Intelligence, Education, and Facets of Job Satisfaction

YOAV GANZACH
Tel Aviv University

This article suggests that intelligence and education have differential effects on intrinsic job satisfaction and on pay satisfaction. Intelligence has a strong direct negative effect on intrinsic satisfaction but a negligible effect on pay satisfaction because it is positively associated with the level of desired job complexity but not with the level of expected pay. On the other hand, education has a strong direct negative effect on pay satisfaction but a small effect on intrinsic satisfaction because it is positively associated with expected pay. These effects of intelligence and education are compared to their effects on global job satisfaction.

Keywords: *job satisfaction; education; intelligence; pay satisfaction*

Education may have both a positive and a negative effect on job satisfaction. It may have a positive indirect effect on job satisfaction because more highly educated people are able to find more rewarding jobs and therefore derive more satisfaction with their work. And it may have a negative direct effect on job satisfaction, because expectations about job rewards—which are negatively related to satisfaction—tend to increase with education (e.g., Arvey, Carter, & Buerkley, 1991; Bowles & Gintis, 1976). These two effects of education on job satisfaction are depicted in Figure 1.

The possibility that the relationships between education and job satisfaction are as depicted in Figure 1 was of great concern to scholars and policy makers alike because these relationships suggest that education—usually considered in the Western society as a key to better life—may be detrimental to one's well-being, or that people may be "overeducated" (e.g., Freeman, 1976). This may lead, it was argued, not only to personal unhappiness but

Author's Note: *Address all correspondence to Yoav Ganzach, Faculty of Management, Tel Aviv University, Tel Aviv, Israel, 69978; e-mail: YOAVGN@POST.TAU.AC.IL; Fax: 972-3-6409560.* *The research was supported by a grant from the Israel Institute of Business Research. I would like to thank Asya Pazy and Ilan Roziner for their comments.*

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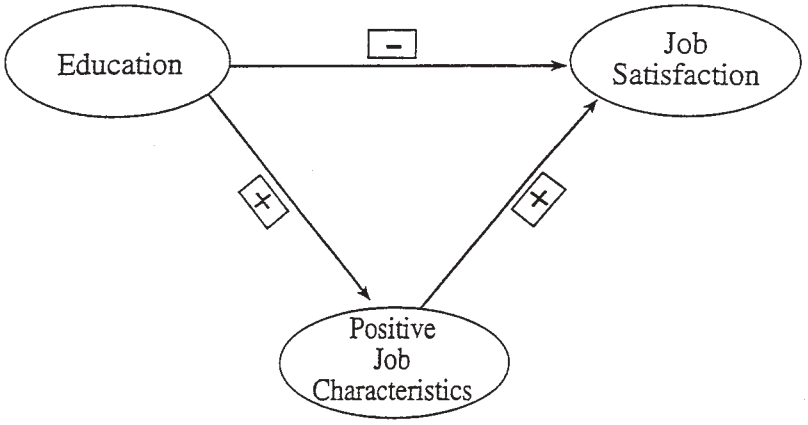

Figure 1: A Causal Model for the Relationships Among Education, Job Characteristics, and Job Satisfaction When Intelligence Is Missing

also to "social unrest", to a "political crisis" (Carnegie Commission on Higher Education, 1973), and to "frustration, alienation and disruption" (Management Development Institute, 1978).

A number of studies have examined the relationship between education and job satisfaction. Although the results of these studies are somewhat mixed (Gordon & Arvey, 1975), it appears that when job characteristics are adequately controlled, education does have a negative effect on job satisfaction (Arvey et al., 1991). Thus, for example, Burris (1983) and Tsang, Rumberger, and Levin (1991) found a negative effect of education on job satisfaction when General Educational Development (an index that measures the level of education needed for a job) is controlled for; and Glenn and Weaver (1982) found such an effect when occupational prestige, job autonomy, job authority, and earnings were controlled.

Recently, however, Ganzach (1998) argued that the direct negative effect of education on job satisfaction observed in previous research is the result of the positive correlation between intelligence and education and reflects a direct negative effect of intelligence, rather then education, on satisfaction. When intelligence was added to the model of Figure 1, the direct effect of intelligence on satisfaction was significantly negative, whereas the direct effect of education on satisfaction was nonsignificant (see Figure 2). In fact, contrary to the overeducation hypothesis (Freeman, 1976), Ganzach (1998) argued that an increase in education can only lead to an increase in job satisfaction, through its positive effect on job characteristics, and cannot lead to a decrease in job satisfaction.

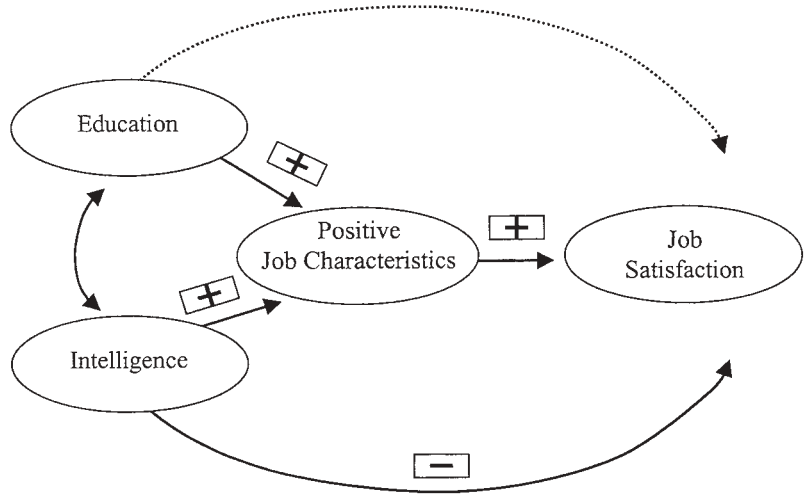

Figure 2: A Causal Model for the Relationships Among Education, Intelligence, Job Characteristics, and Job Satisfaction
NOTE: The broken line represents a negligible effect of education on job satisfaction.

One shortcoming of the Ganzach (1998) study and most of the studies that examined the effect of education on job satisfaction is that they focused on global job satisfaction rather than the facets of job satisfaction. In particular, the effects of intelligence and education on intrinsic work satisfaction may be quite different from their effects on satisfaction with the extrinsic aspects of the work and, in particular, on satisfaction with pay. Thus, the purpose of the current study is to examine a model in which intelligence and education have *differential* effects on these two main facets of job satisfaction, and the data sets that are used include not only information about intelligence, education, and global satisfaction but also information about facet satisfaction.

A MODEL OF THE RELATIONSHIPS BETWEEN INTELLIGENCE, EDUCATION, AND FACET SATISFACTION

I begin my analysis of the effects of intelligence and education on pay satisfaction and intrinsic satisfaction by discussing the differences between the processes underlying the formation of these two facets of job satisfaction. One important difference between these processes is that whereas intrinsic satisfaction is influenced primarily by job complexity (Hackman & Oldham, 1976), pay satisfaction is influenced primarily by pay. Thus—although complexity and pay are highly correlated—I anticipate that pay, but not

complexity, will be an important determinant of pay satisfaction, and we anticipate that complexity, but not pay, will be an important determinant of intrinsic satisfaction (note that these hypothesized effects of pay and job complexity on pay satisfaction and intrinsic satisfaction are by no means universally accepted. It is often argued that that job complexity does not affect intrinsic satisfaction [e.g., O'Reilly & Caldwell, 1979; Orpen, 1979] and that pay is positively related not only to pay satisfaction but to favorable work attitudes in general [e.g., Levine, 1993]).

However, it is not pay itself that influences pay satisfaction but the difference between what one expects to be paid and what one is actually paid. Similarly, it is not job complexity itself that influences intrinsic satisfaction but the difference between desired complexity—the complexity one would like—and the actual complexity of one's job (e.g., Locke, 1969; Porter, 1961). Thus, a theory of the effects of intelligence and education on job satisfaction in general, and on facet satisfaction in particular, should consider not only their effects on actual complexity and actual pay but also their effects on expected pay and desired complexity.

A main proposition of the study is that expected pay is influenced primarily by education, whereas desired complexity is influenced primarily by intelligence. Expected pay is influenced primarily by education and less by intelligence for two main reasons. First, education is more important than intelligence in formal pay systems. Many such systems use education to determine salaries, but few use the results of intelligence tests. Second, education is more important than intelligence in forming one's reference group, because information about the education of other workers, but not about their intelligence, is publicly available. Because one's reference group is a major determinant in forming one's expectations, education should play a more important role than intelligence in forming pay expectations.

Whereas the information that underlies the formation of expectations about pay is public, the information that underlies the formation of aspirations regarding complexity is private. It is based on people's experience in performing tasks with various levels of complexity, evaluating their intrinsic satisfaction with performing these tasks, and finding out what is their desired, or ideal, complexity—the complexity that will maximize their intrinsic satisfaction. Intelligence affects this desired complexity because (a) intrinsic satisfaction is achieved through success in task performance (Deci & Ryan, 1985; Lawler & Porter, 1967); (b) this success must be attributed to internal (e.g., ability), rather than external (e.g., task ease) factors (Weiner, 1986); and (c) internal attribution requires a subjective feeling that the task is sufficiently complex (Bandura & Cervone, 1983; Weiner, 1986). These processes lead to a positive relationship between the complexity one desires and her

intelligence: Less intelligent people will not desire complex work because they will fear failing in them, and intelligent people would not desire simple work because success in this work will not lead to intrinsic satisfaction (it will be attributed to the ease of the task).

This reasoning also suggests that education will play only a minor role in the formation of desired complexity. First, public information, such as the education of other workers, which is necessary for the formation of a reference group, is not involved in the development of desired complexity. Second, as described above, the formation of desired complexity is the result of indigenous intellectual characteristics, rather than formal education; it is the result of wit rather than learning.

To summarize, the model for the relationship between education, intelligence, and facet satisfaction is based on the premise that expectations are negatively related to satisfaction and that education has a strong influence on expected pay but a weak influence on desired complexity, whereas intelligence has a strong influence on desired complexity but a weak influence on expected pay. This model is presented in Figures 3 and 4. In both figures, intelligence and education are exogenous variables, job characteristics are intervening variables, and facet satisfaction are the dependent variables; and in both, intelligence and education are positively related to the relevant characteristic of the job. The difference between the figures—a difference that is the focus of the current study—is the direct effects of education and intelligence on facet satisfaction. Education has a direct negative effect on pay satisfaction and a negligible effect on intrinsic satisfaction, and intelligence has a direct negative effect on intrinsic satisfaction and a negligible effect on pay satisfaction.

The model presented in Figures 3 and 4 includes the main themes of this article. However, before concluding the theoretical discussion, I discuss below the similarities and differences that may exist between this model of facet satisfaction and the previous model (Ganzach, 1998) linking education and intelligence to *global* job satisfaction.

EDUCATION, INTELLIGENCE AND JOB SATISFACTION: ON THE SIMILARITIES AND DIFFERENCES BETWEEN GLOBAL SATISFACTION AND FACET SATISFACTION

Although it seems rather clear that people can be satisfied from some facets of their jobs but not from other facets, there is very little research that shows that this within-individual heterogeneity in facet satisfaction is meaningful. For example, it could be argued that a global job attitude determines people's perceptions of their facet satisfaction—that facet satisfaction is primarily different indicators of the same construct—and that within-individual

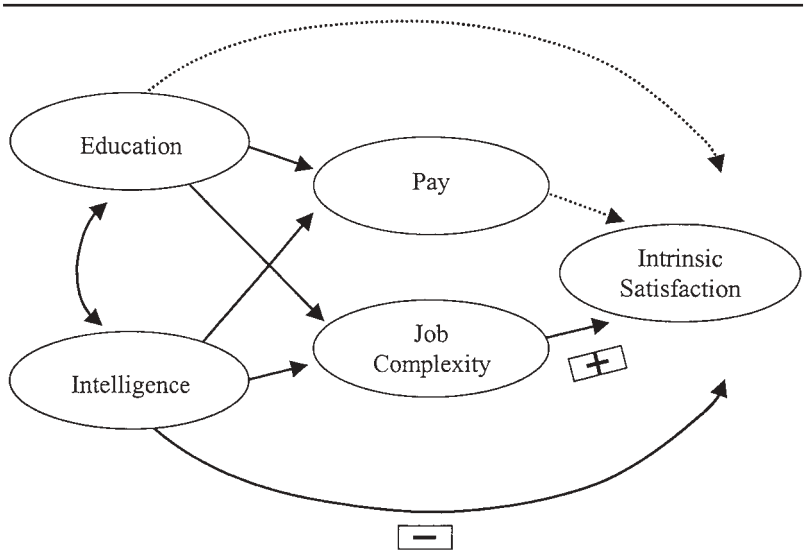

Figure 3: A Causal Model for the Relationships Among Education, Intelligence, Job Complexity, Pay, and Intrinsic Satisfaction
NOTE: Broken lines represent nonsignificant effects.

heterogeneity in facet satisfaction simply reflects noisy measurement of this global attitude. This line of reasoning is consistent with two streams of research in organizational psychology. First, it is consistent with the social information-processing model of job attitudes (Salancik & Pfeffer, 1977, 1978), which argues that people tend to impose consistency on their job attitudes and beliefs. And second, it is consistent with many studies that conceptualize global job satisfaction as an unweighted sum of facet satisfaction. In contrast, the current theorizing suggests that job attitudes are complex and intricate. It argues for the construct validity of facet satisfaction by emphasizing both the convergent validities and the discriminant validities of intrinsic satisfaction and pay satisfaction. The convergent validities of these two variables are associated with the relationships among intelligence, job complexity, and intrinsic satisfaction and with the relationships among education, pay, and pay satisfaction. The discriminant validities of the two variables are associated with the relationships among education, pay, and intrinsic satisfaction and with the relationships among intelligence, job complexity, and pay satisfaction.

In view of previous research about the relationship between intelligence education and global job satisfaction (Ganzach, 1998), an interesting question concerns the relationship between the effects of education and

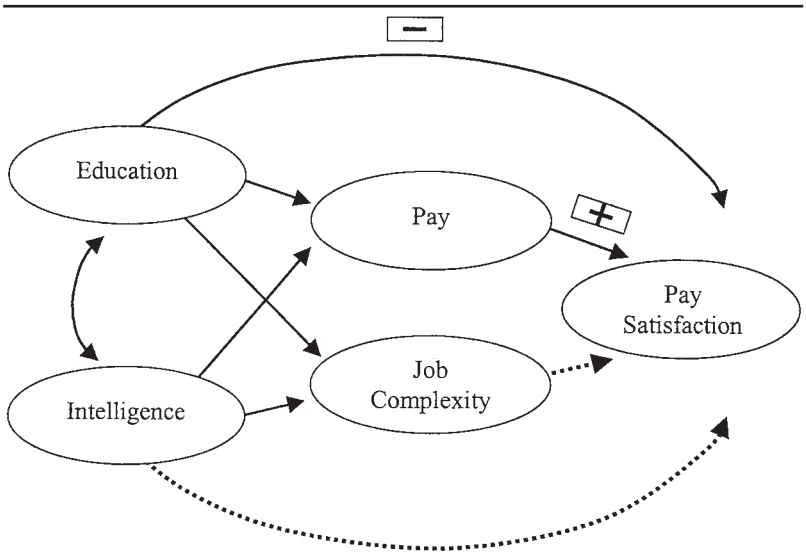

Figure 4: A Causal Model for the Relationships Among Education, Intelligence, Job Complexity, Pay, and Pay Satisfaction
NOTE: Broken lines represent nonsignificant effects.

intelligence on facet satisfaction and their effects on global job satisfaction. Will the effects of education and intelligence on global job satisfaction be similar to their effects on intrinsic satisfaction, or will they be similar to their effects on pay satisfaction? A similarity between the global job satisfaction model and the intrinsic satisfaction model would suggest that the psychological processes underlying the formation of global job satisfaction are similar to those underlying the formation of intrinsic satisfaction, whereas a similarity between the global job satisfaction model and the pay satisfaction model would suggest that the psychological processes underlying the formation of global job satisfaction are similar to those underlying the formation of pay satisfaction.

METHOD

DATA

Two sets of data are analyzed. One, labeled the *NLSY data set*, was taken from the National Longitudinal Survey of Youth (NLSY). The other, labeled the *NLS data set*, was taken from the young men cohort and from the young

women cohort of the National Longitudinal Survey (NLS). The NLSY includes a probability sample of 12,686 American males and females born between 1957 and 1964 (with an oversampling of African Americans, Hispanics, and economically disadvantaged Whites). The young men cohort of the NLS includes a probability sample of 5,225 American males (oversampling for African Americans) born between 1942 and 1952. The young female cohort of the NLS includes a probability sample of 5,159 American females (oversampling for African Americans) born between 1944 and 1954. The data from these two cohorts were combined in the current study to one data set (the NLS data set) that included both males and females.

Both the NLSY and the NLS were administered annually. However, information about facet satisfaction was not collected in each of these years. I chose to analyze the latest years possible that included information about facet satisfaction (1988 in the NLSY, 1980 in the young female cohort of the NLS, and 1981 in the young male cohort of the NLS), inasmuch as by these years the large majority of the participants had already finished their schooling and had a number of years of experience in the labor market. Thus, the NLSY data set includes participants aged 24 to 31, and the NLS includes females aged 26 to 36 and males aged 28 to 38.

It is important to emphasize that the NLSY data set examined here is not independent of the data set examined by Ganzach (1998) in that the two data sets were taken from two surveys administered to the same participants 6 years apart. However, the main dependent variables that are examined here, intrinsic satisfaction and pay satisfaction, were not examined by Ganzach (1998).

The NLS data set examined has no overlap with the data set examined by Ganzach (1998). It consists of a different sample from a different cohort. Thus, the results of this data set are entirely independent of Ganzach' s (1998) results.

MEASURES

Intelligence. In the NLSY data set, 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 of four tests: arithmetic reasoning, paragraph comprehension, word knowledge, and mathematics knowledge.

In the NLS data set, the measure of intelligence is derived from the results of various intelligence tests such as the Otis/Beta/Gamma, the California Test

of Mental Maturity and the Lorge-Thorndike intelligence test, which were available in the participants' high school records. The results of these tests were standardized to create a unified intelligence score and were expressed as centiles in the population.

Finally, because both in the NLSY and in the NLS the intelligence score was correlated with age ($r = .21$, $r = .06$, respectively), this was further standardized within each age group to obtain an age-independent measure of intelligence.

Education. The measure for education was the number of years of education completed by the participants. This information was collected both by the NLSY and by the NLS.

Occupation. In both the NLSY data set and the NLS data set, occupation was derived from participants' open-ended descriptions of their job. This information was categorized into 591 occupational categories using the three-digit 1970 census classification.

Job complexity. In both data sets, the measure of job complexity, labeled *DOT complexity*, is the measure derived by Roos and Treiman (1980) from the 4th edition of the *Dictionary of Occupational Titles* (*DOT*). It 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.

Pay. Both the NLSY and the NLS provided information on the hourly rate of pay of the participants. The logarithm of this variable was used in the analyses.

Facet satisfaction. The same facet satisfaction questions were asked in the NLSY and in the NLS. 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 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*.

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*.

Control variables. These variables included sex, age, ethnic origin, number of hours worked per week, area of residence, marital status, and the unemployment rate in the area of residence.

RESULTS

This section is organized as follows. The first subsection reports descriptive statistics of the main variables of the study. The second subsections report the results of regression models of facet satisfaction, and the third subsection reports the results of regression models of global satisfaction. The fourth subsection reports the results of some robustness checks, particularly tests examining the robustness of the results to measurement unreliability.

DESCRIPTIVE STATISTICS

Descriptive statistics of, and intercorrelations among, the variables are presented in Tables 1 and 2 for the NLSY and the NLS data sets, respectively. A number of things are worthwhile noting here. First, the high correlation between intelligence and education (.62 in the NLSY and .47 in the NLS). These high correlations demonstrate the difficulty in distinguishing between the role of intelligence and the role of education in models of labor market outcomes in general, and job satisfaction in particular, and suggest that a powerful design (e.g., a large data set) is necessary for this distinction. Second, the difference between the correlations of intrinsic satisfaction and global satisfaction (.46 and .40 in the NLSY and in the NLS, respectively) and the correlations of pay satisfaction and global satisfaction (.33 and .25, respectively) suggests that intrinsic satisfaction is more similar to global satisfaction than is pay satisfaction. Additional evidence of this difference is discussed below. Third, the correlations between pay satisfaction and intrinsic satisfaction are rather low (.28 and .22 in the NLSY and NLS, respectively) and suggest that the two are indeed independent constructs rather than two

TABLE 1: Descriptive Statistics—The NLSY Data Set

Variable	*Unit*	n	*1*	*2*	*3*	*4*	*5*	*6*
1. Education	Years	10,382	—					
2. Intelligence[a]	Centiles	11,878	0.62	—				
3. Pay	Natural log in cents	8,790	0.31	0.34	—			
4. *DOT* complexity	1-10 scale	9,031	0.47	0.43	0.36	—		
5. Intrinsic satisfaction	1-4 scale	8,649	0.06	0.04	0.12	0.21	—	
6. Pay satisfaction	1-4 scale	8,627	0.06	0.10	0.37	0.11	0.28	—
7. Global satisfaction	1-4 scale	9,220	0.05	0.05	0.10	0.15	0.46	0.33

NOTE: NLSY = National Longitudinal Survey of Youth; *DOT* = *Dictionary of Occupational Titles*.
a. Before standardization.

TABLE 2: Descriptive Statistics—The NLS Data Set

Variable	*Unit*	n	*1*	*2*	*3*	*4*	*5*	*6*
1. Education	Years	7,571	—					
2. Intelligence[a]	Centiles	6,735	0.47	—				
3. Pay	Natural log in cents	5,236	0.38	0.21	—			
4. *DOT* complexity	1-10 scale	4,713	0.50	0.27	0.24	—		
5. Intrinsic satisfaction	1-4 scale	5,033	0.03	0.00	0.08	0.09	—	
6. Pay satisfaction	1-4 scale	5,036	–0.01	0.02	0.37	–0.06	0.22	—
7. Global satisfaction	1-4 scale	5,502	0.05	0.03	0.05	0.07	0.40	0.25

NOTE: NLS = National Longitudinal Survey; *DOT = Dictionary of Occupational Titles.*
a. Before standardization.

measures of the same underlying construct. Finally, although the relationship between intelligence (education) and intrinsic (pay) satisfaction is the central issue of the study, the correlations between the two is rather low. The reason is apparent in Figure 3 (Figure 4), which suggests that this low correlation results from the fact that intelligence (education) has both a negative direct effect and a positive indirect effect on intrinsic (pay) satisfaction.

FACET SATISFACTION

To examine the theoretical model, I estimated two types of regression models: (a) models in which pay and job complexity were the dependent variables, and education, intelligence, and the control variables were the independent variables; and (b) models in which the two indicators of facet satisfaction were the dependent variables and pay, job complexity, intelligence, education, and the control variables were the independent variables. All the variables were standardized (i.e., the parameter estimates are standardized coefficients) to allow comparison between the coefficients. To simplify the presentation, I show in the body of the text only the results that are pertinent to the theoretical model. The results of the full models are presented in the appendices.

The NLSY data set. Figure 5 presents the theoretically important results for the NLSY data set (see Appendix A for full results). These results are consistent with the hypotheses. The effect of intelligence on intrinsic satisfaction is significantly negative ($\beta = -.102$, $p < .0001$ for the null hypothesis that the coefficient is equal to zero), whereas the effect of education is not significantly different from zero ($\beta = -.026$, $p > .1$); the difference between the two coefficients was significant, $p < .01$. On the other hand, the effect of intelligence on pay satisfaction is not significantly different from zero ($\beta = .004$, $p > .8$), whereas the effect of education is significantly negative ($\beta = -.065$, $p < .0001$); the difference between the two coefficients was significant, $p < .01$.

In addition, as expected, the effect of job complexity on intrinsic satisfaction ($\beta = .202$, $p < .0001$) is much larger than the effect of pay on intrinsic satisfaction ($\beta = .059$), although this latter effect is also significant, $p < .0001$; the difference between the two effects (the difference between the coefficients) is significant, $p < .0001$. On the other hand, consistent with the theoretical framework, the effect of pay on pay satisfaction is very high ($\beta = .407$, $p < .0001$), whereas the effect of job complexity on pay satisfaction is negligible ($\beta = .002$, $p > .9$); the difference between the two effects is significant, $p < .0001$.

The NLS data set. Figure 6 presents the theoretically important results for the NLS data set (see Appendix B for full results). These results are consistent with the hypotheses. The effect of intelligence on intrinsic satisfaction is significantly negative ($\beta = -.087$, $p < .0001$), whereas the effect of education is not significantly different from zero ($\beta = -.032$, $p > .2$); the difference between the two coefficients was significant, $p < .01$. On the other hand, the effect of intelligence on pay satisfaction is not significantly different from zero ($\beta = .000$, $p > .9$), whereas the effect of education is significantly

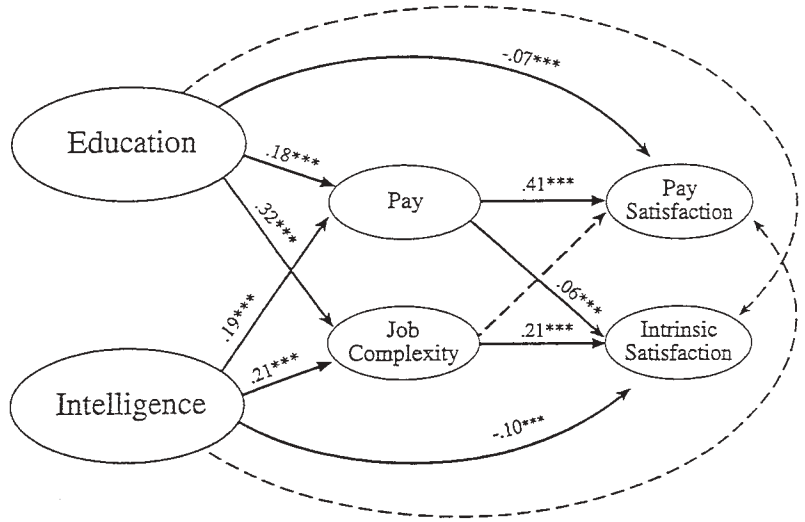

Figure 5: Standardized Coefficients of a Path Model for the Relationships Between Education, Intelligence, Job Complexity, Pay, Intrinsic Satisfaction, and Pay Satisfaction on the Basis of the National Longitudinal Survey of Youth Data Set

NOTE: Broken lines represent nonsignificant effects.

negative ($\beta = -.188$, $p < .0001$); the difference between the two coefficients is significant, $p < .01$.

In addition, as expected, the effect of job complexity on intrinsic satisfaction ($\beta = .096$, $p < .001$) is much larger than the effect of pay on intrinsic satisfaction ($\beta = .025$, this effect is not significant, $p > .4$); however, the difference between these two effects does not reach significance. On the other hand, consistent with the theoretical framework, the effect of pay on pay satisfaction ($\beta = .495$, $p < .0001$), is much more positive ($p < .0001$) than the effect of job complexity on pay satisfaction ($\beta = -.104$, $p > .0001$). Note that this effect of job complexity on pay satisfaction is negative, perhaps because when other factors are controlled for, pay expectations increase with job complexity.[1]

GLOBAL JOB SATISFACTION

Ganzach's (1998) results regarding the relationships between intelligence, education, and global job satisfaction are similar to these results regarding the relationships between intelligence, education, and intrinsic satisfaction but not to our results regarding the relationships between intelligence, education, and pay satisfaction. Thus, one purpose of this subsection

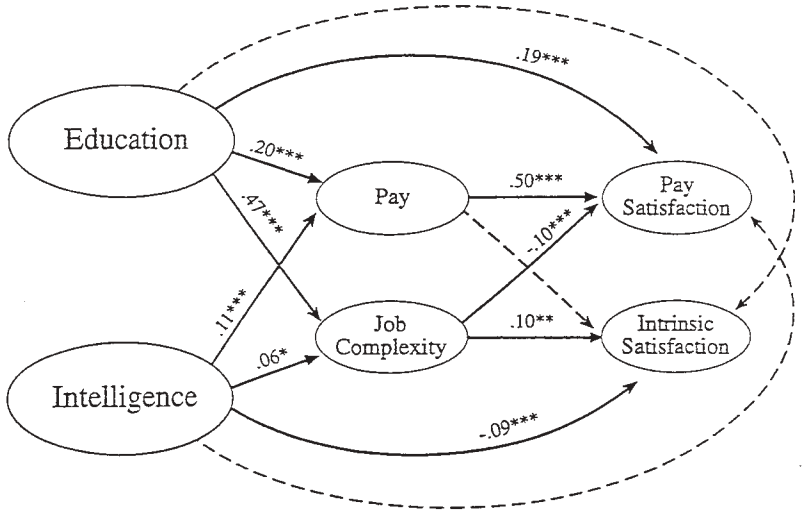

Figure 6: Standardized Coefficients of a Path Model for the Relationships Between Education, Intelligence, Job Complexity, Pay, Intrinsic Satisfaction, and Pay Satisfaction on the Basis of the National Longitudinal Survey Data Set

NOTE: Broken lines represent nonsignificant effects.

is to examine whether this similarity between global satisfaction and intrinsic satisfaction occurs in the two data sets that are analyzed in the current study. Another purpose of this subsection is to provide a replication of Ganzach (1998). Therefore, the models estimated in this subsection are similar to the models estimated in the previous subsection except that global job satisfaction, rather than facet satisfaction, was the dependent variable.

Figures 7 and 8 present the theoretically important results of the global satisfaction model for the NLSY and the NLS data sets, respectively (see Appendix A and Appendix B, respectively, for the full results). It is clear from these figures that the effects of education and intelligence on global job satisfaction are similar to their effects on intrinsic satisfaction but not to their effects on pay satisfaction. In the NLSY data set (Figure 7), the effect of intelligence on global satisfaction is significantly negative ($\beta = -.061$, $p < .001$), whereas the effect of education is nonsignificant ($\beta = -.021$, $p > .2$). Similarly, in the NLS data set (Figure 8), the effect of intelligence on global satisfaction is significantly negative ($\beta = -.072$, $p < .001$), whereas the effect of education is nonsignificant ($\beta = .002$, $p > .9$).

These results replicate Ganzach's (1998) results that, in the 1982 wave of the NLSY, intelligence had a strong negative effect on global job satisfaction,

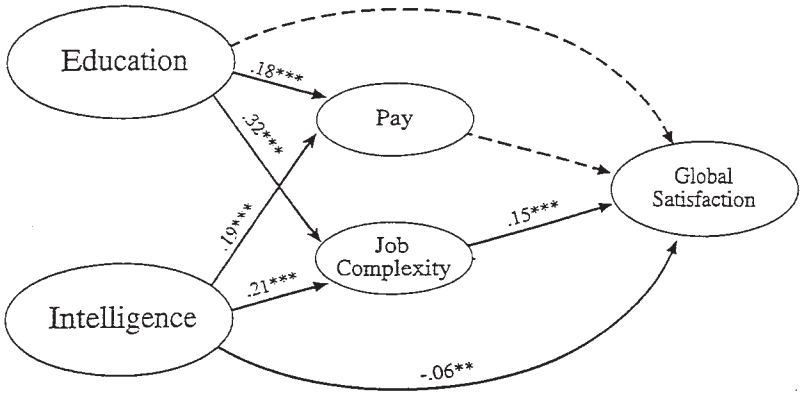

Figure 7: Standardized Coefficients of a Path Model for the Relationships Between Education, Intelligence, Job Complexity, Pay, and Global Satisfaction on the Basis of the National Longitudinal Survey of Youth Data Set

NOTE: Broken lines represent nonsignificant effects.

whereas the effect of education was negligible, and suggest that the processes underlying the formation of global job satisfaction are similar to those underlying the formation of intrinsic satisfaction but not to those underlying the formation of pay satisfaction. Note, however, that whereas the results of the NLS data set provide an independent replication of Ganzach (1998), the results of the NLSY do not provide an entirely independent replication. It should be emphasized, however, that the 1988 global satisfaction that is examined here is rather different from the 1982 global satisfaction that was examined by Ganzach (1998) in that most of the young, highly mobile participants of the NLSY reported having a different job (90%) and a different employer (84%) in 1988 than in 1982.[2] Indeed, adding the 1982 global satisfaction to the 1988 global satisfaction model has a very small effect on the coefficients of intelligence and education.

METHODOLOGICAL CONSIDERATIONS

One limitation of this study is that the dependent variables are measured on single item measures, which may compromise their reliability. However, low reliabilities of the dependent variables do not constitute a threat to the validity of the results because changes in these reliabilities cause equal changes in parameter estimates of *all* independent variables (see Dawes &

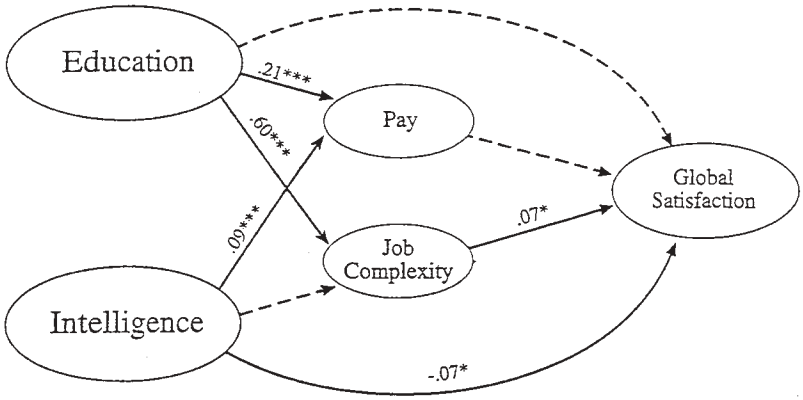

Figure 8: Standardized Coefficients of a Path Model for the Relationships Between Education, Intelligence, Job Complexity, Pay, and Global Satisfaction on the Basis of the National Longitudinal Survey Data Set
NOTE: Broken lines represent nonsignificant effects.

Corrigan, 1974)[3]—and these are the relative values of the parameters that are relevant for testing the model.

A more serious threat to the validity of the results stems from differences in the reliabilities of the independent variables: The relative values of parameter estimates in path models are influenced not only by the true relationships between independent and dependent variables but also by the reliabilities of their measures. To take into account these reliabilities, I estimated a full structural equations model in which intelligence, education, ethnic background, and sex were the exogenous variables, *DOT* complexity and pay were intervening variables, and pay satisfaction and intrinsic satisfaction were the endogenous variables. The reliabilities of the measures were taken to be 0.9 for intelligence (Gregory, 1996), 0.9 for education (Bishop, 1989; Murnane Willet & Levy, 1995), 0.9 for pay (Jencks, 1979), 0.7 for *DOT* complexity (Gerhart, 1988), and 0.7 for pay satisfaction and intrinsic satisfaction (based on Wanous & Reichers, 1996). The structural equations model also included correlated errors between the disturbances of pay and job complexity, which were not taken into consideration in the regression model.[4]

The results of these structural equations models are given in Figure 9 for the NLSY data set and in Figure 10 for the NLS data set. It is clear that, with some minor differences, the effects of education and intelligence on intrinsic satisfaction and pay satisfaction in these models are similar to their effects in the regression models, as presented in Figures 5 and 6.[5] Thus, the results

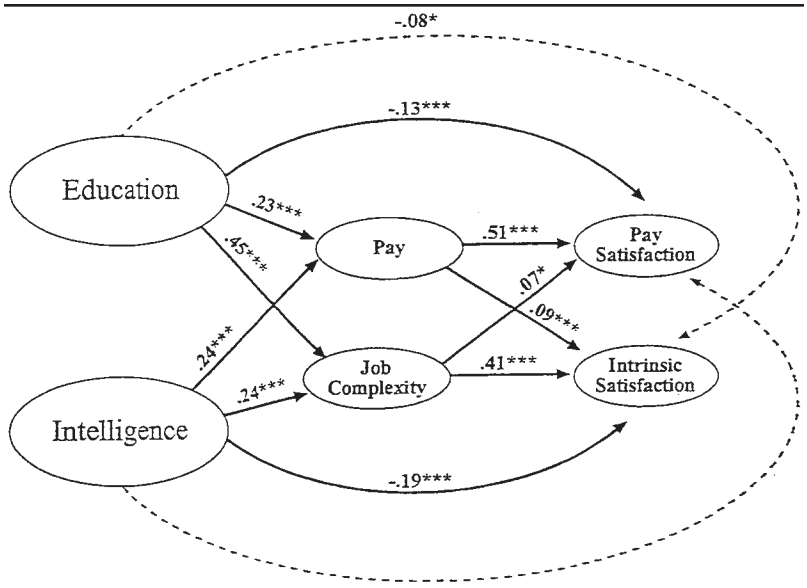

Figure 9: Standardized Coefficients of a Structural Equation Model for the Relationships Between Education, Intelligence, Job Complexity, Pay, Intrinsic Satisfaction, and Pay Satisfaction on the Basis of the National Longitudinal Survey of Youth Data Set.

NOTE: The model also includes correlation between the disturbances of pay and education not shown in the figure. Broken lines represent nonsignificant effects. For clarity, only the results of the structural part of the model are presented.

appear to be robust to various assumptions about the reliabilities of the variables (ranging from perfect reliabilities to the reliabilities underlying the results of Figures 9 and 10) as well as to various assumptions about the correlation between the errors of facet satisfaction.

Another methodological issue concerns the use of *DOT* complexity. Although *DOT* complexity was used by a number of authors as a measure of job complexity (e.g., Spector & Jex, 1991; Xie & Johns, 1995), reliance on this measure could be questioned on the grounds that it includes job analysts' judgments regarding required education and aptitude. Therefore, the models that are discussed in the article were also estimated using a measure of job complexity that could be derived from the data available in the *DOT* and did not involve such judgments. Specifically, this measure was based on job analysts' judgments of the job's complexity with regard to data and its complexity with regard to people (the correlation between this measure of job complexity and the standard *DOT* complexity measure is .90). The results of the models based on this measure were very similar to the results of the models

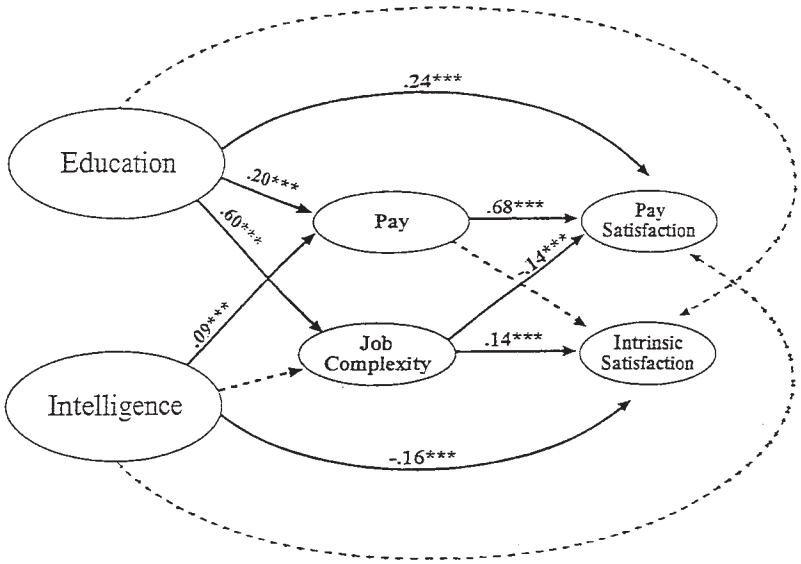

Figure 10: Standardized Coefficients of a Structural Equation Model for the Relationships Between Education, Intelligence, Job Complexity, Pay, Intrinsic Satisfaction, and Pay Satisfaction on the Basis of the National Longitudinal Survey Data Set

NOTE: The model also includes correlation between the disturbances of pay and education not shown in the figure. Broken lines represent nonsignificant effects. For clarity, only the results of the structural part of the model are presented.

based on Roos and Treiman's (1980) standard measure of *DOT* complexity and therefore are not reported.

Finally, I also examined the robustness of our results to the assumption that the dependent variables are measured on an interval scale, by estimating ordered logit models, which make only the assumption that the dependent variables are monotone. The results of these models were similar to the results of the regression models, suggesting that the four-level response scales of the dependent variables can safely be analyzed using linear regression techniques.

DISCUSSION

Whereas the focus of previous research was on how education (e.g., Burris, 1983; Freeman, 1976; Glenn & Weaver, 1982) and, to some extent,

intelligence (Barrett & Forbes, 1980; Ganzach, 1998) affect global job satisfaction, the focus of the current study is on the effects of intelligence and education on facet satisfaction. The results of the study show that—when job characteristics are controlled for—intelligence has a strong direct negative effect on intrinsic satisfaction but a negligible effect on pay satisfaction, whereas education has a strong direct negative effect on pay satisfaction but a small effect on intrinsic satisfaction.

The results of the study shed light on the sources of within-individual heterogeneity in facet satisfaction—on why people are often satisfied with one aspect of their work (e.g., pay) but not with another (e.g., work itself). One source of this heterogeneity is that jobs in the labor market are not characterized by one dimension ranging from low-level jobs, with little complexity and meager pay, to high-level jobs which are rich in complexity and pay well, but are characterized by two related, yet distinct, dimensions, one associated with job complexity and the other with pecuniary compensations. The distinct effects of job complexity and pay on pay satisfaction and intrinsic satisfaction provide strong support for the relative independence of these two dimensions.

Another source of within-individual heterogeneity in facet satisfaction is that with regard to their expectations about job rewards, people are not characterized by one dimension, associated with skill, or human capital (see, for example, Levine, 1993, for an analysis of expectations based on the notion of one such dimension) but by two related, yet distinct, dimensions—one associated with intelligence and the other with education. The distinct effects of intelligence and education on pay satisfaction and intrinsic satisfaction provide strong support for the relative independence of these dimensions. Note also that this relative independence is inconsistent with the view that education has a negligible importance in the labor market and serves only as a proxy for ability (e.g., Arrow, 1973; Hernstein & Murray, 1994; Spence, 1974); or vice versa, that intelligence is unimportant because it is simply a reflection of education (e.g., Fischer et al., 1996).

One interesting aspect of the study is the comparison between the facet satisfaction models and the global satisfaction models. This comparison shows that global job satisfaction is more similar to intrinsic satisfaction than to pay satisfaction. Following Ironson, Smith, Brannick, Gibson, and Paul (1989, p. 196), there are three indications for this difference in similarity: First, the correlation between intrinsic satisfaction and global satisfaction is higher than the correlation between pay satisfaction and global satisfaction. Second, the pattern of relationships of global satisfaction and a set of other variables (i.e., intelligence, education, job complexity, and pay) is more similar to the pattern of relationships between these variables and intrinsic

satisfaction than to the pattern of relationships between these variables and pay satisfaction. The third condition suggested by Ironson et al. for similarity between two measures is that they respond in a similar way to changes in situation. Because changes in *DOT* complexity could be viewed as changes in situation, and because the effect of *DOT* complexity on global satisfaction is more similar to its effect on intrinsic satisfaction than to its effect on pay satisfaction, this third condition is also met in the results here.

CONCLUSION

The basic view expressed in this article—that job satisfaction is a function of some discrepancy between desires and reality, between what the person wants and what the environment has to offer—is shared by a number of job satisfaction theorists (e.g., Locke, 1969; Lofquist & Dawis, 1969; Porter, 1961; Schaffer, 1953; Schneider, Gunnarson, & Wheeler, 1992). Nevertheless, the empirical research that ensued from these theories was limited and concentrated primarily on evaluating the validity of the concept of discrepancy on the basis of respondents' self-reports about what they have, on the one hand, and what they want, on the other hand, and by correlating the discrepancies between these two measures with global job satisfaction (e.g., Locke, 1969; Rice, Gentile, & McFarlin, 1991; McFarlin & Sweeney, 1995). The current study differs from this previous research in that the concept of discrepancy is embodied in a theoretical framework that relates facet discrepancies to objective measures of job characteristics, on the one hand, as well as objective (model-driven) measures of expectations, on the other hand. This approach has a number of valuable features. First, in this approach, the construct validity of facet discrepancy is not susceptible to problems associated with incumbents' reports about their job characteristics and expectations. Second, the concept of discrepancy is incorporated into a larger social cognitive framework, which provides a description of how cognitive—rather than motivational—person and situational characteristics (Bandura, 1978, 1986; Mischel & Shoda, 1995; Wood & Bandura, 1989) interact in affecting various facets of job satisfaction. And finally, this approach focuses on the prediction of the discrepancy between wants and haves, rather than on their measurement, thus allowing the a priori estimation of job satisfaction by assessing the fit between the characteristic of the person (e.g., intelligence and education) and the characteristic of the job (e.g., complexity and pay).

One implication of the current study concerns the relationship between facet satisfaction and global satisfaction. In particular, there are two altern-

ative explanations for the differences between intrinsic satisfaction and pay satisfaction in their similarity to global satisfaction. One, the *differential weights* explanation, is that in judging their global satisfaction, people assign greater weight to intrinsic satisfaction than to pay satisfaction; that is, intrinsic satisfaction has a larger influence on global satisfaction than pay satisfaction. The other, the *priming explanation*, is that when asked about their global satisfaction—at least as this was done in the NLSY and in the NLS surveys—people are induced, or "primed," to think about intrinsic rather than extrinsic sources of satisfaction. My data do not allow for distinguishing between these two alternative explanations because the pattern of results reported above is consistent with both. However, this issue could be examined in future research. One possible approach would be to compare the relationships between facet satisfaction and global satisfaction to the relationships between facet satisfaction and measures that are less prone to priming and, in particular, behaviorally oriented measures such as intention to quit. The priming explanation suggests that pay satisfaction (intrinsic satisfaction) would be more (less) similar to intention to quit than to global satisfaction, whereas the differential weights explanation suggests that pay satisfaction (intrinsic satisfaction) would be as similar to intention to quit as to global. It is also worthwhile noting here that the differences between the two facets in their similarity to global satisfaction are not consistent with previous research indicating that an unweighted combination is the optimal rule for combining facet satisfaction into global job satisfaction (e.g., Blood, 1971; Butler, 1983; Ewen, 1967; Mikes & Hulin, 1968; Rice, Gentile, & McFarlin, 1991) because such a combination rule suggests that facets do not differ in their similarity to global satisfaction. Although the findings of this previous research were concerned with individual weights (i.e., the importance of the facets to individual participants), whereas the findings of the current research concern aggregate relationships and aggregate weights (e.g., average importance across individuals), the apparent contradiction between the two sets of findings calls for an explanation.

Finally, the current results have policy implications for human resource management decisions such as placement, compensation, and job design. They point to the relationships between the effects of job characteristics (i.e., complexity, pay) on job satisfaction/dissatisfaction and people characteristics (i.e., intelligence, education), which augment these effects. To augment satisfaction with one's job, these effects should be taken into account in deciding who to hire and, once hired, how to design and compensate his or her work.

APPENDIX A
Standardized Coefficients (Standard Errors) of the Intrinsic Satisfaction Model and the Pay Satisfaction Model—The NLSY Data Set

	Model									
Independent Variable	*Job Complexity*		*Pay*		*Intrinsic Satisfaction*		*Pay Satisfaction*		*Global Satisfaction*	
Education	0.323***	(0.014)	0.183***	(0.014)	–0.026	(0.017)	–0.065***	(0.016)	–0.021	(0.17)
Intelligence	0.214***	(0.015)	0.190***	(0.015)	–0.102***	(0.017)	0.004	(0.017)	–0.061**	(0.017)
Pay	—	—	0.059***	(0.015)	0.407***	(0.015)	0.045*	(0.014)	—	—
DOT complexity	—	—	0.212***	0.015)	–0.002	0.014)	0.152***	0.014)	—	—
Sex (males)	–0.043***	(0.011)	0.183***	(0.011)	–0.046**	(0.013)	0.004	(0.012)	–0.018	(0.012)
Hours of work	0.051***	(0.011)	0.038**	(0.011)	0.092***	(0.013)	0.035*	(0.013)	0.051***	(0.012)
White vs. others	–0.084***	(0.015)	–0.064***	(0.015)	0.026	(0.017)	–0.006	(0.017)	0.001	(0.017)
Black vs. others	–’0.123***	(0.015)	–0.083***	(0.015)	–0.057*	(0.018)	–0.034	(0.017)	–0.101***	(0.017)
Age	0.048***	(0.011)	0.126***	(0.011)	0.025	(0.012)	0.019	(0.012)	0.021	(0.012)
Marital status (married)	0.020	(0.010)	0.070***	(0.011)	0.017	(0.012)	0.015	(0.012)	0.033*	(0.012)
Unemployment rate	–0.067***	(0.011)	–0.151***	(0.011)	0.019	(0.013)	0.009	(0.012)	0.006	(0.012)
Southern residence	0.009	(0.010)	–0.089***	(0.010)	0.022	(0.012)	0.056***	(0.011)	0.030	(0.012)
n	6,822		6,656		6,251		6,253		6,608	

NOTE: NLSY = National Longitudinal Survey of Youth; *DOT* = *Dictionary of Occupational Titles*. Dashes indicate noninclusion in the model.
*$p < .01$. **$p < .001$. ***$p < .0001$.

APPENDIX B
Standardized Coefficients (Standard Errors) of the Intrinsic Satisfaction Model and the Pay Satisfaction Model—The NLS Data Set

	Model									
Independent Variable	*Job Complexity*		*Pay*		*Intrinsic Satisfaction*		*Pay Satisfaction*		*Global Satisfaction*	
Education	0.471**	(0.022)	0.201***	(0.018)	0.032	(0.032)	–0.188***	(0.030)	0.002	(0.034)
Intelligence	0.062*	(0.022)	0.113***	(0.017)	–0.087**	(0.026)	0.000	(0.025)	–0.072*	(0.028)
Pay	—	—	0.025	(0.029)	0.495***	(0.028)	0.071	(0.032)	—	—
DOT complexity	—	—	0.096**	(0.025)	–0.104***	(0.023)	0.069*	(0.026)	—	—
Sex (males)	0.052*	(0.019)	0.554***	(0.015)	0.030	(0.028)	–0.112***	(0.026)	–0.129**	(0.030)
Hours of work	–0.001	(0.019)	–0.023	(0.016)	0.057*	(0.027)	0.072**	(0.026)	0.033	(0.029)
Blacks	–0.003	(0.024)	0.001	(0.018)	–0.006	(0.028)	–0.033	(0.027)	–0.075*	(0.030)
Age	0.043	(0.019)	0.077***	(0.014)	0.042	(0.023)	–0.001	(0.022)	0.005	(0.025)
Marital status (married)	0.013	(0.019)	–0.001	(0.015)	0.030	(0.023)	0.027	(0.022)	0.040	(0.024)
Unemployment rate	–0.046*	(0.017)	–0.012	(0.013)	0.013	(0.021)	0.012	(0.019)	–0.037	(0.022)
Southern residence	0.032	(0.016)	–0.080***	(0.013)	0.070*	(0.020)	0.015	(0.019)	0.026	(0.024)
n	2,552		3,242		2,010		2,012		2,007	

NOTE: NLS = National Longitudinal Survey; *DOT* = *Dictionary of Occupational Titles*. Dashes indicate noninclusion in the model.
*$p < .01$. **$p < .001$. ***$p < .0001$.

NOTES

1. This effect was not observed in the National Longitudinal Survey of Youth (NLSY) data set where the effect of job complexity on pay satisfaction was not significant. The reason for this discrepancy may be that the effect of pay on pay satisfaction is stronger in the National Longitudinal Survey (NLS) than in the NLSY data set.

2. Note that the 1988 survey is more valid for testing the hypothesis that intelligence but not education affects job satisfaction because in 1982, when the age of the participants ranged from 15 to 22, many of the participants in the survey had not yet finished their formal education but had reached an age in which a stable measurement of intelligence was possible. This could not be argued with regard to the 1988 wave of the NLSY (or with regard to the 1980-1981 wave of the NLS).

3. Furthermore, although the reliability of single-item measures, such as the ones used in the NLS and the NLSY, is often questioned, with regard to job satisfaction, there is evidence that single-item measures are not less reliable than multiple-item measures (Scarpello & Campbell, 1983; Wanous & Reichers, 1996; Wanous, Reichers, & Hudy, 1997).

4. I also estimated models that included other control variables as well as models that included correlated errors between the measurement of pay satisfaction and intrinsic satisfaction (dispositional factors, response biases, and omitted variables are examples for possible causes for this correlation). The results of these models were very similar to the results reported below.

5. In particular, in the NLSY data set (but not in the NLS data set), the direct effect of education on intrinsic satisfaction is significantly negative. However, this effect of education is still significantly and substantially weaker than the effect of intelligence ($p < .0001$). Thus, although it is possible that in addition to intelligence, education also affects intrinsic satisfaction (by positively affecting the level of desired complexity), the data indicate that this effect is still considerably weaker than the effect of intelligence.

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Yoav Ganzach is a professor of organizational behavior in the Faculty of Management at Tel Aviv University. His areas of interest are organizational behavior, behavioral decision making, and research methodology.