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Work, Age, and Flow: An exploration of the relationship between different work aspects, health- and age-related aspects, and flow

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Abstract

Since work flow can contribute to optimalizing employability and productivity of employees, this present article aims at investigating which personal and work-related aspects contribute to flow at work (i.e. absorption, work enjoyment, and intrinsic work motivation). On the basis of the literature it was hypothesized that the relationship between job demands, job control, or job resources and flow was mediated by physical workload, physical work capacity, or perception of ageing. The hypotheses were tested on a sample of 103 employees. Results of the hierarchical regression analyses only supported the hypotheses regarding job resources. Flow is positively affected by job resources and this relationship is mediated by physical work capacity and by perception of ageing. This finding indicates the importance of job resources in reaching a state of flow and therefore it is recommended to managers to pay attention to this specific work-related aspect.

Keywords: *job demands, job resources, job control, physical work capacity, perception of ageing, flow*

INTRODUCTION

Optimalizing employees' productivity and employability, the striving towards a broad availability during all life phases (Van Buul & Maas, 2004), are important topics in today's organizations (Remery, Henkens, Schippers, & Ekamper, 2003; Van Buul & Maas, 2004). First, it may prevent or solve problems such as burnout, absenteeism, and disengagement (Spector, 1997; Judge, Thoresen, Bono, & Patton 2001), which, in turn, is important for the performance and survival of organizations (Grant, Christianson, & Price, 2007). Second, due to low fertility rates, greater longevity, and demographic developments in the age structure (Fougère & Mérette, 1999; Remery et al., 2003), the middle aged and older workers are becoming increasingly prevalent in the work place (Sterns & Miklos, 1995). Population ageing will lead to large increases in pension expenses (Bongaarts, 2004). In order to cope with these increasing costs it is determined that the pensionable age has to be raised (European Council of Barcelona, 2002). Therefore, it is necessary that employees are able and willing to work longer. Measures aimed at optimalizing the employability and productivity of employees can prevent early retirement of employees (Remery et al., 2003; Van Buul & Maas, 2004). According to Schaufeli (2004) and Demerouti (2006) work flow can contribute to optimalizing employability and productivity. Demerouti (2006, p. 269) assumed that "to achieve high in-role performance (i.e. those officially required outcomes and behaviors that directly serve the goals of the organization), employees will have to experience flow in activities that serve the goals of the organization, among the different primary and secondary tasks typically included in all jobs". Findings of the study of Demerouti (2006) indicate that flow indeed contributes to better job performance. Demerouti (2006, p. 275) states that "flow is an experience that is related to classical job characteristics and that this experience can be beneficial for both the individual and the organization in term of job

performance." Therefore it is assumed that organizations should take measures which contribute to reaching a state of flow within their employees.

Bakker (2005, p. 26) defines flow as "a state of consciousness where people become totally immersed in an activity, and enjoy it intensely". It exists of three dimensions: absorption, enjoyment and intrinsic motivation. Bakker (2005) has attempted to apply these dimensions to the work context and defines them as follows: *Absorption* refers to a state of total concentration, whereby employees are totally immersed in their work (Csikszentmihalyi, 1997). Employees who *enjoy* their work and feel happy make a very positive judgement about the quality of their working life (Veenhoven, 1990). *Intrinsic motivation* refers to the need to perform a certain activity with the aim of experiencing the inherent pleasure and satisfaction in the activity (Ryan & Deci, 2000) (Bakker, 2005).

If flow is to occur, several conditions have to be met. First, it is essential that the individual is thoroughly involved in something that is enjoyable and meaningful to him or herself (Csikszentmihalyi, 1999). Second, there has to be a balance between job demands and skills (Ghani & Deshpande, 1994; Csikszentmihalyi, 1997; Bakker, 2005; 2008). Creating a balance between job demands and skills can be done by providing more job resources, such as good material, support from colleagues and supervisors, and performance feedback, or by providing more job control (Karasek, 1979; Csikszentmihalyi, 1999; Demerouti, Bakker, Nachreiner, & Schaufeli, 2001a; Schaufeli & Bakker, 2004). These studies demonstrate that the work-related aspects job demands, job control, and job resources are all related to flow. However, it is assumable that flow is also affected by other aspects. According to Demerouti (2006, p. 267), "flow is a multifaceted construct that is in line with a fairly broad notion of occupational mental health [well-being] including not only affective aspects but also cognitive and motivational aspects". This assumption, that the construct flow is related to well-being, is supported by

LeFevre (1988) and Csikszentmihalyi (1997). They both state that flow contributes to well-being. Therefore, it is assumable that aspects affecting well-being are also affecting flow. Well-being is not only affected by work-related aspects but also by personal aspects, like health and age (De Zwart, Frings-Dresen, & Van Dijk, 1995; Ryff, 1995; Gureje, Von Korff, Simon, & Gater, 1998). Based on this conclusion it is assumed that work-related aspects as well as personal aspects contribute to flow. Therefore, various personal and work-related aspects of flow are studied. The central research question in current study is: Which personal and work-related aspects contribute to flow? In order to investigate which aspects are possible causes of flow, the "work demands-capacity" model of Van Dijk, Van Dormolen, Kompier, and Meijman (1990) and the model of "ageing and physical workload" conducted by De Zwart et al. (1995) are taken as a basis because these models take into account both work-related aspects and personal aspects. Concepts derived from the models of Van Dijk et al. (1990) and De Zwart et al. (1995) are job demands, job control, job resources, physical workload, physical work capacity, and ageing. These concepts will be described below. Furthermore, relationships between the personal aspects and flow, and between the work-related aspects and the personal aspects are described and hypotheses are given. To clarify the underlying processes, it is proposed in this study that work-related aspects (i.e. job demands, job control, and job resources) are affecting personal aspects (i.e. physical workload, physical work capacity and perception of ageing), which may result in flow. More specifically, this study investigates how personal aspects are the mediating link in the work-related aspects – flow process.

Physical workload

In this study, physical workload is described as all temporary short-term physical responses which can be regarded as indicators of the physical workload (Van Dijk et al., 1990; De Zwart et

al., 1995). Examples are sweating, feeling of fatigue, and changes in, for example, heart rate, breathing frequency, and blood pressure. Physical workload can occur during work and some hours thereafter (Van Dijk et al., 1990; De Zwart et al., 1995).

As mentioned in the introduction, flow can only occur when all three elements of flow are experienced simultaneously (Demerouti, 2006). When one experiences physical workload during work, it is assumable that one is not completely absorbed or is not enjoying the work. For example, when one is experiencing headaches due to demanding work, one is not enjoying work at that moment and is therefore not experiencing flow. This assumption is supported by Demerouti, Bakker, De Jonge, Janssen, & Schaufeli (2001b). They have investigated the effects of health complaints on engagement (including vigor, dedication, and absorption). Results show that health complaints have a negative effect on vigor (i.e. work motivation), absorption, and dedication (i.e. work enjoyment). Findings from a study conducted by Landsbergis (1988) also prove that health complaints due to the job leads to job dissatisfaction. Therefore, in this study it is assumed that flow is affected by physical workload.

Physical work capacity

Physical work capacity is described as the physical capacities and characteristics of a worker (Van Dijk et al., 1990; De Zwart et al., 1995). Physical work capacity is a dynamic measure. Changes may occur in a short-term period, such as changes over the day caused by fatigue, as well as in long-term periods, such as increase or decrease in muscle strength in months or years (De Zwart et al., 1995).

Researchers state that if flow is to occur, there has to be a balance between job demands and skills (i.e. physical work capacities) (Ghani & Deshpande, 1994; Csikszentmihalyi, 1997; Bakker, 2005; 2008). When job demands can not be met due to low physical work capacity, one

may become frustrated (Demerouti, 2006; Bakker, 2008). Frustration is negative in reaching a state of flow (Csikszentmihalyi & LeFevre, 1989; Demerouti, 2006). Furthermore, Malchaire et al. (2001) found that musculoskeletal problems are associated with worse appreciation of work. Saltzman (1998) examined the impact of Stretch Break, an ergonomic software program, in order to reduce physical complaints, such as muscle ache. Findings from his study indicate that physical complaints reduced and that both productivity and work enjoyment increased. These studies demonstrate the correlation between physical complaints and (dimensions) of flow (e.g. work enjoyment) and therefore, it is assumed that flow is affected by physical work capacity.

Ageing

Ageing is described as the perception towards physical changes due to ageing. This study investigates the effects of the perception of ageing instead of actual age, because the perception of ageing says more about an individual than the chronological age (Boehmer, 2007). An individual's interpretation of age may reflect perceptions of health, energy, capacities, and so forth (Cleveland & McFarlane Shore, 1992). Thus, individuals with the same chronological age may vary in terms of the subjective meaning that age has for them (Barak, 1987 In: Cleveland & McFarlane Shore, 1992). If only chronological age is measured it may not capture the different perceptions of ageing. Not capturing the different perceptions of ageing may result in lower prediction of work outcomes (Cleveland & McFarlane Shore, 1992). Looking at the chronological age, one can be very old. But because that person has less constraints due to the biological age, one can feel younger. So, it is stated that perception of age is not the same as chronological age.

Boehmer (2007) states that positive subjective age is positively related to life satisfaction, which in turn is part of the psychological dimension of well-being (Grant et al., 2007). LeFevre

(1988) and Csikszentmihalyi (1997) state that flow contributes to well-being and thus to satisfaction. Based on the conclusions of LeFevre (1988) and Csikszentmihalyi (1997) it is assumed that perception of ageing is affecting flow.

Previous research has demonstrated relationships between work-related aspects, like job demands, job control, and job resources, and the personal aspects mentioned above (Van Dijk et al., 1990; Karlqvist, Leijon, & Härenstam, 2003; Donders, Roskes, & Van der Gulden, 2007; Boehmer, 2007). These relationships will be discussed below. Furthermore, hypotheses are given.

Job demands

"Job demands are the physical, social, or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs" (Demerouti et al., 2001a, p. 501).

In the model of Van Dijk et al. (1990) a relationship between the work situation and short-term effects (i.e. physical workload) is suggested. They state that due to job demands short-term effects can occur. For example, one can feel tired after physical or psychological demanding work or one can have an increased heart rate due to physical demanding work (Van Dijk et al., 1990). This relationship is also found by Donders et al. (2007). They state that high job demands have a negative effect on feeling tired (i.e. physical workload). Researchers also investigated the relationship between job demands and physical work capacity (Karlqvist et al., 2003; Donders et al., 2007) In both studies a negative relationship between job demands and physical work capacity was found. Karlqvist et al. (2003) state that employees with higher job demands had lower physical capacity than employees with lower job demands. Based on these findings it is

assumed that job demands have a negative effect on both physical workload and on physical work capacity.

A relationship between job demands and perception of ageing is also found. Kaliterna, Larsen, & Brkljacic (2002) have investigated subjective age (i.e. perception of ageing) differences in terms of physical, mental, and social demands of work. They found that older subjective age was related to poorer ability for completing physical, mental and social demands of work. They state that when an individual's perception of ageing is negative, he or she also has more difficulties with completing tasks. This leads to the first set of hypotheses:

Hypothesis 1$_a$: The negative relationship between job demands and flow is mediated by physical workload

Hypothesis 1$_b$: The negative relationship between job demands and flow is mediated by physical work capacity

Hypothesis 1$_c$: The negative relationship between job demands and flow is mediated by perception of ageing

Job control

Job control is described as "the organization of work in terms of workers' authority to make decisions concerning their own activities and skill usage" (Elovianio et al., 2005, p. 85).

As mentioned before, research has demonstrated that job demands are affecting physical workload. It is however assumable that job control is also related to physical workload. When one has the authority to make decisions concerning his/her own work, this has effect on the physical workload one experiences (Van Dijk et al., 1990). For example, one can alter the work pace so that less physical workload is experienced.

Besides the assumed relationship between job control and physical workload, it is also assumed that job control is affecting physical work capacity. When one experiences difficulties due to his/her physical work capacity, and one has the authority to make decisions concerning his/her own work one can determine to adjust the way work is carried out in order to protect the physical capacities. For example, one can ask a co-worker for help. Therefore, it is assumed that job control has a positive effect on one's physical work capacities. This assumption is supported by Donders et al. (2007) who concluded from their research that job control is positively related to emotional exhaustion (i.e. physical work capacity).

Furthermore, it is suggested that job control is related to perception of ageing. Boehmer (2007) has investigated the relationship between subjective age and self-belief in one's competence to exercise control over a wide range of difficult or novel tasks. This latter aspect is strongly related to job control, the ability one has to make decisions concerning their own activities and skill usage (Elovianio et al., 2005). Boehmer (2007) found that individuals with younger age identity (i.e. had positive perceptions of ageing) had more optimistic self-belief in one's competence to exercise control over a wide range of difficult or novel tasks. When individuals are given the ability to make decisions about their work, they are able to coordinate skills and abilities in changing and challenging situations by themselves, and because of that, self-belief in one's competence to exercise control over a wide range of difficult or novel tasks is increasing. This creates a positive self-image, which in turn is associated with feeling younger (Kaliterna et al., 2002). Based on these findings, following hypotheses are suggested:

Hypothesis 2$_a$: The positive relationship between job control and flow is mediated by physical workload

Hypothesis 2$_b$: The positive relationship between job control and flow is mediated by physical work capacity

Hypothesis 2$_c$: The positive relationship between job control and flow is mediated by perception of ageing

Job resources

"Job resources are physical, psychological, social, or organizational aspects of the job that may do any of the following: (a) be functional in achieving work goals; (b) reduce job demands at the associated physiological and psychological costs; (c) stimulate personal growth and development" (Demerouti et al., 2001a, p. 501).

Donders et al. (2007) have investigated the effects of job resources on fatigue and health complaints (i.e. physical workload and physical work capacity). They found that job resources have a positive effect on both outcomes. For example, using mechanical devises for carrying out heavy tasks reduces the physical demands, which in turn, has a positive effect on physical workload. Furthermore, Sterns and Miklos (1995) state that work adjustments are crucial in order to retain employment for ageing employees. In most cases, this does not mean that adjustments need to be made to the physical working environment, but instead, changes are needed in the tasks, increasing job control, lowering of the work pace and changes in working hours. The barrier against actually using such facilities is smaller when the employee feels supported by his/her superiors (Detaille, Haafkens, & Van Dijk, 2003).

Job resources not only affect physical workload and physical work capacity, but also perception of ageing. People who feel older than their chronological age have poorer abilities for completing physical, mental, and social job demands (Kaliterna et al., 2002). Resources can help people in achieving (work) goals (Demerouti et al., 2001a) and because perceptions of ageing are positively affected by having the abilities to complete job demands (Kaliterna et al., 2002), it is

stated that job resources have a positive effect on perception of ageing. Hence, the last three hypotheses are as follows:

Hypothesis 3$_a$: The positive relationship between job resources and flow is mediated by physical workload

Hypothesis 3$_b$: The positive relationship between job resources and flow is mediated by physical work capacity

Hypothesis 3$_c$: The positive relationship between job resources and flow is mediated by perception of ageing

The above mentioned hypotheses are graphically demonstrated in figure 1.

--Insert figure 1 about here--

--Insert table 1 about here--

METHOD

Participants and procedure

The questionnaire data were gathered in 2008 from an organization in the Dutch semi-public leisure sector. The organization manages and exploits more than 80 facilities in the field of sports, education, and recreation.

Participation in the study was voluntary and confidential; this was stated explicitly in the one-page covering letter attached to the questionnaire. All of the 175 employees were included in the study. Questionnaires were delivered to the respondents by the organizations' internal mail. All of the respondents completed the same version of the questionnaire and returned it in a sealed and

prepaid envelope directly to the researcher. A total of 103 employees filled out and returned the questionnaire (response rate = 58,9 %). Of the total sample 49,5% were men and 47,6% were women. 2,9% left this question open. The mean age of the respondents was 44 years (SD = 11.43).

Measures: Independent variables

Job demands is measured by using six items of the Job Content Scale developed by Karasek et al. (1998) (e.g. “I have to work very hard” and “My work is very hectic”). Respondents evaluated their perception of job demands on a five-point-Likert scale (1 =strongly disagree, 5 =strongly agree). Cronbach’s alpha of the job demands scale was 0.75.

Job control is measured by four items of the Job Content Scale developed by Karasek et al. (1998) (e.g. “I can determine the content of my job”). Respondents evaluated their perception of job control on a five-point-Likert scale (1 =strongly disagree, 5 =strongly agree). The job control scale yielded a Cronbach’s alpha of 0.74.

Job resources were measured by using four items of the Organizational Culture Scale developed by Zamanou & Glaser (1994) and nine items of the Job Content Scale developed by Karasek et al. (1998). Respondents evaluated their perception of the task-level (i.e. information regarding tasks (Schaufeli & Bakker, 2004)), the interpersonal-level (i.e. help and support from colleagues (Schaufeli & Bakker, 2004)), and the organizational-level (i.e. feedback from the supervisor (Schaufeli & Bakker, 2004)). Items concerning the task-level were derived from the information-flow dimension of the Organizational Culture Scale (Zamanou & Glaser, 1994) (e.g. “I receive the information needed to do my job”). Items concerning the interpersonal- and the organizational-level were derived from the Job Content Scale (Karasek et al., 1998) (e.g. “I feel comfortable around my co-workers” and “My supervisor pays attention to what I say”). The

factor analysis confirmed its three-dimensional factor structure. The job resources scale had a Cronbach's alpha coefficient of 0.87.

Physical workload was measured by eight items derived from the physical workload questionnaire, designed by Bot et al. (2004) (e.g. "My work involves working with my hands above shoulder level"). Furthermore, respondents evaluated their lifting activities on a frequency-based response scale (1 =never, 4 =more than ten time per week). Lifting activities were measured by four items derived from Campbell, Pannett, Egger, Cooper and Coggon (1997) (e.g. "In the course of your work, how often on average do you lift or carry weights of 10 kg or more?"). Furthermore, one question is asked to assess whether or not respondents have physical complaints due to the physical workload. Cronbach's alpha of the physical workload scale was 0.92.

To measure *Physical work capacity* six questions about several physical complaints were asked. Respondents evaluated their physical work capacity on a frequency-based response scale (1 =none, 5 =very much) Items were derived from Roelen, Schreuder, Koopmans, and Groothoff, (2008) (e.g. "To what extend do you suffer from the following symptoms?"). The physical work capacity scale yielded a Cronbach's alpha coefficient of 0.83.

To measure respondents' *perception of ageing* six questions derived from the Attitudes toward Ageing Questionnaire from Laidlaw, Power, Schmidt, and the WHOQOL-OLD Groep (2007) (e.g. "I don't feel old") were asked. The ageing scale had a Cronbach's alpha coefficient of 0.70.

Measures: Dependent variable

Flow is measured by means of the flow instrument of Bakker (2008). Thirteen items representing all three dimensions of flow (absorption, intrinsic motivation, and enjoyment) are asked (e.g. "I feel happy during my work" and "I work because I enjoy it"). Factor analysis

revealed a three-dimensional factor structure of flow; enjoyment, which accounts for 23,8% of the variance, intrinsic motivation, which accounts for 19,8% of the variance, and absorption, which accounts for 16% of the variance. Pearson correlations of the subscales were calculated. Results show significant positive correlations at a 0.01 level (two-tailed) between all subscales. The subscales enjoyment, intrinsic motivation, and absorption had Cronbach's alpha's of 0.85, 0.72, and 0.74 respectively. The total flow scale had a Cronbach's alpha coefficient of 0.83. Since this study's main interest is the overall flow concept, flow is in this study treated as a unidimensional construct. Although the multidimensionality of flow is widely acknowledged, there are theoretical and practical reasons to consider a multidimensional construct as a single construct (Brenninkmeijer & Van Yperen 2003). According to Brenninkmeijer and Van Yperen (2003) conducting research and theorising on the overall concept may sometimes help to advance the knowledge in amore thorough way than research on the separate, underlying dimensions. With regard to the practical reasons, Brenninkmeijer and Van Yperen (2003) state that a unidimensional approach would have the advantage of simplifying results considerably. Reporting findings for the variable "flow", rather than separately for the underlying dimensions, may give a better understanding of the outcomes, especially when complex effects are studied.

RESULTS

Descriptive statistics

Means, standard deviations and correlations among all study variables are presented in Table 2. Flow shows significant positive correlations with job resources ($r = 0.306$, $p < 0.01$), and perception of ageing ($r = 0.311$, $p < 0.01$). Flow shows a significant negative correlation with physical work capacity ($r = -0.317$, $p < 0.01$). From these results it appears that high physical work capacity, better perception of ageing, and more job resources contribute to experience flow.

Job demands show significant positive correlations with job control ($r = 0.253$, $p < 0.01$) and with physical work capacity ($r = 0.227$, $p < 0.05$). Job control shows significant positive correlations with job resources ($r = 0.394$, $p < 0.01$). Job resources show significant negative correlations with physical workload ($r = -0.236$, $p < 0.05$) and with physical work capacity ($r = -0.282$, $p < 0.01$). Physical workload shows a significant positive correlation with physical work capacity ($r = 0.402$, $p < 0.01$). Physical work capacity shows a significant negative correlation with perception of ageing ($r = -0.248$, $p < 0.05$). As predicted, table 2 shows that age of the respondent and perception of ageing are two different things; there is almost no correlation between the two constructs ($r = 0.006$, $p > 0.05$). This finding supports the assumption that the perception of age is not the same as the real age.

--Insert Table 2 about here--

Model testing

In this section results for hypothesis 1_a to hypothesis 3_c are discussed. All hypotheses are mediation hypotheses. This means that the effects of independent variables on the outcome variable are mediated by various transformation processes internal to the organism (Baron & Kenny, 1986). A variable functions as a mediator when it meets the following conditions: (a) variations in levels of the independent variable significantly account for variations in the presumed mediator; (b) variations in the mediator significantly account for variations in the dependent variable; and (c) when the relations between the independent variable and the mediator en between the mediator and the dependent variable are controlled, a previously significant relation between the independent and the dependent variables is no longer significant (Baron & Kenny, 1986). Thus, when the relationship between an independent variable and the outcome

variable was at first significant but is reduced significantly by a mediator variable, the effect of the mediator is demonstrated. In order to demonstrate the effect of a mediator variable, there has to be a relationship between the independent variable and the outcome variable.

Table 3 shows the hierarchical regression analyses of flow for hypotheses 1_a, 1_b, and 1_c. As can be seen in Table 3, there is no significant relationship between the independent variable job demands and the outcome variable flow. Therefore, no support was found for hypothesis 1_a, hypothesis 1_b, and hypothesis 1_c. The negative relationship between job demands and flow is not mediated by physical workload, is not mediated by physical work capacity, and is not mediated by perception of ageing.

--Insert Table 3 about here--

Table 4 shows the hierarchical regression analyses of flow for hypotheses 2_a, 2_b, and 2_c. As can be seen in Table 4, there is no significant relationship between job control and flow. Based on this finding, hypotheses 2_a, 2_b, and 2_c are not supported. The positive relationship between flow and job control is not mediated by physical workload, is not mediated by physical work capacity, and is not mediated by perception of ageing.

--Insert Table 4 about here--

Table 5 shows the hierarchical regression analyses of flow for hypotheses 3_a, 3_b, and 3_c. As can be seen in Table 5, the relationship between job resources and flow is significant at the 0.05 level (two-tailed) and therefore it is possible to demonstrate the effects of mediators. The first and upper part of the table shows the hierarchical regression analyses of flow predicted by job

resources and physical workload. As can be seen in Table 5 the positive and significant effect of job resources on flow becomes even more significant when mediated by physical workload (r = ,301, $p < 0.01$). As mentioned above, mediation is demonstrated when the relationship between the independent variable and the dependent variable is reduced considerably with the intervention of another variable (Baron & Kenny, 1986). Therefore, no support is found for hypothesis 3_a, that the relationship between flow and job resources is mediated by physical workload.

The second part of Table 5 shows the hierarchical regression analyses of flow predicted by job resources and physical work capacity. As can be seen in Table 5, the predictors age of the respondent, gender, job resources and physical work capacity explained 8,7% of the variance of flow. The control variables age of the respondent and gender did not have a significant effect on flow. Model 3 with predictors job demands and physical work capacity is significant ($F_{4,95}$ = 3,252, $p < 0.05$). The relationship between job resources and flow is reduced significantly with the intervention of physical work capacity, demonstrating the effect of physical work capacity as a mediator. Therefore, support was found for hypothesis 3_b, that the positive relationship between flow and job resources was mediated by physical work capacity.

To test the hypothesis that the positive relationship between job resources and flow is mediated by ageing a hierarchical regression analyses was conducted. The results of this hierarchical regression analyses can be seen in the lower part of Table 5. As can be seen the predictors age of the respondent, gender, job control and age explained 14,1% of the variance of flow. The control variables age of the respondent and gender did not have a significant effect on flow. Model 3 with predictors job control and age is significant ($F_{4,96}$ = 4,953, $p < 0.01$). With the intervention of the variable perception of ageing, the positive correlation between job resources and flow is reduced. However, this relationship is still significant at the 0.05 level (two-tailed).

Therefore, hypothesis 3_c, the positive relationship between job recourses and flow is mediated by perception of ageing, is partially supported.

--Insert Table 5 about here--

DISCUSSION

This study has investigated the effects of work-related aspects and personal aspects on flow. The study builds on the "work-demands-capacity" model conducted by Van Dijk et al. (1990) and the model of "ageing and physical workload" conducted by De Zwart et al. (1995). These models investigate the effects of the work situation and personal aspects on health, a dimension of well-being. Previous research has indicated that health and the other dimensions of well-being (i.e. psychological and social) are affected by both the work situation as well as by personal aspects, like capacities and age (Van Dijk et al., 1990; De Zwart et al., 1995; Ryff, 1995; Gureje et al., 1998). LeFevre (1989) and Csikszentmihalyi (1997) have investigated the relationship between flow and well-being. They both conclude that flow contributes to well-being. Based on these assumptions this study hypothesized that flow is affected by both work-related aspects (job demands, job control, and job resources) and personal aspects (physical workload, physical work capacity, and perception of ageing). Personal aspects were hypothesized to mediate between work-related aspects and flow. Of the nine hypotheses two were supported. Physical workload, physical work capacity, and ageing did not mediate between job demands and flow, nor between job control and flow (Hypotheses $1_{a,b,c}$ and hypotheses $2_{a,b,c}$). Furthermore, physical workload did not mediate between job resources and flow (hypothesis 3_a).

Surprisingly, no significant relationship between job demands and flow was found. This finding is different from findings in previous research. This may be due to the fact that in this

study job demands, job control, and job resources are all considered independent variables. In previous research job resources, including autonomy (i.e. job control) are considered to have a positive influence on job demands. This may imply that job demands only show a significant relationship with flow when it is influenced by job resources.

Furthermore, based on previous literature (Janssen, Peeters, De Jonge, Houkes & Tummers, 2004; Van Veldhoven, Taris, De Jonge, Broersen, 2005; Bakker, 2008) a relationship between job control and flow was expected. Surprisingly however, this expected relationship was not found in this study.

The expected relationship between job resources and flow, mediated by physical workload was not found either. This might be because physical workload was measured with questions about physical demanding activities instead of measuring physical changes in individuals due to work. It is possible that other results will be found when physical workload is measured differently, for example by a fitness test. This assumption is supported by findings from a study conducted by Demerouti et al. (2001b). They found that health complaints (i.e. physical workload) are negatively related with absorption, dedication (i.e. work enjoyment), and vigor (i.e. work motivation). Because this current study did not find a relationship between physical workload and flow, it is likely that this is due to the way physical workload is measured.

Support was found for the hypotheses that the relationship between job resources and flow was mediated by physical work capacity (hypothesis 3_b) and by perception of ageing (hypothesis 3_c). This suggests that job resources positively contribute to physical work capacity and to perception of ageing, which, in turn, positively contributes to reaching a state of flow.

Previous research also found a positive relationship between job resources and physical work capacity. As stated earlier Donders et al. (2007) found that job resources have a positive effect on emotional exhaustion and health complaints (i.e. physical work capacity). Donders et al. (2007)

have investigated the effects of several job resources (possibilities for learning, social support from colleagues, and social support from superiors) on health-related characteristics. Findings indicate that possibilities for learning, social support from superiors, and social support from colleagues had a positive effect on physical work capacity. Donders et al. (2007) divided physical work capacity into emotional exhaustion and health complaints. Findings indicate that all components of job resources contribute positively to emotional exhaustion (i.e. higher score on job resources is associated with a lower score on emotional exhaustion) but that only social support from colleagues contributes positively to both emotional exhaustion and health complaints (i.e. social support from colleagues reduces health complaints). Since Donders et al. (2007) consider physical work capacity as a construct consisting of both emotional exhaustion and health complaints, it can be stated that job resources have a positive effect on physical work capacity. Moreover, some researchers have attempted to provide insight into the relationship between physical work capacity and (dimensions of) flow. Demerouti et al. (2001b) found that physical work capacity is negatively related to all three dimensions of flow. Furthermore, Malchaire et al. (2001) found that musculoskeletal complaints are related to worse appreciation of work. A possible explanation for the negative relationship between physical work capacity and flow is that job demands can not be met due to low physical work capacities. Not being able to meet job demands is frustrating, which in turn, is negative in reaching flow (Csikszentmihalyi & LeFevre, 1989; Demerouti, 2006). Another possible explanation is that individuals with low physical capacities are dissatisfied with life overall (Malchaire et al., 2001), and therefore can not enjoy work either (Judge & Watanabe, 1993).

Since the relationships between job resources and perception of ageing and between perception of ageing and flow have not been investigated by other researchers, this is the first study that investigated these relationships. Based on previous literature is was assumed that the

relationship between job resources and flow is mediated by perception of ageing. Kaliterna et al. (2002) have investigated the relationship between work-related aspects and perception of ageing. They found that poor abilities for accomplishing job demands are related to lower perception of ageing (i.e. they consider themselves older than their chronological age). Since job resources are helpful in achieving work goals (Demerouti et al., 2001a), it was assumed that job resources positively contribute to perception of ageing. Furthermore, research indicates that adults who feel younger than their chronological age (i.e. have positive perceptions of ageing) are more satisfied with life (Chua, Cote, & Leong, 1990), which in turn is related to job satisfaction (Judge & Watanabe, 1993). Therefore, it was assumed that perception of ageing was positively related to flow. Findings from this study partially supported the proposed relationship between job resources and flow, mediated by perception of ageing. The significance of the relationship between job resources and flow reduced with the intervention of perception of ageing, however it remained significant. It is likely that besides perception of ageing another variable, interacting with perception of ageing, has to be taken into account. Since both gender and age of the respondent did not have a significant effect on flow, these variables are excluded to be the possible third variables. Since perception of ageing is largely affected by health (Boehmer, 2007), it is possible that health is the third variable to take into account.

A positive and significant relationship between perception of ageing and flow was found in this study. Thus, the better the perception of ageing, the more work flow one is experiencing. This may be due to self-efficacy and coping. Boehmer (2007) found that people who feel younger than their chronological age had higher self-efficacy than people who had same or older age identity. Thus, feeling younger than one's age relates to a stronger inner belief of one's ability to control life events (i.e. self-efficacy) (Boehmer, 2007). Furthermore, Boehmer (2007) found that people who feel younger than their chronological age had higher task-oriented coping. Feeling

able to exercise control over a wide range of difficult and novel tasks and to cope with adverse, or challenging events makes it easier to deal with job demands and possible short-term or long-term physical problems (i.e. physical workload or physical work capacity). Therefore, when self-efficacy is perceived and when one is able to cope with life-events, one feels that one is able to handle work- and personal related aspects, which positively contributes to reaching a state of flow.

Strengths, limitations, and directions for future research

This is one of the first studies that has extended knowledge about the relationship between work-related aspects and flow by including personal factors. It appeared that both physical work capacity and perception of ageing are important influencers of flow. Furthermore, it is one of the first studies within the area of flow to investigate the importance of perception of ageing. Research within occupational behavior mainly looks at chronological age. However, as results indicate, perception of age says more about an individual than chronological age.

Another strength of this study is that the direct relationship between job resources and flow is investigated. In previous research job resources was seen only as an influencer of job demands. This study has proved the importance of job resources within the study of flow.

Although the present study has strengths and innovations, its limitations need to be discussed. A weakness of this study is the relatively small number of participants (N 103). An advantage of the study population was that a heterogeneous sample of jobs was investigated. Thus, the findings seem generalizable over working environments. Arthur, Woehr, and Graziano (2001) pointed out the danger of self-selection on the basis of personality. They state that career choice and subsequent performance in these careers is based on personality. This means that it may be likely that employees in a particular job have corresponding personalities. The

heterogeneous population participating in this study reduces the possibility that the relationship between work-related aspects, personal aspects, and flow may have been restricted by a certain personality type of individuals seeking employment in a specific job (Demerouti, 2006).

Another limitation of this study is its cross-sectional character. It was assumed that work-related aspects, mediated by personal aspects, would lead to flow, but as they were measured simultaneously, it was actually not possible to say anything about the direction of the associations found. However, a longitudinal study conducted by De Jonge et al. (2001) has shown that job characteristics, like job demands, job control, and support from colleagues and supervisors, influence psychological well-being. More specifically, time 2 job satisfaction was determined by Time 1 job demands and workplace social support, respectively (De Jonge et al., 2001). This finding justifies for the assumption that flow is affected by job resources and not the other way around.

Furthermore, only perceptions with regard to physical changes are taken into account in this study. For future research it is recommendable to measure all dimensions of ageing since perception of ageing is not only determined by physical changes, but also by psychosocial loss and by psychological growth (Laidlaw et al., 2007). Additionally, only the physical part of work capacity is measured in this study, however, since work capacity is also consists of a cognitive and psychological part, it is recommendable for future researchers to also measure cognitive and psychological capacities (Van Dijk et al.1990).

Managerial implications

Findings from current research indicate that job resources are beneficial in reaching a state of flow. Thus, it seems worthwhile for organizations to promote flow by providing sufficient job resources to all employees. Information about the organization one works for, social support from

co-workers and supervisors, supervisory coaching, and performance feedback are examples of such resources. Additionally, communication and possibilities for self-growth could be considered. To which aspect of job resources most attention should be given to, differs per organization and should therefore be investigated by organizations. Findings may offer possibilities to optimize the working environment (Bakker, 2005). It is possible for example, that in some organizations scores on supervisory coaching are relatively low. Organizations could choose to offer additional training to supervisors regarding leadership styles.

To summarize, findings from this study suggest the importance of job resources in reaching a state of flow. Therefore, to improve flow among employees attention should be given to job resources. These results can be applied to the company's human resource management as a starting point for improving flow among employees. Improving flow will contribute to optimalizing employability and productivity of employees, which, in turn, is profitable for the organization.

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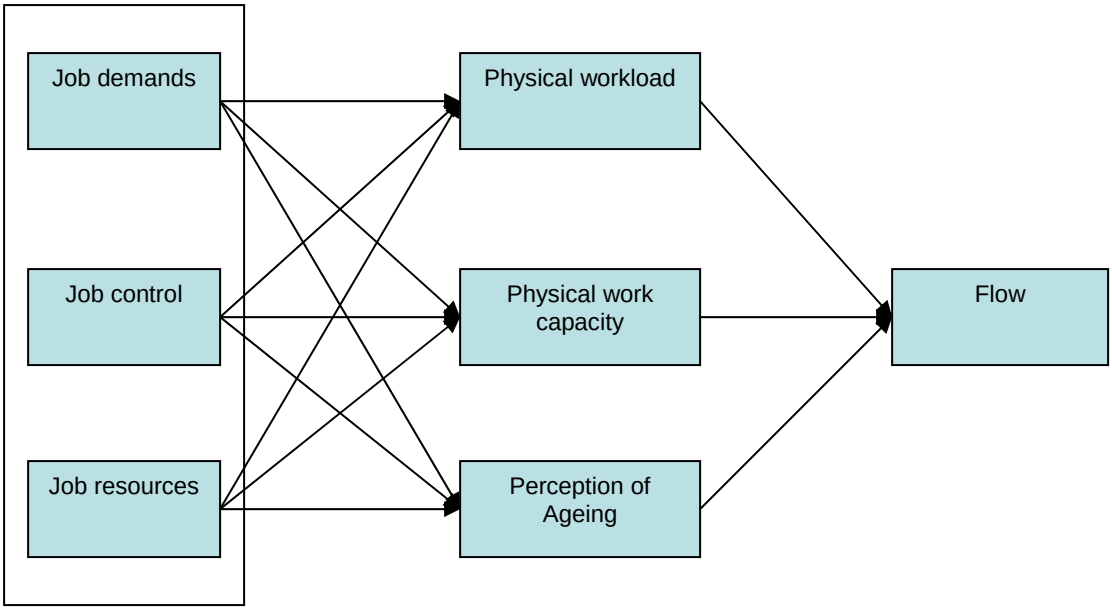

Figure 1

Research model

Table 1

Definitions of concepts used in the research model

Job demands – physical, social or organizational aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs (Demerouti et al., 2001, p. 501).
Job control – the organization of work in terms of workers' authority to make decisions concerning their own activities and skill usage (Elovainio et al., 2005).
Job resources – physical, psychological, social or organizational aspects of the job that may do any of the following: (a) be functional in achieving work goals; (b) reduce job demands at the associated physiological and psychological costs; (c) stimulate personal growth and development (Demerouti et al., 2001, p. 501).
Physical workload - all temporary short-term physical responses which can be regarded as indicators of the physical workload – changes in, for example, heart rate, breathing frequency, hormonal responses, and blood pressure, but also sweating and feelings of fatigue, during work and some hours thereafter (De Zwart et al., 1995, p. 2).
Physical work capacity – physical capacities and characteristics of a worker. Physical work capacity is a dynamic measure. Changes may occur in a short-term period, such as changes over the day cuased by fatigue, as well as in long-term periods, such as increase of decrease in muscle strength in months or years (De Zwart et al., 1995, p. 2).
Ageing – perception of ageing with relation to physical changes
Flow – a state of consciousness where people become totally immersed in an activity, and enjoy it intensely (Bakker, 2005).

Table 2

Means, standard deviations and correlations among all variables of the research model

	M	SD	1	2	3	4	5	6	7	8	9
1. FLOW	3,7701	,59306	-								
2. gender of the respondent	1,49	,502	,049	-							
3. age of the respondent	1963,53	11,429	-,026	,198	-						
4. JD	3,1227	,80712	-,041	-,185	,051	-					
5. JC	3,6149	,91734	-,019	-,262(**)	,100	,253(**)	-				
6. JR	3,9451	,65752	,306(**)	-,134	,041	,046	,394(**)	-			
7. PW	2,1023	,94689	,064	-,131	,038	,084	-,153	-,236(*)	-		
8. PWC	2,0190	,85465	-,317(**)	,038	-,044	,227(*)	-,071	-,282(**)	,402(**)	-	
9. AGE	4,1296	,58241	,311(**)	-,052	,006	,056	,013	,150	,032	-,248(*)	-

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table 3

Hierarchical Regression to Predict Flow (Dependent Variable – Flow)

Predictors	**Model 1**	**Model 2**	**Model 3**
	ß	**ß**	**ß**
1. gender	,044	,037	,050
2. age of the respondent	-,037	-,034	-,041
3. JD		-,036	-,039
4. PW			,098
Adjusted R^2	-,018	-,028	-,029
Adjusted ΔR^2	,003	,001	,010
1. gender	,073	,062	,094
2. age of the respondent	-,062	-,057	-,081
3. JD		-,060	,011
4. PWC			-,310**
Adjusted R^2	-,014	-,021	,062
Adjusted ΔR^2	,007	,003	,091**
1. gender	,044	,037	,054
2. age of the respondent	-,037	-,034	-,048
3. JD		-,036	-,057
4. Perception of Ageing			,368***
Adjusted R^2	-,018	-,028	,101
Adjusted ΔR^2	,003	,001	,135***

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

Table 4

Hierarchical Regression to Predict Flow (Dependent Variable – Flow)

Predictors	**Model 1**	**Model 2**	**Model 3**
	ß	**ß**	**ß**
1. gender	,044	,021	,038
2. age of the respondent	-,037	-,025	-,033
3. JC		-,071	-,058
4. PW			,089
Adjusted R^2	-,018	-,025	-,028
Adjusted ΔR^2	,003	,005	,008
1. gender	,073	,054	,077
2. age of the respondent	-,062	-,051	-,072
3. JC		-,058	-,042
4. PWC			-,306**
Adjusted R^2	-,014	-,022	,064
Adjusted ΔR^2	,007	,003	,093**
1. gender	,044	,021	,046
2. age of the respondent	-,037	-,025	-,042
3. JC		-,071	-,058
4. Perception of Ageing			,363***
Adjusted R^2	-,018	-,025	,101
Adjusted ΔR^2	,003	,005	,131***

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

Table 5

Hierarchical Regression to Predict Flow (Dependent Variable – Flow)

Predictors	**Model 1**	**Model 2**	**Model 3**
	ß	**ß**	**ß**
1. gender	,044	,085	,116
2. age of the respondent	-,037	-,060	-,076
3. JR		,256*	,301**
4. PW			,174
Adjusted R^2	-,018	,037	,055
Adjusted ΔR^2	,003	,064*	,028
1. gender	,073	,105	,112
2. age of the respondent	-,062	-,078	-,090
3. JR		,227*	,160
4. PWC			-,268**
Adjusted R^2	-,014	,027	,087
Adjusted ΔR^2	,007	,051*	,067**
1. gender	,044	,085	,097
2. age of the respondent	-,037	-,060	-,069
3. JR		,256*	,209*
4. Perception of Ageing			,336***
Adjusted R^2	-,018	,037	,141
Adjusted ΔR^2	,003	,064*	,111***

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