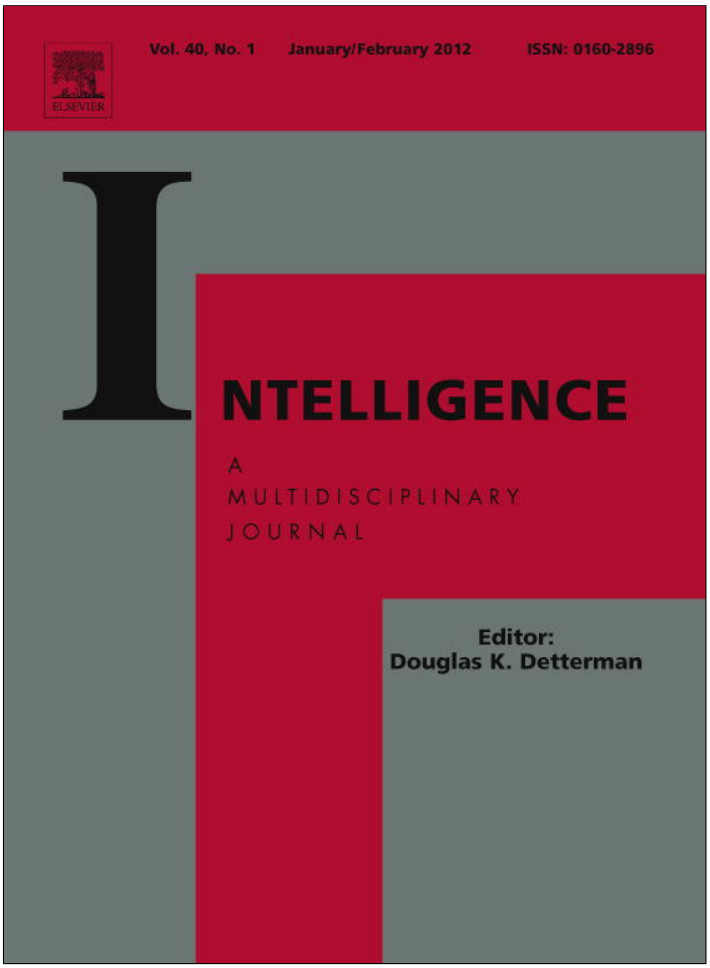
Provided for non-commercial research and education use.
Not for reproduction, distribution or commercial use.



(This is a sample cover image for this issue. The actual cover is not yet available at this time.)

This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the authors institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

http://www.elsevier.com/copyright

Author's personal copy

Intelligence 40 (2012) 333–342

Contents lists available at SciVerse ScienceDirect

Intelligence

The role of intelligence in the formation of well-being: From job rewards to job satisfaction ☆

Yoav Ganzach [a,*], Itzhak Fried [b]

[a] Tel Aviv University, Israel
[b] Syracuse University, United States

ARTICLE INFO

Article history:
Received 24 May 2011
Received in revised form 1 February 2012
Accepted 23 March 2012
Available online xxxx

Keywords:
Job satisfaction
Intelligence
Pay satisfaction
Extrinsic satisfaction
Intrinsic satisfaction

ABSTRACT

In a longitudinal study, we investigate the moderating role of intelligence on the effects of intrinsic and extrinsic rewards and intrinsic and extrinsic satisfactions on global job satisfaction. The results support our hypotheses that: (1) intrinsic rewards and intrinsic satisfaction are more strongly related to global job satisfaction among individuals who are higher rather than lower in intelligence; and (2) extrinsic rewards and extrinsic satisfaction are more strongly related to global job satisfaction among individuals who are lower rather than higher in intelligence. We also suggest that these effects could be viewed in terms of a moderated mediation model in which facets' satisfaction mediate the effects of rewards on global satisfaction, and intelligence moderates the relationship between facets' satisfaction and global satisfaction. Implications of the results were discussed.

© 2012 Elsevier Inc. All rights reserved.

1. Introduction

The relationship between intelligence and well-being has received considerable attention in the recent literature (Grigorenko & Sterenber, 2001; Hunt & Wittmann, 2008; Nyborg, 2003; Pesta, McDaniel, & Bertch, 2010; Oswald & Wu, 2010; Zagorsky, 2007. See also Jensen, 1998 for an earlier review as well as a number of relevant articles in a special issue on intelligence and social policy that were published in 1997 in volume 24 of *Intelligence*). However in all these studies, intelligence was examined as a correlate — perhaps even a determinant — of well-being. In the current study we examine the moderating role of intelligence in the relationship between well-being and its antecedents, focusing on well-being at work.

Research has demonstrated that people express facet-related satisfaction associated with both the intrinsic aspects of work, such as interest and challenge, and the extrinsic context of the job, most noticeably pay (e.g., Gagn & Deci, 2005; Harpaz & Fu, 2002; Porter & lawler, 1968; Van De Vliert, Van Yperen, & Thierry, 2008). However, scholars have long debated the relative effect of intrinsic versus extrinsic satisfaction on overall affective well-being at work, often referred to as global (overall) job satisfaction (e.g., Gagn & Deci, 2005; Hackman & Oldham, 1980). Some scholars emphasize the important contribution of intrinsic job satisfaction to overall job satisfaction (e.g., Deci, 1975; Hackman & Oldham, 1980; Herzberg, 1966), while others emphasize the important effect of extrinsic job satisfaction (e.g., pay satisfaction) on this global affective outcome (e.g., Gerhart & Milkovich, 1992; Lawler, 1971; Van De Vliert et al., 2008).

Both intrinsic and extrinsic aspects have been shown to make important contributions to psychological and behavioral outcomes in the workplace (e.g., Gagn & Deci, 2005; Mitchel, 1974). It is likely, however, that the relative effects of intrinsic and extrinsic job satisfactions at work may be contingent on a variety of situational and individual difference variables (Gagn & Deci, 2005). Thus, there is a need to improve our understanding of the circumstances under which individuals will respond more positively to intrinsic

☆ We would like to thank the Henry Crown Institute of Business Research for supporting this research.

* Corresponding author.
E-mail address: yoavgn@post.tau.ac.il (Y. Ganzach).

0160-2896/$ – see front matter © 2012 Elsevier Inc. All rights reserved.
doi:10.1016/j.intell.2012.03.004

Author's personal copy

relative to extrinsic job satisfaction. In the present study we attempt to address this issue by examining the moderating effect of intelligence on the associations among intrinsic satisfaction, pay satisfaction, and global job satisfaction. We propose that more intelligent people are likely to respond more positively to the experience of high intrinsic satisfaction, whereas less intelligent people are likely to respond more positively to the experience of high pay satisfaction.

1.1. Intrinsic and extrinsic aspects as contributors to employee well-being at work

Some key theories of work attitudes have emphasized the dominance of intrinsic satisfaction in affecting employees' reactions to their work (e.g., Herzberg, 1966; Kanungo, 1982). Thus, for example, in his motivator-hygiene theory, Herzberg (1966) argued, consistent with Maslow (1954), that when hygiene needs (which are related to such outcomes as pay or job security) are not met, people will be dissatisfied, and when they are met, people will not be dissatisfied. However, to be satisfied at work, individuals require that the characteristics of the work itself should meet their intrinsic motivational needs.

However, a critical examination of Herzberg theory (e.g., Farr, 1977; King, 1970) led scholars to emphasize the role of extrinsic rewards in the formation of job satisfaction. For example, in his ERG theory, Alderfer (1972) argued that when people are unable to satisfy higher-level growth needs, they will tend to focus on and be content with satisfying lower level needs associated, for example, with physical existence and life style issues for themselves and their families. Here, people may be energized to pursue extrinsic goals (e.g., securing a high and sustainable income level) in order to achieve desired consequences such as creating conditions for themselves and family members to pursue a comfortable standard of living. Consistent with ERG theory, self-determination theory (Deci & Ryan, 1985; 2000; Ryan & Deci, 2000) also suggests that the focus on extrinsic rewards can be identified with and internalized by people as a positive mechanism to achieve valuable goals which are external to the job itself (i.e., the extrinsic rewards provide the means to support the goals of the self and family members, such as living in a nice neighborhood, providing the children with a good education, etc.). As a result, because they value the extrinsic rewards the work provides, these individuals can be expected to also express overall satisfaction at work. Similarly, Hackman and Oldham's (1980) job characteristics model (JCM) argued that, depending on the person and on the situation, the key characteristics that affect job satisfaction are associated both with intrinsic work characteristics (high skill variety, task identity, task significance, autonomy, and job feedback) and with extrinsic characteristics (pay, job security, supervisor and peers).

In sum, there is an ongoing debate among scholars about the relative importance of intrinsic versus extrinsic job satisfaction in forming employee affective reactions to their work. In the current paper we attempt to contribute to this debate by suggesting that while both intrinsic and extrinsic characteristics of one's job are important, people differ in the way these two classes of characteristics affect their global work attitudes. We argue that a parsimonious way to differentiate between people who respond more positively to intrinsic versus extrinsic work characteristics is to focus on differences in intelligence.

1.2. The moderating role of intelligence

The literature suggests that intelligence predicts both the type of jobs individuals will hold and their attitudes toward their jobs. Specifically, individuals with higher levels of intelligence will tend to be engaged in complex, stimulating jobs, while individuals with lower levels of intelligence will more likely be engaged in simpler and less challenging jobs (e.g., Ganzach, 1998; Wilk, Desmarais, & Sackett, 1995). The literature further indicates that consistent with their intellectual characteristics, more intelligent individuals express a higher desire to be engaged in complex jobs (Gottfredson, 1986). These individuals are therefore likely to report high levels of intrinsic job satisfaction associated with high overall positive affective reactions at work (high overall job satisfaction). The focus of intelligent people on the content of the job, and their desire to be engaged in jobs whose complexity is commensurate with their intellectual skills (Ganzach, 1998) may reduce their interest in extrinsic rewards that are not directly associated with satisfying their intrinsic needs for job growth. Consistent with Herzberg's (1966) motivator-hygiene theory and Hackman and Oldham's (1980) job characteristics model, these individuals are likely to perceive extrinsic rewards as prerequisites necessary to enable the freedom and peace of mind to focus on the challenge and complexity of their jobs.

In contrast, less intelligent individuals are less likely to be engaged in complex and stimulating jobs. However, consistent with Alderfer's ERG theory and Deci and Ryan's self-determination theory (Deci & Ryan, 1985, 2000; Ryan & Deci, 2000), these individuals may be likely to internalize the value of extrinsic rewards at work as a mechanism to achieve important personal and family-oriented goals (e.g., financial security, the provision of education, health care and career opportunities for family members). For them extrinsic rewards that satisfy extrinsic goals are likely to become the center of their focus at work (cf. Alderfer, 1972; Gagn & Deci, 2005). Consequently, for less intelligent individuals, good compensation, resulting in high pay satisfaction, is likely to be associated with higher experience of overall job satisfaction.

1.3. Moderation models of intelligence

Our discussion above suggests two related models. The first, the facets model, suggests that intelligence moderates the effects of intrinsic and extrinsic satisfactions on global job satisfaction, such that: (a) intrinsic satisfaction is more strongly related to global job satisfaction among individuals who are higher rather than lower in intelligence; and (b) extrinsic (pay) satisfaction is more strongly related to global job satisfaction among individuals who are lower rather than higher in intelligence. The second, the rewards model, suggests that intelligence moderates the effects of intrinsic and extrinsic rewards on global satisfaction, such that: (a) job complexity is more strongly related to global job satisfaction among individuals who are higher rather than lower in intelligence; and (b) pay is more strongly related to global job satisfaction

Author's personal copy

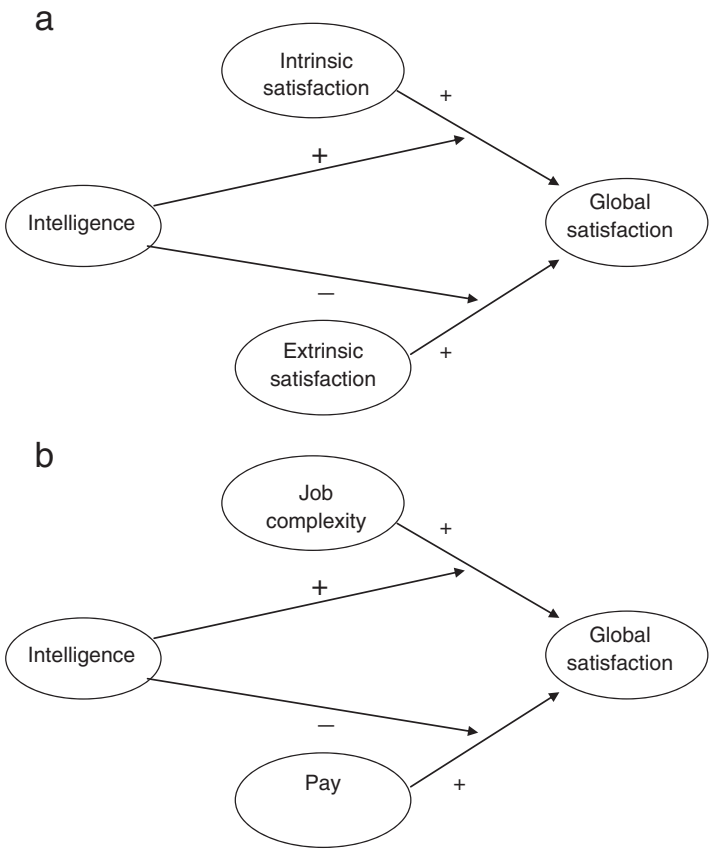


Fig. 1. a. The facets model. b. The rewards model.

among individuals who are lower rather than higher in intelligence.[1] The two models are presented in Fig. 1a and b, respectively.[2]

One interesting feature of these two models is that they suggest that whereas intrinsic and extrinsic satisfactions on the one hand, and pay and job-complexity on the other hand, are both highly correlated and similar in their (positive) effects on global satisfaction, their interactions with intelligence are opposite in signs. Intelligence enhances the effects of rewards and facet satisfactions on global work attitudes when it comes to work's intrinsic aspects, but reduces these effects when it comes to work's extrinsic aspects.

From a theoretical perspective, the facets model, more than the rewards model, is the more relevant model to the questions we ask, as facets' satisfaction, rather than rewards, are the direct determinants of global satisfaction. On the other hand, it could be argued that the facets model, unlike the rewards model, may suffer from a reciprocal causation associated with global satisfaction being a determinant, rather than a cause, of facets' satisfaction. However, although a reverse causation explanation may account for the relationship between global and facets' satisfaction, it is hard to see how it can explain an interaction between facets' satisfaction and intelligence.

Finally, since intrinsic satisfaction mediates the (main) effect of job complexity on global satisfaction and extrinsic satisfaction mediates the (main) effect of pay on global satisfaction, Fig. 2 presents a comprehensive model that incorporates the moderating effects of intelligence as depicted in the facets' and rewards' models with the mediating effects of facets satisfaction on the relationship between rewards and global satisfaction. The model suggests that overall intrinsic (extrinsic) satisfaction mediates the relationships between job complexity (pay) and global satisfaction, and that in addition, intelligence moderates the relationship between intrinsic (extrinsic) rewards and intrinsic (extrinsic) satisfaction, and/or the relationships between intrinsic (extrinsic) satisfaction and global satisfaction. This is a moderated mediation,(Edwards & Lambert, 2007; Muller, Judd, & Yzerbyt, 2005) with regard to intelligence, in which the moderator (intelligence) moderates the relationship between the independent variables (rewards) and global satisfaction and/or the relationships between the mediators (facets' satisfaction) and global satisfaction (we use the term moderated mediation rather than mediated moderation since, as we discuss below, our data are more in line with the former than with the latter). In essence, what the model of Fig. 2 suggests is

[1] We note that these two effects may enhance each other if the relationship between facets' satisfaction and global satisfaction is associated with a constant sum weights model in which when the importance of one facet increases, the importance of the other decreases.

[2] Ganzach (1998) also suggested a direct (negative) effect of intelligence on global satisfaction. However, since this effect is not relevant to the current paper — particularly since we use fixed-effects estimation that fully control for individual differences — we omit this effect from the model of Fig. 1. Furthermore, Ganzach (1998) examined part of the rewards model — the part associated with job-complexity and found that a subjective measure of job complexity (Sims, Szilagyi and Keller, 1976 measure of incumbent perception of job complexity) interacted with intelligence. However, these results should be viewed as preliminary, since the validity of this measure was criticized by many authors (Brief & Aldag, 1978; O'Reilly & Caldwell, 1985; Salancik & Pfefer, 1977) and since an objective measure of job-complexity failed to reveal such an interaction.

Author's personal copy

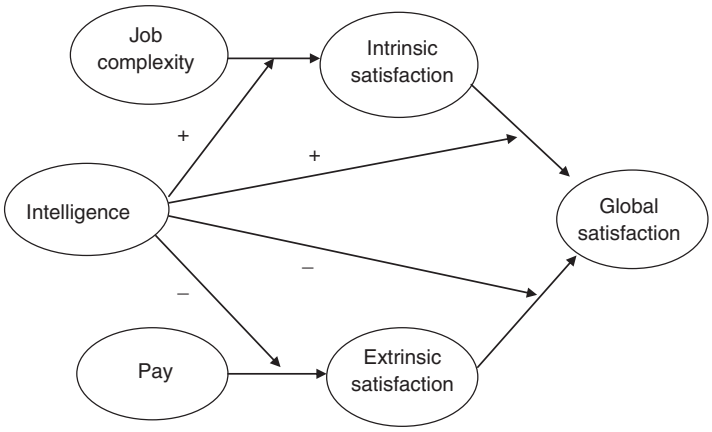


Fig. 2. A comprehensive mediation and moderation model.

that the effects of rewards on global satisfaction depend on the level of intelligence, and that this moderation process may be associated either with intelligence influencing the way rewards affect facets' satisfaction or with intelligence influencing the way facets' satisfactions affect global satisfaction.

2. Method

2.1. Data

The data were taken from the National Longitudinal Survey of Youth (NLSY), a probability sample of 12,686 American males and females born between 1957 and 1964 (with an over sampling of African Americans, Hispanics, and economically disadvantaged Whites). The percentages of males and females in the sample were 50.5% and 49.5%, respectively. The surveys were administered annually starting at 1979 (and bi-annually from 1996). Each survey includes information about global job satisfaction, pay, and occupation. However, information about facets' satisfaction was collected only in 1979, 1982 and 1988. Therefore, our analyses are based on two databases. Because facet satisfaction was measured only in the surveys of 1979, 1982 and 1988, analyses that involve facet satisfaction are based on what we call the 3-survey database that includes only these three surveys. Analyses that do not involve facet satisfaction are based on a database that includes all the 21 surveys conducted between 1979 and 2004, labeled the 21-survey database.

2.2. Measures

2.2.1. Intelligence

The measure of intelligence is derived from participants' test scores on the Armed Forces Qualifying Test (AFQT). This test was administered to groups of 5 to 10 members of the NLSY during the period June through October 1980; respondents were compensated, and the overall completion rate was 94%. The intelligence score is the sum of the standardized scores on four tests: arithmetic reasoning, paragraph comprehension, word knowledge, and mathematics knowledge.

2.2.2. Rewards

We used the logarithm of the hourly rate of pay, collected at each survey, as a measure of extrinsic rewards. There are two main reasons for using log-transformed pay rather than raw pay. First, the distribution of pay is skewed to the right, which violates the assumption of normality when estimating regression models. And second, the relationship between the construct (e.g., utility, satisfaction) and its raw measure (i.e. nominal pay) exhibits a decreasing marginal sensitivity (see Birnbaum & Sutton, 1992; Hinrichs, 1969, with regard to the relationship between pay and satisfaction. See Birenbaum, 1992; Piliavin, Gartner, Thornton, & Matsueda, 1986, with regard to the relationship between pay and utility). Thus, for example, a logarithmic pay scale suggests that the change associated with a pay increase from 10 to 20 is larger than the change associated with a pay increase from 100 to 110, whereas a nominal pay scale would suggest that the change is the same. Indeed, in reviewing the last three years of the Journal of Labor Economics — the most prominent journal in the area of remuneration research in economics — we found that in practically every paper that studied pay, log-transformation was performed.

Job complexity was used as a measure of intrinsic rewards (see Hackman & Oldham, 1976, for a discussion of job complexity as an intrinsic reward). At each survey, participants described their job to the interviewer. This description was used by the NLSY staff to categorize the participant's occupation into three digit census occupation categories. Based on this occupational information, we used Roos and Treiman's (1980) measure that assigns a value to job complexity of each of the three digit census occupations based on the 4th edition of the Dictionary of Occupational Titles (DOT). This is a summary index of evaluations of the following characteristics of the occupations, evaluated by objective observers (job analysts): complexity with regard to data required educational and vocational preparation, the degree to which the work is abstract and creative, and the degree to which it requires verbal and numerical aptitudes.

2.2.3. Facet satisfaction

Facets' satisfaction was collected in the surveys of 1979, 1982 and 1988. Because of the costs associated with asking questions in a large national survey, only one question representing each facet was chosen from the job satisfaction questionnaire of the University of Michigan Quality of Employment Survey (Quinn & Mangione, 1973) to represent each facet (see NLS user guide, 1995, for details regarding how the representative questions were chosen). The intrinsic satisfaction question asked

Author's personal copy

participants to indicate on a 4-point Likert-type scale their agreement with the statement that in their work they are "given a chance to do the things they do best." The pay satisfaction question asked them to indicate agreement with the statement "The pay is good." In both questions, the response scale ranged from "not true at all" to "very true".

2.2.4. Global job satisfaction

The global satisfaction question asked participants to indicate "How do you feel about your job?" on a 4-point Likert-type scale ranging from "dislike it very much" to "like it very much." See Wanous and Reichers (1996); Wanous, Reichers, and Hudy (1997) for the use of a single-item measure of job satisfaction.

2.3. Analytical approach

The data used in the analyses are longitudinal in that each subject has either 21 observations (in analyses based on the 21-survey database) or 3 observations (in the 3-survey database). To control for the dependence associated with the within-subject observations we used fixed effects models (see, for example, Allison, 2009). In such models a dummy for each subject is entered into the regression prior to the estimation of the effects of the independent variables, or alternatively, subjects' means are subtracted from each of their measurements on the time-varying variables (both dependent and independent variables) resulting in variables being expressed as a deviation from the subject mean value. Such models fully control for individual differences. All stable attributes of the individual, even those that are not measured explicitly, are captured by this approach. In essence, we model changes in global satisfaction and ignore stable individual differences in satisfaction. Note that the models also control for the effect of individual differences in intelligence — therefore the main effect of intelligence cannot be estimated. However, the interaction between intelligence and rewards (in the rewards model) and intelligence and facet satisfaction (in the facets model) can be estimated. Its estimation is the central purpose of our analyses.[3]

3. Results

Table 1 presents the means, standard deviations, and inter-correlations in the 3-survey database. The correlations were estimated by averaging the three available measures of each variable in this database. Note the pattern of relatively high correlations between intrinsic satisfaction and job complexity and extrinsic satisfaction and pay, and relatively low correlations between intrinsic satisfaction and pay and extrinsic satisfaction and complexity. As job complexity is the prime precursor of intrinsic satisfaction and pay as the prime precursor of extrinsic satisfaction (Hackman & Oldham, 1980; Mitchel, 1974), this pattern supports the construct validity of our measures of facet satisfaction.

Table 1
Descriptive statistics and inter-correlations.

	M	SD	1	2	3	4	5
1. Intelligence	41.0	28.8	–				
2. Global satisfaction	3.16	0.62	0.01	–			
3. Intrinsic satisfaction	3.06	0.73	0.06	0.48	–		
4. Extrinsic satisfaction	2.79	0.74	0.03	0.35	0.30	–	
5. Job complexity	3.52	1.69	0.41	0.14	0.15	0.08	–
6. Pay	6.21	0.45	0.23	0.06	0.08	0.26	0.30

Correlations above 0.05 are significant at the 0.0001 level. Correlations above 0.03 are significant on the 0.001 level. n ranges between 10,397 and 11,878. Data are derived from the 1979, 1982 and 1988 surveys.

Table 2
Parameter estimates (standard errors) of the fixed effects facets' model.

	b	Standard error	t-Ratio
Intrinsic satisfaction (IS)	0.2467	0.0142	17.3
Extrinsic satisfaction (ES)	0.2224	0.0140	15.9
IS × Intelligence	0.0017	0.0003	6.3
ES × Intelligence	−0.0011	0.0003	4.0

All the coefficients are significant on the 0.0001 level. N = 21,784 participant-year observations with df = 10,863 for the error.

Table 2 presents the parameter estimates of the facets model obtained from regressing global job satisfaction on intrinsic satisfaction, extrinsic satisfaction, and the interactions between the two facet satisfaction measures and intelligence. The 3-survey database was used for this analysis. The main effect of intelligence is not included in the model since fixed-effects estimates were applied.

Consistent with our hypotheses, the interaction between intelligence and intrinsic satisfaction was significantly positive ($p<0.0001$) whereas the interaction between intelligence and pay satisfaction was significantly negative ($p<0.0001$), suggesting that intrinsic satisfaction has a stronger effect on global satisfaction when intelligence is high rather than low, whereas extrinsic satisfaction has a stronger effect on global satisfaction when intelligence is low rather than high. The patterns of these two interactions are presented in Figs. 3 and 4, respectively. The figures plot predicted deviations from the mean global satisfaction as a function of intrinsic and extrinsic satisfactions expressed in standard deviations. For example, Fig. 3 suggests that when intrinsic satisfaction is high (1 standard deviation above the mean), global satisfaction is 0.34 above the mean for highly intelligent people (1 standard deviation above the mean intelligence), and about 0.24 above the mean for low intelligent people. As the mean of global satisfaction is 3.16 on a 1–4 scale (see Table 1), this difference of 0.1 is not negligible (although it accounts only for 0.3% of the variance which is not associated with between-participant differences in the level of job satisfaction[4]). Note also that the interactions in Figs. 3 and 4 could also be viewed as suggesting

[3] In order to examine whether the results or our fixed-effects models are robust to the assumption of equal variances, we compared the estimates of these models to the estimates of random effects models, which are less sensitive to violations of this assumption. Since the results were rather similar, we report only the results of the fixed effects models. We prefer these latter models because random effects models are more prone to biases associated with correlations between omitted level-2 variables (i.e., individual characteristics not included in the model) and level-1 variables (i.e. our measures of job satisfaction and job rewards. See for example, Hausman, 1978; Clarke, Crawford, Steele & Vignoles, 2010).

[4] Note, however, that the variance explained by interactions is notoriously low, and does not necessarily shed light on the practical importance of the associated moderation effects. See for example, Aguinis (1995); Aguinis and Stone-Romero (1997); Russell and Bobko (1992).

Author's personal copy

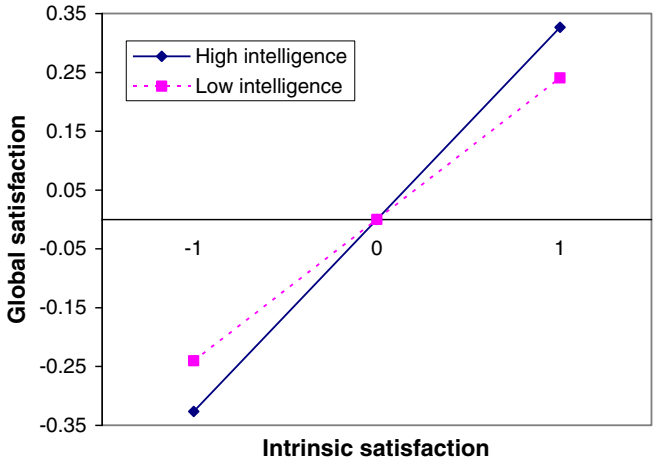


Fig. 3. The interaction between intelligence and intrinsic satisfaction in determining global satisfaction.

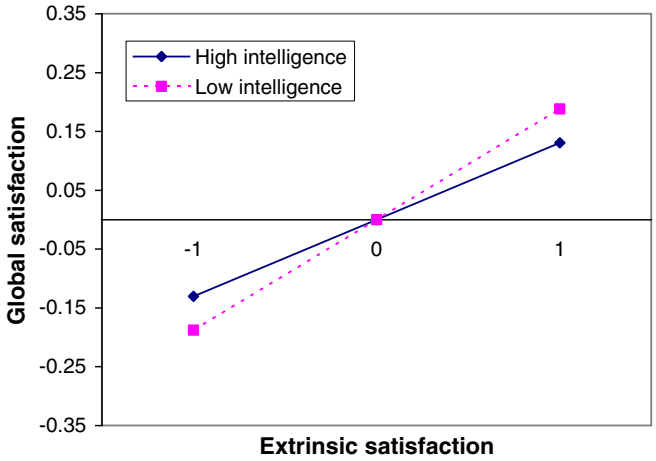


Fig. 4. The interaction between intelligence and extrinsic satisfaction in determining global satisfaction.

that when intrinsic satisfaction is high, intelligence has a positive effect on global satisfaction whereas when extrinsic satisfaction is high, it has a negative effect; and that when intrinsic satisfaction is low, intelligence has a negative effect on global satisfaction whereas when extrinsic satisfaction is low, it has a positive effect.

Table 3 presents the parameter estimates of the rewards model by regressing global job satisfaction on pay, job complexity, and the interactions of pay and complexity with intelligence. This regression was performed on the 21-survey database, and again, because of the fixed-effects estimation, the main effect of intelligence is not estimated. Consistent with our hypotheses, the interaction between intelligence and job complexity was significantly positive ($p<0.0001$) whereas the interaction between intelligence and pay was significantly negative ($p<0.0001$), suggesting that the higher the intelligence, the stronger the effect of job complexity and the weaker the effect of pay. The patterns of these two interactions are presented in Figs. 5 and 6, respectively. Again, the figures plot predicted deviations from the mean global satisfaction as a function of intrinsic and extrinsic satisfactions expressed in standard deviations, and again they demonstrate non-trivial interaction effects (e.g., a difference of about 0.1 in global satisfaction between high and low intelligence people when pay is one standard deviation from the mean pay). Note also that here, too, the interactions could be understood as suggesting that when job complexity is high intelligence has a positive effect on global satisfaction, whereas when pay is high it has a negative effect; and that when job complexity is low intelligence has a negative effect on global satisfaction, whereas when pay is low it has a positive effect.

Table 3
Parameter estimates (standard errors) of fixed effects rewards' model.

	b	Standard error	t-Ratio
Job complexity (JC)	0.04075	0.00224	18.2
Pay	0.14790	0.00783	18.9
JC × Intelligence	0.00023	0.00006	3.8
Pay × Intelligence	−0.00055	0.00014	3.9

All the coefficients are significant on the 0.0001 level. N = 136,413 participant-year observations with df = 125,019 for the error.

Finally, our moderated mediation model can be examined based on the 3-survey database. In examining this model we rely on Muller et al. (2005), who suggest that to establish such a model, "at least one of the two indirect effects (from the treatment through the mediator to the outcome) should

Author's personal copy

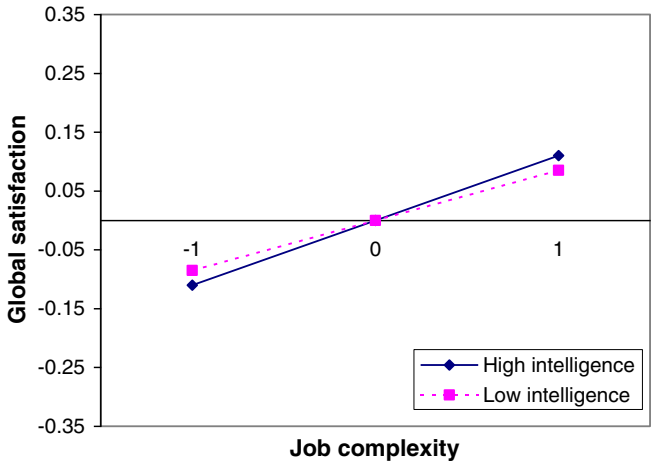


Fig. 5. The interaction between intelligence and job-complexity in determining global satisfaction.

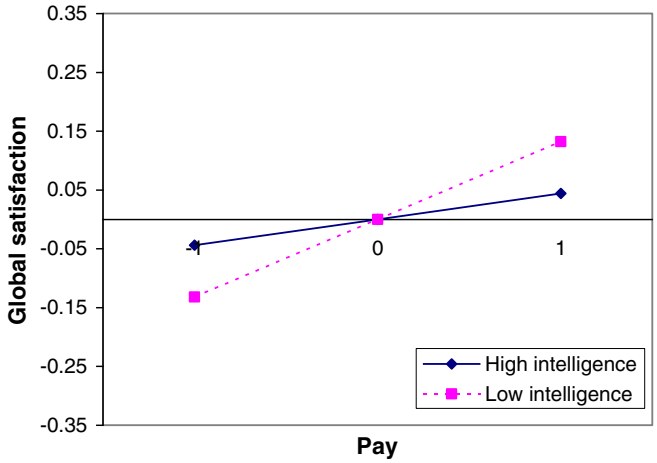


Fig. 6. The interaction between intelligence and pay in determining global satisfaction.

be significantly moderated, while the other indirect effect should be significant on average." (p. 860). The Muller et al. (2005) framework is depicted in Fig. 7 and applied here both for our measures of intrinsic and extrinsic rewards and for our measures of intrinsic and extrinsic satisfactions. Note that for simplicity we included in this figure only one facet and its associated reward, but our actual estimations are based on models that include both facets and both rewards (see Appendix A).

The full results of these models are given in Appendix A, and the coefficients that are directly relevant to the examination of the moderated mediation as well as their standard errors and t-

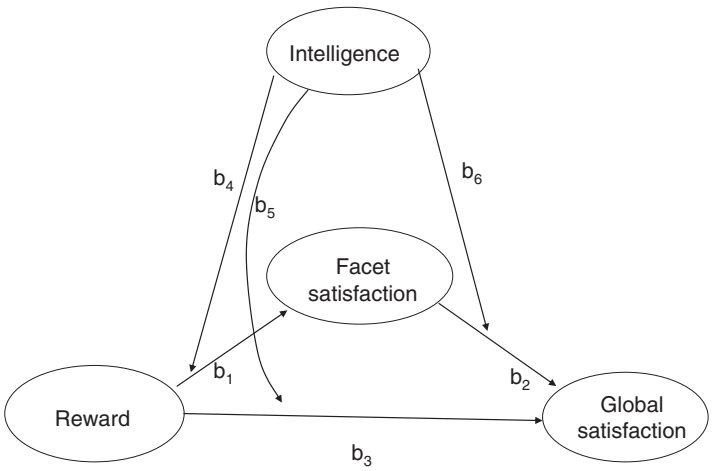


Fig. 7. A framework for testing moderated mediation.

Author's personal copy

Table 4
Unstandardized coefficients, standard errors and t-ratios for moderated mediation model.

	Intrinsic reward/satisfaction model			Extrinsic reward/satisfaction model		
	Estimate	Std. error	t-Ratio	Estimate	Std. error	t-Ratio
b_1	0.103	0.007	15.5	0.487	0.021	23.7
b_2	0.299	0.012	25.3	0.184	0.011	17.0
b_3	0.018	0.006	3.2	0.046	0.012	2.6
b_4	0.00030	0.0002	1.3	0.0011	0.0007	1.5
b_5	0.000012	0.0020	0.1	−0.00034	0.00061	0.6
b_6	0.0025	0.0004	6.1	−0.0011	0.0004	2.8

Note: In the intrinsic (extrinsic) model b_1 is the coefficient of complexity (pay) in regressing intrinsic (extrinsic) satisfaction on job-complexity and pay; b_3 is the coefficient of job-complexity (pay) in regressing global satisfaction on job-complexity, pay and intrinsic and extrinsic satisfaction, and b_2 is the coefficient of intrinsic (extrinsic) satisfaction in this regression. b_4 is the coefficient of the interaction between job complexity (pay) and intelligence in regressing intrinsic (extrinsic) satisfaction on intelligence, job-complexity, pay and the interactions involving intelligence; b_5 is the coefficient of the interaction between job complexity (pay) and intelligence in regressing global satisfaction on intelligence job complexity, pay intrinsic and extrinsic satisfaction and all the interactions involving intelligence, and b_6 is the interaction between intelligence and intrinsic (extrinsic) satisfaction in this model.

ratios are presented in Table 4 (the labels of the coefficients in this table corresponds to the labels in Fig. 7). According to Muller et al. (2005) as well as Edwards and Lambert (2007), moderated mediation is associated with a moderation of the effect of the mediator on the outcome, which requires that both b1 and b6 will be significant. The results of Table 4 are consistent with this pattern, since b1 and b6 are both significant for the intrinsic part of the model ($p<0.0001$, $p<0.01$, respectively. See Table 4) as well as for the extrinsic part of the model ($p<0.0001$, $p<0.0001$, respectively). They are not consistent, with the mediated moderation, since b4 was not significant either for intrinsic features of our model ($p>0.9$) or for the extrinsic features ($p>0.6$). Thus, these sets of analyses establish that the facet satisfactions' mediation of the relationships between rewards and global satisfaction is moderated by effect of intelligence on the relationships between facet satisfaction and global satisfaction.

Muller et al. (2005) and Edwards and Lambert (2007) also suggest that moderated mediation may be associated with significant estimates of b2 and b4, in which case it cannot be clearly distinguished from mediated moderation. However, although our estimates of b2 were significant both for intrinsic satisfaction and for extrinsic satisfaction, our estimates for b4 were not (i.e., the intelligence × reward interactions were not significant when facet satisfaction was the dependent variable). In terms of Edwards and Lambert (2007, p. 7), this suggests that the mediation process we observe is of moderated mediation rather than mediated moderation. This is also consistent with the lack of overall moderation in this 3-survey sample — i.e. lack of reward × intelligence interactions in a global satisfaction model that does not include facet satisfaction — which in the Muller et al.'s framework also suggests moderated mediation rather than mediated moderation. We note that mediated moderation — or significant b3s — make a theoretical sense, since it is possible that intelligence moderated the relationship between rewards and satisfaction. For example, it is possible that the higher the intelligence, the stronger (weaker) is the effect of job complexity (pay) in determining intrinsic satisfaction. Indeed, the significant reward × intelligence interactions in the 21-survey analysis is consistent with a mediated moderation. But since we could not confirm these interactions in the 3-survey analysis we concluded that the evidence is consistent with a moderated mediation process, but only suggestive of a mediated moderation process. In the discussion section we discuss possible reasons for the difference in results between the 21- and 3-survey analyses.

4. Discussion

Our findings are consistent both with the facets model and with the rewards model in that we find that the relationship between facets' satisfaction and global satisfaction is moderated by intelligence such that in determining global satisfaction, the higher the intelligence the more important are intrinsic rewards and intrinsic satisfaction and the less important are extrinsic rewards and extrinsic satisfaction.

The findings of our study help to shed light on a major issue discussed and debated in the work satisfaction literature — why some individuals respond more positively to the intrinsic facets of work while others respond more favorably to the extrinsic facets (e.g., Gagn & Deci, 2005). In the present study we showed that intelligence may be an important variable in explaining the differential contribution of intrinsic and extrinsic job satisfactions to global (overall) job satisfaction. However, it should be noted that although individual differences in cognitive ability matter, there is substantial similarity between people in the way job characteristics affect job satisfaction. Whether you are of low or high intelligence, both extrinsic and intrinsic rewards are important, but that this vary only to a degree. Thus, although depending on their intelligence, people are different in the importance they assign to intrinsic versus extrinsic aspects of their jobs, and most of the variance in job-satisfaction is still explained by the main effects of job rewards and facet satisfactions.

Our study has a number of limitations associated primarily with the use of archival data. First, due to budget constraints of a large-scale national survey, our measures of satisfaction are single item measures. Although these single item measures were designed by the NLSY staff to capture both global satisfaction as well as intrinsic and extrinsic satisfactions, and were based on a well established job satisfaction questionnaire (Quinn & Mangione, 1973), they still may suffer from low reliability. However, we note that our study indicates that, despite their potential low reliability, these measures are valid as our results are consistent with the theoretical model. Furthermore, the similarity between the results of the rewards model and the results of the facets model strongly suggest that

Author's personal copy

reliability does not constitute a threat to the internal validity of our results for facets' satisfaction.

Reliability may still be a problem when one desires to estimate weak effects in our data. For example, although the moderating effect of intelligence on rewards was highly significant in the rewards model when estimated based on 21 surveys, it was not significant when we estimated it on the basis of 3 surveys. Given that we used large samples and highly sensitive (though degrees-of-freedom wasteful) fixed-effects models, this indeed suggests that the reliability of our single item measures may be a problem in our analyses when data come from short periods of time (i.e., only three surveys spanning 9 years). Since our fixed-effects analyses of the rewards models are based on within-individuals variance in measures of job (occupational) complexity, which depends on occupational changes, this variance, while sufficient for a precise estimation of the 21 surveys' rewards model, may be insufficient for the 3-surveys' rewards model. This may be the reason for the lack of significant results in our attempt to establish a mediated moderation process. Furthermore, the fact that job complexity was measured via occupational complexity may also lead to low power associated with the detection of interactions in the 3-surveys' model. Indeed, a previous analysis that used the same occupational complexity, but a less sensitive cross-sectional design, also failed to detect a complexity × intelligence interaction (Ganzach, 1998), suggesting that the reliability of our job complexity measure may also limit the power of analyses based on this measure.

Future research should further explore the moderating role of intelligence relative to other moderator variables discussed and examined in the literature on work and satisfaction. For example, Hackman and Oldham (1980) proposed that individuals are more likely to respond positively to job factors associated with intrinsic satisfaction when they are high on the personality variable of growth need strength (GNS) and on the ability to perform complex tasks (high knowledge and skills). It is possible that intelligence could serve as a more parsimonious moderator, because intelligence is strongly associated with both high aspiration for achievement and high ability to pursue challenging tasks successfully.

This finding on the moderating role of intelligence can also be valuable for management in determining the balance in using intrinsic versus extrinsic rewards at work to enhance individuals' satisfaction and motivation. Although by and large people are similar in the direction of their responses to various job characteristics — we all like better paying and more interesting jobs — managers can use information on individuals' intelligence, which is often obtained as part of the job selection process, as a basis for fine tuning decisions about the degree of intrinsically- versus extrinsically-oriented rewards that should be emphasized.

Appendix A. Full results of moderated mediation models

In these equations JC is job complexity, PY is pay, IS is intrinsic satisfaction, ES is extrinsic satisfaction and GS is global satisfaction. Numbers in parentheses are standard errors.

Main effects models:

$$\underset{(0.007)}{IS} = \underset{0.105}{} * JC + \underset{(0.020)}{0.246} * PY$$

$$\underset{(0.007)}{ES} = \underset{-0.017}{} * JC + \underset{(0.021)}{0.488} * PY$$

$$\underset{(0.006)}{GS} = \underset{0.018}{} * JC - \underset{(0.018)}{0.051} * PY + \underset{(0.012)}{0.307} * IS + \underset{(0.012)}{0.195} * ES.$$

Interaction models:

$$\underset{(0.0128)}{IS} = \underset{0.0893}{} * JC + \underset{(0.0385)}{0.193} * PY + \underset{(0.00023)}{0.00030} * JC * IQ + \underset{(0.0007)}{0.0010} * PY * IQ$$

$$\underset{(0.0134)}{ES} = \underset{0.0086}{} * JC + \underset{(0.040)}{0.439} * PY - \underset{(0.00024)}{0.00054} * JC * IQ + \underset{(0.0007)}{0.0011} * PY * IQ$$

$$\underset{(0.011)}{GS} = \underset{0.015}{} * JC - \underset{(0.033)}{0.039} * PY + \underset{(0.021)}{0.198} * IS + \underset{(0.021)}{0.244} * ES + \underset{(0.000242)}{0.000012} * JC * IQ -$$

$$\underset{(0.00061)}{0.00034} * PY * IQ + \underset{(0.00025)}{0.00252} * IS * IQ - \underset{(0.00041)}{0.00124} * ES * IQ.$$

References

Aguinis, H. (1995). Statistical power problems with moderated multiple regression in management research. *Journal of Management*, *21*, 1141–1158.

Aguinis, H., & Stone-Romero, E. F. (1997). Methodological artifacts in moderated multiple regression and their effects on statistical power. *The Journal of Applied Psychology*, *82*, 192–206.

Alderfer (1972). *Existence, relatedness, and growth: Human needs in organizational settings.* New York: Free Press.

Allison, P. E. (2009). *Fixed effects regression models.* New York: Sage.

Birenbaum, M. H. (1992). Issues in utility measurement. *Organizational Behavior and Human Decision Processes*, *52*, 319–330.

Birnbaum, M. H., & Sutton, S. E. (1992). A change-of-process theory for contextual effects and preference reversals in risky decision making. *Organizational Behavior and Human Decision Processes*, *52*, 331–369.

Brief, A. P., & Aldag, R. J. (1978). The job characteristics inventory: An examination. *The Academy of Management Journal*, *21*, 659–671.

Clarke, P., Crawford, C., Steele, F., & Vignoles, A. (2010). The choice between fixed and random effects models: some considerations for educational research. Working paper No. 10-10, Department of Quantitative Social Science, University of London.

Deci, E. L. (1975). *Intrinsic motivation.* New York: Plenum.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior.* New York: Plenum.

Deci, E. L., & Ryan, R. M. (2000). The 'what' and 'why' of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268.

Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and mediation: A general analytical framework using moderated path analysis. *Psychological Methods*, *12*, 1–22.

Farr, R. M. (1977). On the nature of attributional artifacts in qualitative research: Herzberg's two-factor theory of work motivation. *Journal of Occupational Psychology*, *50*, 1–66.

Gagn, M., & Deci, E. L. (2005). Self determination theory and work motivation. *Journal of Organizational Behavior*, *26*, 331–362.

Ganzach, Y. (1998). Intelligence and job satisfaction. *The Academy of Management Journal*, *41*, 526–539.

Gerhart, B., & Milkovich, G. T. (1992). Employee compensation: Research and practice. In M. D. Dunnette, & L. M. Hough (Eds.), (2nd ed). *Handbook of industrial and organizational psychology*, *vol. 3*. (pp. 481–569)Palo Alto, CA: Consulting Psychologists Press Herzberg, 1966.

Gottfredson, L. S. (1986). Societal consequences of the g factor in employment. *Joumal of Vocational Behavior*, *29*, 379-340.

Grigorenko, E. L., & Sterenber, R. (2001). Analytical, creative, and practical intelligence as predictors of self-reported adaptive functioning: A case study in Russia. *Intelligence*, *29*, 57–93.

Hackman, J. R., & Oldham, G. R. (1976). Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, *16*, 250–279.

Hackman, J. R., & Oldham, G. R. (1980). *Work redesign.* Reading, MA: Addison-Wesley.

Harpaz, I., & Fu, K. (2002). The structure of the meaning of work: A relative stability amidst change. *Human Relations*, *55*, 639–668.

Author's personal copy

Hausman, J. A. (1978). Specification tests in econometrics. *Econometrica*, *46*, 1251–1271.
Herzberg, F. (1966). *Work and nature of man.* Cleveland: World.
Hinrichs, J. R. (1969). Correlates of employee evaluations of pay increases. *The Journal of Applied Psychology*, *53*, 481–489.
Hunt, E., & Wittmann, W. (2008). National intelligence and national prosperity. *Intelligence*, *36*, 1–9.
Jensen, A. (1998). *The g factor: The science of mental ability.* Westport CT: Praeger.
Kanungo, R. N. (1982). *Work alienation: An integration approach.* New York: Praeger.
King, N. (1970). Clarification and evaluation of the two-factor theory of job satisfaction. *Psychological Bulletin*, *74*, 18–31.
Lawler, E. E. (1971). *Pay and organizational effectiveness.* New York: McGraw-Hill.
Maslow, A. H. (1954). *Motivation and personality.* New York: Harper & Row.
Mitchel, T. R. (1974). Expectancy models of satisfaction, occupational preferences and effort: A theoretical, methodological and empirical appraisal. *Psychological Bulletin*, *81*, 1053–1077.
Muller, D., Judd, C. M., & Yzerbyt, V. Y. (2005). When moderation is mediated and mediation is moderated. *Journal of Personality and Social Psychology*, *89*, 852–863.
NLS user guide. (1995). Columbus: The Ohio State University, Center for Human Resource Research.
Nyborg, H. (2003). *The scientific study of general intelligence: A tribute to Arthur Jensen.* Oxford, U.K.: Pergamon Press.
O'Reilly, C. A., & Caldwell, D. F. (1985). The impact of normative social influence and cohesiveness on task perceptions and attitudes: A social information processing approach. *Journal of Occupational Psychology*, *58*, 193–206.
Oswald, A., & Wu, S. (2010). Objective confirmation of subjective measures of human well-being: Evidence from the U.S.A. *Science*, *327*, 576–579.
Pesta, B., McDaniel, M. A., & Bertch, S. (2010). Toward an index of well-being for the fifty U.S. states. *Intelligence*, *38*, 160–168.
Piliavin, I., Gartner, R., Thornton, C., & Matsueda, R. (1986). Crime, deterrence, and rational choice. *American Sociological Review*, *51*(101-1), 19.
Porter, L. W., & lawler, E. E. (1968). *Managerial attitudes and performance.* Homewood, IL: Irwin-Dorsey.
Quinn, R. B., & Mangione, T. W. (1973). Job satisfaction 1972 — A brief manual. In R. P. Quinn, & T. W. Mangione (Eds.), *The 1969–1970 survey of working conditions: Chronicles of an unfinished enterprise.* Ann Arbor: University of Michigan, Institute of Social Research, Survey Research Center.
Roos, P. A., & Treiman, D. J. (1980). Worker functions and worker traits in the 1970 U. S. census. In A. R. Miller, D. J. Treiman, P. S. Cain, & P. A. Roos (Eds.), *Work, Jobs and Occupations: A Critical Review of the Dictionary of Occupational Titles, 45–92*. Washington DC: National Academy Press.
Russell, C. J., & Bobko, P. (1992). Moderated regression analysis and Likert scales: Too coarse for comfort. *The Journal of Applied Psychology*, *77*, 336–342.
Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *The American Psychologist*, *55*, 67–78.
Salancik, G. R., & Pfefer, J. (1977). An examination of need-satisfaction models of job attitudes. *Administrative Science Quarterly*, *22*, 427–456.
Sims, H., Szilagyi, A., & Keller, R. (1976). The measurement of job characteristics. *The Academy of Management Journal*, *19*, 195–212.
Van De Vliert, E., Van Yperen, N. W., & Thierry, H. (2008). Are wages more important for employees in poorer countries with harsher climates? *Journal of Organizational Behavior*, *29*, 79–94.
Wanous, J. P., & Reichers, A. E. (1996). Estimating the reliability of a single-item measure. *Psychological Reports*, *78*, 631–634.
Wanous, J. P., Reichers, A. E., & Hudy, M. J. (1997). Overall job satisfaction: How good are single-item measures? *The Journal of Applied Psychology*, *82*, 247–252.
Wilk, S. L., Desmarais, L. B., & Sackett, P. R. (1995). Gravitation to jobs commensurate with ability: Longitudinal and cross-sectional tests. *The Journal of Applied Psychology*, *80*, 79–85.
Zagorsky, J. L. (2007). Do you have to be smart to be rich? The impact of IQ on wealth income and financial distress. *Intelligence*, *35*, 489–501.