furniture or on the floor, in order to take care of, play with, and interact with children (Gratz, Claffey, King, & Scheuer, 2002).

In the present study, job resources were considered to consist of support from supervisors, support from colleagues, work meaning, and job autonomy.

Supervisory support has previously been studied in research on the human services workforce and has been found to critically shape the workplace experiences of child-care workers (Lizano & Barak, 2012). Also, relationships with coworkers represent significant aspects of the work experience in this context (Kelly & Berthelsen, 1995). For instance, classes are often co-managed with other teachers, and decisions about classroom activities need to be co-made. Therefore, both horizontal and vertical support may represent salient psychosocial factors in the kindergarten teaching context.

## STRESS, WORK ABILITY, AND AGING

Work meaning refers to the degree to which the work is perceived as meaningful, important, and constructive (Kristensen, Borritz, Villadsen, & Christensen, 2005). The perception that a job is part of a larger and more meaningful project with value for the whole community, as well as for the recipients of the service, is a vital resource for these workers and others in “helping professions” (Maslach, Schaufeli, & Leiter, 2001).

In a similar vein, the opportunity to exercise autonomy is a resource for kindergarten teachers because it may favor the planning of classroom activities and, thus, the maintenance of a stimulating learning environment for children. Job autonomy may also ensure that the strategies developed are in harmony with the pedagogic philosophy embraced by the teachers (Leana, Appelbaum, & Shevchuk, 2009).

### **The mediating role of work ability in the relationship of job demands and resources with exhaustion**

An important added value of the COR theory (Hobfoll, 1989) is its description of the energetic process. One of the principles of this process is that people invest resources in order to gain additional resources and to protect themselves against resource losses. A strong armamentarium of resources tends to generate other resources, thus creating resource caravans, which may result in positive outcomes such as greater well-being and fewer symptoms of job-related strain (Hobfoll, 2002). In the framework of the COR theory (Hobfoll, 1989), work ability can be considered as a health-related resource functioning to help in keeping the energetic process activate at work. According to Hobfoll and Shirom (2001), in personal as well as professional life, the energetic state of the body needs to be in line with the activities undertaken; this ensures people can effectively respond to the demands they face. Within boundaries, the energetic process is normally self-regulated.

Diminished ability is usually noticed by workers themselves, either directly (cognitive awareness) or indirectly (physical symptoms). The mobilization of additional effort to

## STRESS, WORK ABILITY, AND AGING

compensate for a worker's limited ability may be accompanied by fatigue, frustration, and a lack of creativity (Kiss, De Meester, & Braeckman, 2008). In the long term, this process may lead to a state of emotional and chronic exhaustion. Exhaustion is considered one of the main burnout symptoms (Maslach et al., 2001) and represents the long-term end state of the process of resources loss (Hobfoll & Shirom, 2001).

Based on the energetic (COR theory) (Hobfoll, 1989) and the health-impariment (JD-R) (Demerouti et al., 2001) process, it is plausible to hypothesize that job demands and reduced job resources may activate a loss cycle leading to diminished work ability and, in turn, to exhaustion.

From an empirical point of view, the mediating role of work ability between job demands/resources and exhaustion has not previously been empirically tested. However, the plausibility of its mediating role is suggested in previous studies, which reported empirical evidence suggesting a predictive role of job demands and resources on both emotional exhaustion (Bermejo-Toro, Prieto-Ursúa, & Hernández, 2015; Lizano & Barak, 2015; Van Droogenbroeck, Spruy, & Vanroelen, 2014) and work ability (Ghaddar, Ronda, & Nolasco, 2011; McGonagle et al., 2014; McGonagle, Fisher, Barnes-Farrell, & Grosch, 2015; Van den Berg, Elders, De Zwart, & Burdorf, 2009). To the authors' knowledge, no studies have specifically investigated the predictive role of work ability on exhaustion. However, there is some evidence that indicates that work ability plays a role as a resource with beneficial effects on well-being and other health-related variables in the long-term. Feldt, Hyvönen, Mäkikangas, Kinnunen, and Kokko (2009) found in a sample of white-collar workers that work ability was related to job involvement and organizational commitment. Similarly, Ahlstrom, Grimby-Ekman, Hagberg, and Dellve (2010) found that work ability predicted future health among women working in human service organizations. More recently, Airila et al. (2014) found in a sample of firefighters that work ability predicted future work

engagement.

### **The moderating role of work ability in the relationship between job demands and exhaustion**

Another central assumption of the JD-R model (Demerouti et al., 2001) is the buffering hypothesis, stating that resources moderate the impact of job demands on workers' well-being. The original JD-R model focused attention only on the resources of the job type. However, further extensions of the model suggest that personal resources (e.g., ability to work) may also play a buffering role in the health-impairment process (Bakker et al., 2001). This is also consistent with one of the basic principles of the COR theory (Hobfoll & Shirom, 2001), which states that those with greater resources are less vulnerable to resource loss and more capable of orchestrating resource gain; conversely, those with fewer resources are more vulnerable to resource loss and less capable of resource gain. Thus, work ability may be a crucial health-related resource that differentiates those who report stress as a consequence of high job demands (due to low work ability) from those who do not (due to high work ability), among older workers.

To the authors' knowledge, the moderating role of work ability has not previously been tested empirically. However, previous studies have indicated the moderating role of several personal resources in the health-impairment process. For example, in a longitudinal study, Makikangas and Kinnunen (2003) found that the association between job demands and psychological health was weaker among optimistic workers when compared with less optimistic employees. More recently, van Doorn, and Hülshager, (2015) found that core self-evaluation moderates the relationship between job demands and worker strain symptoms.

### **STUDY HYPOTHESES**

On the basis of the findings and arguments presented above, the authors formulated the following hypotheses:

## STRESS, WORK ABILITY, AND AGING

H1: Work ability mediates the relationship between job demands and emotional exhaustion. This implies that job demands positively predict exhaustion (condition a), job demands negatively predict work ability (condition b), and work ability negatively predicts exhaustion (condition c).

H2: Work ability mediates the relationship between job resources and emotional exhaustion. This implies that job resources negatively predict exhaustion (condition a), job resources positively predict work ability (condition b), and work ability negatively predicts exhaustion (condition c).

H3: Work ability moderates the relationship between job demands and exhaustion. In other words, the relationship between job demands and exhaustion is weaker when work ability is high.

## METHOD

### Data collection

Data were collected during February-June 2013 in a research program aimed at assessing the psychosocial risks of kindergarten teachers in the Municipality of Turin by means of a self-reporting questionnaire. Before data collection began, a series of meetings were conducted with the aim of sharing the objectives and the time plan of the research with both the school administrators and the workers. The self-reporting questionnaire was administered during work hours and during a series of meetings held in each school to all teachers interested in joining the research project. Once completed, the worker placed the questionnaire in an envelope and returned it to a researcher of the Department of Psychology (University of Turin). The voluntary nature of participation, the anonymity of the data, and the elaboration of the findings were ensured. In accordance with the legal requirements of the study country (Italy), no additional ethical approval was required because no patients were involved. Also, no treatment, including medical, invasive diagnostics, or procedures causing



## STRESS, WORK ABILITY, AND AGING

psychological or social discomfort, was administered to the participants. The research also conforms to the requirements of the 1995 Declaration of Helsinki (as revised in Edinburgh in 2000).

### Context of the research & participants

The Educational Sector of the Municipality of Turin, where the research took place, offers a service dedicated to children aged from 3 to 6 years and includes a total of 82 schools geographically distributed in the territory, providing service to 8,759 children (21.9% of the 3 to 6-year-old residents within the city). At the time of the research, 490 kindergarten teachers aged 50 or over worked for the city of Turin and represented 70.2% of all employed kindergarten teachers. All kindergarten teachers 50 and over were eligible to be included in the study. Only 342 could be reached,<sup>1</sup> and 244 questionnaires were returned to the research group. Of these, 202 teachers correctly filled out the questionnaire and were included in the study sample. All of the sample (100%) were woman aged from 50 to 62 years old ( $m = 55.89$ ,  $sd = 3.24$ ). Of these, 69.7% were married or living with a partner, 14.9% had at least one child under 19, and 31.7% took care of elderly parents. The average job seniority as a kindergarten teacher was 23.10 years ( $sd = 14.15$ ) and ranged from 3 to 41 years. The sample rated their health on a scale from 1 ("very problematic") to 5 ("excellent"); 65.3% of the sample rated their own health as good (3), 21.7% as very good (4), 10.4% as problematic (2), and 2.6% as very problematic (1), and 0% as excellent.

### Measures

---

<sup>1</sup> The response rate was 49.7%. Non-responders included about 30 teachers that at the time of the research were temporarily off-duty (due to family leave, long term illness- and injury-related absences) and about 20 teachers temporarily re-assigned to other functions within educational services. Moreover, three schools (including about 60 aged 50 or over kindergarten teachers) were excluded from the survey because they were dealing with an important reorganization. However, the comparisons of age and gender distributions between the study sample ( $n = 202$ ) and the universe ( $n=490$ ) suggests the exclusion of selection bias regarding these variables.  $\chi^2$  ( $\chi^2 = 23$ ;  $p = .63$ ) revealed no significant differences regarding gender between the study sample (male = 0; female = 202) and the universe (male = 3; female = 487). Similarly, ANOVA ( $F = 2.74$ ,  $p = .09$ ) did not show a significant difference in the age distribution between the study sample ( $m = 55.89$ ,  $sd = 3.24$ ;  $min = 50$ ,  $max = 62$ ) and the universe ( $m = 56.44$ ,  $sd = 3.32$ ;  $min = 50$ ,  $max = 65$ ).

## STRESS, WORK ABILITY, AND AGING

The data were obtained using a self-reporting questionnaire with two sections. The first section collected socio-demographic and professional data. The second section used scales to measure job demands, job resources, work ability, and emotional exhaustion.

*Job demands.* Relational demands (RD) were measured with five items referring to relationships with children and families (e.g., “the demands of our recipients are exorbitant”) from the Customer-Related Social Stressors (CSS) inventory developed by Dormann and Zapf (2004). The five items had a Cronbach’s alpha ( $\alpha$ ) of .92. Mental demands (MD) and physical demands (PD) were measured with two subscales from the Job Content Questionnaire (JCQ) (Karasek, 1985), containing, respectively, three items (e.g., “my job is mentally demanding,”  $\alpha = .71$ ) and four items (e.g., “my job is physically demanding”;  $\alpha = .77$ ). Responses to all sub-scales were given on a four-point scale ranging from 1 (“strongly disagree”) to 4 (“strongly agree”).

*Job resources.* In this context, four subscales were considered: *meaning of work* (WM, five items,  $\alpha = .73$ , e.g., “Is your work meaningful?”), *job autonomy* (JA, three items,  $\alpha = .64$ , e.g., “My job allows me to make a lot of decisions on my own”), *support from superiors* (SS, four items,  $\alpha = .89$ , e.g., “My supervisor is helpful in getting the job done”), and *support from colleagues* (SC, five items,  $\alpha = .88$ , e.g., “People I work with are competent in doing their jobs”). The first was drawn from the Copenhagen Psychosocial Questionnaire by Kristensen et al. (2005) and the other three from the Job Content Questionnaire (JCQ) (Karasek, 1985). Responses to all sub-scales were given on a four-point scale ranging from 1 (“strongly disagree”) to 4 (“strongly agree”).

*Perceived work ability* (WA). The authors employed a modified version of the Work Ability Index (Tuomi, Ilmarinen, Jahkola, Katajarinne, & Tulkki, 1998) specifically aimed at assessing perceived work ability, as suggested by McGonagle et al. (2014, 2015). It contained five items: (1) current work ability compared with lifetime best (score range: 1-10); (2) work

## STRESS, WORK ABILITY, AND AGING

ability in relation to mental and physical demands (score range : 2-10); (3) estimated work impairment due to diseases (score range: 1-6); (4) self-prognosis of work ability for the next two years (score range: 1-4 or 7); and (5) mental resources (score range: 1-4). The Cronbach alpha was .79.

*Emotional exhaustion (EX).* Emotional exhaustion was measured using nine items (e.g., “I feel burned out from my work”) from the Maslach Burnout Inventory – Educational Survey (Maslach & Jackson, 1986). The scales had good internal consistency ( $\alpha = .84$ ). Responses were provided on a scale ranging from 0 (“never”) to 6 (“every day”).

*Control variables.* The literature recognizes perceived health, age, and job tenure as potential confounders for both work ability (Ilmarinen, Tuomi, & Seitsamo, 2005; McGonagle et al., 2014, Van den Berg et al., 2009) and exhaustion (Maslach et al., 2001). In addition, some studies in the work-life-balance field highlighted that, especially in the case of women (Payne & Doyal, 2010), home demands such as parental care or childcare may affect work exhaustion (Bekker, Croon, & Bressers, 2005) and work ability (Rotemberg et al., 2008).

### **Analysis Strategy**

Analyses were performed using SPSS 21 and AMOS 20.

Prior to testing the proposed hypotheses, the factorial structure of the considered constructs were checked for accuracy, as were the associations between them. In order to assess the psychometric proprieties of the four constructs (i.e., job demands, job resources, work ability, and exhaustion), a series of Confirmatory Factor Analyses (CFAs) were performed. At first, each construct was tested separately. After that, a CFA including all constructs was performed. With regard to job demands and job resources, second-order latent factors on which the specific job demands and job resources subscales are presumed to load were included in the analysis. Because no serious violations of the normal distribution were

## STRESS, WORK ABILITY, AND AGING

found (all the skewness and kurtosis values of the variables considered were within  $\pm 1$ ), maximum likelihood (ML) was employed as an estimation method. The fit of the model was assessed with the ratio of  $\chi^2$  to the degrees of freedom (df), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA). According to Kline (2005), a  $\chi^2$ /df ratio of 3 or less indicates a good model fit and less than 2 indicates an excellent model fit. For TLI and CFI indices, values higher than .90 and .95 are considered indicators for good and excellent model fit, respectively (Bentler, 1995; Hoyle, 1995). A value of the SRMR equal to or less than .09 indicates good fit (Hu & Bentler, 1999). Finally, a RMSEA value lower than .06 indicates acceptable model fit (Byrne, 2002).

Pearson's correlations were performed in order to check the significance and the direction of the relationships among all the variables considered. In addition, Pearson's correlations (for continuous variables) and ANOVA (when independent variables were categorical) were employed to assess the associations of the potential confounders (i.e., health, age, job seniority, and family duties) with work ability and exhaustion.

In order to test the relationships hypothesized in the sample, structural equation modeling (SEM) was conducted using ML. The fit of the model was assessed with the ratio of  $\chi^2$  to the degrees of freedom (df), the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA).

The mediating effect of work ability on the relationships of job demands and resources with exhaustion was assessed using the procedure outlined by Baron and Kenny (1989). Generally, their method requires significance testing of the relationships between a) the independent variable (X, i.e., job demands and job resources) and the dependent variable (Y, i.e., work exhaustion), b) the independent variable (X, i.e., job demands and job

## STRESS, WORK ABILITY, AND AGING

resources) and the mediator (M, i.e., work ability), and c) the mediator and the dependent variable (M and X, i.e., work ability and work exhaustion). Given these conditions, mediation is proven if the value of the path  $X \rightarrow Y$  decreases (partial mediation) or stops being significant (total mediation) after controlling for the paths  $X \rightarrow M \rightarrow Y$ . However, because several recent statistical simulation studies showed that the ability to detect mediated effects using the Baron and Kenny (1986) method can be very low (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002), the bootstrapping procedure was applied to test the significance of the indirect effects (Cheung & Lau, 2008).

Moderated hierarchical regression analyses were employed to examine the moderating role of work ability between job demands and exhaustion. Predictor variables were entered in three successive steps: (1) control variables were entered, (2) a standardized index of job demands and job resources was included in the model, and (3) a standardized index of work ability, as well as the interaction term for job demands and work ability (that is the product between the two variables) were included. In this last step, the interaction term for job demands and job resources was also included. In this way, although not specifically one of the aims of the study, the buffering role of job resources in the relationship between job demands and exhaustion was checked.

## RESULTS

### Preliminary analyses

As shown in Table 1, the goodness-of-fit indexes demonstrate the adequacy of the factorial structures of all the constructs considered. With regard to job demands, the tridimensional structure was confirmed. All items significantly loaded on their corresponding factors ( $.30 \leq \lambda \leq .87$ ), and all the paths from second-order latent factors to first-order latent factors were positive and significant ( $\gamma_{JD \rightarrow RD} = .24$ ;  $\gamma_{JD \rightarrow MD} = .95$ ;  $\gamma_{JD \rightarrow PD} = .93$ ). Concerning job resources, the four-factor structure was supported as well. All the paths from second-

## STRESS, WORK ABILITY, AND AGING

order latent factors to first-order latent factors were significant ( $\gamma_{JR \rightarrow WM} = .30$ ;  $\gamma_{JR \rightarrow JA} = .64$ ;  $\gamma_{JR \rightarrow SS} = .58$ ;  $\gamma_{JR \rightarrow SC} = .61$ ). Each observed variable was significantly associated with its corresponding first-order latent factor as expected ( $.34 \leq \lambda \leq .90$ ). Separated CFAs also supported the adequacy of the factorial structure of both work exhaustion ( $.49 \leq \lambda \leq .92$ ) and work ability ( $.55 \leq \lambda \leq .81$ ). The last CFA, which included all investigated constructs, showed a good fit. Each observed variable continued to be significantly associated with its corresponding latent factor. All the correlations between factors were significant ( $\phi_{JD-EX} = .41$ ;  $\phi_{JR-EX} = -.54$ ;  $\phi_{JD-WA} = -.41$ ;  $\phi_{JR-WA} = .66$ ;  $\phi_{EX-WA} = -.77$ ) with the exception of the correlation between job demands and job resources ( $\phi_{JD-JR} = -.11$ ).

Table 2 shows the means, standard deviations, and Pearson's correlations among subscales.

### Testing for mediation

As suggested by Baron and Kenny (1989), in order to test the mediating role of work ability on the two types of job characteristics and exhaustion, a non-mediated model was performed in the first step. The model showed an acceptable fit to the data (see Table 3). All observed variables were significantly associated with their corresponding latent factors. Job demands positively predicted exhaustion ( $\gamma = .31$ ;  $p = .00$ ), whereas job resources negatively predicted exhaustion ( $\gamma = -.46$ ;  $p = .00$ ), confirming condition a) ( $X \rightarrow Y$ ) for both H1 and H2. Among the control variables, only perceived health showed a significant association with exhaustion ( $\gamma = -.34$ ;  $p = .00$ ). Age, job seniority, and family duties did not significantly affect exhaustion, nor was the covariation between job demands and job resources found to be significant.

In the second step, another measurement model was performed in which work ability was included (see Figure 1). The model fit was good, and all observed variables were

## STRESS, WORK ABILITY, AND AGING

significantly associated to the latent constructs, as expected. Among the control variables, only perceived health was found to inversely affect work ability ( $\gamma = -.41$ ;  $p = .00$ ). The covariation between job resources and job demands was not significant. Work ability was significantly negatively predicted by job demands ( $\gamma = -.29$ ;  $p = .00$ ) and positively by job resources ( $\gamma = .67$ ,  $p = .00$ ). Work ability negatively predicted exhaustion ( $\beta = -.62$ ;  $p = .00$ ). These results confirmed conditions b) ( $X \rightarrow M$ ) and c) ( $M \rightarrow Y$ ) for both H1 and H2. After including work ability in the model, the direct effects on emotional exhaustion of both job demands ( $\gamma = .14$ ,  $p = .08$ ) and job resources ( $\gamma = -.11$ ,  $p = .41$ ) decreased. In both cases, the path stopped being significant, suggesting the presence of full mediation. In the last line of Table 3, the goodness of fit indexes of the final model, in which the non-significant paths were deleted ( $JD \leftrightarrow JR$ ,  $JR \rightarrow EX$ ,  $JD \rightarrow EX$ ,  $Health \rightarrow EX$ ,  $age \rightarrow EX$ ,  $job\ seniority \rightarrow EX$ ,  $family\ duties \rightarrow EX$ ,  $job\ seniority \rightarrow EX$ ,  $family\ duties \rightarrow EX$ ,  $age \rightarrow WA$ ,  $job\ seniority \rightarrow WA$ ,  $family\ duties \rightarrow WA$ ,  $job\ seniority \rightarrow WA$ ,  $family\ duties \rightarrow WA$ ), were reported. In this final model, the bootstrapping test was performed, confirming the presence of an indirect effect of both job demands and job resources on exhaustion via work ability. Therefore, both H1 and H2 were confirmed. In accordance with the conclusions using the Baron and Kenny method, the indirect effect of work ability seemed to be stronger between job resources and exhaustion ( $\beta = -.48$ ;  $CI [-.62, -.34]$ ,  $p = .00$ ) than between job demands and exhaustion ( $\beta = .25$ ;  $CI [.13, .36]$ ,  $p = .00$ ).

### Testing for the moderating effect

Table 4 reports the results of the moderated hierarchical regression. In the first step, the control variables were entered;  $R^2$  was significant ( $.17$ ,  $p = .00$ ). Among the variables included in the model, only perceived health significantly predicted exhaustion ( $\beta = .40$ ,  $p = .00$ ). In the second step, when the main effects of job demands and job resources were

## STRESS, WORK ABILITY, AND AGING

entered, a significant change in  $R^2$  (.24,  $p = .00$ ) was observed, explaining the 41% of the variance. In this step, in addition to perceived health ( $\beta = .28$ ,  $p = .00$ ), job demands ( $\beta = .37$ ,  $p = .00$ ) and job resources ( $\beta = -.28$ ,  $p = .00$ ) also demonstrated significant  $\beta$  values. In the third step, the  $\Delta R^2$  was significant (.12), and  $R^2$  reached .53. Perceived health ( $\beta = .14$ ,  $p = .01$ ) and work ability ( $\beta = -.44$ ,  $p = .00$ ) significantly predicted exhaustion. On the other hand, the main effects of job demands and job resources stop being significant, confirming the mediating role of work ability on the relationship between both types of job characteristics and exhaustion. However, no interaction effects were found to be significant, leading to a rejection of H3.

## DISCUSSION

The aim of the present study was to investigate the relationships between job demands, job resources, work ability, and emotional exhaustion. Specifically, the study attempted to understand the role of work ability in the JD-R model (Bakker et al., 2014; Demerouti et al., 2001) and establish whether and through which mechanisms it operates as a personal resource in the health-impairment process.

The findings demonstrated the mediating role of work ability on the relationship between job characteristics, i.e., job demands and job resources, and exhaustion. As expected, both job demands and job resources significantly predicted exhaustion. However, job demands showed a stronger association with exhaustion than job resources. This result is in line with the findings of previous studies (Alarcon, 2011; Fernet, Guay, Senécal, & Austin, 2012; Van Droogenbroeck et al., 2014) and confirms one of the main principles of the JD-R model (Bakker et al., 2014; Demerouti et al., 2001): job demands, as initiators of the depletion of energy process, are strongly associated with stress outcomes such as exhaustion. In contrast, job resources, as initiators of the motivational process, would be strongly associated with motivational outcomes such as work engagement. Also, the hypotheses that



## STRESS, WORK ABILITY, AND AGING

job demands and job resources predict work ability were fully confirmed. Work ability was more strongly associated with resources than demands. This result partially contradicts the traditional trend of the literature on work ability, which focuses more on demands than resources in identifying possible predictors (Van den Berg et al., 2009). Nevertheless, this result goes in the direction indicated by Airila et al. (2014) that work ability, as a health-related resource, is often strongly associated with the variables involved in the motivational process such as job resources. Finally, confirming the suggestion from previous studies, work ability emerged as a strong predictor of emotional exhaustion (Feldt et al., 2009; Ahlstrom et al., 2010).

On the other hand, the moderating role between demands and exhaustion was not supported by the findings. Although it contradicts H3 of the present study and the postulations of the authors of the JD-R model (e.g. Bakker et al., 2014), this result is not completely surprising. For example, Xanthopoulou et al. (2007), tested both the mediating and the moderating role of three personal resources (self-efficacy, organizational-based self-esteem, and optimism) in the JD-R model and found evidence of the first relationship pattern but not for the second. These results suggest that, although adaptation to one's work environment may differ between workers due to differing personal resources, it is important to recognize that the level of personal resources is strongly affected by job characteristics (i.e., job demands and job resources) (Xanthopoulou et al., 2007). In this perspective, mediation, which includes the path from job characteristics to work ability (and in turn, the path to exhaustion), rather than moderation would be more appropriate to describe the role of work ability on the variables studied.

An unexpected finding is the lack of evidence of the buffering role job resources play in the relationship between job demands and exhaustion, which was largely demonstrated in the previous literature across various populations (Bakker et al., 2014), but not among older

## STRESS, WORK ABILITY, AND AGING

workers. Therefore, a possible explanation is that among older workers, the mechanisms underlying the health-impairment process may be partially different from those of the general working population. This interpretation is consistent with previous studies that have highlighted the impact of work characteristics on worker health varies across age cohorts (e.g., Guglielmi, Bruni, Simbula, Fraccaroli, & Depolo, 2015; Shultz, Wang, Crimmins, & Fisher, 2010; Sluiter, 2006). Future studies should investigate whether there are any differences across age cohorts in which job demands and job resources interact to affect worker well-being.

With regard to the control variables, with the exception of perceived health, none of the variables were found to be significantly related to work ability and exhaustion. One explanation for this finding, which contrasts with most of the previous literature, is the age homogeneity within the sample; this may create range restriction, thus limiting the effect of all the variables on work ability and exhaustion. In studies involving samples with limited age ranges, similar results are more common (McGonagle et al., 2015).

Finally, CFA and SEM confirmed that all the specific job demands and job resources selected are relevant to the work context of kindergarten teachers. In particular, the highest loading (see Figure 1) was reported by physical demands on the latent factor of job demands. This result highlights that, although understudied among kindergarten teachers, physical demands are an important work characteristic that merits specific attention in future studies in order to clarify whether it may also represent an important risk factor for the health of these professionals (Gratz et al., 2002), especially in country as Italy in which age of the population in the educational sector is increasing.

**Study limitations**

The present study has some limitations. The most relevant is its cross-sectional design. Future research should employ a longitudinal design in order to explore the cross-

## STRESS, WORK ABILITY, AND AGING

lagged associations between the constructs examined. Indeed, as suggested by Airila et al. (2014) and the COR theory (Hobfoll 1989; Hobfoll & Shirom, 2001), the relationship between all these constructs may be cyclic rather than unidirectional. Longitudinal studies may also be useful for understanding whether and how the relationship between these constructs changes over time.

Moreover, the representativeness of the results may be a limiting factor. The present study was conducted among a specific professional group, kindergarten teachers who work with children aged 3-6. Therefore, caution should be exercised when generalizing the results to older populations employed in other occupational sectors, as well as to teachers of other grades. This is because in different work contexts, relationships among variables may also be different.

Another limitation is that this study focus only on workers aged 50-62. Studies involving groups representing various ages and professions may find differences across age, class, and workplace contexts.

A final concern pertains to the generalization of these results to the entire working population of kindergarten teachers aged 50 or over employed in Italy, as well as in other countries. Even though the data needed to perform this analysis are not available, the authors believe that the generalization of the results to the national level would be appropriate because the characteristics of the sample from the point of view of age, gender, and job seniority are quite similar throughout the Italian teacher population (Eurostat, 2014). On the other hand, the generalization of these results to older kindergarten teachers in other countries may raise more concerns because the Italian educational working population has specific characteristics (Organization for Economic Co-operation and Development, OECD, 2014). For example, the average age of teachers in Italy is higher than the OECD countries average (Italy = 48.9; OECD countries = 44). Moreover, Italy has one of the highest percentages of

## STRESS, WORK ABILITY, AND AGING

woman in the educational sector (Italy = 77.4%; OECD countries = 68%). Future studies should extend this research to other municipalities in Italy, as well as to other OECD countries.

### CONCLUSION

These results indicate that the mediating model built in the present study, based on the COR theory principle, can explain depletion/gain resource processes among workers aged 50-62. Moreover, these results suggest that work ability plays a key role in the stress process. This role seems to be more complex than previously posed in medical and psychological research, which treated work ability merely as a final consequence of the resource depletion process (Airila et al., 2014; Hakanen et al., 2006; Van den Berg et al., 2009). Instead, the present findings suggest that work ability can be seen as an important health resource capable of sustaining workers' well-being.

In general, the present study confirms the importance of continuing research aimed at identifying the role of specific job characteristics in predicting work ability. In line with previous studies, this study highlighted that job characteristics play an important role in explaining either the decline or the enhancement of work ability (McGonagle et al., 2014, 2015).

The present study also has practical implications. In Italy, workers with impaired work ability rarely consider early retirement because this choice may have a negative impact on their income during the retirement period. Therefore, the risk is that workers decide to stay at work despite negative self-evaluations of work ability (Argentin, 2013). Poor work ability (due to job demands or other factors such as aging) may activate a loss spiral that leads to chronic exhaustion. As the literature points out, exhaustion is associated with very serious consequences such as low performance, absenteeism, presenteeism, and diminished quality of service (e.g., D'Errico et al., 2013). To prevent this, organizations should implement actions

## STRESS, WORK ABILITY, AND AGING

aimed at monitoring and adjusting job demands and job resources over the entire working life in order to protect/sustain work ability and allow a greater number of workers to continue working in optimal conditions in the latter stages of their careers. Moreover, the present study also suggests that specific attention should be paid to older workers during the health surveillance that occurs in organizations in observance of the law in EU countries (in accordance with the provision of the Council Directive n. 89/391/EE on the safety and health of workers at work).

The present study suggests that various types of intervention programs may be implemented in order to sustain work ability, and thus well-being, among older kindergarten teachers. On one hand, job characteristics were found to be determinants for exhaustion via work ability. In this view, interventions at the task level, such as job re-design programs, or ergonomic modifications of the work environment, which take into account the specific needs of older workers may be crucial for promoting a healthy and satisfactory working life among this segment of workers.

On the other hand, health status was also found to be a strong predictor of work ability. Therefore, health promotion programs aimed at enabling older workers to increase control over their health, as well as actions aimed at encouraging workers to adopt a healthier lifestyle (e.g., diet modification, introduction of low intensity physical activities), may be beneficial. Finally, because the job of kindergarten teachers may involve an over-stimulation of the musculoskeletal system, particularly of the lumbar area, health promotion programs may also include posture exercise classes aimed at lessening and preventing musculoskeletal pain and diseases.

## References

Ahlstrom, L., Grimby-Ekman, A., Hagberg, M., & Dellve, L. (2010). The work ability

## STRESS, WORK ABILITY, AND AGING

index and single-item question: associations with sick leave, symptoms, and health—a prospective study of women on long-term sick leave. *Scandinavian Journal of Work, Environment & Health*, 404-412. doi: 10.5271/sjweh.2917

Airila, A., Hakanen, J. J., Schaufeli, W. B., Luukkonen, R., Punakallio, A., & Lusa, S. (2014). Are job and personal resources associated with work ability 10 years later? The mediating role of work engagement. *Work & Stress*, 28(1), 87-105. doi: 10.1080/02678373.2013.872208

Alarcon, G. M. (2011). A meta-analysis of burnout with job demands, resources, and attitudes. *Journal of Vocational Behavior*, 79(2), 549-562. doi: 10.1016/j.jvb.2011.03.007

Argentin, G. (2013). Come cambia la forza lavoro nel sistema scolastico. Le tendenze demografiche degli insegnanti italiani, 1990-2010. *Sociologia del Lavoro*, 131, 74-88. doi: 10.3280/SL2013-131005

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD-R approach. *Annual Review of Organizational Psychology and Organizational Behavior*, 1, 389-411. doi: 10.1146/annurev-orgpsych-031413-091235

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality & Social Psychology*, 51, 1173-1182. doi: 10.1037/0022-3514.51.6.1173

Bekker, M. H., Croon, M. A., & Bressers, B. (2005). Childcare involvement, job characteristics, gender and work attitudes as predictors of emotional exhaustion and sickness absence. *Work & Stress*, 19(3), 221-237. doi: 10.1080/02678370500286095

Bentler, P. M. (1995). *EQS structural equations program manual*. Encino, CA: Multivariate Software.

Bermejo-Toro, L., Prieto-Ursúa M., & Hernández V. (2015) Towards a model of teacher well-being: personal and job resources involved in teacher burnout and

## STRESS, WORK ABILITY, AND AGING

engagement. *Educational Psychology*, 1-21. doi: 10.1080/01443410.2015.1005006

Byrne B. M. (1998). *Structural Equation Modeling with LISREL, PRELIS and SIMPLIS: Basic Concepts, Applications and Programming*. Mahwah, NJ: Lawrence Erlbaum Associates.

Camerino, D., Fichera, G. P., & Punzi, S., Camapnini P., Conway P.M., Prevedello P.M., & Costa G. (2011). Work-related stress in nursery school educators in the Venice and Marghera districts. *La Medicina del Lavoro*, 102(3), 262-274.

Cheung, G. W, Lau, R. S. (2008). Testing mediation and suppression effects of latent variables: Bootstrapping with structural equation models. *Organizational Research Methods*. 11(2), 296-325. doi: 10.1177/1094428107300343

Converso, D., Viotti, S., Sottimano, I., Cascio, V., & Guidetti, G. (2015). Work ability, psycho-physical health, burnout, and age among nursery school and kindergarten teachers: a cross-sectional study. *La Medicina del Lavoro*, 106(2), 91-108.

Council Directive of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (89/391/EEC). Retrieved July, 26, 2015: <https://osha.europa.eu/it/legislation/directives/the-osh-framework-directive/1>

Czaja, S. J., Sharit, J., Ownby, R., Roth, D. L., & Nair, S. (2001). Examining age differences in performance of a complex information search and retrieval task. *Psychology and Aging*, 16(4), 564-579. <http://dx.doi.org/10.1037/0882-7974.16.4.564>

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, 86, 499-512. doi: 10.1037/0021-9010.86.3.499

D'Errico, A., Viotti, S., Baratti, A., Mottura, B., Barocelli, A. P., Tagna, M., ... & Converso, D. (2013). Low back pain and associated presenteeism among hospital nursing staff. *Journal of Occupational Health*, 55(4), 276-283. doi:10.1016/j.ics.2005.02.051

## STRESS, WORK ABILITY, AND AGING

- Dormann, C., & Zapf, D. (2004). Customer-related social stressors and burnout. *Journal of Occupational Health Psychology*, 9, 61-82. doi: 10.1037/1076-8998.9.1.61
- Eurostat (2014). *Key Data on Education in Europe. Education, Audiovisual and Culture Executive Agency*, Retrieved from: [http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ\\_thpertch&lang=en](http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=educ_thpertch&lang=en), 2014
- Feldt, T., Hyvönen, K., Mäkikangas, A., Kinnunen, U., & Kokko, K. (2009). Development trajectories of Finnish managers' work ability over a 10-year follow-up period. *Scandinavian Journal of Work, Environment & Health*, 37-47. doi: 10.5271/sjweh.1301
- Fernet, C., Guay, F., Senécal, C., & Austin, S. (2012). Predicting intraindividual changes in teacher burnout: The role of perceived school environment and motivational factors. *Teaching and Teacher Education*, 28(4), 514-525. doi: 10.1016/j.tate.2011.11.013
- Geukes, M., van Aalst, M. P., Nauta, M. C., & Oosterhof, H. (2012). The impact of menopausal symptoms on work ability. *Menopause*, 19(3), 278-282. doi: 10.1097/gme.0b013e31822ddc97
- Ghaddar, A., Ronda, E., & Nolasco, A. (2011). Work ability, psychosocial hazards and work experience in prison environments. *Occupational Medicine*, 61(7), 503-508. doi: 10.1093/occmed/kqr124
- Gratz, R. R., Claffey, A., King, P., & Scheuer, G. (2002). The physical demands and ergonomics of working with young children. *Early Child Development and Care*, 172(6), 531-537. doi: 10.1080/03004430215109
- Guglielmi, D., Bruni, I., Simbula, S., Fraccaroli, F., & Depolo, M. (2015). What drives teacher engagement: a study of different age cohorts. *European Journal of Psychology of Education*, 1-18. doi: 10.1007/s10212-015-0263-8
- Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work



## STRESS, WORK ABILITY, AND AGING

engagement among teachers. *Journal of School Psychology*, 43(6), 495-513. doi: 10.1016/j.jsp.2005.11.001

Hall-Kenyon, K. M., Bullough, R. V., MacKay, K. L., & Marshall, E. E. (2014). Preschool teacher well-being: A review of the literature. *Early Childhood Education Journal*, 42(3), 153-162. doi: 10.1007/s10643-013-0595-4

Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *American Psychologist*, 44(3), 513-524. doi: 10.1037/0003-066X.44.3.513

Hobfoll, S. E. (2002). Social and psychological resources and adaptation. *Review of General Psychology*, 6(4), 307-324. doi: 10.1037/1089-2680.6.4.307

Hobfoll, S. E. & Shirom, A. (2001). Conservation of resources theory: Applications to stress and management in the workplace. In R. T., Golembiewski (Ed.), *Handbook of Organizational Behavior* (2<sup>nd</sup> ed.) (pp. 57-80). New York, NY, US: Marcel Dekker.

Hoyle, R. H. (1995). *Structural Equation Modeling*. Thousand Oaks, CA: Sage Publications Inc.

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1): 1-55. doi:10.1080/10705519909540118

Huang, J., Wang, Y., & You, X. (2015). The Job Demands-Resources Model and Job Burnout: The Mediating Role of Personal Resources. *Current Psychology*, 1-13. doi:10.1007/s12144-015-9321-2

Ilmarinen, J. E. (2001). Aging workers. *Occupational and Environmental Medicine*, 58(8), 546-546. doi: 10.1136/oem.58.8.546

Ilmarinen, J., Tuomi, K., & Seitsamo, J. (2005). New Dimensions of Work Ability. *International Congress Series*, 1280, 3-7. doi: 10.1016/j.ics.2005.02.060.

Ilmarinen, J., Tuomi, K., & Klockars, M. (1997). Changes in the work ability of active

## STRESS, WORK ABILITY, AND AGING

employees over an 11-year period. *Scandinavian Journal of Work, Environment & Health*, 49-57.

Karasek, R. (1985). *Job content instrument questionnaire and user's guide, Version 1.1*. Los Angeles CA: Department of Industrial and Systems Engineering, University of Southern California.

Kelly, A. L., & Berthelsen, D. C. (1995). Preschool teachers' experiences of stress. *Teaching and Teacher Education*, 11(4), 345-357. doi: 10.1016/0742-051X(94)00038-8

Kiss, P., De Meester, M., & Braeckman, L. (2008). Differences between younger and older workers in the need for recovery after work. *International Archives of Occupational and Environmental Health*, 81(3), 311-320. doi: 10.1007/s00420-007-0215-y

Kline, R. B. (2005). *Principles and practices of structural equation modelling* (2<sup>nd</sup> ed.). New York: Guilford Press.

Kristensen, T., Borritz, M., Villadsen, E., & Christensen, K. B. (2005). The Copenhagen burnout inventory: A new tool for the assessment of burnout. *Work & Stress*, 19, 192-207. doi: 10.1080/02678370500297720

Leana, C., Appelbaum, E., & Shevchuk, I. (2009). Work process and quality of care in early childhood education: The role of job crafting. *Academy of Management Journal*, 52(6), 1169-1192. doi: 10.5465/AMJ.2009.47084651

Lizano, E. L., & Barak, M. M. (2012). Workplace demands and resources as antecedents of job burnout among public child welfare workers: A longitudinal study. *Children and Youth Services Review*, 34(9), 1769-1776. doi: 10.1016/j.childyouth.2012.02.006

Lizano, E. L., & Barak, M. M. (2015). Job burnout and affective wellbeing: A longitudinal study of burnout and job satisfaction among public child welfare

## STRESS, WORK ABILITY, AND AGING

workers. *Children and Youth Services Review*, 55, 18-28. doi:

10.1016/j.chilyouth.2015.05.005

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods*, 7(1), 83-104. doi: 10.1037/1082-989X.7.1.83

Mäkikangas, A., & Kinnunen, U. (2003). Psychosocial work stressors and well-being: Self-esteem and optimism as moderators in a one-year longitudinal sample. *Personality and Individual Differences*, 35(3), 537-557. doi:10.1016/S0191-8869(02)00217-9

Maslach C. & Jackson S. E. (1986). *Maslach Burnout Inventory Manual* (2<sup>nd</sup> ed.). Palo Alto, CA: Consulting Psychologist Press.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology*, 52(1), 397-422. doi: 10.1146/annurev.psych.52.1.397

McGonagle, A. K., Barnes-Farrell, J. L., Di Milia, L., Fischer, F. M., Hobbs, B. B., Iskra-Golec, I., ... & Smith, L. (2014). Demands, resources, and work ability: A cross-national examination of health care workers. *European Journal of Work and Organizational Psychology*, 23(6), 830-846. doi: 10.1080/1359432X.2013.819158

McGonagle, A. K., Fisher, G. G., Barnes-Farrell, J. L., & Grosch, J. W. (2015). Individual and work factors related to perceived work ability and labor force outcomes. *Journal of Applied Psychology*, 100(2), 376-98. doi: 10.1037/a0037974

OECD, Organization for Economic Cooperation and Development (2014). *Education Indicators in Focus*. Retrieved from: [http://www.oecd.org/education/skills-beyond-school/EDIF%202014--No21%20\(eng\).pdf](http://www.oecd.org/education/skills-beyond-school/EDIF%202014--No21%20(eng).pdf)

Payne, S., & Doyal, L. (2010). Older women, work and health. *Occupational Medicine*, 60(3), 172-177. do: 10.1093/occmed/kqq030

Rotenberg, L., Portela, L. F., Banks, B., Griep, R. H., Fischer, F. M., & Landsbergis,

## STRESS, WORK ABILITY, AND AGING

P. (2008). A gender approach to work ability and its relationship to professional and domestic work hours among nursing personnel. *Applied Ergonomics*, 39(5), 646-652. doi:

10.1016/j.apergo.2008.02.013

Shultz, K. S., Wang, M., Crimmins, E. M., & Fisher, G. G. (2010). Age differences in the Demand—Control Model of work stress an examination of data from 15 European countries. *Journal of Applied Gerontology*, 29(1), 21-47. doi: 10.1177/0733464809334286

Sluiter, J. K. (2006). High-demand jobs: age-related diversity in work ability?. *Applied Ergonomics*, 37(4), 429-440. doi: 10.1016/j.apergo.2006.04.007

Tuomi K., Ilmarinen J., Jahkola A., Katajarinne L., & Tulkki A. (1998). *Work Ability Index. 2<sup>nd</sup> Revised Edition*. Helsinki: Finnish Institute of Occupational Health.

Tuomi, K., Eskelinen, L., Toikkanen, J., Jarvinen, E., Ilmarinen, J., & Klockars, M. (1991). Work load and individual factors affecting work ability among aging municipal employees. *Scandinavian Journal of Work, Environment & Health*, 128-134.

Van den Berg, T., Elders, L., De Zwart, B., & Burdorf, A. (2009). The effects of work-related and individual factors on the Work Ability Index: a systematic review. *Occupational and Environmental Medicine*, 66, 211-220. doi: 10.1136/oem.2008.039883

Van Doorn, R. R., & Hülsheger, U. R. (2015). What makes employees resilient to job demands? The role of core self-evaluations in the relationship between job demands and strain reactions. *European Journal of Work and Organizational Psychology*, 24(1), 76-87. doi: 10.1080/1359432X.2013.858700

Van Droogenbroeck, F., Spruyt, B., & Vanroelen, C. (2014). Burnout among senior teachers: Investigating the role of workload and interpersonal relationships at work. *Teaching and Teacher Education*, 43, 99-109. doi: 10.1016/j.tate.2014.07.005

Whitaker, R. C., Dearth-Wesley, T., & Gooze, R. A. (2015). Workplace stress and the

## STRESS, WORK ABILITY, AND AGING

quality of teacher–children relationships in Head Start. *Early Childhood Research Quarterly*, 30, 57-69. doi: 10.1016/j.ecresq.2014.08.008

Williamson, D. L., & Carr, J. (2009). Health as a resource for everyday life: Advancing the conceptualization. *Critical Public Health*, 19(1), 107-122. doi: 10.1080/09581590802376234

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2007a). The role of personal resources in the job demands-resources model. *International Journal of Stress Management*, 14(2), 121-141. doi: : 10.1037/1072-5245.14.2.121

## STRESS, WORK ABILITY, AND AGING

## Tables

Table 1. Goodness-of-fit indexes - Confirmatory Factor Analyses (CFA) of the constructs considered in the study

	$\chi^2(df)$	$\chi^2/df$	CFI	TLI	SMRM	RMSEA
Job demands (1 second-order latent factor, 3 first order latent factors)	91.36(51)	1.72	.98	.95	.05	.06 (.04 - .08)
Job resources (1 second-order latent factor, 4 first-order latent factors)	196.23(100)	1.96	.93	.92	.07	.07(.05 - .08)
Exhaustion (1 factor)	47.14(27)	1.70	.98	.96	.03	.06 (.03 - .08)
Work ability (1 factor)	10.53(5)	2.10	.97	.97	.04	.05 (.03 - .07)
Job demands, job resources, Exhaustion, Work ability	101.71(806)	1.45	.91	.90	.09	.05 (.04 - .05)

## STRESS, WORK ABILITY, AND AGING

Table 2. Descriptive statistics, Pearson's correlations among subscales (two-tails), and ANOVA (Health and family duties).

	M (ds)	Range	1	2	3	4	5	6	7	8	9	10	11
1. Relational demands (RD)	2.78 (1.00)	1-4	1										
2. Mental demands (MD)	2.77 (.65)	1-4	.14*	1									
3. Physical demands (PD)	2.76 (.66)	1-4	.20**	.56**	1								
4. Work meaning (WM)	3.60 (.39)	1-4	-.09	.11	.07	1							
5. Decision authority (JA)	2.80 (.54)	1-4	-.22**	-.06	-.08	.15*	1						
6. Support from superior (SS)	2.48 (.75)	1-4	-.18**	.02	-.02	.23**	.24**	1					
7. Support from colleagues (SC)	2.77 (.69)	1-4	-.29**	-.03	-.17*	.13	.30**	.32**	1				
8. Job demands (JD)	2.92 (.39)	1-4	.77**	.64**	.72**	.02	-.16*	-.11	-.26**	1			
9. Job resources (JR)	2.86 (.57)	1-4	-.32**	-.08	-.09	.47**	.62**	.75**	.72**	-.23**	1		
10. Work ability (WA)	26.33 (4.98)	5-37	-.28**	-.15**	-.29**	.30**	.34**	.26**	.25**	-.38**	.42**	1	
11.Exhaustion (EX)	21.63 (12.75)	0-54	.40**	.24**	.30**	-.21**	-.33**	-.21**	-.29**	.46**	-.39**	-.63**	1
Age	55.89 (3.24)	--	--	--	--	--	--	--	--	--	--	-.09	.08
Job tenure	32.10 (14.15)	--	--	--	--	--	--	--	--	--	--	-.08	.04
Health <sup>§</sup> (F test)	--	--	--	--	--	--	--	--	--	--	--	39.82**	50.86**
Family duties <sup>b</sup> (F test)	--	--	--	--	--	--	--	--	--	--	--	.25	.16

\*\* p&lt;.01; \* p&lt;.05

<sup>§</sup>0=problematic/very problematic 1=good very good; <sup>b</sup>0=no 1=yes (elderly and/or under 19-years-old children to take care)

## STRESS, WORK ABILITY, AND AGING

Table 3. Goodness-of-fit indexes - Series of SEM for testing mediation

	$\chi^2(df)$	$\chi^2/df$	CFI	TLI	SMRM	RMSEA
Model I (non-mediated)	311.12 (167)	1.86	.91	.90	.08	.06 (.05 -.08)
Model II (partially mediated)	442.18 (265)	1.67	.91	.90	.08	.06 (.05 -.07)
Model III (full mediation)	366.86 (227)	1.62	.93	.92	.08	.05 (.04 -.07)



## STRESS, WORK ABILITY, AND AGING

Table 4. Moderated hierarchical regressions to measure the moderating effects of work ability in the relationship between job demands and exhaustion

Variable	Step 1			Step 2			Step 3		
	$\beta$	t	p	$\beta$	t	p	$\beta$	t	p
Age	.07	1.03	.30	.00	.06	.95	-.03	-.51	.61
Perceived health	.40	6.17	.00	.28	4.88	.00	.14	2.46	.01
Family duties	-.00	-.03	.97	-.11	-1.04	.30	-.07	-.69	.49
Job seniority	.03	.26	.80	.08	.82	.41	.07	.74	.46
Job demands (JD)				.37	6.33	.00	-.13	-.33	.74
Job resources (JR)				-.28	-4.87	.00	-.42	-1.55	.12
Work ability (WA)							-.44	-6.91	.00
JD * JR							.43	1.02	.31
JD * WA							.01	.25	.80
R <sup>2</sup>		.17***			.41***			.53***	
$\Delta R^2$					.24***			.12***	

Note: \*\*\*p=.00

## STRESS, WORK ABILITY, AND AGING

## Figure caption

Figure 1. Structural equation model (SEM) for the relationships among job demands (JD), job resources (JR), work ability (WA), emotional exhaustion (EX).

