

Age and creativity at work

The interplay between job resources, age and idea creativity

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Abstract

Purpose – The purpose of this study is to examine the interplay between job resources (job control and support for creativity from coworkers and supervisors), age and creativity at work. Job control and support for creativity are assumed to benefit idea creativity and to moderate the relationship between age and idea creativity.

Design/methodology/approach – A sample of 117 nurses completed questionnaire measures and reported a creative idea they recently had at work. Three subject matter experts rated the creativity of the ideas. Hierarchical regression analyses were used to test hypotheses.

Findings – Job control and support for creativity as well as age were unrelated to idea creativity. However, job control and support for creativity moderated the relationship between age and idea creativity. Age was positively related to idea creativity under high job control and negatively related to idea creativity under low job control and low support for creativity.

Research limitations/implications – A potentially selective sample due to systematic drop-outs and a selection effect of older nurses might limit the generalizability of our results. Future research should examine the mechanisms that explain the moderating effect of job resources in the relationship between age and performance.

Practical implications – Older employees' creativity at work can be raised by fostering support for creativity from coworkers and supervisors. Younger employees should get support to deal with a high level of job control, because their creativity is lowest under a high level of job control.

Originality/value – Using data from multiple sources the study shows that different constellations of job resources benefit older and younger employees' creativity at work.

Keywords Resources, Creative thinking, Older workers, Nurses

Paper type Research paper

Creativity is an important topic in management research (Shalley *et al.*, 2004). Researchers defined creativity as the generation of new and useful products, practices, services or procedures (Amabile, 1996; Shalley *et al.*, 2004). Creativity is the prerequisite for an organization's innovation, effectiveness, and long-term survival and

The authors are grateful to Anneliese Westermann-Binnewies for help in data collection and to Bing C. Lin and Sabine Sonntag for helpful comments on earlier versions of this manuscript.

facilitates an organization's adjustment to shifting environmental conditions and to take advantage of emerging opportunities (Oldham, 2002; Shalley *et al.*, 2004). Moreover, creativity can be viewed as a form of active mental health (Warr, 1987, 1994). Warr (1987, 1994) identified five types of active mental health: positive self-regard (e.g. high self-esteem), competence (e.g. effective coping), aspiration (e.g. goal directedness), autonomy/independence (e.g. proactivity), and integrated functioning (i.e. states involving balance and harmony). Because creativity and proactivity are closely related behaviors (Unsworth and Parker, 2003) and because individuals can gain positive self-regard, a feeling of competence, and a sense of independence by solving work problems in a creative way, creativity can be regarded as one form of active mental health (Warr, 1987, 1994).

Accordingly, researchers and organizations should be highly interested in identifying the factors that foster employees' creativity in order to directly stimulate an organization's effectiveness and promote employee's active mental health. Contextual factors and especially job resources have already been shown as important for employees' creativity (Eder and Sawyer, 2007; Harrison *et al.*, 2006; Shalley *et al.*, 2004). However, relationships between job resources and creativity still show variability across studies and therefore researchers have called for research on person-context interactions (Shalley *et al.*, 2004).

As the workforce is aging rapidly in many industrial countries (Hedge *et al.*, 2006; Kanfer and Ackerman, 2004), it becomes an increasingly important topic to understand how age is related to different organizational outcomes, such as creativity, and to examine contextual factors that enable older workers to show their competency at work.

Meta-analytic research on the relationship between age and creativity has shown that age is unrelated to creativity (Eder and Sawyer, 2007). However, there is great variability in the empirical relationships between age and creativity, indicating a need to search for moderators (Eder and Sawyer, 2007). Findings on the relationship between age and creativity are in line with meta-analytic results on the relationship between age and job performance in general. Two meta-analyses have shown that age and performance are uncorrelated (McEvoy and Cascio, 1989; Waldman and Avolio, 1986). Relationships between age and job performance vary widely across studies indicating that the relationship is moderated by certain conditions (McEvoy and Cascio, 1989; Waldman and Avolio, 1986). Several researches examined contextual factors, such as occupational type (McEvoy and Cascio, 1989; Waldman and Avolio, 1986) or job complexity (Avolio and Waldman, 1990; Sturman, 2003) as moderators in the relationship between age and performance. However, findings did not fully account for variations in the age-performance relationship and also had inconclusive findings (McEvoy and Cascio, 1989; Sturman, 2003). Therefore, researchers called for more research on contextual moderators, such as workplace characteristics in the relationship between age and performance (see Avolio and Waldman, 1990; Sturman, 2003).

In our study, we addressed this gap in the literature and examined two important job resources for creativity, namely job control and support for creativity as moderators in the relationship between age and creativity. We focused on these two job resources, because job control stimulates learning and the application of knowledge and skills (Parker and Sprigg, 1999; Parker and Wall, 1998), and support for creativity

represents instrumental support (Scott and Bruce, 1994; Zhou and George, 2001) and a climate of psychological safety (Edmondson, 1999). Thus, both job control and support for creativity should provide an environment that should particularly help older employees to overcome negative age stereotypes (Finkelstein *et al.*, 1995) and to be more creative at work.

Our study aims at understanding the interplay between age, job resources and creativity at work. First, we assume that job control and support for creativity are beneficial for the creativity of all employees (main effect). Second, we presume that job resources moderate the relationship between age and creativity (interaction effect). Specifically, we assume that a high level of job resources helps older employees to maintain and strengthen their creativity at work (positive relationship between age and creativity), whereas a low level of job resources should be detrimental for older employees' creativity (negative relationship between age and creativity). Figure 1 gives an overview over the main constructs and the hypothesized relationships in our study.

Creativity

Creativity is the production of novel and useful ideas (Amabile, 1988). Researchers distinguished creativity, that is idea generation from innovation, that is the implementation of these ideas (Amabile, 1988; West, 2002). Ideas are novel when "they are unique relative to other ideas currently available in the organization" (Shalley *et al.*, 2004), and they are useful when "they have potential for direct or indirect value to the organization, either in the short or long-term" (Shalley *et al.*, 2004). Ideas can be generated by employees in any job, and are either a part of an individual's job, as is the case with employees in R&D departments, or are viewed as extra-role behavior, for example in production workers. Accordingly, Unsworth (2001) differs between jobs with high or low creative requirements. In this study, we will focus on creativity of nurses. In nursing jobs, creativity is not required, but nevertheless contributes to overall organizational functioning (McMurray and Williams, 2004). When examining creativity as an outcome variable we asked study participants to report a specific creative idea they recently generated at work and examined predictors of the creativity of this idea. Therefore, we investigated predictors of the quality of a creative idea as opposed to many studies that investigated the quantity of ideas or creative behaviors individuals show at work.

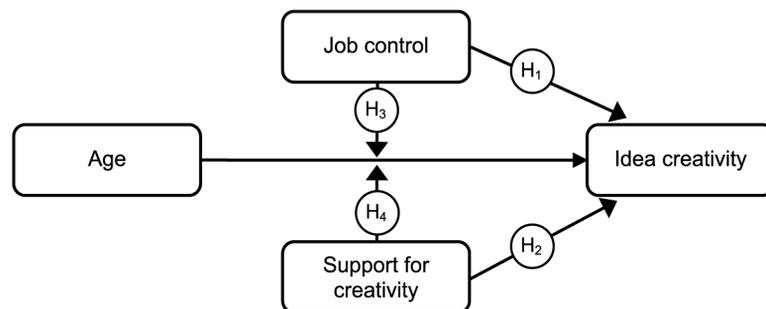


Figure 1.
Theoretical model of the study

Job resources and creativity

Job resources, such as job control and support for creativity from coworkers and supervisors are generally assumed to promote creativity for two reasons (Amabile, 1988; Woodman *et al.*, 1993). First, job resources directly facilitate creativity because they provide employees with direct resources for generating creative ideas. For example, job control offers employees more action opportunities and the possibility to learn about the task and gain task-related knowledge (Holman and Wall, 2002; Leach *et al.*, 2003). Support for creativity from coworkers and supervisors provides the possibility to share and benefit from the knowledge and expertise of others (Madjar *et al.*, 2002, Oldham and Cummings, 1996). Second, job resources indirectly facilitate creativity, because they promote an individual's motivation to generate creative ideas (Amabile, 1988; Oldham and Cummings, 1996).

The level of job control refers to how much influence a workplace offers over sequence, time frame, and content of one's work tasks (Jackson *et al.*, 1993; Parker and Wall, 1998). Job control enables employees to experiment in the workplace and thereby allows employees to generate and enhance creative ideas at work (Frese *et al.*, 1999; Ohly *et al.*, 2006). Furthermore, a high level of job control may make employees feel more responsible for developing creative ideas in order to solve problems or to improve work (Frese *et al.*, 1999; Ohly *et al.*, 2006). In addition, job control is assumed to raise employees' motivation to work on their tasks (Hackman and Oldham, 1976) and should accordingly foster creativity at work (Amabile, 1988). The experience of job control in itself is viewed as a positive experience that energizes employees and facilitates work-related behavior (Saavedra and Kwun, 2000). Job control is associated with positive affect (Saavedra and Kwun, 2000) and positive affect in turn is positively related to creative problem solving (Ashby *et al.*, 1999; Isen *et al.*, 1987).

Previous studies clearly demonstrated that job control is positively related to employee creativity (Ohly *et al.*, 2006; Shalley *et al.*, 2004). Recently, two meta-analyses confirmed the positive relationship between job control and employee creativity (Eder and Sawyer, 2007; Harrison *et al.*, 2006). Therefore, we assume the following hypothesis:

H1. Job control will be positively related to idea creativity.

Support for creativity from coworkers and supervisors, refers to the extent to which supervisors and coworkers encourage employees to develop and refine creative ideas (Madjar *et al.*, 2002). Supervisors and coworkers can provide support for creativity by showing concern for employees' feelings or problems and by giving nonjudgmental, informational feedback (Oldham and Cummings, 1996; Shalley *et al.*, 2004). Receiving support for creativity suggests that creativity is a desired behavior in the organization that is valued by the organization and may even be rewarded (Baer and Oldham, 2006). Thus, support for creativity should raise an individual's motivation to develop a creative idea. Furthermore, receiving supportive feedback involves sharing knowledge, expertise and resources with others (Scott and Bruce, 1994; Zhou and George, 2001). Consequently, the development of creative ideas may be directly facilitated by support for creativity from coworkers and supervisors (Scott and Bruce, 1994).

Empirical evidence on the relationship between support for creativity and creativity is mixed. Numerous studies found a positive relationship between support for creativity and creativity, whereas other studies failed to support this relationship (for

an overview see Shalley *et al.*, 2004). Results from the two meta-analyses on creativity showed an overall positive relationship between support for creativity and creativity (Eder and Sawyer, 2007; Harrison *et al.*, 2006). Thus, we expect the following hypothesis:

H2. Support for creativity will be positively related to idea creativity.

The role of job resources in the relationship between age and creativity

Examining the relationship between age and creativity has been of great interest to researchers (Amabile, 1996). Simonton (1988, 1991) examined the creativity of scientists and artists and developed a model of creative lifetime achievement (Simonton, 1997). However, Simonton focused on extraordinary creativity and outstanding achievements. Research on creativity in the area of management, focuses on creativity as a behavior in the workplace that can occur every day (Amabile, 1996; Shalley *et al.*, 2004). Within management research on creativity, the role of age has been largely ignored. In most studies, age is assessed and treated as a control variable. Studies reporting relationships between age and creativity most of the times found no relationship between age and creativity (Amabile *et al.*, 2005; Madjar *et al.*, 2002) or a slightly negative relationship (Amabile *et al.*, 2005; Zhou, 2003). Accordingly, results from the meta-analysis of Eder and Sawyer (2007) found age and creativity to be unrelated. Furthermore, the meta-analysis showed that the relationship between age and creativity varied widely across studies, indicating that moderators play a role in this relationship (Eder and Sawyer, 2007).

Regarding people's expectations about the relationship between age and creativity, a negative relationship is often assumed because older employees are generally perceived and evaluated as less effective, less creative and less flexible (Finkelstein *et al.*, 1995; Rosen and Jerdee, 1977). These negative age stereotypes are assumed to be held by coworkers and supervisors, and also by older employees themselves (Rothermund and Brandstädter, 2003). Because negative stereotypes are related to a lower self-efficacy to perform tasks (Chung-Herrera *et al.*, 2005; Mayer and Hanges, 2003), older employees should have a lower self-efficacy regarding their creativity at work. Creative self-efficacy in turn is a strong predictor of employee creativity (Tierney and Farmer, 2002).

Furthermore, older employees generally possess more working experience, task-specific knowledge and skills and thus have developed more routines in their jobs (Frensch and Sternberg, 1989; Quinones *et al.*, 1995). Some scholars assume that a long working experience and routines are detrimental for creativity, because they are associated with habitual behaviors and a preference for solving problems in a familiar, conventional way (Feltovich *et al.*, 1997; Ford and Gioia, 2000; Gilson and Shalley, 2004). However, other scholars argue that experience and the associated knowledge that includes domain-relevant skills is absolutely necessary and important for creativity (Amabile, 1988; Weisberg, 1999). Moreover, routines that older employees have developed can also be positive for creativity, because they free mental resources that can be used for other tasks including creative problem solving (Ohly *et al.*, 2006). Consequently, contrasting assumptions can be drawn for a relationship between age and creativity. Probably such contrasting mechanisms coexist and result into a null correlation between age and creativity. Therefore, we do not assume a positive or negative relationship between age and creativity.

Although we do not assume a direct relationship between age and creativity, we examine potential moderators in the relationship between age and creativity. In particular, we assume that the relationship between age and creativity depends on job resources. Under certain circumstances older employees should be able and motivated to bring in their experiences and potential at work and a positive relationship between age and creativity should be observed. Under other circumstances older employees should be hindered and demotivated to develop creative ideas at work and thus a negative relationship between age and creativity should be found.

In our study, we examine two important job resources for creativity, namely job control (Ohly *et al.*, 2006) and support for creativity from coworkers and supervisors (Scott and Bruce, 1994) as moderators of the relationship between age and idea creativity (see also Figure 1). Specifically, we reason that age is positively related to creativity under conditions of high job control and high support for creativity. Under the conditions of low job control and low support for creativity age should be negatively related to creativity.

Granting an employee a high level of job control should increase employees' responsibility to develop creative ideas (Frese *et al.*, 1999). A high level of job control may indicate to the employee that he or she is believed capable of successfully fulfilling the task and encourage him or her to take advantage of the granted job control (Frese *et al.*, 1999). Older employees should particularly benefit from high job control because it should "disable" the negative age stereotype that older employees are less capable of fulfilling their tasks and less effective in creative problem solving (Finkelstein *et al.*, 1995; Rosen and Jerdee, 1977). Moreover, using the freedom offered by high job control at work means that the employee has to decide how to carry out the task and how to effectively use the freedom to experiment when developing creative ideas (Langfred and Moye, 2004). Older employees should benefit more from high job control, because they have more knowledge and experience for deciding how to accomplish the task (Griffiths, 1999). Older employees' increased levels of domain-relevant knowledge and skills should help them utilize their creative efforts and ideas at work, and develop more creative ideas when job control is high (Amabile, 1988, 1996).

A low level of job control should be particularly detrimental for older employees' creativity. A low level of job control means that few responsibilities are granted to the employee, if at all, and that employees have to carry out tasks as prescribed (Jackson *et al.*, 1993). Particularly, older employees should be demotivated by a low level of job control, because they perceive a low level of job control as controlling and as lack of trust in their capabilities to accomplish their tasks. A low level of job control should negatively affect older employees because it is in contrast to their increased working experience and task-related expertise (Frensch and Sternberg, 1989; Quinones *et al.*, 1995). In sum, we state the following hypothesis:

- H3.* Job control will moderate the relationship between age and idea creativity. The relationship between age and idea creativity will be positive under conditions of high job control and negative under conditions of low job control.

Support for creativity from coworkers and supervisors, is assumed to raise employees motivation to be creative (Madjar *et al.*, 2002; Ohly *et al.*, 2006). Receiving a high level of support for creativity points out that developing creative ideas is valued (Baer and

Oldham, 2006). Furthermore, support for creativity may create a climate of psychological safety (Edmondson, 2003; Kahn, 1990) that may encourage employees to propose and discuss new ideas (Binnewies *et al.*, in press). Older employees' creativity should be augmented by support for creativity, as older employees should have a lower self-efficacy to be creative because of age stereotyping (Artistico *et al.*, 2003). Support for creativity means the recipient is believed to be capable of developing a creative solution and that these creative ideas are valuable (Baer and Frese, 2003). By receiving support from coworkers or supervisors, negative age stereotypes should be disabled and older employees should feel competent and supported to solve problems in a creative way (Tierney and Farmer, 2002). When discussing problems and creative solutions with others, older employees may also be attributed an expert status, because they have more expertise and knowledge due to their increased working experience (Quinones *et al.*, 1995). Consequently, we conjecture that a high level of support for creativity should increase older employees' motivation to be more creative and to bring in their experience, knowledge and experience in order to generate creative ideas. Thus, older employees should maintain or even strengthen creativity at work when experiencing high support for creativity.

A low level of support for creativity should particularly decrease older employees' creativity. A low level of support for creativity means for an employee that his or her creative ideas are not valued or that he or she is not believed to generate creative ideas (Baer and Frese, 2003). Under the condition of low support for creativity, older employees may be confirmed in their own negative age stereotype and may lose confidence in successfully generating a creative idea (Tierney and Farmer, 2002). Consequently, older employees' self-efficacy to generate creative ideas should be diminished resulting into less creative ideas (Tierney and Farmer, 2002). Therefore, we expect the following hypothesis:

- H4.* Support for creativity from coworkers and supervisors will moderate the relationship between age and idea creativity. The relationship between age and idea creativity will be positive under conditions of support for creativity and negative under conditions of low support for creativity.

Method

Overview

Participants completed a questionnaire measuring job control, support for creativity from coworkers and supervisors, and demographic information. Furthermore, participants were asked to write down and describe a novel idea they generated at work within the last month. To gain a measure of idea creativity the reported ideas were rated by three subject-matter experts according to the Consensual Assessment Technique (Amabile, 1996).

Sample and procedures

Our sample consisted of nursing staff, recruited with the cooperation of several training institutes in Northern Germany. Former and current course participants were asked to take part in our study and to ask colleagues for participating in our study as well. We made no reference to creativity throughout the process of data collection, but announced the study as examining "novel ideas at work". Although creativity is mostly not required or expected in nursing jobs, interviews with experts in the field

indicated that having novel and useful ideas is common among nurses and important for organizational functioning as well. Previous studies also studied creativity in nurses (Zhou, 2003). Examples from our study for highly creative ideas are the new ways of sorting and ordering pharmaceuticals to facilitate the sequence of operations or new ways of bedding patients with new material or by using old material in a new way. Less creative ideas were for example small changes in the workflow or documentation system.

Questionnaires were distributed to 274 nurses. A total of 185 questionnaires were returned for a response rate of 67.5 percent including 176 questionnaires with usable data. About two third ($n = 119$) participants reported and described an idea in the questionnaire whereas 57 participants did not report any idea. Because demographic information from two persons was missing our final sample consisted of 117 persons. We checked if there were systematic differences in study variables between participants who reported an idea in the questionnaire and participants who did not. Participants who reported an idea were older and had longer working experience. Furthermore, among those who reported an idea were more registered nurses, more persons working in shift work, more persons with a leadership position, and more persons who participated in an advanced vocational training at the time of data collection. However, persons who reported an idea and those who did not differ in the level of job control or support for creativity from coworkers and supervisors.

Our sample included 97 women and 20 men. Among the participants were 78.6 percent registered nurses and 21.4 percent apprentices in the final stage of education. Mean age was 34.4 years ($SD = 10.2$ years) ranging from 19 to 60 years and mean job experience was 12.7 years ($SD = 9.2$ years). Approximately half of the participants (55.6 percent) held a leadership position at work. At the time of data collection, 24.8 percent of the participants attended a course of advanced vocational training. Participants worked in different areas of nursing, mainly in nursing the sick and the elderly. Although the apprentices in our study are generally younger than the registered nurses it is important to note that older apprentices are common in the education of nurses. Accordingly, the mean age among apprentices was 25.8 years ($SD = 9.6$ years) ranging from 19 to 48 years. Mean age among registered nurses was 36.8 years ($SD = 9.1$ years) ranging from 22 to 60 years. Table I provides an overview over the distribution of main demographic variables in our sample.

Measures

Job control was assessed with a measure developed by Büssing and Glaser (2002). This measure is part of larger instrument (Büssing and Glaser, 2002) designed to assess job characteristics in nursing jobs and is a fully standardized questionnaire that has been shown to have good construct and criterion validity as well as good reliability (Büssing and Glaser, 2000; Höge and Büssing, 2004). The scale job control measures how much influence the workplace offers over sequence, time frame, method and means of one's work tasks and consists of eight items (sample item: "At my workplace one is able to determine how to perform one's tasks"). Participants indicated the strength of agreement to the items on a five-point Likert scale ranging from 1 = not true to 5 = totally true. Cronbach's alpha was 0.81.

Support for creativity from coworkers and supervisor was measured with seven items from Madjar *et al.* (2002). The scale comprises both support from coworkers and

		Frequency	Percent
Gender	Female	97	82.9
	Male	20	17.1
Leadership position	No	52	44.4
	Yes	65	45.6
Registered nurse	No	25	21.4
	Yes	92	21.4
Age	19-24 years	28	23.9
	25-29 years	20	17.1
	30-34 years	8	6.8
	35-39 years	22	18.8
	40-44 years	19	16.2
	45-49 years	11	9.4
	50-54 years	5	4.3
	55-60 years	4	3.4

Table I.
Distribution of gender,
leadership position,
registered nurse and age
in the sample

Notes: $n = 117$

from the supervisor and assesses the extent to which coworkers or the supervisor support new ideas, provide useful feedback and discuss new ideas (sample items: "My supervisor discusses with me my work-related ideas in order to improve them", "My coworkers other than my supervisor are almost always supportive when I come up with a new idea about my job"). Items had to be rated on a seven-point Likert scale with the anchors 1 = not true to 7 = totally true. Cronbach's alpha was 0.88.

Age was assessed by a single item asking participants to indicate their age in years.

Idea creativity was assessed by the Consensual Assessment Technique (Amabile, 1996) using the average of three expert ratings of participants' reported ideas. We chose expert ratings for the operationalization of idea creativity because experts were blind to the age of an idea's originator. Thus, the ratings of idea creativity could not be influenced by age stereotypes. Thereby, we overcame the problems of self-reports or supervisor ratings when evaluating creativity (Rosen and Jerdee, 1976).

In the questionnaire, participants were asked to report and describe an idea they generated at work during the past month. Three experts in the field of nursing rated the ideas for a monetary reward. The experts were all registered nurses who had attended vocational training to become teachers for nurses. Two were female and one male and their working experience as a teacher for nurses ranged between ten and thirty years.

We adapted the rating procedure of Zhou (1998), (Zhou and Oldham, 2001) to get creativity ratings of the reported ideas. All three experts received all participants' descriptions of the reported ideas. To avoid ratings influenced by handwriting or spelling mistakes by participants, the reported ideas were typewritten on a standardized form and corrected for spelling mistakes. We provided the experts with guidelines explaining the rating procedure including a definition of creativity and some examples. As suggested by Zhou (1998) raters were instructed to randomly choose 15 examples and read them without giving any ratings in order to get an insight into the spectrum of reported ideas. Afterwards, all three experts rated each idea with respect to its novelty, its usefulness, and its overall creativity. As recommended by Zhou and Oldham (2001) only the rating of overall creativity was used as a measure of the creative outcome. The ratings of novelty and usefulness were merely made to

ensure that both dimensions were taken into account when undertaking the overall rating. Overall creativity was rated on a ten-point scale ranging from (1) not creative at all to (10) extremely creative. Therefore, our measure of creativity provides a measure of the quality of the creative ideas.

In addition, the raters were asked to take into account if the ideas were reported by apprentices or by registered nurses. This was done to ensure that the evaluation of creativity was made in consideration of the participants' work context and experience (Amabile, 1996). Knowledge and experience have been shown as crucial determinants of creativity (Amabile, 1996; Sternberg *et al.*, 1997). Because we were not interested in studying the relationships between idea creativity and knowledge or experience we controlled for these variables by giving raters the information if the reported idea was from an apprentice or from a registered nurse. Raters were instructed to make their judgments according to what they expected to be creative for an apprentice and for registered nurses respectively. Experts did not have any information about the age, gender or status of the idea's originator to ensure that ratings were not influenced by stereotypes or subjective theories.

To test interrater reliability we computed an intraclass correlation coefficient (ICC) with the factor rater as fixed. The ICC was 0.89, indicating a very high interrater reliability that confirms the internal validity of our measure (Amabile, 1996).

Control variables were additionally measured to account for possible influences of third variables. These control variables included gender (female or male), leadership position (yes or no) and if a participant was a registered nurse or not (yes or no).

Results

Zero-order correlations between study variables are displayed in Table II. Idea creativity had no significant correlations with any control or predictor variables.

Hierarchical regression analyses were used to test our hypotheses. As recommended by Cohen *et al.* (2003) we centered continuous predictor variables and dummy-coded categorical predictor variables. Control variables were entered in the first step into the regression model, job control, support for creativity from coworkers and supervisors, and age were entered in the second step, and the interaction terms *Job control* × *Age* and *Support for creativity* × *Age* were entered in the third step. Table III displays the results of the hierarchical regression analysis predicting idea creativity. Results of the first step of regression analysis showed that control variables did not significantly predict idea creativity. Neither gender, leadership position nor

	M	SD	1	2	3	4	5	6
1 Gender ^a	0.17	0.38						
2 Leadership position ^b	0.56	0.50	0.09					
3 Registered nurse ^c	0.79	0.41	0.07	0.46**				
4 Age	34.43	10.21	0.02	0.46**	0.44**			
5 Job control	3.14	0.70	-0.06	-0.07	-0.04	-0.14		
6 Support for creativity	4.26	1.32	-0.04	0.24*	0.15	0.04	0.14	
7 Idea creativity	6.19	1.47	0.12	0.05	0.08	-0.06	-0.02	0.03

Notes: $n = 117$; ^a 0 = female, 1 = male; ^b 0 = no leadership position, 1 = leadership position; ^c 0 = no, 1 = yes; * $p < 0.05$; ** $p < 0.001$

Table II.
Means, standard deviations, and intercorrelations of study variables

		Beta	ΔR^2	ΔF	R^2	F
Step 1	Gender	-0.12			0.02	0.78
	Leadership position	0.00				
	Registered nurse	0.07				
Step 2	Gender	-0.11	0.01	0.46	0.03	0.61
	Leadership position	0.04				
	Registered nurse	0.10				
	Age	-0.13				
	Job control	-0.03				
Step 3	Support for creativity	0.02				
	Gender	-0.09	0.12	7.59**	0.15	2.41*
	Leadership position	0.01				
	Registered nurse	0.10				
	Age	-0.08				
	Job control	-0.16				
	Support for creativity	0.01				
Age \times job control	0.28**					
Age \times support for creativity	0.19*					

Table III.
Hierarchical regression
analysis predicting idea
creativity

Notes: $n = 117$; * $p < 0.05$; ** $p < 0.01$

registered nurse were significantly related to idea creativity. Results of Step 2 of regression analysis showed that job resources did not significantly predict idea creativity. Both job control ($\beta = -0.03$) and support for creativity ($\beta = 0.02$) were unrelated to idea creativity (see Table III). Therefore, we did not find support for the assumed relationships between job control and idea creativity (*H1*) and between coworker support and idea creativity (*H2*). In addition, results of Step 2 of regression analysis showed that age was also unrelated to idea creativity (see Table III). In Step 3 of the regression analysis the interaction terms *Job control* \times *Age* and *Support for creativity* \times *Age* were entered into the regression. Results of Step 3 showed that the interaction terms explained an additional 12 percent of the variance. Both interaction terms *Job control* \times *Age* ($\beta = 0.28$, $p < 0.01$) and *Support for creativity* \times *Age* ($\beta = 0.19$, $p < 0.05$) turned out to be significant predictors of idea creativity (see Table III). In order to examine the nature of the significant interactions, we plotted the interaction effects according to the procedure recommended by Cohen *et al.* (2003). The pattern of the interaction effects can be seen in Figure 2 and in Figure 3. Examining the interaction between job control and age on idea creativity, additional simple slope tests showed that age was positively related to idea creativity under conditions of high job control ($\beta = 0.29$, $t = 2.12$, $p < 0.05$) and negatively related to idea creativity under conditions of low job control ($\beta = -0.35$, $t = -2.84$, $p < 0.01$). Therefore, our hypothesis that age is positively related to idea creativity under conditions of high job control and negatively related to idea creativity under conditions of low job control (*H3*) was supported. Simple slope tests for the interaction between support for creativity and age on idea creativity revealed that age was unrelated to idea creativity under conditions of high support for creativity ($\beta = 0.22$, $t = 1.57$, *n.s.*) and negatively related to idea creativity under conditions of low support for creativity ($\beta = -0.29$, $t = -2.26$, $p < 0.05$). Because we found a negative relationship between age and idea creativity under low job control, but no relationship with idea creativity under high job

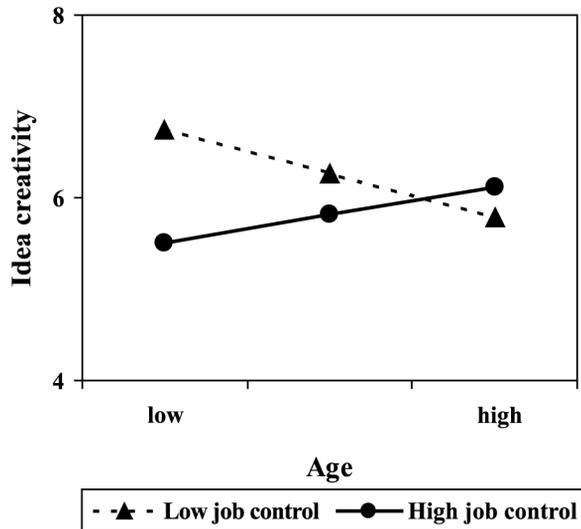


Figure 2. Job control as a moderator in the relationship between age and idea creativity

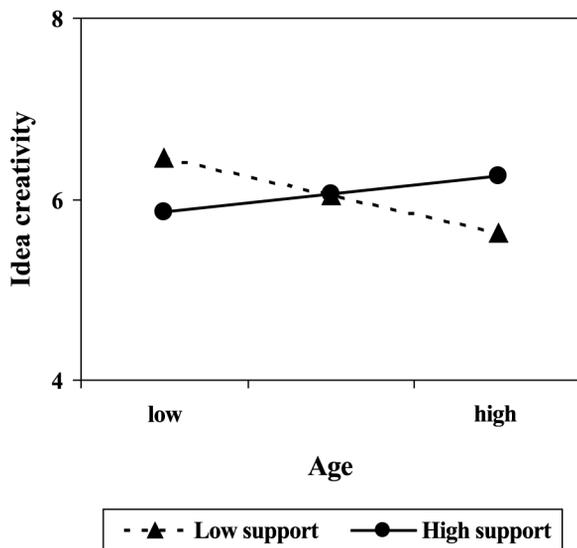


Figure 3. Support for creativity as a moderator in the relationship between age and idea creativity

control, our hypothesis that age is positively related to idea creativity under conditions of high coworker support and negatively related to idea creativity under conditions of low job coworker support (*H4*) was partially supported.

Discussion

This study examined the interplay between age, two job resources, namely job control and support for creativity, and idea creativity in a sample of younger and older nurses. Neither job control nor support for creativity was significantly related to idea

creativity. Age was also unrelated to idea creativity, but job control and support for creativity moderated the relationship between age and idea creativity. Age was positively related to idea creativity under conditions of high job control, whereas age was negatively related to idea creativity under conditions of low job control and under conditions of low support for creativity.

The finding that job control and support for creativity were not directly related to idea creativity was unexpected. Whereas research on support for creativity already provided mixed empirical results (Shalley *et al.*, 2004), research on job control has established a positive relationship between job control and creativity (Eder and Sawyer, 2007; Harrison *et al.*, 2006). Our results show that support for creativity and job control do not seem beneficial for the idea creativity of nurses. One explanation might be that we used idea creativity, that is, the quality of an idea, as an operationalization of creativity, as opposed to the quantitative measure of creativity most field studies use that assesses the extent to which creative ideas are generated (Shalley *et al.*, 2004). Job control and support for creativity may increase the quantity of ideas or of creative behavior, but according to our results they do not seem to increase the quality of a creative idea. A further explanation may be that job control and support for creativity may be necessary but not sufficient for the quality of creative ideas. In addition to job control and support for creativity domain-specific and creativity-relevant skills might be further necessary to take advantage of job control and support for creativity in order to generate ideas that are viewed as highly creative (Amabile, 1988, 1996).

Both job control and support for creativity moderated the relationship between age and idea creativity. In our sample, older employees include employees around the age of 45 years, whereas younger employees are about 24 years old. Under conditions of high job control the relationship between age and idea creativity was positive, whereas the relationship was negative under conditions of low job control. As can be seen from the figure of the interaction effect (see Figure 2), older employees' creativity does not seem to differ at a high or low level of job control. A high level of job control does not seem to foster older employees' creativity and a low level of job control does not seem to decrease older employees' creativity. Older employees may have learned to be creative at work when certain workplace characteristics, such as the level of job control, are not favorable. Creative ideas, in this situation, could include changing the situation at work when necessary and enlarging certain degrees of freedom. Older employees may have the experience and the self-confidence to develop creative ideas independent of the level of job control.

On the contrary, younger employees' creativity largely differs under conditions of high and low job control. However, a closer inspection of the relationship between job control and younger employees' creativity revealed an unexpected finding. Younger employees seem to be most creative when experiencing low job control, whereas they seem to be less creative in situations with high job control. As job control is sometimes experienced as a demand (De Jonge and Schaufeli, 1998), younger employees may lack the skills to successfully cope with this demand and to take advantage of a high level of job control. In jobs with low job control, clear guidance on how to carry out the work task is given, and this guidance may be a useful starting point and important for younger employees to foster creativity. At a workplace with high control this useful

guidance may be missing and may result in less creative ideas among younger employees.

With regard to the moderating effect of support for creativity, we found that age was negatively related to creativity under conditions of low support for creativity. Under conditions of high support for creativity, age was unrelated to creativity. Therefore, experiencing low support for creativity from coworkers and supervisors seems to be particularly detrimental for older employees' creativity at work. When older employees get little or no support for developing a creative idea they might be discouraged to develop creative ideas and experience lower creative self-efficacy (Tierney and Farmer, 2002). Therefore, under low support for creativity older employees seem to stick to the routine way of solving problems and develop ideas that are less creative.

Study limitations and future research

Our study has some limitations that have to be discussed. First, the cross-sectional design of our study does not allow drawing any conclusions about causality. While alternative explanations, such as reverse causation or the influence of third variables, can be ruled out in the future by using a longitudinal design, causality can only be demonstrated in an experimental study. However, as we cannot manipulate participants' age, future studies have to use a quasi-experimental design or should try to manipulate the underlying characteristics of younger and older employees.

A second limitation might be that the expert raters knew if the idea that had to be rated was reported by an apprentice or by a registered nurse. As apprentices in the final stage are usually around 20 years old expert raters had indirect information about the age of a part of our sample. However, as common in the field of nursing, our sample of apprentices also included older persons (up to the age of 46) and our sample of registered nurses also included very young persons. Therefore, our expert raters could not make a firm conclusion about whether the idea from an apprentice was also the idea from a younger person. In addition, we controlled for the occupational status of an employee (apprentice versus registered nurse) in our analyses.

The selectivity of our sample might limit the generalizability of the results. We examined our hypotheses in a sample of nurses where creativity is not a required part of the formal job role. Future research will need to replicate our findings with samples where creativity is an expected part of the work role.

One major limitation of our study is that we may have a selective sample due to systematic drop-outs. We could only analyze relationships between job resources, age and creativity for persons who reported an idea in the questionnaire. As mentioned above among employees who reported an idea were older persons with longer working experience, more persons working in shift work, holding a leadership position, and attending an advanced vocational training. Although these systematic drop-outs limit the generalizability of our results, we preferred these limitations in order to get a more objective measure of creativity instead of solely relying on participants' self-reports.

A further limitation regarding our sample is that older employees who are still working in the field of nursing might be healthier, more skilled or have other beneficial characteristics that enable them to stay at work while older employees who are less healthy or skilled tend to quit (Warr, 1992). We are aware that is a major problem that we cannot rule out in our study. However, we think that the older workforce in today's

working environment may actually be selective. Managing older employees suggests having to deal with a specific group of persons who possess certain characteristics that have enabled them to stay in their jobs. Therefore, our study still provides knowledge about the conditions that are beneficial for the creativity of older and younger employees who are actually working in the field of nursing.

Results supported the assumption that the relationship between age and idea creativity is moderated by contextual factors, specifically by job control and support for creativity. Future research should examine the underlying mechanisms that explain these findings. For example, research should examine if the interaction between age and job resources on creativity can be explained by higher domain-specific or creativity-relevant skills of older employees. If this is the case, younger employees' creativity, can be increased by training these skills. Furthermore, research should investigate if the moderation between age and job resources on creativity is (at least partially) mediated by motivation or the (de)activation of age stereotypes (Finkelstein *et al.*, 1995). Knowing more about how the mechanisms between job resources, age and creativity function enables us to refine interventions that aim at promoting the creativity of older and younger employees, according to their needs.

Implications for management

Our study yields practical implications for the management of younger and older employees' creativity at work. As we examined the relationship between job resources, age and creativity in a sample including younger and older employees, we can provide recommendations for managing older and younger employees' creativity.

Our study showed that low support for creativity from coworkers and supervisors is related to a higher level of creativity in older employees. Assuming a causal link between support for creativity and idea creativity suggests that older employees' creativity can be raised by preventing low support for creativity from coworkers and supervisors. Supervisors can be sensitized and trained to provide supportive, non-controlling feedback and to create a climate of psychological safety at work (Edmondson, 1999). Acting as a role model, supervisors may also increase coworker support for creativity. Furthermore, supervisors can encourage employees to ask for support in team meetings and can ensure that support for creativity is provided by others when an employee wants to discuss creative ideas. Although our results support the notion that only older employees benefit from support for creativity, supervisors and organizations should be cautious in their treatment of older employees because it can be discriminating, even if supervisors and organizations are providing additional support for older employees. Rather supervisors and organizations should establish a culture at work that values the creativity of all employees, and fosters support for creativity by opening discussions for younger and older employees. This recommendation is especially valid because high level of support does not affect younger employees' creativity in a negative way.

Moreover, our findings suggest that age is positively related to creativity under high job control and negatively under low job control. However, the pattern of the interaction effect shows that this relationship alludes to the fact that younger employees are less creative under conditions of high job control. As job control is particularly important for employees' health (De Lange *et al.*, 2004) and also for

performance in general (Langfred and Moye, 2004) reducing younger employees' job control is not an option. Rather, younger employees should seek assistance to deal with higher levels of job control in order to be capable of generating creative ideas. Supervisors could focus on initiating structure for their younger employees to provide them with information about work procedures and effective ways to accomplish the task. Their task-relevant knowledge and skills will be enhanced so that are better able to deal with a high level of job control. As older employees seem to be able to effectively deal with a high level of job control when generating creative ideas, older employees could also play a mentoring role for younger employees.

Conclusion

Until today, the role of age has largely been ignored in management research on creativity at work. However, as our workforce grows older it becomes more and more important to identify conditions that enable older workers to bring in their knowledge and expertise and develop creative ideas at work. Our study shows that age is not directly related to idea creativity but that the relationship between age and idea creativity is dependent on job resources. Thus, our study suggests that different constellations of job resources benefit older and younger employees' creativity at work. Human resource management should take these differences into account in order to promote both older and younger employees' creativity at work.

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