

MASTER

The relation between work characteristics and global job satisfaction the influence of different job satisfaction measures

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Eindhoven, August 2007

**The relation between work
characteristics and global job
satisfaction: The influence of
different job satisfaction measures**

by
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Summary

Background

In industrial, organizational, and social psychology, a major dependent variable is job satisfaction. It is defined as “how people feel about their jobs and different aspects of their jobs” (Spector, 1997, p. 2).

In academic research, an important aspect in measuring psychological variables is the number of items. Since single-item measures have been criticized because it is not possible to estimate the internal consistency reliability, it may seem that multi-item measures of a psychological variable are preferable to single-item measures. However, the study findings of Wanous, Reichers, and Hudy (1997) and Nagy (2002) showed support for the use of single-item measures for assessing job satisfaction. Moreover, Scarpello and Campbell (1983) and Highhouse and Becker (1993) showed that a single-item measure of global job satisfaction may be more inclusive than a multi-item measure.

Purpose

The purpose of our study was to investigate the influence of different measures of global job satisfaction on the relation between work characteristics and global job satisfaction based on the Job Demand–Control–Support model (JDCS; Johnson & Hall, 1988; Johnson, Hall & Theorell, 1989; Karasek & Theorell, 1990). The following four measures of global job satisfaction were investigated: a single-item faces scale, a single-item rating scale, a multi-item rating scale, and a composite scale of eight single-item job satisfaction facets. In addition, three aspects in the work situation, as identified by the model, were examined, i.e., job demands (conceptualized as physical workload and work and time pressure), job control (conceptualized as skill discretion and autonomy), and workplace social support (conceptualized as workplace social support from colleagues and workplace social support from direct supervisor). Furthermore, four background variables were assessed, i.e., age,

gender, organizational tenure, and negative affectivity. The focus of our study was on the iso-strain hypothesis of the model and normal causal relations.

Methodology

An incomplete two-wave panel design with written, pre-formatted questionnaires was used. The time lag was two months. Research data was obtained from a Dutch health care organization. The sample consisted of $N = 344$ employees (62% response rate). In addition to a correlational analysis, the research data was analyzed both cross-sectionally and longitudinally using hierarchical multiple linear regression analysis with confirmatory model specification

Findings

As was hypothesized, the four measures of global job satisfaction compare favourably in terms of being highly correlated. However, with respect to the JDCS model, they are by no means equivalent. Both the cross-sectional and the longitudinal analysis revealed several differences between the measures regarding the background and independent variables on the one hand and the variance in global job satisfaction explained on the other hand. In addition, contrary to what was hypothesized, results showed that in terms of variance explained a composite scale of job satisfaction facets outperforms the other three measures of global job satisfaction. The composite scale of job satisfaction facets showed support for the JDCS model in the cross-sectional analysis. However, no support was found in the longitudinal analysis.

Implications

Implications of our study pertain both to researchers examining the JDCS model and practitioners in the field of job redesign. Since the job satisfaction measure may be more important than thought of at first glance, a decision should be taken with care.

Limitations

Limitations that should be noted concern the absence of an initial non-response and attrition analysis, the time lag used, and the generalizability of the study findings.

Future research

Future research may focus on examining different populations, different measures of both the work characteristics and global job satisfaction, interactive effects, reverse and/or reciprocal causal relationships between work characteristics and job satisfaction, and other models incorporating job satisfaction.

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1. Introduction

1.1. Measurement of job satisfaction

In industrial, organizational, and social psychology, a major dependent variable is job satisfaction (Ironson, Smith, Brannick, Gibson & Paul, 1989). Job satisfaction is a form of psychological well-being. In particular, it is considered an aspect of job-related well-being, as opposed to general measures, such as anxiety and depression (Van der Doef & Maes, 1999). Job satisfaction pertains to an employee's job that, as Locke (1976, p. 1301) has pointed out, "is not an entity but a complex interrelationship of tasks, roles, responsibilities, interactions, incentives, and rewards". Spector (1997, p. 2) defines job satisfaction as "how people feel about their jobs and different aspects of their jobs".

In academic research, an important aspect in measuring psychological variables is the number of items. Two categories can be distinguished, i.e., single-item measurement and multi-item measurement (Cooper & Schindler, 2003). In case of single-item measurement, a variable is assessed using only one item. Wanous, Reichers, and Hudy (1997, p. 247) mention that "the use of single-item measures in academic research is often considered a 'fatal error' in the review process". Single-item measures have been criticized. A major point of critique is that it is not possible to estimate the internal consistency reliability. Contrary to single-item measures, multi-item measures assess a variable using more than one item, usually a minimum of three. An advantage of multi-item measures is that their reliability can be assessed (Cooper & Schindler, 2003). It may thus seem that multi-item measures of a psychological variable, such as job satisfaction, are preferable to single-item measures.

Wanous et al. (1997) investigated the extent to which single-item measures of global job satisfaction are correlated with multi-item measures of global job satisfaction. The meta-analysis showed that single-item measures correlated quite strongly with multi-item measures (correlation corrected for unreliability, $r_c = .67$). Moreover, although a reliability estimate of single-item measures cannot be assessed, the authors calculated a lower bound for this estimate. The estimates calculated ranged from a low of .45 to a high of .69. The average

reliability estimate was .57. Given their findings, the authors concluded that the reliability of a single-item measure of global job satisfaction is acceptable.

In addition to the examination of single-item and multi-item measures of global job satisfaction, Wanous et al. (1997) investigated the properties of a global job satisfaction measure based on a composite scale of job satisfaction facets, in terms of the sum of facets. Examples of job satisfaction facets are the nature of the work itself, financial rewards, and supervision (Spector, 1997). The results showed that multi-item measures of global job satisfaction had properties similar to a composite scale of job satisfaction facets (correlation with single-item measures corrected for unreliability, $r_c = .72$ and $r_c = .68$, respectively). Yet another examination of the authors pertained to the difference between so-called faces scales (Kunin, 1955) and other single-item measures of global job satisfaction, i.e., rating scales. In case of a faces scale, job satisfaction is assessed with pictures of circular faces showing different emotions related to job satisfaction, whereas in case of a rating scale, each response is given a numerical score to reflect its degree of attitudinal favourableness. The findings showed that single-item faces scales and single-item ratings scales assessing global job satisfaction were comparable (correlation with multi-item measures corrected for unreliability, $r_c = .66$ and $r_c = .68$, respectively). An overview of several types of global job satisfaction measures is shown in Table 1.

Table 1: Overview of several global job satisfaction measures

Global job satisfaction measure
Single-item faces scale
Single-item rating scale
Multi-item rating scale
Composite scale of (single-item or multi-item) job satisfaction facets

Moreover, Wanous et al. (1997) listed several advantages of single-item measures compared to multi-item measures. First, the format is much more efficient, since single-items use less space. Furthermore, single-item measures are more cost-effective. For example, data input takes less time and therefore less cost. Finally, single-item measures have more face validity, especially in organizations with poor employee relations.

Based on the research of Wanous et al. (1997), Nagy (2002) investigated the extent to which single-item measures of job satisfaction *facets* were correlated with multi-item measures of job satisfaction *facets*. The study assessed five facets, i.e., work itself, pay, promotions, supervision, and co-workers. The results showed that single-item measures

correlated quite strongly with multi-item measures. The correlations found ranged from $r = .60$ to $r = .72$. The average correlation across all five facets was $r = .66$. The correlations were quite similar in magnitude to the correlations Wanous et al. (1997) found between the single-item and multi-item measures of global job satisfaction. It can be concluded that both studies support the use of single-item measures for assessing job satisfaction. Although the studies advocate the use of single-item measures, it is noted that a well-constructed multi-item measure of job satisfaction makes sense, if neither the research question nor the research situation suggest the use of a single-item measure.

1.2. Antecedents of job satisfaction

Measuring job satisfaction is not an end in itself. Rather, job satisfaction is assessed because it is associated with outcome variables, such as performance, absenteeism, and turnover (Spector, 1997). Considering the importance of job satisfaction, the question arises: how can organizations influence employees' job satisfaction? Although numerous variables have been found to be determinants of job satisfaction, unfortunately no comprehensive and cohesive theory has emerged (Kinicki, McKee-Ryan, Schriesheim & Carson, 2002). Based on their meta-analysis and Locke (1976), four sub categories of antecedent variables of job satisfaction can be distinguished, i.e., work characteristics, group and organizational characteristics, leader characteristics, and personal characteristics.

An example of a work characteristics variable is role ambiguity. Role ambiguity refers to the extent to which the nature of the expected job behaviour is unclear to an employee (Brown & Peterson, 1993). In their meta-analysis, the authors found that role ambiguity was strongly negatively related to job satisfaction (correlation corrected for measurement error, $r_c = -.45$). An example of a group and organizational characteristics variable is human resource development. Human resource development is defined as the perceptions employees have regarding opportunities for training, future career growth, and general skill development (Wright & Davis, 2003). The authors found a strong positive relation ($r = .47$). An example of a leader characteristics variable is supervisory communication. The meta-analysis of Blegen (1993) showed a strong positive relation (correlation corrected for measurement error, $r_c = .45$). Finally, an example of a personal characteristics variable is negative affectivity. Negative affectivity is a person's tendency to

experience negative feelings over time (Bond & Bunce, 2003). The authors found that negative affectivity was moderately negatively related to job satisfaction ($r = -.24$).

The focus of our study is on work characteristics variables in relation to job satisfaction. The reason for this is of a practical nature. Our study is part of an investigation on the level of employee job satisfaction and the antecedents thereof in a health care organization. The main emphasis of this investigation is on antecedents that are relatively easy to control. Generally speaking, it takes less effort for an organization to adapt work characteristics compared to group and organizational characteristics, leader characteristics, or personal characteristics. For example, role ambiguity could be decreased by devising a formal, job-specific, written-down job description that has been agreed upon by the relevant job stakeholders, e.g., the employee him/herself, the supervisor, and colleagues. In contrast, improving human resource development may require an organization-wide change in policies regarding training, career opportunities, and skill development. This adaptation would probably take more time and be more expensive.

1.3. Job Demand-Control-Support model

A model that integrates several work characteristics and well-being variables is the Job Demand–Control–Support model (JDCS; Johnson & Hall, 1988; Johnson, Hall & Theorell, 1989; Karasek & Theorell, 1990). It is considered one of the most influential models in research on the relation between work and health (Van der Doef & Maes, 1999). The JDCS model is an extension of the Job Demand-Control model (JDC; Karasek, 1979; Karasek & Theorell, 1990). The JDC model identifies two crucial aspects in the work situation, i.e., job demands and job control. These work characteristics are considered to be determinants of the health of employees. Job demands refer to an employee's workload. Job control refers to an employee's ability to control his/her work activities. It consists of two components, i.e., skill discretion and autonomy. Skill discretion is the variety of skills used by the employee at work, whereas autonomy is an employee's authority to make decisions at work.

The model is based on two central mechanisms. The first mechanism is that having job control will reduce an employee's stress, but increase his/her learning. The second mechanism is that having job demands will increase both stress and learning. These two mechanisms are represented by the diagonals of the model in Figure 1 and formulated in terms of two hypotheses. The strain hypothesis (strain diagonal A) states that employees

working in jobs characterized by high demands and low control, will experience a more than average number of health problems over time. In contrast, the learning hypothesis (learning diagonal B) states that employees working in a job characterized by both high demands and high control, will lead to increased learning, motivation, and development of skills. As we are interested in employee well-being, in particular job satisfaction, the focus of our study is on the strain hypothesis.

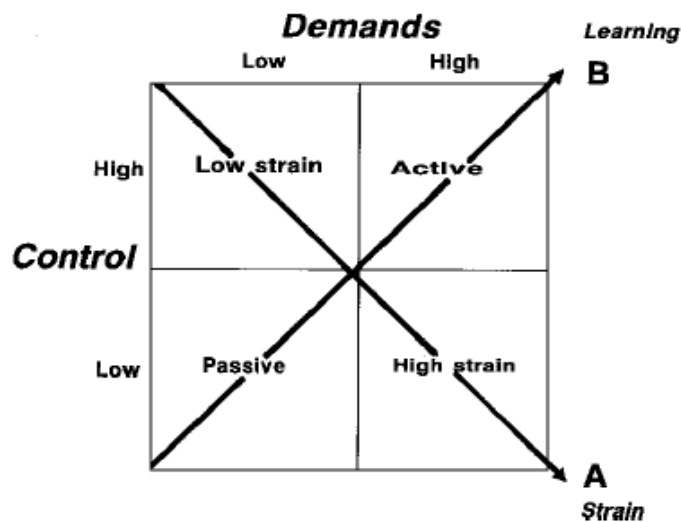


Figure 1: The Job Demand-Control model (adapted from Karasek, 1979)

As mentioned above, the JDC model has been extended with a third work characteristic, i.e., workplace social support. Workplace social support refers to general helpful behaviour from both colleagues and direct supervisors (Karasek & Theorell, 1990). The strain hypothesis can also be applied to the JDCS model (now referred to as iso-strain hypothesis): employees working in a job characterized by high demands, low control, and low social support, will experience a more than average number of health problems over time.

In our study, the JDCS model is used as a foundation in order to examine the influence of different job satisfaction measures. In particular, the purpose is to investigate the influence of different measures of global job satisfaction on the relation between job demands, job control, and workplace social support on the one hand and global job satisfaction on the other hand. The conceptual model of our study is shown in Figure 2. Four different measures of global job satisfaction are investigated, i.e., (1) a single-item faces scale, (2) a single-item rating scale, (3) a multi-item rating scale, and (4) a composite scale of single-item rating scales assessing eight job satisfaction facets.

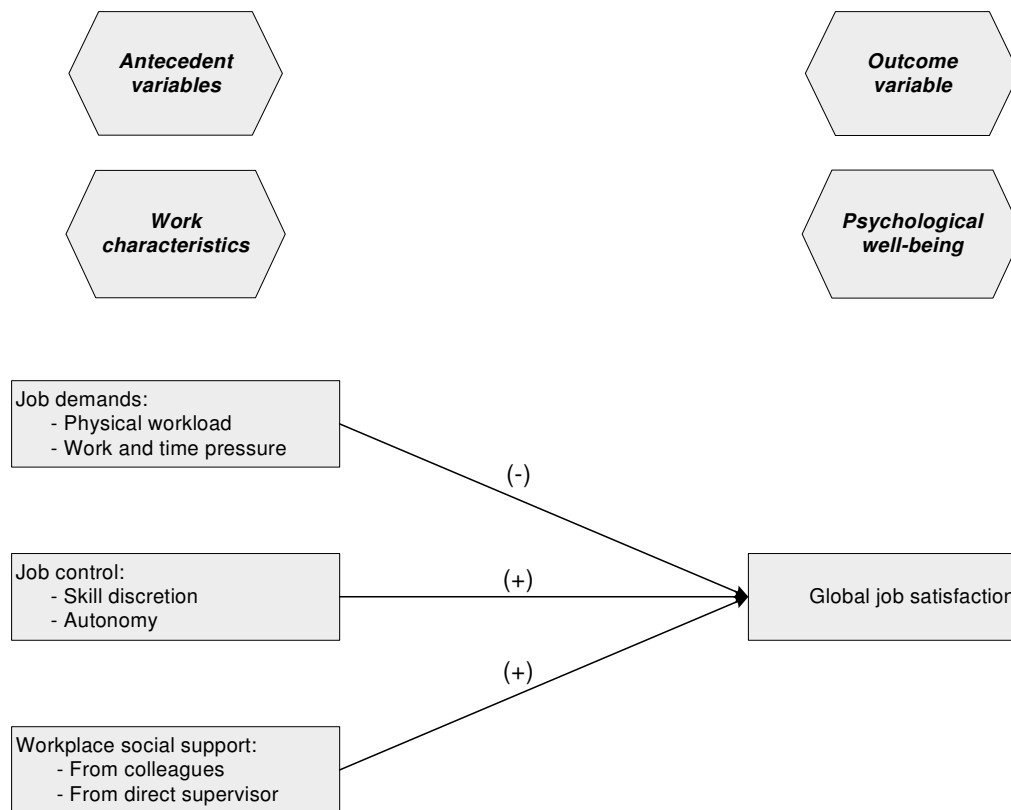


Figure 2: Conceptual model

An important issue of the JDCS model pertains to the question of when the iso-strain hypothesis is empirically supported. In other words, is an interactive effect between the three work characteristics required or do main effects suffice. Consistent with Karasek (1989), De Lange, Taris, Kompier, Houtman, and Bongers (2003) consider a focus on interactive effects only too strict. In particular, in their review the authors stated that the iso-strain hypothesis is *also* supported when there are three main effects of job demands, job control, and workplace social support. So, for example, increasing demands, decreasing control, and decreasing social support independently lead to higher levels of strain. As the aim of our study is not so much on validating the JDCS model itself but on investigating the influence of different job satisfaction measures with respect to that model, the recommendation by De Lange et al. (2003) is followed.

Another important issue of the JDCS model is its basic assumption of a uni-directional relation between work characteristics and health. This means that work characteristics at one moment in time have an influence on health at a later moment in time. Such an effect is also called a normal causal relation (Hair, Black, Bain, Anderson & Tatham, 2006). Several studies investigating the JDCS model have found evidence of normal causal relations between work characteristics and global job satisfaction (see e.g., De Jonge et al.,

2001; Dollard, Winefield, Winefield & De Jonge, 2000). Although other studies have also investigated reverse and/or reciprocal causal relations between work characteristics and health (see e.g., De Lange, Taris, Kompier, Houtman & Bongers, 2004; Gelsema et al., 2006), the focus of our study is on the normal causal relation. Being part of a larger organizational investigation, for practical reasons the work characteristics are only assessed once, inhibiting the examination of reverse and reciprocal causal relations (Zapf, Dormann & Frese, 1996).

1.4. Hypotheses

As was mentioned previously, the focal point of our study is the influence of different measures of global job satisfaction. Although it has been shown that different measures of job satisfaction are quite comparable (see e.g., Nagy, 2002; Wanous et al., 1997), it is argued that a general scale assessing global job satisfaction is not equivalent to a composite scale of job satisfaction facets (Ironson et al., 1989; Scarpello & Campbell, 1983). The information provided with each scale is unique. A general scale is used to estimate an employee's overall feelings about his/her job. As such, it is applicable to quickly assessing employees' job satisfaction within an organization at different moments in time in order to detect trends. In addition, it can easily be used in studies comparing the global job satisfaction of employees in different occupations and countries. A facet scale, however, is used to discriminate between different aspects of job satisfaction. As such, strengths and weaknesses concerning these aspects in an organization can be assessed in order to improve these areas of the job satisfaction of its employees.

In a general scale, an employee is asked to give a single integrated response. It is assumed that some sort of internal processing takes place in which an employee incorporates all aspects he/she considers relevant. In contrast, consistent with Locke (1969, p. 330) who states that overall job satisfaction "is the sum of the evaluations of the discriminable elements of which the job is composed", a composite scale assumes that the whole is equal to the sum of its parts. However, Scarpello and Campbell (1983, p. 599) stated that "the 'whole' appears to be more complex than the sum of the [...] parts". The authors argued that a composite scale lacks content validity. Such a scale may omit facets that are important to an employee when evaluating his/her job satisfaction. Similarly, such a scale may include facets that are

unimportant to an employee. In other words, a general scale may be more inclusive than a composite scale in assessing global job satisfaction.

For example, an employee may consider a sound balance between work and non-work as a major determinant of his/her job satisfaction, an aspect generally not assessed with a composite scale. Conversely, a composite scale may ask for an employees' evaluation of his/her satisfaction with promotion opportunities, even though an employee could consider this aspect as not important at all. In both examples, using a composite scale for assessing an employee's global job satisfaction may lead to spurious conclusions.

In their study, Scarpello and Campbell (1983) compared a single-item global job satisfaction scale with an established composite scale of twenty job satisfaction facets. The composite was calculated in terms of the sum of the facet scores. In addition, they carried out interviews with all respondents in order to obtain information about possible facets employees consider in evaluating global job satisfaction. Results showed that twenty of the 23 interview-based job satisfaction facets explained more variance in the general scale over and above what was measured with the composite scale. Furthermore, although three facets were both discussed in the interviews and present in the composite scale, five interview-based facets were not related to the composite scale facets but at the same time were significantly correlated to the single-item global job satisfaction scale (correlations range from $r = .14$ for the facet of tools and equipment to $r = .39$ for the facet of pleasantness of interactions with people at work).

In addition to Scarpello and Campbell (1983), Highhouse and Becker (1993) also found some support for the lack of content validity of composite scales compared to general scales in assessing global job satisfaction. In the first part of their study, the authors used a single-item global job satisfaction scale and an in-house developed composite scale assessing twelve job satisfaction facets. The composite was calculated in terms of the mean of the facet scores. In addition, a representative group of employees from the sample was asked to elicit facets that employees consider relevant in assessing their global job satisfaction. Results showed that some of the employee-chosen facets explained more variance in the general scale over and above what was measured with the composite scale.

In the second part of their study, the authors focused on a single facet, i.e., satisfaction with benefit package. They compared a single-item global scale with a composite scale that included *all* company benefits, as defined in the employee handbook. Results showed that the correlation between both scales was as low as $r = .49$, meaning that less than 25% of the variance in the single-item scale is explained with the composite scale. The authors

concluded that even a well-defined composite scale did not incorporate all of the elements that employees consider when evaluating their job satisfaction.

The same line of reasoning holds for a multi-item global scale. Again, as opposed to a single-item global scale, some unimportant aspects may be included in the measure, whereas some important ones could be missing. As a consequence, also a multi-item scale may lead to an incomplete assessment of an employee's global job satisfaction.

With respect to a possible difference between a single-item rating scale and a faces scale, no a priori hypothesis is formulated. Ironson et al. (1989), among other things, compared a faces scale with a single-item numerical rating scale and found a correlation of $r = .75$. In addition, Wanous et al. (1997) found that the type of single-item measures did not moderate the overall correlation between single-item and multi-item scales of global job satisfaction. Finally, in her review on single-item scales, Patrician (2004, p. 351) concluded that "single-item measures in general, and faces scales in particular, can provide reliable and valid inferences when used to measure global constructs", such as job satisfaction.

In line with the above-mentioned, Nagy (2002) examined the empirical relations of job satisfaction and three outcome variables, i.e., absenteeism, intentions to turnover, and self-reported performance, for both single-item and multi-item measures of job satisfaction facets. Results showed that a single-item measure of job satisfaction facets may have accounted for more variance in outcome variables than a multi-item measure of job satisfaction facets. This finding did hold for all five facets with respect to intentions to turnover, for some facets with respect to self-reported performance, but for no facets with respect to absenteeism. In other words, a single-item measure of job satisfaction facets may be more inclusive than a multi-item measure. If this finding holds for outcome variables of job satisfaction, it would be interesting to see if it also applies to antecedent variables. Hence, the following hypotheses are formulated:

Hypothesis 1: All four measures of global job satisfaction will be positively associated with each other.

Hypothesis 2a: A single-item rating scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale measure.

Hypothesis 2b: A single-item faces scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale measure.

Hypothesis 3a: A single-item rating scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a measure in terms of a composite scale of single-item rating scales assessing eight job satisfaction facets.

Hypothesis 3b: A single-item faces scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a measure in terms of a composite scale of single-item rating scales assessing eight job satisfaction facets.

2. Methodology

2.1. Research design

An incomplete two-wave panel design with written, pre-formatted questionnaires was used. The time lag between the two waves was two months. According to De Lange et al. (2003), the recommendations with respect to the length of the time lag are inconsistent, resulting in a lack of “commonly accepted guidelines” (p. 285). In our study, the time lag was short, and only the dependent variables were assessed at both waves. It is assumed, therefore, that no significant changes in work characteristics have occurred.

2.2. Field site and participants

The research data was obtained from a Dutch health care organization as part of an investigation focussing on the level of employee job satisfaction and the antecedents thereof. The organization offers both psycho geriatric and somatic care for a maximum of 374 patients. Care is provided at four sites. Almost 750 employees and some 350 volunteers are employed.

The organization comprises five departments. The majority of employees work in teams at the Department of Care (58%). The others are employed in supporting departments (Department of Treatment (14%), Department of Finance (2%), Department of Facilities (22%), Department of Personnel, Training & Organization (2%)) and in management (2%).

The research sample consisted of all 694 employees with a non-temporary contract. At Time 1, 501 respondents returned the questionnaire (72% response rate). Of these respondents, 429 respondents returned the questionnaire at Time 2 as well (86% response rate). Missing values were dealt with as follows. For the dependent variables, only respondents with non-missing values were taken into account in order to avoid any artificial increase in relations with independent variables (Hair et al., 2006). With respect to the independent and background variables, only respondents with at least 75% non-missing

values for all items of a multi-item measure were considered. Finally, for reasons of equal comparison a listwise deletion of missing values still present was carried out, yielding a sample $N = 344$ employees.

A breakdown of the demographic characteristics of the sample shows that 91% of the employees were women. The mean age of the employees was 44.8 years ($SD = 10.1$ years). The mean organizational tenure was 9.6 years ($SD = 8.4$ years) and 84% of the respondents worked part-time, i.e., less than 36 hours per week.

The sample can be considered representative for the population. The division of employees of the sample within the organizational departments is similar to the division of employees of the population. Of the respondents, 55% worked in the Department of Care, 15% in the Department of Treatment, 3% in the Department of Finance, 23% in the Department of Facilities, 2% in the Department of Personnel, Training & Organization, and 2% in management.

2.3. Measures

2.3.1. Dependent variables

Global job satisfaction was measured with four different scales. The first scale was a single-item faces scale (Kunin, 1955). The second scale was a single-item rating scale (i.e., “Overall, I am satisfied with my job.”). A five-point response scale was used, ranging from 1 ‘totally disagree’ to 5 ‘totally agree’. The third scale was a five-item rating scale (based on De Jonge, Van Vegchel & Hamers, 2003). A five-point response scale was used, ranging from 1 ‘totally disagree’ to 5 ‘totally agree’. A sample item is: “Usually, I enjoy starting my day at work.” The fourth scale was a composite scale (i.e., the mean) of eight single-item job satisfaction facets (i.e., nature of the work, colleagues, financial rewards, direct supervisor, working conditions, non-financial rewards, promotion, and personal development (facets are based on Spector, 1985). A five-point response scale was used, ranging from 1 ‘totally disagree’ to 5 ‘totally agree’. A sample item is: “Overall, I am satisfied with the nature of my work.”

2.3.2. Independent variables

Two conceptualizations of job demands were assessed, i.e., *physical workload* and *work and time pressure*. Physical workload was measured using an eight-item scale (Van Veldhoven, Meijman, Broersen & Fortuin, 1997). A sample item is: “Do you work in discomforting or strenuous positions?” Work and time pressure was assessed using an eleven-item scale (Van Veldhoven et al., 1997). A sample item is: “Do you have to work very fast?” For both scales a four-point response scale was used, ranging from 1 ‘never’ to 4 ‘always’.

Two conceptualizations of job control were assessed, i.e., *skill discretion* and *autonomy*. Skill discretion was measured using a six-item scale (Karasek et al., 1998). A sample item is: “My job requires me to be creative.” Autonomy was measured using a four-item scale (Biessen, 1992). A sample item is: “I have the opportunity to decide on my own how to carry out my work.” For both scales a five-point response scale was used, ranging from 1 ‘totally disagree’ to 5 ‘totally agree’.

Two conceptualizations of workplace social support were assessed, i.e., *workplace social support from colleagues* and *workplace social support from direct supervisor*. Workplace social support from colleagues was measured using a nine-item scale (Van Veldhoven et al., 1997). A sample item is: “Can you, if it’s necessary, ask your colleagues for help?” Workplace social support from direct supervisor was measured using a nine-item scale (Van Veldhoven et al., 1997). A sample item is: “Can you rely on your direct supervisor in case you experience difficulties at work?” For both scales a four-point response scale was used, ranging from 1 ‘never’ to 4 ‘always’.

2.3.3. Background variables

Four background variables (i.e., *age*, *gender*, *organizational tenure*, and *negative affectivity*) were assessed. These variables may have a confounding effect on the results (De Lange et al., 2003; Karasek & Theorell, 1990; Spector, 1997) and were included in our study in order to control for their possible influence. Negative affectivity was assessed using a ten-item scale (Watson, Clark & Tellegen, 1988). A sample item is: “In general, to what extent do you feel nervous?” A five-point response scale was used, ranging from 1 ‘very slightly’ to 5 ‘very much’. A complete overview of all measures can be found in Appendix A.

2.4. Data collection

The questionnaires were sent to the home address of the employees. Although it was stressed in an accompanying letter that participation was strongly requested, employees participated voluntarily. Confidentiality was guaranteed by an identification code used for second round identification. The researchers were the only ones to have access to the key. The questionnaires could be returned using a self-addressed and stamped answering envelope. The time frame between receiving and returning the questionnaire was three weeks. Two weeks after questionnaire dissemination a reminder letter requesting for response was sent. As an incentive, employees who returned both questionnaires received a lottery ticket at € 5,-.

2.5. Data analysis

In order to gain more basic insight into the data, first the means, standard deviations, Cronbach's alphas, and Pearson product moment correlations were computed. For this, the assumptions of normally distributed variables and linear relations between dependent and independent variables were checked.

Second, in order to get a first impression, the data was analyzed cross-sectionally at Time 1 using hierarchical multiple linear regression analysis (MRA) with confirmatory model specification (Hair et al., 2006). For this, the additional assumption of low multicollinearity between independent variables was checked. Then, for each of the four measures of global job satisfaction a separate regression analysis was carried out. The following regression analysis approach was used. First, the four background variables (i.e., age, gender, organizational tenure, and negative affectivity) were introduced into the equation to partial out their effects. Then, the six independent variables (i.e., physical workload, work and time pressure, skill discretion, autonomy, workplace social support from colleagues, and workplace social support from direct supervisor) were introduced into the equation. The dependent variable in the equation was global job satisfaction at Time 1. The cross-sectional relation between work characteristics and global job satisfaction was supported if the R^2 change of the last step was significant.

Finally, the data was analyzed longitudinally using MRA. Again, the additional assumption of low multicollinearity between independent variables was checked. Now, the

following regression analysis approach was used. First, the four background variables were introduced into the equation to partial out their effects. Second, the dependent variable of global job satisfaction at Time 1 was introduced into the equation to partial out its effect. Finally, the six independent variables were introduced into the equation. The dependent variable in the equation was global job satisfaction at Time 2. The causal relation between work characteristics and global job satisfaction was supported if the R^2 change of the last step was significant (see Figure 3.)

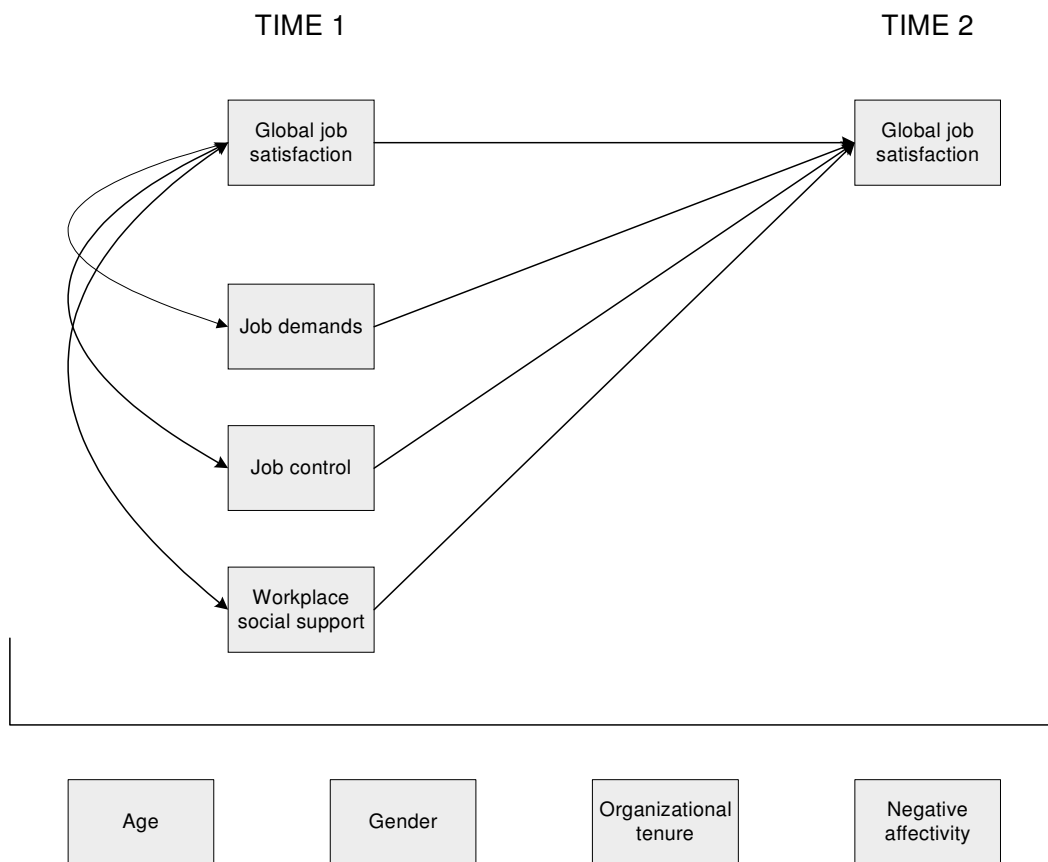


Figure 3: Hierarchical multiple linear regression analysis approach

3. Results

3.1. Correlational analysis

First, the assumptions of normally distributed variables and linear relations between dependent and independent variables were checked. Based on both the threshold value of $|z_{skewness}| \leq 1.96$ and normal probability plots (Hair et al., 2006), it was initially found that the first assumption - normally distributed variables - was not met. Therefore, the multi-item independent and background variables were transformed. The transformations used are shown in Table 2. Some of the variables were reflected twice because of the negative skewness values of these variables. This means that, in this case, the correlations do not have to be interpreted differently. After all, each reflection changes the sign of the correlation. After transformation, the variables were normally distributed. Thus, in the end, for the multi-item independent and background variables the first assumption was met. Based on scatter plots showing no curvilinear relations, it was found that the second assumption - linear relations between dependent and independent variables - was also met.

Table 2: Transformations of multi-item independent and background variables

Variable	Transformation
Physical workload	Square root
Work and time pressure	Square root
Skill discretion	Reflect (reflect and logarithm)
Autonomy	Reflect (reflect and square root)
Workplace social support from colleagues	Reflect (reflect and square root)
Workplace social support from direct supervisor	Reflect (reflect and logarithm)
Negative affectivity	Square root

Second, the means, standard deviations, Cronbach's alphas, and Pearson product moment correlations of the study variables were computed, as shown in Table 3. The Cronbach's alphas for the multi-item scales ranged from $\alpha = .76$ (for skill discretion) to $\alpha = .90$ (for workplace social support from direct supervisor). These values exceed the generally

Table 3: Means, standard deviations, Cronbach's alphas (in parentheses), and Pearson product moment correlations for study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. T1 global job satisfaction single-item faces scale	4.28	.73	-							
2. T1 global job satisfaction single-item rating scale	4.29	.72	.72**	-						
3. T1 global job satisfaction multi-item rating scale	4.28	.66	.78**	.82**	(.89)					
4. T1 composite scale of job satisfaction facets	3.77	.64	.66**	.68**	.72**	(.84)				
5. T2 global job satisfaction single-item faces scale	4.17	.74	.66**	.56**	.65**	.55**	-			
6. T2 global job satisfaction single-item rating scale	4.22	.72	.59**	.59**	.67**	.57**	.70**	-		
7. T2 global job satisfaction multi-item rating scale	4.17	.68	.67**	.66**	.78**	.61**	.75**	.81**	(.89)	
8. T2 composite scale of job satisfaction facets	3.70	.68	.61**	.56**	.64**	.79**	.64**	.68**	.72**	(.86)
9. Physical workload	2.02	.68	-.22**	-.24**	-.25**	-.32**	-.24**	-.23**	-.25**	-.30**
10. Work and time pressure	2.43	.49	-.19**	-.16**	-.12*	-.19**	-.09	-.10	-.10	-.09
11. Skill discretion	3.66	.67	.27**	.38**	.42**	.37**	.20**	.29**	.38**	.37**
12. Autonomy	3.90	.71	.25**	.33**	.35**	.30**	.21**	.22**	.27**	.26**
13. Workplace social support from colleagues	3.43	.38	.37**	.35**	.39**	.46**	.40**	.37**	.38**	.44**
14. Workplace social support from direct supervisor	3.45	.52	.45**	.40**	.45**	.59**	.40**	.37**	.39**	.54**
15. Age	44.84	10.11	-.02	-.02	-.08	-.09	.01	.01	-.02	-.05
16. Gender	-	-	.02	.03	.05	.03	.02	.03	.05	.01
17. Organizational tenure	9.58	8.39	-.09	-.03	-.05	.01	-.13*	-.04	-.08	-.03
18. Negative affectivity	1.92	.52	-.37**	-.27**	-.29**	-.27**	-.32**	-.26**	-.31**	-.25**

	9	10	11	12	13	14	15	16	17	18
1. T1 global job satisfaction single-item faces scale										
2. T1 global job satisfaction single-item rating scale										
3. T1 global job satisfaction multi-item rating scale										
4. T1 composite scale of job satisfaction facets										
5. T2 global job satisfaction single-item faces scale										
6. T2 global job satisfaction single-item rating scale										
7. T2 global job satisfaction multi-item rating scale										
8. T2 composite scale of job satisfaction facets										
9. Physical workload	(.90)									
10. Work and time pressure	.42**	(.90)								
11. Skill discretion	-.31**	.10	(.76)							
12. Autonomy	-.20**	-.00	.41**	(.86)						
13. Workplace social support from colleagues	-.21**	-.15**	.11*	.16**	(.85)					
14. Workplace social support from direct supervisor	-.19**	-.15**	.11*	.21**	.46**	(.90)				
15. Age	-.09	-.03	-.06	.02	-.04	.04	-			
16. Gender	.07	-.01	-.14**	-.14**	-.05	-.09	-.18**	-		
17. Organizational tenure	-.04	-.02	.07	.10	.05	-.04	.35**	-.24**	-	
18. Negative affectivity	.20**	.26**	-.11*	-.22**	-.31**	-.26**	-.09	.11*	.02	(.85)

* $p < .05$ (2-tailed); ** $p < .01$ (2-tailed); $N = 344$

M = mean; SD = standard deviation; T1 = Time 1; T2 = Time 2

Means and standard deviations were calculated before transformation of scales.

accepted lower limit of $\alpha = .70$, thus giving support for the internal consistency of the measures used in our study (Hair et al., 2006).

With respect to the across-time stability of the four job satisfaction measures, the test-retest reliabilities ranged from $r = .59$ (for the global job satisfaction single-item rating scale) to $r = .79$ (for the composite scale of job satisfaction facets). All reliabilities were significant ($p < .01$). Even though these correlations are considered high, there is quite some across-time variation in the job satisfaction measures. For example, a correlation of $r = .59$ means that no more than 35% of the variance is shared.

All Pearson product moment correlations between Time 1 work characteristics and Time 1 global job satisfaction were significant ($p < .01$; except for the correlation between work and time pressure and the global job satisfaction multi-item rating scale: $p < .05$) and in the right direction according to the JDCS model. Furthermore, all correlations between work characteristics at Time 1 (except work and time pressure) and global job satisfaction at Time 2 were also significant ($p < .01$) and in the right direction.

With respect to the four background variables and global job satisfaction at both Time 1 and Time 2, typically only negative affectivity showed significant correlations (correlations ranged from $r = -.25$ to $r = -.37$, $p < .01$). Moreover, the effect of negative affectivity was strongest with the global job satisfaction single-item faces scale and weakest with the composite scale of job satisfaction facets, both at Time 1 and Time 2 ($r = -.37$ vs. $r = -.27$ at Time 1 and $r = -.32$ vs. $r = -.25$ at Time 2).

It must be noted that with respect to the background variables only one other significant correlation with global job satisfaction was found, i.e., the correlation between organizational tenure and the global job satisfaction single-item faces scale at Time 2 ($r = -.13$, $p < .05$). Moreover, both negative affectivity and gender are significantly correlated with some of the independent variables.

It can be seen that the correlation between two conceptualizations of the same work characteristic is higher than the correlations between conceptualizations of different work characteristics. Compare, for example, the correlation between physical workload and work and time pressure ($r = .42$, $p < .01$) and the correlations between physical workload and skill discretion, autonomy, workplace social support from colleagues, and workplace social support from direct supervisor, respectively (correlations ranged from $r = .19$ to $r = .31$, $p < .01$).

The standard deviations of the four global job satisfaction measures are comparable. These ranged from .64 to .73 at Time 1 and from .68 to .74 at Time 2. This means that the

variation in global job satisfaction cannot be considered an alternative explanation for any subsequent differences in the relation between work characteristics and global job satisfaction.

Based on the correlational analysis, empirical support was found for hypothesis 1. Hypothesis 1 stated that there is a positive association between all four measures of global job satisfaction. This hypothesis was supported at both Time 1 and Time 2. For example, the Time 1 correlation between the global job satisfaction multi-item rating scale and the composite scale of job satisfaction facets was $r = .72$ ($p < .01$). At Time 1, the correlations ranged from $r = .66$ to $r = .82$ ($p < .01$). At Time 2 the correlations ranged from $r = .64$ to $r = .81$ ($p < .01$).

3.2. Cross-sectional analysis of the JDCS model

The cross-sectional regression results are shown in Tables 4 and 5. For each of the four measures of global job satisfaction the cross-sectional effect of the relation between work characteristics and global job satisfaction was supported: for the global job satisfaction single-item faces scale: $\Delta R^2 = .21$; $\Delta F(6, 333) = 18.15$, $p < .01$, for the global job satisfaction single-item rating scale: $\Delta R^2 = .28$; $\Delta F(6, 333) = 23.75$, $p < .01$, for the global job satisfaction multi-item rating scale: $\Delta R^2 = .34$; $\Delta F(6, 333) = 32.97$, $p < .01$, and for the composite scale of job satisfaction facets: $\Delta R^2 = .43$; $\Delta F(6, 333) = 49.18$, $p < .01$. For each regression analysis the assumption of low multicollinearity between independent variables was checked. The tolerance values of the four regression models ranged from .68 to .90, exceeding the threshold value of .10 (Hair et al., 2006). This means that the assumption of low multicollinearity was met.

The cross-sectional regression results show several differences between the four measures of global job satisfaction. First, there are differences regarding the background variables in the final regression model. With respect to the global job satisfaction single-item faces scale, both gender and negative affectivity make a significant contribution to the prediction equation ($t = 2.02$, $p < .05$ and $t = -3.96$, $p < .01$, respectively). The same can be said about the multi-item rating scale ($t = 3.33$, $p < .01$ and $t = -2.06$, $p < .05$, respectively). With respect to the single-item rating scale, only gender makes a significant contribution ($t = 2.52$, $p < .05$). Finally, with respect to the composite scale of job satisfaction facets, both age and gender make a significant contribution ($t = -2.08$, $p < .05$ and $t = 3.27$, $p < .01$,

respectively). Moreover, only age and negative affectivity are negatively related to job satisfaction.

Second, there are differences regarding the independent variables in the final regression model. With respect to the global job satisfaction single-item faces scale, four of the six work characteristics are significantly related to global job satisfaction, i.e., work and time pressure, skill discretion, workplace social support from colleagues, and workplace social support from direct supervisor ($t = -2.00, p < .05$; $t = 4.14, p < .01$; $t = 2.66, p < .01$; and $t = 5.73, p < .01$, respectively). The regression results suggest that employees are likely to be more satisfied with their job, if their job has lower levels of work and time pressure and higher levels of skill discretion, workplace social support from colleagues, and workplace social support from direct supervisor. With respect to the global job satisfaction single-item rating scale, five work characteristics show a significant relation with job satisfaction, i.e.,

Table 4: Cross-sectional regression results for the global job satisfaction single-item faces scale and the global job satisfaction single-item rating scale at Time 1

Variable	Global job satisfaction single-item faces scale			Global job satisfaction single-item rating scale		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Step 1						
Age	.00	.00	-.02	.00	.00	-.04
Gender	.11	.14	.04	.13	.14	.05
Organizational tenure	-.01	.00	-.06	.00	.00	.00
Negative affectivity	-1.46	.20	-.37**	-1.05	.20	-.27**
R^2	.14			.07		
Adjusted R^2	.13			.06		
Regression F	14.12**			6.72**		
df	4 / 339			4 / 339		
Step 2						
Age	.00	.00	.01	.00	.00	.02
Gender	.24	.12	.09*	.30	.12	.12*
Organizational tenure	-.01	.00	-.08	.00	.00	-.04
Negative affectivity	-.77	.19	-.20**	-.28	.19	-.07
Physical workload	.05	.17	.02	.07	.16	.02
Work and time pressure	-.48	.24	-.10*	-.58	.24	-.12*
Skill discretion	1.26	.30	.22**	1.81	.30	.31**
Autonomy	.17	.15	.06	.41	.15	.14**
Workplace social support from colleagues	.67	.25	.14**	.75	.25	.16**
Workplace social support from direct supervisor	1.57	.27	.29**	1.23	.27	.23**
R^2	.35			.35		
Adjusted R^2	.34			.33		
ΔR^2	.21**			.28**		
Regression F	18.25**			18.02**		
df	10 / 333			10 / 333		

* $p < .05$; ** $p < .01$; $N = 344$

B = regression coefficient; $SE B$ = standard error of regression coefficient; β = standardized regression coefficient

Table 5: Cross-sectional regression results for the global job satisfaction multi-item rating scale and the composite scale of job satisfaction facets at Time 1

Variable	Global job satisfaction multi-item rating scale			Composite scale of job satisfaction facets		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Step 1						
Age	-.01	.00	-.09	-.01	.00	-.13*
Gender	.16	.13	.07	.13	.12	.06
Organizational tenure	.00	.00	.00	.01	.00	.07
Negative affectivity	-1.05	.18	-.30**	-.97	.18	-.28**
R^2	.10			.09		
Adjusted R^2	.08			.08		
Regression <i>F</i>	8.90**			8.24**		
<i>df</i>	4 / 339			4 / 339		
Step 2						
Age	.00	.00	-.03	-.01	.00	-.09*
Gender	.34	.10	.15**	.30	.09	.13**
Organizational tenure	.00	.00	-.04	.00	.00	.05
Negative affectivity	-.34	.16	-.10*	-.14	.15	-.04
Physical workload	.01	.14	.00	-.20	.13	-.07
Work and time pressure	-.25	.20	-.06	-.34	.18	-.08
Skill discretion	1.75	.26	.33**	1.33	.23	.26**
Autonomy	.36	.13	.13**	.17	.11	.07
Workplace social support from colleagues	.74	.21	.17**	.74	.19	.17**
Workplace social support from direct supervisor	1.40	.23	.29**	2.07	.21	.44**
R^2	.43			.52		
Adjusted R^2	.42			.50		
ΔR^2	.34**			.43**		
Regression <i>F</i>	25.36**			35.61**		
<i>df</i>	10 / 333			10 / 333		

* $p < .05$; ** $p < .01$; $N = 344$

B = regression coefficient; *SE B* = standard error of regression coefficient; β = standardized regression coefficient

work and time pressure, skill discretion, autonomy, workplace social support from colleagues, and workplace social support from direct supervisor ($t = -2.40, p < .05$; $t = 6.03, p < .01$; $t = 2.78, p < .01$; $t = 3.02, p < .01$; and $t = 4.53, p < .01$, respectively). The regression results suggest that employees are likely to be more satisfied with their job, if their job has lower levels of work and time pressure and higher levels of skill discretion, autonomy, workplace social support from colleagues, and workplace social support from direct supervisor. With respect to the global job satisfaction multi-item rating scale, four work characteristics are significantly related to job satisfaction, i.e., skill discretion, autonomy, workplace social support from colleagues, and workplace social support from direct supervisor ($t = 6.82, p < .01$; $t = 2.86, p < .01$; $t = 3.50, p < .01$; and $t = 6.07, p < .01$, respectively). The regression results suggest that employees are likely to be more satisfied

with their job, if their job has higher levels of skill discretion, autonomy, workplace social support from colleagues, and workplace social support from direct supervisor. Finally, with respect to the composite scale of job satisfaction facets, three work characteristics are significantly related to job satisfaction, i.e., skill discretion, workplace social support from colleagues, and workplace social support from direct supervisor ($t = 5.79, p < .01$; $t = 3.87, p < .01$; and $t = 9.98, p < .01$, respectively). The regression results suggest that employees are likely to be more satisfied with their job, if their job has higher levels of skill discretion, workplace social support from colleagues, and workplace social support from direct supervisor.

Third, the relative influence of the background and independent variables is different for the four measures of global job satisfaction. In two cases (i.e., the global job satisfaction single-item faces scale and the composite scale of job satisfaction facets) workplace social support from direct supervisor makes the highest contribution to the prediction equation, whereas in the two other cases skill discretion shows the strongest effect on global job satisfaction.

In sum, only one background variable (i.e., gender) and three independent variables (i.e., skill discretion, workplace social support from colleagues, and workplace social support from direct supervisor) make a significant contribution to the prediction equation in *all* regression models. However, the relative influence of these variables is different between the four measures of global job satisfaction. In addition, one background variable (i.e., organizational tenure) and one independent variable (i.e., physical workload) are not significantly related to global job satisfaction in *any* of the regression models. With respect to the other background and independent variables, the four regression models are different.

Based on the cross-sectional analysis, no empirical support was found for hypothesis 2a. Hypothesis 2a stated that a single-item rating scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale measure. Rather, the opposite result was found. The variance in global job satisfaction explained with the global job satisfaction single-item rating scale is lower compared to the global job satisfaction multi-item rating scale: adjusted $R^2 = .33$ and adjusted $R^2 = .42$, respectively.

No empirical support was found for hypothesis 2b. Hypothesis 2b stated that a single-item faces scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale measure. Rather, the opposite result was found. The

variance in global job satisfaction explained with the global job satisfaction single-item faces scale is lower compared to the global job satisfaction multi-item rating scale: adjusted $R^2 = .34$ and adjusted $R^2 = .42$, respectively.

No empirical support was found for hypothesis 3a. Hypothesis 3a stated that a single-item rating scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a measure in terms of a composite scale of single-item rating scales assessing eight job satisfaction facets. Rather, the opposite result was found. The variance in global job satisfaction explained with the global job satisfaction single-item faces scale is lower compared to the composite scale of job satisfaction facets: adjusted $R^2 = .33$ and adjusted $R^2 = .50$, respectively.

No empirical support was found for hypothesis 3b. Hypothesis 3b stated that a single-item faces scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a measure in terms of a composite scale of single-item rating scales assessing eight job satisfaction facets. Rather, the opposite result was found. The variance in global job satisfaction explained with the global job satisfaction single-item faces scale is lower compared to the composite scale of job satisfaction facets: adjusted $R^2 = .34$ and adjusted $R^2 = .50$, respectively.

With respect to a possible difference between a single-item rating scale and a faces scale, it was found that the variance in global job satisfaction explained was similar for both scales: adjusted $R^2 = .33$ and adjusted $R^2 = .34$, respectively.

It must be noted that from this cross-sectional analysis no causal inferences can be made regarding support for the JDCS model, since it assumes a causal relation between work characteristics and job satisfaction. However, it can be said that some support was found for the iso-strain hypothesis of the JDCS model. The three aspects in the work situation, as identified by the model (i.e., job demands, job control, and workplace social support), were present in two of the four regression models (not present in the regression models of the multi-item rating scale and the composite scale of job satisfaction facets). In addition, the signs of the conceptualizations of these aspects, i.e., the independent variables, were all in the right direction, meaning that employees working in a job characterized by high demands, low control, and low social support, experienced the lowest level of job satisfaction. It must be noted that the multi-item rating scale and the composite scale of job satisfaction facets showed no support for the strain hypothesis either.

3.3. Longitudinal analysis of the JDCS model

The longitudinal regression results are shown in Tables 6 and 7. For three of the four measures of global job satisfaction was the longitudinal effect of the relation between work characteristics and global job satisfaction supported (no support was found for the global job satisfaction multi-item rating scale): for the global job satisfaction single-item faces scale: $\Delta R^2 = .04$; $\Delta F(6, 332) = 4.81$, $p < .01$, for the global job satisfaction single-item rating scale: $\Delta R^2 = .04$; $\Delta F(6, 332) = 4.11$, $p < .01$, for the global job satisfaction multi-item rating scale: $\Delta R^2 = .01$; $\Delta F(6, 332) = 1.68$, $p = .13$, and for the composite scale of job satisfaction facets: $\Delta R^2 = .03$; $\Delta F(6, 332) = 4.37$, $p < .01$. For each regression analysis the assumption of low multicollinearity between independent variables was checked. The tolerance values of the four regression models ranged from .48 to .89, exceeding the threshold value of .10 (Hair et al., 2006). This means that the assumption of low multicollinearity was met.

The longitudinal regression results show several differences between the four measures of global job satisfaction. First, there are differences regarding the background variables in the final regression model. Only with respect to the global job satisfaction single-item faces scale does a background variable make a significant contribution to the prediction equation: organizational tenure: $t = -2.45$, $p < .05$.

Second, there are differences regarding the independent variables in the final regression model. With respect to the global job satisfaction single-item faces scale, three of the six work characteristics are significantly related to global job satisfaction, i.e., physical workload, work and time pressure, and workplace social support from colleagues ($t = -2.40$, $p < .05$; $t = 2.34$, $p < .05$; and $t = 3.31$, $p < .01$, respectively). The regression results suggest that employees are likely to be more satisfied with their job, if their job has lower levels of physical workload and higher levels of work and time pressure and workplace social support from colleagues. With respect to the global job satisfaction single-item rating scale, two work characteristics show a significant relation with global job satisfaction, i.e., workplace social support from colleagues and workplace social support from direct supervisor ($t = 2.79$, $p < .01$ and $t = 2.08$, $p < .05$, respectively). The regression results suggest that employees are likely to be more satisfied with their job, if their job has higher levels of workplace social support from colleagues and workplace social support from direct supervisor. Finally, with respect to the composite scale of job satisfaction facets, three work characteristics are significantly related to global job satisfaction, i.e., work and time pressure, skill discretion,

Table 6: Longitudinal regression results for the global job satisfaction single-item faces scale and the global job satisfaction single-item rating scale at Time 2

Variable	Global job satisfaction single-item faces scale			Global job satisfaction single-item rating scale		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Step 1						
Age	.00	.00	.02	.00	.00	.01
Gender	.07	.14	.03	.12	.14	.05
Organizational tenure	-.01	.00	-.13*	.00	.00	-.03
Negative affectivity	-1.28	.20	-.32**	-1.00	.20	-.26**
R^2	.12			.07		
Adjusted R^2	.11			.06		
Regression <i>F</i>	11.77**			6.35**		
<i>df</i>	4 / 339			4 / 339		
Step 2						
Age	.00	.00	.04	.00	.00	.03
Gender	.00	.11	.00	.05	.11	.02
Organizational tenure	-.01	.00	-.09*	.00	.00	-.03
Negative affectivity	-.36	.17	-.09*	-.41	.17	-.11*
T1 global job satisfaction	.63	.04	.62**	.56	.04	.56**
R^2	.45			.37		
Adjusted R^2	.44			.36		
ΔR^2	.33**			.30**		
Regression <i>F</i>	55.40**			38.86**		
<i>df</i>	5 / 338			5 / 338		
Step 3						
Age	.00	.00	.04	.00	.00	.04
Gender	.04	.11	.02	.12	.11	.05
Organizational tenure	-.01	.00	-.11*	.00	.00	-.04
Negative affectivity	-.24	.18	-.06	-.25	.18	-.06
T1 global job satisfaction	.55	.05	.54**	.45	.05	.45**
Workload	-.36	.15	-.11*	-.16	.15	-.05
Work and time pressure	.51	.22	.11*	.22	.23	.05
Skill discretion	-.14	.28	-.02	.47	.30	.08
Autonomy	.10	.13	.03	-.06	.14	-.02
Workplace social support from colleagues	.76	.23	.15**	.67	.24	.14**
Workplace social support from direct supervisor	.29	.26	.05	.55	.26	.10*
R^2	.49			.41		
Adjusted R^2	.48			.39		
ΔR^2	.04**			.04**		
Regression <i>F</i>	29.51**			20.88**		
<i>df</i>	11 / 332			11 / 332		

* $p < .05$; ** $p < .01$; T1 = Time 1; $N = 344$

B = regression coefficient; *SE B* = standard error of regression coefficient; β = standardized regression coefficient

Table 7: Longitudinal regression results for the global job satisfaction multi-item rating scale and the composite scale of job satisfaction facets at Time 2

Variable	Global job satisfaction multi-item rating scale			Composite scale of job satisfaction facets		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
Step 1						
Age	.00	.00	-.02	.00	.00	-.07
Gender	.16	.13	.06	.06	.13	.02
Organizational tenure	.00	.00	-.05	.00	.00	.01
Negative affectivity	-1.11	.19	-.30**	-.94	.19	-.26**
R^2	.10			.07		
Adjusted R^2	.09			.06		
Regression <i>F</i>	9.15**			6.25**		
<i>df</i>	4 / 339			4 / 339		
Step 2						
Age	.00	.00	.05	.00	.00	.03
Gender	.03	.08	.01	-.05	.08	-.02
Organizational tenure	.00	.00	-.05	.00	.00	-.05
Negative affectivity	-.28	.13	-.08*	-.13	.13	-.04
T1 global job satisfaction	.79	.04	.76**	.83	.04	.79**
R^2	.63			.63		
Adjusted R^2	.62			.63		
ΔR^2	.53**			.56**		
Regression <i>F</i>	112.65**			115.88**		
<i>df</i>	5 / 338			5 / 338		
Step 3						
Age	.00	.00	.06	.00	.00	.02
Gender	.06	.09	.03	.02	.08	.01
Organizational tenure	.00	.00	-.06	.00	.00	-.04
Negative affectivity	-.23	.14	-.06	-.11	.13	-.03
T1 global job satisfaction	.73	.05	.71**	.70	.05	.67**
Workload	-.10	.12	-.03	-.18	.11	-.06
Work and time pressure	.08	.17	.02	.38	.16	.09*
Skill discretion	.42	.23	.08	.51	.21	.09*
Autonomy	-.10	.11	-.04	-.06	.10	-.02
Workplace social support from colleagues	.35	.18	.08	.33	.17	.07
Workplace social support from direct supervisor	.04	.20	.01	.48	.21	.10*
R^2	.64			.66		
Adjusted R^2	.62			.65		
ΔR^2	.01			.03**		
Regression <i>F</i>	52.73**			58.21**		
<i>df</i>	11 / 332			11 / 332		

* $p < .05$; ** $p < .01$; T1 = Time 1; $N = 344$

B = regression coefficient; *SE B* = standard error of regression coefficient; β = standardized regression coefficient

and workplace social support from direct supervisor ($t = 2.31, p < .05$; $t = 2.36, p < .05$; and $t = 2.29, p < .05$, respectively). The regression results suggest that employees are likely to be more satisfied with their job, if their job has higher levels of work and time pressure, skill discretion, and workplace social support from direct supervisor.

Third, the relative influence of the background and independent variables is different for each of the four measures of global job satisfaction.

In sum, the only variable that is significantly related to global job satisfaction in *all* regression models is the global job satisfaction measure at Time 1, as can be expected of course. Job satisfaction at Time 1 serves as a control variable in order to measure any changes in global job satisfaction. The relative influence of the other variables is different between the four measures of global job satisfaction. In addition, the only variable that makes no significant contribution to *any* of the prediction equations is autonomy. With respect to the other background and independent variables, the four regression models are different.

Based on the longitudinal analysis, empirical support was found for hypothesis 2a. Hypothesis 2a stated that a single-item rating scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale measure. Since no longitudinal effect was found for the global job satisfaction multi-item rating scale, the variance in global job satisfaction explained with the global job satisfaction single-item rating scale is - of course - higher (adjusted $R^2 = .39$).

Empirical support was found for hypothesis 2b. Hypothesis 2b stated that a single-item faces scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale measure. Since no longitudinal effect was found for the global job satisfaction multi-item rating scale, the variance in global job satisfaction explained with the global job satisfaction single-item rating scale is - of course - higher (adjusted $R^2 = .48$).

No empirical support was found for hypothesis 3a. Hypothesis 3a stated that a single-item rating scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a measure in terms of a composite scale of single-item rating scales assessing eight job satisfaction facets. Rather, the opposite result was found. The variance in global job satisfaction explained with the global job satisfaction single-item faces scale is lower

compared to the composite scale of job satisfaction facets: adjusted $R^2 = .39$ and adjusted $R^2 = .65$, respectively.

No empirical support was found for hypothesis 3b. Hypothesis 3b stated that a single-item faces scale measure of global job satisfaction will account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a measure in terms of a composite scale of single-item rating scales assessing eight job satisfaction facets. Rather, the opposite result was found. The variance in global job satisfaction explained with the global job satisfaction single-item faces scale is lower compared to the composite scale of job satisfaction facets: adjusted $R^2 = .48$ and adjusted $R^2 = .65$, respectively.

With respect to a possible difference between a single-item rating scale and a faces scale, it was found that the global job satisfaction single-item faces scale explained more variance in global job satisfaction compared to the global job satisfaction single-item rating scale: adjusted $R^2 = .48$ and adjusted $R^2 = .39$, respectively.

From this longitudinal analysis causal inferences can be made regarding support for the JDCS model. Clearly, the global job satisfaction multi-item rating scale does not support the JDCS model. None of the aspects in the work situation, as identified by the model (i.e., job demands, job control, and workplace social support), were significantly related to global job satisfaction. Both the global job satisfaction single-item rating and faces scales show no support for the JDCS model either. With respect to the former scale, only one of the three aspects in the work situation showed a significant relation with global job satisfaction, i.e., workplace social support (conceptualized as workplace social support from both colleagues and direct supervisor). With respect to the latter scale, only two aspects were significantly related to global job satisfaction, i.e., job demands (conceptualized as physical workload and work and time pressure) and workplace social support (conceptualized as workplace social support from colleagues). Finally, the composite scale of job satisfaction facets does not support the JDCS model either. All three work aspects showed a significant relation to global job satisfaction, i.e., job demands (conceptualized as work and time pressure), job control (conceptualized as skill discretion), and workplace social support (conceptualized as workplace social support from direct supervisor). However, the signs of the conceptualizations of these aspects were not all in the right direction. Contrary to the JDCS model, work and time pressure was positively related to job satisfaction. Thus, no support for the iso-strain hypothesis of the model was found. Moreover, none of the four measures of global job satisfaction showed support for the strain hypothesis either.

4. Discussion and conclusions

The purpose of our study was to investigate the influence of different measures of global job satisfaction on the relation between work characteristics and global job satisfaction based on the JDCS model. The following four measures of global job satisfaction were investigated: a single-item faces scale, a single-item rating scale, a multi-item rating scale, and a composite scale of job satisfaction facets. In addition, three aspects in the work situation, as identified by the model, were examined, i.e., job demands (conceptualized as physical workload and work and time pressure), job control (conceptualized as skill discretion and autonomy), and workplace social support (conceptualized as workplace social support from colleagues and workplace social support from direct supervisor). In addition to a correlational analysis, the data was analyzed both cross-sectionally and longitudinally.

The correlational analysis supported the first hypothesis in showing a strong positive association between the four measures of global job satisfaction both at Time 1 and Time 2. The correlations found (ranging from $r = .64$ to $r = .82$) are comparable to Wanous' et al. (1997) and Nagy's (2002) findings regarding single-item and multi-item measures of global job satisfaction and job satisfaction facets, respectively. The average correlation the authors obtained were $r = .63$ for global job satisfaction and $r = .66$ for job satisfaction facets. In addition, the correlations found in our study between the single-item faces scale and the single-item rating scale both at Time 1 ($r = .72$) and Time 2 ($r = .70$) are comparable to Ironson's et al. (1989) finding of $r = .75$.

Although it can be concluded that the four measures of global job satisfaction compare favourably in terms of being highly correlated, with respect to the JDCS model, however, they are by no means equivalent. Both the cross-sectional and the longitudinal analysis revealed several differences between the measures regarding the background and independent variables on the one hand and the variance in global job satisfaction explained on the other hand.

The cross-sectional analysis showed that only one of the four background variables (i.e., gender) and three of the six independent variables (i.e., skill discretion, workplace social support from colleagues, and workplace social support from direct supervisor) were significantly related to all measures of global job satisfaction. It must be noted, however, that

the relative influence of these variables was different. Furthermore, one background variable (i.e., organizational tenure) and one independent variable (i.e., physical workload) were not significantly related to any of the global job satisfaction measures. Finally, with respect to all other background and independent variables, the four measures were different. In particular, the single-item faces scale appeared to be the most sensitive to the impact of negative affectivity, whereas the composite scale appeared to be the least sensitive.

The longitudinal analysis showed differences regarding background and independent variables, as well. Controlling for global job satisfaction at Time 1, the relative influence of the other variables was different. In addition, the only variable that was not significantly related to any of the four measures was autonomy. Lastly, with respect to all other background and independent variables, the four measures were different.

Differences between the four measures were also found regarding the variance in global job satisfaction explained. In our study it was hypothesized that a single-item (rating and faces scale) measure of global job satisfaction would account for incremental variance in the relation between work characteristics and global job satisfaction over and above that explained by a multi-item rating scale or a composite scale of job satisfaction facets measure. In general, both the cross-sectional and longitudinal analysis did not support these hypotheses. Rather, the results showed that with a single-item global job satisfaction scale the variance explained was lower compared to a multi-item or composite scale of global job satisfaction. Moreover, a composite scale of job satisfaction facets accounted for the highest amount of variance in global job satisfaction explained. The only instance, in which support for the hypothesis was found, was in the longitudinal analysis with respect to the multi-item rating scale measure. However, it must be noted that the reason for this support was the absence of a longitudinal effect for the multi-item rating scale measure.

While not hypothesized, with respect to the two single-item scale measures some differences were found, as well. Whereas the cross-sectional analysis showed no difference in the variance in global job satisfaction explained, the variance explained in the longitudinal analysis was higher for the single-item faces scale. In addition, both analyses showed that the two measures were different regarding some of the background and independent variables.

Although it can be concluded that the four measures of global job satisfaction cannot be considered substitutes of each other, our study did not corroborate the findings of Scarpello and Campbell (1983) and Highhouse and Becker (1993). The results showed no support for their argument of lack of content validity of composite scale measures of global job satisfaction. In other words, no support was found for the assumption underlying single-

item measures of global job satisfaction, that some sort of internal processing takes place in which an employee incorporates all aspects he/she considers relevant. Based on the criterion of the amount of variance in global job satisfaction explained, a composite scale of job satisfaction facets seems to be better in incorporating these aspects. Thus, the results are more in line with studies holding an opposing view on measures of global job satisfaction, i.e., advocating the use of a composite scale of job satisfaction facets (see e.g., Judge, Thoresen, Bono & Patton, 2001; Locke, 1969; Spector, 1997). Adherents of this view state that global job satisfaction is defined by job satisfaction facets. In other words, the evaluation of job satisfaction facets will lead to an evaluation of global job satisfaction. It is believed that this facet approach “can provide a more complete picture of a person’s job satisfaction” (Spector, 1997, p. 3). Unfortunately, the authors have provided neither a sound line of reasoning nor any empirical support for this view. Therefore, reasons for the unexpected results in our study can only be speculative.

A possible reason may be that employees, when confronted with a single-item question assessing global job satisfaction, do not incorporate *all* aspects they consider relevant. Instead, when asked - out of the blue - to evaluate their level of job satisfaction, they may just think of *some* of the relevant aspects. Of course, at that moment they would probably at least include the most important aspects in their evaluation but, at the same time, they may ignore other relevant ones. In contrast, with a composite scale assessing several job satisfaction facets, each of the questions may trigger employees to take these other aspects, which at that moment they would not have thought of by themselves, into account when evaluating their level of job satisfaction. As a result, a composite scale of job satisfaction facets would include more aspects employees consider relevant than a single-item scale, meaning that more variance in global job satisfaction would be explained.

Another possible reason may be the composite scale measure itself. Scarpello and Campbell (1983) used the short form Minnesota Satisfaction Questionnaire (MSQ; Weiss, Dawis, England & Lofquist, 1967) assessing twenty job satisfaction facets. In contrast, in our study, the composite scale used was based on the Job Satisfaction Survey (Spector, 1985) and measured eight facets. All of these eight facets were also covered by the MSQ. Highhouse and Becker (1993) used an in-house developed composite scale of job satisfaction assessing twelve facets. Compared to the scale used in our study, the only facet not covered was the nature of the work facet. Thus, different composite scales were used. In particular, Scarpello and Campbell (1983) and Highhouse and Becker (1993) used a composite scale measuring some additional job satisfaction facets. Moreover, results of both studies showed that the

scales used consisted of some facets not considered important by the respondents. In addition, some of the facets that were deemed important were not assessed with the scales. It is conceivable that the combination of the composite scale measure and research sample accounted for the differences in study results. In other words, it may be possible that in our study the job satisfaction facets assessed were all considered important to the employees and that no other important facets were omitted.

Although it may be concluded that in terms of variance explained a composite scale of job satisfaction facets outperforms the other three measures of global job satisfaction, no support for the JDACS model has been provided. All three work aspects identified by the model showed a significant relation to global job satisfaction. However, the signs of the conceptualizations of these aspects were not all in the right direction. Contrary to the iso-strain hypothesis of the JDACS model, work and time pressure was positively related to job satisfaction. A possible reason for this finding may be the absence of significant correlations between work and time pressure and global job satisfaction assessed at Time 2. It must be noted that at Time 1 all correlations were significant and that the cross-sectional analysis showed negative signs of work and time pressure. However, in the final regression model of the composite scale, work and time pressure failed to reach significance ($p < .06$), meaning no support for the iso-strain hypothesis either.

5. Implications, limitations, and future research

Our study showed that the four measures of global job satisfaction are comparable in terms of being highly correlated. However, based on the JDCS model, the four measures cannot be considered equivalent with respect to the background and independent variables on the one hand and the variance in global job satisfaction explained on the other hand.

We believe our study has major implications, both scientific and practical. A major scientific implication of these findings pertains particularly to researchers examining the JDCS model. The choice for a measure of global job satisfaction may be of more importance than thought of at first glance. The measure used may influence the extent to which support for the JDCS model is found. Analogously, studies meta-analyzing research on the JDCS model may consider the measure of global job satisfaction as a potential moderator in the relation between work characteristics and global job satisfaction. A major practical implication pertains to practitioners in the field of job redesign. In order to determine the need and effectiveness of a redesign, the decision of a global job satisfaction measure should be taken with care. However, it must be noted that, given the scarce literature available, the preliminary findings of our study await further substantiation in order to determine which global job satisfaction measure is superior.

Notwithstanding, our study has some limitations that should be noted. The first limitation concerns the absence of an initial non-response and attrition analysis. The data in our study did not allow for a comparison between respondents and non-respondents. It must be noted, however, that the division of respondents of the sample within the organizational departments was similar to the division of respondents of the population. It is therefore rather unlikely that the non-response would have influenced the results.

The second limitation pertains to the time lag in our study, which was two months. Although the importance of the time lag is generally acknowledged, the recommendations concerning the length of the time lag differ (De Lange et al., 2003; Zapf et al., 1996). Several studies have shown that the length of the time lag influences the extent to which significant effects are found (see e.g., De Lange et al., 2004). Future research should focus on different

time lags in order to explore the causal process with which work characteristics influence global job satisfaction.

The third limitation is concerned with the generalizability of the study findings. Inferences can only be made with regard to the specific setting of our study. Future research may extend the generalizability by, for example, examining different populations and different measures of both the work characteristics and global job satisfaction. Additionally, in order to extend the research findings, future studies could also focus on interactive effects and reverse and/or reciprocal causal relations between work characteristics and job satisfaction. Furthermore, it would be interesting to investigate whether the findings also apply to other models incorporating job satisfaction, such as the Job Characteristics Model (Hackman & Oldham, 1976) and the Demand-Induced Strain Compensation Model (De Jonge & Dormann, 2003).

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Appendix A

Note: Variables marked with an * are translated from Dutch.

Dependent variables

Global job satisfaction single-item faces scale (Kunin (1955))

- Which of the following faces resembles your job satisfaction best?

Global job satisfaction single-item rating scale*

- Overall, I am satisfied with my work.

Global job satisfaction multi-item rating scale* (based on De Jonge et al. (2003))

- I have fun at work.
- I think my work is fascinating, every day again.
- Usually, I enjoy starting my day at work.
- I feel happy at work.
- If I had the choice, I would choose this job again.

Composite scale of job satisfaction facets (based on Spector (1985))

- Overall, I am satisfied with the nature of my work.
- Overall, I am satisfied with my colleagues.
- Overall, I am satisfied with the financial rewards I receive.
- Overall, I am satisfied with my direct supervisor.
- Overall, I am satisfied with the working conditions.
- Overall, I am satisfied with the non-financial rewards I receive.

- Overall, I am satisfied with the opportunities for promotion.
- Overall, I am satisfied with the opportunities for personal development.

Independent variables

Physical workload* (Van Veldhoven et al. (1997))

- During work, do you have discomfort from lifting or carrying things?
- During work, do you have discomfort from bending over regularly?
- During work, do you have discomfort from reaching high regularly?
- During work, do you have discomfort from making repetitive movements for extended periods of time?
- Do you think your work is physically strenuous?
- Requires your work physical strength?
- Do you work in discomforting or strenuous positions?

Work and time pressure* (Van Veldhoven et al. (1997))

- Do you have to work very fast?
- Do you have too much work to do?
- Do you have to work extra to get things done?
- Do you work under time pressure?
- Do you have to hurry?
- Can you do your job at ease?
- Do you have a backlog in your work?
- Do you have too little work?
- Do you experience difficulties with the speed of work?
- Do you experience difficulties with the work pressure?
- Would you like to step down in your work?

Skill discretion (Karasek et al. (1998))

- My job requires me to learn new things.

- My job is repetitive.
- My job requires me to be creative.
- My job requires a high skill level.
- There's a lot of variety at work.
- I have the opportunity to develop own abilities.

Autonomy* (Biessen (1992))

- I have the opportunity to decide on my own how to carry out my work.
- At work, I can operate independently.
- There is opportunity to organize my work as desired.
- I can keep track of how to carry out my work myself.

Workplace social support from colleagues* (Van Veldhoven et al. (1997))

- Can you rely on your colleagues in case you experience difficulties at work?
- Can you, if it's necessary, ask your colleagues for help?
- Is your understanding with your colleagues good?
- Do you have conflicts with your colleagues?
- Do you feel appreciated by your colleagues?
- Do you experience aggression from your colleagues?
- Are your colleagues friendly to you?
- Is there a nice ambiance between you and your colleagues?
- Do any unpleasant events occur between you and your colleagues?

Workplace social support from direct supervisor* (Van Veldhoven et al. (1997))

- Can you rely on your direct supervisor in case you experience difficulties at work?
- Can you, if it's necessary, ask your direct supervisor for help?
- Is your understanding with your direct supervisor good?
- Do you have conflicts with your direct supervisor?
- Do you feel appreciated by your direct supervisor?
- Do you experience aggression from your direct supervisor?

- Is your direct supervisor friendly to you?
- Is there a nice ambiance between you and your direct supervisor?
- Do any unpleasant events occur between you and your direct supervisor?

Background variables

Negative affectivity (Watson et al. (1988))

- To what extent do you feel irritable?
- To what extent do you feel alert?
- To what extent do you feel ashamed?
- To what extent do you feel inspired?
- To what extent do you feel nervous?
- To what extent do you feel determined?
- To what extent do you feel attentive?
- To what extent do you feel jittery?
- To what extent do you feel active?
- To what extent do you feel afraid?

