

Understanding the dynamic relationships among personality, mood, and job satisfaction: A field experience sampling study

Remus Ilies* and Timothy A. Judge

*Department of Management, Warrington College of Business Administration, University of Florida,
Gainesville, FL 32611, USA*

Abstract

This study investigated the within-individual relationship between mood and job satisfaction, and examined the role of personality characteristics in moderating this relationship. The design of the study involved an experience sampling methodology (ESM); 27 employees completed mood and job satisfaction surveys at four different times during the day for a period of four weeks, resulting in a total of 1907 observations. Results showed that within-individual variance comprised 36% of the total variance in job satisfaction, and mood explained 29% of the within-individual variance in job satisfaction. Second, mood and job satisfaction were related both within and across individuals. Third, two personality traits—Neuroticism and Extraversion—were associated with average levels of mood. Fourth, within-individual variability in mood was significantly related to within-individual variability in job satisfaction, and variability in both mood and job satisfaction was predicted by Neuroticism. Finally, personality impacted the degree of association between mood and job satisfaction within individuals.

© 2002 Elsevier Science (USA). All rights reserved.

Keywords: Job Satisfaction; Mood; Affect; Dispositions; Personality; Experience sampling

1. Introduction

One major goal of job satisfaction research has been to discover causes of job satisfaction and dissatisfaction. Fisher and Locke (1992), in their assessment of the state of job satisfaction research, noted that substantial progress has been made in understanding the causes of job satisfaction. Though great progress has been made in this area, advances in understanding the psychological processes that connect those causes to individuals' satisfaction with their job have been much slower (Judge, 1992). Further progress may come from studying the relationships between job satisfaction and its dynamic correlates in the work environment (i.e., studying job satisfaction as a dynamic process over time).

* Corresponding author.
E-mail address: iliesr@ufl.edu (R. Ilies).

A major reason for the lack of insight into mechanisms that influence people's job satisfaction is the typical research design employed in organizational research. Traditional cross-sectional, between-subjects designs assume that constructs are stable over time and that variations around the average level of a variable are randomly distributed across occasions as transient errors. This approach ignores the distinct possibility that much of the variation in job satisfaction across time is not stochastic error, but corresponds to substantive changes in feelings related to the job. If that is the case, using "single-shot" measures of job satisfaction and its possible causes will prevent researchers from identifying patterns of job satisfaction changes and their causes. Idiosyncratic interpretations of anchoring points of the scales, alternative rating strategies that individuals use, and acquiescence response biases can also lead to systematic distortions in between-subjects analyses (Watson, 2000). Though cross-sectional designs have provided important insights in job satisfaction research (see Brief, 1998; Spector, 1997 for reviews), past research designs limit our understanding of the dynamic mechanisms that explain the relation of job satisfaction with other variables across time.

The present study investigates the dynamic relationship between job satisfaction and some of its most extensively studied causes—personality and mood. Studies using retrospective ratings of job satisfaction, mood at work, and personality inventories have firmly established personality and mood constructs as correlates of job satisfaction (see Brief, 1998; Spector, 1997; Watson, 2000). But research based on retrospective ratings cannot tell us much about how mood and job satisfaction are related in the daily work environment over time (dynamic covariation). On this point, the best evidence to date comes from Weiss, Nicholas, and Daus (1999) study of affective experiences at work. The results of their study revealed that average levels of multiple time-sampled mood ratings accounted for significant variance in job satisfaction across individuals. Our study takes Weiss et al.'s (1999) investigation one step further by concomitantly examining the relationships between mood and job satisfaction across and within individuals. In other words, like Weiss et al., we examine how mood relates to job satisfaction across individuals, but unlike the Weiss et al. study, we also investigate the dynamic relationship between mood and job satisfaction across time. Real time measures of mood and job satisfaction can uncover this dynamic covariation. We also examined the role of personality as a moderator of the relationship between mood and job satisfaction by investigating whether the relationship between mood and job satisfaction, across time, shows different patterns for different individuals, and the extent to which stable personality factors explain such differences between individuals.

To study dynamic relationships, variables need to be sampled within individuals across time; this goal can be accomplished by Experience Sampling Methodology (ESM) designs. In an ESM design, participants are required to report their momentary experiences or subjective feeling states, or to record momentary measures of physiological variables (e.g., heart rate, body temperature, etc.). The ESM measurement approach eliminates the process of recall or summarization, which can be problematic due to selective memory processes (Alliger & Williams, 1993; Larson & Csikszentmihalyi, 1983). Measurement occurs in the natural environment and the data collection process is intensive, typically involving multiple observations per person.

Although ESM has been introduced into the Industrial/Organizational psychology literature, the potential for its application to investigating the dynamic relationship among personality, mood, and job satisfaction has not been fully realized. ESM enables researchers to understand psychological variables at the time level at which they are manifested (Alliger & Williams, 1993) and to investigate dynamic processes (Alliger & Williams, 1993; Eckenrode, 1984; Larsen, 1987; Wood & Brown, 1994). Hormuth (1986), in his discussion of possible applications of ESM to

personality psychology, notes that ESM allows the study of the interaction between person and situation variables without some of the limitations inherent to traditional study designs (e.g., recall and summarization biases). The goal of the present study is to investigate such interactive effects by looking at the relationship between stable personal characteristics and momentary measures of mood and job satisfaction which both have a strong situational component.

1.1. Mood and job satisfaction

Research investigating how affective traits and job satisfaction relate across individuals has found solid support for a positive relationship between trait measures of Positive Affectivity and job satisfaction and a negative relationship between trait Negative Affectivity and job satisfaction (e.g., Agho, Price, & Mueller, 1992; Brief & Roberson, 1989; Watson & Slack, 1993). The design of the present study does not include measures of trait-level affectivity (i.e., scales with general or long-term instructions) but research suggests that average levels of momentary mood can be used as indicators of trait affectivity. Watson and Clark (1994) showed that average levels of positive and negative affect are substantially correlated with measures of their respective affective traits ($r = .64$ and $r = .53$, for the associations between average Positive Affect and trait Positive Affect, and average Negative Affect and trait Negative Affect, respectively), thus average scores of momentary affect ratings are considered good indicators of affectivity (trait affect). Consequently, we expect average levels of mood to be related to average levels of job satisfaction across individuals.

H1a: Mood will be related to job satisfaction across individuals. Average levels of job satisfaction will be positively related to average levels of Positive Affect and negatively related to average levels of Negative Affect.

Judge (1992) noted that “a central limitation in past dispositional research [on job satisfaction] is its failure to rely on psychological theories in explaining dispositional effects” (p. 49). In this paper, we develop a theoretical explanation for the relationship between mood and job satisfaction within individuals based on psychological theories underlying affect-cognition processes. Job satisfaction, like other attitudes, has both affective and cognitive components (e.g., Brief, 1998; Locke, 1976; Weiss et al., 1999). Affective disposition will influence the ways in which individuals process and evaluate information about their jobs (Judge, 1992), at least partially, through its impact on experienced (momentary) affect. Experienced affect, in turn, influences cognitive evaluations of work events and experiences through mood congruency phenomena. The effect of experienced affect on job satisfaction is not entirely mediated by cognitions about the job, that is, job affect can also arise as an autonomic response to the work situation, similar to emotional reactions to environmental stimuli such as the fear induced by threatening situations. Affective disposition should also be related to this distinct component of job satisfaction, through the mechanisms that link personality to the basic affect system (Watson, 2000). In sum, we view job satisfaction as an emotional state comprising both job affect resulting from cognitive appraisals of the work situation (Locke, 1976), and independent affective responses to this situation. Below, we use a cognitive theory to generate within-individual predictions but we recognize that these predictions can be generated from basic mood theory as well.

Mood congruency theory is largely based on associative network models of memory (Blaney, 1986; Bower, 1981), which suggest that emotions impose an organizational structure on concepts in memory. The structure consists of a cognitive semantic network formed by nodes that correspond to distinct emotions (e.g., joy, interest, anger, fear, etc.). When a particular node becomes activated by its corresponding emotional state, it stimulates memories and cognitions congruent with the emotional state that activated the network node. During positive affective states,

positively valenced information and cognitions become activated, so that individuals retrieve positively valenced material more easily from the memory (Rusting & DeHart, 2000). Negative affective states, conversely, make associations with negatively valenced memories and cognitions more likely. In this way, affective states are believed to influence beliefs and judgments. In the workplace, positive affective states increase the tendency to make positive assessments and judgments regarding one's job, leading to higher momentary job satisfaction. In contrast, negative affective states increase the likelihood of making negative assessments and judgments regarding the job, leading to lower momentary job satisfaction. Accordingly

H1b: Mood will be related to job satisfaction within individuals. Specifically, momentary job satisfaction will be positively related to Positive Affect and negatively related to Negative Affect.

1.2. Personality, mood, and job satisfaction

The last two decades have seen an increased interest in the study of relationships between transient affective states and enduring personality characteristics (e.g., Costa & McCrae, 1980; Diener & Emmons, 1984; Gray, 1981; Larsen & Ketelaar, 1991; Watson, 1988). Affect is regulated by two broad bio-behavioral systems: the Behavioral Facilitation System (BFS) which controls positive affect, and the Behavioral Inhibition Systems (BIS) which controls negative affect. The two systems are believed to be innate and to have adapted through evolution (Watson, 2000). The BFS stimulates approach behaviors that lead to resource acquisition (food, mates, etc.); the BIS has evolved to protect humans from dangers from the environment (predators, poisons, etc.) so it is a highly reactive system. To study the relations between broad personality characteristics and transient affect (mood), one needs to first look at trait-like parameters that control the affect system (BFS and BIS), namely, Positive Affectivity and Negative Affectivity (Watson, Wiese, Vaidya, & Tellegen, 1999). With regard to the role of broad personality traits in regulating the affect system, we examine whether Extraversion and Neuroticism relate to individual differences in affect. The two broad personality factors of Extraversion and Neuroticism have been included in virtually all major dispositional models (Watson et al., 1999). Neuroticism has long been considered a personality trait related to affective processes, a fact suggested by its very name: it is alternatively described as Emotional Stability. With respect to Extraversion, although traditional models have focused on its role in regulating interpersonal interaction, starting with Tellegen's (1985) seminal paper on the structure of affect and personality, a new line of research is considering the role of Extraversion in regulating affective processes (e.g., Tellegen, 1985; Watson, 2000).

Empirical research has consistently found support for strong and positive relationships between Positive Affectivity and Extraversion and between Negative Affectivity and Neuroticism (see Watson & Clark, 1992, for a review). As noted, average levels of mood have been shown to be good indicators of trait-affect (Watson & Clark, 1994), thus we expect the relationships between average levels of mood and personality measures to parallel the results from studies that have used trait measures of affect.

H2: Personality traits will predict average levels of mood. Neuroticism will be positively related to average levels of Negative Affect and Extraversion will be positively related to average levels of Positive Affect.

The second important dispositional parameter of the affect system is characteristic variability (Watson, 2000). Larsen (1987) argues for the importance of the variability in behavior and emotion and suggests that such variability represents a personality characteristic. Research has shown that within-individual variability in affect ratings is stable across time and generalizable across different mood dimensions (e.g., Penner, Shiffman, Paty, & Fritzsche, 1994; Watson, 2000), and also consistent across

situations (Penner et al., 1994). This evidence points to the existence of a single factor of affect variability (McConville & Cooper, 1992), which has trait-like characteristics. Because job affect is likely generated by the same mechanism that controls mood (i.e., the affect system), logically, the variability in this job satisfaction component should be related to variability in mood within individuals. The job affect component that is related to job cognitions should also vary in synchrony with basic mood (through the mood congruency process), leading to a positive relationship between mood variability and job satisfaction variability. Thus

H3: Variability in mood within individuals will be related to variability in job satisfaction within individuals. Specifically, variability in Positive Affect and variability in Negative Affect will both be positively related to variability in job satisfaction.

Since the start of the modern era in psychology, personality researchers have been trying to distinguish between strength of emotions, and the changeability of emotional states (Hepburn & Eysenck, 1989). Because, as noted, characteristic variability is believed to be a dispositional parameter of the affect-regulating system, it should be predicted by personality traits. The first model explaining how personality characteristics would relate to individuals' variability in affective experiences was proposed by Eysenck and Eysenck (1985, Fig. 17, p. 142). In Eysenck and Eysenck's (1985) model, personality influences affect variability through the average level of experienced affect. Eysenck and Eysenck's argument starts from the premise that individuals with higher average levels of positive or negative affect are thought to experience affective states that vary between neutrality and relatively high extremes of positive or negative affect, while individuals with lower average levels of affect (positive or negative), experience states varying between neutrality and moderate levels of positive or negative affect. It follows that individuals who experience higher average levels of affect (positive or negative) will display higher affect variability than those characterized by lower average levels. By taking into consideration the association between Extraversion and mean levels of positive affect and that between Neuroticism and mean levels of negative affect, it follows that Extraversion would predict within-individual variability in positive affect and Neuroticism will predict within-individual variability in negative affect. For example, both low-Neuroticism and high-Neuroticism individuals experience low negative affect states but only individuals who score high on Neuroticism characteristically experience high negative affect, which leads to higher negative affect variability for people high on Neuroticism.

The model put forward by Eysenck and Eysenck (1985) has received mixed empirical support. While some evidence has provided full support for the model (Hepburn & Eysenck, 1989), other studies supported the model only with respect to Neuroticism's association with mood variability (McConville & Cooper, 1999; Williams, 1993). Williams (1990) proposed a competing model, which predicts Extraversion to be negatively related to general mood variability, and maintains Eysenck and Eysenck's (1985) prediction that Neuroticism will positively relate to variability in negative moods. Williams, starting from the fact that individuals who tend to experience the most extreme degrees of feeling (highest affect variability) are on the whole less happy, argues that due to Extraversion's positive relationship with positive mood (momentary happiness), general mood variability should be inversely related to Extraversion. His review of six studies (Williams, 1990) gave partial support for this alternative model. Results from a later study (Williams, 1993), however, include a rather small correlation between Extraversion and Mood Reactivity (a measure of mood variability; $r = -.14$, $p < .05$; Williams, 1993) and a large correlation between Neuroticism and Mood Reactivity ($r = .59$, $p < .001$; Williams, 1993). We interpret the evidence above as providing consistent support for a positive relationship between Neuroticism and within-individual variability in Negative Affect, and mixed and sometimes-conflicting support for Extraversion's

alleged relationship with mood variability. As a result of the conflicting evidence, we offer no hypothesis regarding the relation of Extraversion and mood variability. However, we do investigate it on an exploratory basis.

It is possible to extend the prediction that Neuroticism impacts within-individual variability in mood (Eysenck & Eysenck, 1985) to job satisfaction. Specifically, we propose that Neuroticism would also be related to individuals' variability in job satisfaction. Because the BIS is a protective system which reacts to stimuli from the environment, the reactivity of the system is controlled by the characteristic variability in negative affect and thus, trait negative affect (Watson, 2000). Neuroticism is strongly associated with trait negative affect which, as shown above, is related to the characteristic variability of the BIS. Because Neuroticism is associated with affect variability in general (Eysenck & Eysenck, 1985; Williams, 1990) and because job satisfaction is affective in nature, Neuroticism should intensify the affective reactions to work related stimuli, resulting in a higher variability in ratings of job satisfaction

H4: Neuroticism will be positively related to variability in (a) Negative Affect and (b) job satisfaction.

Judge (1992) suggested that a fruitful line of research would investigate how dispositions influence reactions to situational influences on job satisfaction. Specifically, do all individuals show the same pattern of covariation of their mood and job satisfaction? If Neuroticism is an intensifier for affective reactions to stimuli at work, it should influence the degree to which mood impacts cognitive job evaluations (through mood congruency). Although we are not aware of research that has investigated the moderating role of personality factors to the idiographic relationships between mood and other variables, suggestive evidence comes from cross-sectional mood congruency research. Rusting (1999) and Rusting and DeHart (2000) argued that both transient affective states and stable personality traits relate to mood congruency processes and proposed that personality traits that regulate mood will moderate the mood congruency effect. Rusting argued that Neuroticism will moderate the congruency between negative mood and cognitive tasks with negative connotations (e.g., spelling and defining negative homophones such as *find-fine*, *pain-pane*, *die-dye*, etc.), and Extraversion will moderate the congruency between positive mood and cognitive tasks with positive connotations (e.g., spelling and defining positive homophones such as *metal-metal*, *pride-pried*, *won-one*, etc.). She found that negative mood congruency was stronger for individuals who scored higher on Neuroticism than for those who scored lower. The moderating role of Extraversion was not supported by the data (Rusting, 1999). Because our measure of job satisfaction comprises both positive and negative judgments about the job (i.e., cognitions with both positive and negative connotations), we cannot investigate mood congruency specifically for positive and negative cognitions. Looking at the within-individual relationship between job satisfaction and mood, we expect Neuroticism to influence the strength of this relationship. We expect individuals who score higher on Neuroticism to show a stronger relationship between transient affective states and momentary job satisfaction across time than those who score lower on Neuroticism.

H5: The personality trait of Neuroticism will impact the magnitude of individuals' idiographic relationship between mood and job satisfaction. Specifically, individuals scoring high on Neuroticism will have a stronger relationship of both (a) Positive Affect and (b) Negative Affect with job satisfaction, compared to individuals scoring low on Neuroticism.

With regard to the possible moderating relationship of Extraversion to mood congruency effects (Rusting, 1999), given the modest support, we do not hypothesize an effect but we will investigate if Extraversion influences the within-individual relationship between job satisfaction and affect on an exploratory basis.

In sum, with respect to the relationships between personality, mood, and job satisfaction, we expected personality to predict average mood, and mood to predict

job satisfaction between and within individuals. We also formulated hypotheses with regard to the variability in mood and job satisfaction. Previous research points to a relationship between personality and job satisfaction. Judge and Bono (2001) present meta-analytical evidence that Neuroticism, self-esteem, locus of control, and generalized self-efficacy are all related to job satisfaction. Other literature also suggests, though indirectly, that broad personality relates to job satisfaction (personality-life satisfaction, e.g., McCrae & Costa, 1991; affectivity-job satisfaction, see Watson, 2000). By investigating the relationships between mood, job satisfaction, and personality concomitantly, it is possible to test the causal flow of these relationships. Because personality traits are enduring characteristics of the individuals, it is appropriate to assume that personality causes mood and job satisfaction. More specifically, we see mood as a mediator of the personality–job satisfaction relationship. Because the mediation effect is in reference to differences between individuals, due to the low power of our cross-sectional design, we investigate this mediation effect on an exploratory basis.

2. Method

2.1. Participants

Participants were 27 employees in three small organizations in the Midwest. Jobs held by participants ranged from secretarial to professional. Subjects were selected through an e-mail letter soliciting participation that was sent to all employees in those organizations. Participation in the study was completely voluntary and individuals who fully participated (completed all measures) received an honorarium in return for their participation. The data were collected during May–June, 2000.

2.2. Survey interface

We used an ESM design by having participants provide multiple ratings of mood and job satisfaction. Data were collected through an Internet interface. Subjects logged on to a Web survey page and were first presented with a job satisfaction survey. There were two versions of the job satisfaction survey that were presented randomly across occasions. Upon completion of the job satisfaction survey, participants completed an adjective-based mood survey. The order in which the mood adjectives appeared in the survey was randomized across occasions.

Wheeler and Reis (1991), after reviewing the use of experience sampling methods, conclude that ESM techniques can be (1) interval-contingent, in which participants record responses at fixed time intervals, (2) signal-contingent, in which participants respond when signaled, and (3) event-contingent, in which participants respond to naturally-occurring events. We used interval-contingent ESM that included signals (sent via e-mail) to remind employees when it was time to submit survey data. The electronic interface was programmed to accept only one set of responses during specified time intervals and to record the exact time of rating for each individual. A separate survey was used to assess individuals' personality factors at two occasions during the study period. Participants provided the first wave of personality ratings, on average, on the ninth day of the study. A second wave of personality data was collected eight days later.

2.3. Experience-sampled measures

Job satisfaction. As noted above, job satisfaction was measured with two scales that alternated randomly. Both job satisfaction scales are overall measures of

satisfaction with one's job. These measures were a 3-item scale developed by Camman, Fichman, Jenkins, and Klesh (1983) and a five-item version of the Brayfield and Rothe (1951) measure. Both scales were administered with momentary time instructions (e.g., "at this very moment I am fairly satisfied with my job") and ratings were obtained on a 5-point scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Internal consistency coefficients (α) of the two scales for our sample (computed on within-individual mean item ratings) were .94 and .93, respectively. The high consistency estimates are not surprising in the light of the fact that each item rating was a mean of ratings across more than 70 occasions. Because individuals rated their job satisfaction using two different scales on different occasions, each individual set of data was adjusted for the mean for each scale across individuals so the momentary measures in the series of individual measurements would be comparable in magnitude. The standard deviation of job satisfaction within individuals was computed as the average of the standard deviations of the two sets of measures corresponding to the two distinct scales, for each individual.

Mood. The mood survey included 40 adjectives that describe mood (R.J. Larsen, personal communication, February 1, 2000). Instructions asked subjects to enter a number from 0 = *not at all* to 6 = *extremely* much in the fields adjacent to each adjective to estimate the extent to which the adjective described their momentary mood. From those adjectives, we selected 20 mood descriptors comprising the PANAS scales (Watson, Clark, & Tellegen, 1988) for measuring general Positive Affect (PA) and general Negative Affect (NA). We chose PA and NA to measure mood because those dimensions are believed to provide a basic structure for measuring affect (Watson & Tellegen, 1985) and also have demonstrated high reliability and validity in previous research (Watson & Clark, 1994; Watson et al., 1988). Internal consistencies of the PA and NA scales, computed for within-individual item averages were .95 for both scales.

Personality traits. We used the NEO-FFI survey (Costa & McCrae, 1992) to measure personality factors of Neuroticism and Extraversion. We measured both traits twice during the study and averaged the ratings to obtain more reliable measures. Internal consistency was .92 and .87 for Neuroticism and Extraversion, respectively.

2.4. Procedure

We used interval-contingent ESM, having 27 employees in three organizations record their momentary mood and job satisfaction four times a day, for 19 working days (maximum number of observations for each individual was 76, maximum number of observations across individuals and time periods was 2052). We obtained a total of 1907 ESM ratings of job satisfaction and mood (i.e., for summated scales; for individual mood descriptors we obtained more than 76,000 ratings), which is equivalent to an overall response rate across all individuals and time periods of 92.9%. Listwise deletion was used for analyses of momentary data; for aggregated analyses missing momentary data points simply did not enter in the computation of the means. All participants provided personality ratings on both occasions.¹

¹ Not all 1907 ratings were consecutive ratings obtained electronically. Two participants had a one-week vacation during the study and they completed the ratings for that week after the normal study period ended. A few participants also "made up" for missing days after the normal study period ended. We provided paper surveys for people that were temporarily working away from a computer or for emergencies such as Web server malfunctioning. The total number of consecutive observations was 1607. Including the 300 non-consecutive observations in the analyses did not influence the results. For example, including those additional observations resulted in a mean change in average PA and NA scores of only .04 and .02, respectively (0–6 scale). For HLM analyses, we did not lag job satisfaction across non-consecutive observations, thus decreasing the number of cases from 1907 to 1606.

2.5. Analyses

We conducted three types of analyses, correlation analysis, regression analysis, and hierarchical linear modeling. Correlation analysis was used to investigate support for the hypotheses with regard to the variability in mood and job satisfaction, and the cross-sectional relationship between mood and personality. Regression analysis was used to investigate whether average levels of PA and NA mediate the cross-sectional relationship between personality (Neuroticism and Extraversion) and job satisfaction. To investigate the effect of mood on job satisfaction across and within individuals, and to examine the moderating role of personality traits, we used hierarchical linear modeling (HLM; Byrk & Raudenbush, 1992). The HLM modeling approach is a two-stage iterative strategy that allows investigation of the relationships between variables manifested at two levels of analysis. HLM can most intuitively be understood as a series of regressions: at the first level of analysis (level 1), relationships among variables—in our case, time-sampled job satisfaction and mood—are investigated by regressing the criterion on the predictors for each group of observations. Thus, in our study, to examine within-individual relationships between mood and job satisfaction, at the first level, job satisfaction was regressed on PA and NA for each of the 27 individuals in the study. At the second level (level 2), the parameters estimated at level 1 (intercepts and slopes) are regressed on level 2 variables—in our case the measures of average affect and personality traits. We used HLM 5 (Byrk, Raudenbush, & Congdon, 2000) to test the hierarchical models.

In HLM analyses, because time-series data violate the assumption of residual independence at level 1 (Hofmann, Griffin, & Gavin, 2000), the level 1 regressions must account for the serial dependence (residual autocorrelation) in the data. We accomplished this by controlling for lagged job satisfaction in the level 1 equations. The lagged variable was centered at the mean for each individual; this method removes the between-individual variance in this control variable. (See Byrk & Raudenbush, 1992.)

Before proceeding with the tests of the hypotheses, we first investigated whether systematic within- and between-individual variance exists in the ratings of job satisfaction, and whether individuals' job satisfaction ratings are indeed serially dependent. We tested these preliminary conditions by estimating two null models (see Appendix). Provided that the tests of the null models reveal that there is substantial within- and between-individual variance in the criterion (HLM tests whether the between-individual variance is significant), tests of the other HLM models can be conducted. Below, we offer descriptions of analyses used to test the hypotheses.

Hypothesis 1a. Model 1 tests the relationship between mood and job satisfaction across individuals. At level 1, this model estimates the intercept for predicting time-sampled job satisfaction (i.e., computes the average job satisfaction level for each individual), and at level 2 the individual intercepts are regressed on average levels of PA and NA. These analyses are conceptually equivalent to a regression in which average levels of job satisfaction are regressed on average levels of PA and NA.

Hypothesis 1b. The level 1 analyses of Model 2 regressed time-sampled job satisfaction on time-sampled mood (PA and NA) for each individual to assess the extent to which mood predicts job satisfaction within individuals. The level 1 predictors were centered relative to individuals' average PA and NA (see Byrk & Raudenbush, 1992; Hofmann et al., 2000). The intercepts and slopes that resulted from the level 1 regressions were used in the level 2 analyses. These analyses simply estimated the cross-sectional intercepts for each level 1 parameter, thus investigating the extent to which mood predicts job satisfaction within individuals, for the average individual in the sample (H1b). The 27 individual slopes (β_{1j} and β_{2j}) show the extent to which mood (PA and NA) predicts job satisfaction within each individual; because there are no level 2 predictors of the intercept and slopes, the gamma (γ) parameters represent the pooled estimates for the intercept and slopes.

Hypotheses 2, 3, and 4. We used correlational analysis to seek support for these hypotheses. We computed the correlations between Neuroticism, Extraversion, average PA and average NA to investigate support for H2. To investigate support for the hypotheses that include variability in mood and job satisfaction ratings (H3 and H4), we computed within-individual standard deviations of the job satisfaction, PA, and NA scores.

Hypothesis 5. To investigate whether Neuroticism and Extraversion moderate the within-individual relationship between mood and job satisfaction, we estimated a hierarchical linear model similar to Model 2 (i.e., included PA and NA as within-individual predictors of job satisfaction) but which included Neuroticism and Extraversion as level 2 predictors (Model 3). The level 2 analyses, which regressed the PA and NA slopes obtained at level 1 on Neuroticism and Extraversion, allowed us to test the cross-levels moderation hypothesis (H5) and the exploratory question with regard to the moderator effect of Extraversion. That is, the level 2 analyses investigated the degree to which Neuroticism and Extraversion predict the magnitude of individuals' association of PA and NA with job satisfaction.

3. Results

Means, standard deviations, and intercorrelations (computed across subjects) of all variables in the study are presented in Table 1. The results for the null model analyses indicated that hierarchical modeling of these data is appropriate and that the level 1 regressions should control for lagged job satisfaction in subsequent models (see Appendix).

3.1. Mood and job satisfaction

The first two hypotheses predicted that mood would be related to job satisfaction both (a) across and (b) within individuals. Table 2 presents the parameter estimates for all models tested to investigate support for hypotheses. (All models controlled for lagged job satisfaction but we do not present these results as they are not of substantive interest.) Model 1 shows that trait-PA ($\gamma_{01} = .37, p < .01$) and trait-NA

Table 1
Means (*M*), standard deviations (*SD*s), and intercorrelations across individuals for all study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Neuroticism	1.75	0.53	1.00							
2. Extraversion	2.32	0.45	-.66**	1.00						
3. Average Positive Affect (PA)	2.62	0.90	-.36†	.40*	1.00					
4. Average Negative Affect (NA)	0.35	0.40	.25	-.15	.18	1.00				
5. Standard deviation of PA	0.63	0.23	.07	.07	.13	-.31	1.00			
6. Standard deviation of NA	0.31	0.16	.38*	-.07	.14	.58**	.20	1.00		
7. Average job satisfaction (JS)	0.00	0.53	-.26	.27	.56**	-.21	.39*	.11	1.00	
8. Standard deviation of JS	0.37	0.14	.56**	-.19	-.19	.20	.29	.60**	-.14	1.00

Note. *N* = 27.

† *p* < .10 (two-tailed).

* *p* < .05 (two-tailed).

** *p* < .01 (two-tailed).

Table 2
Parameter estimates and variance components of substantive HLM models tested

Model equations ^a	γ_{00}	γ_{01}	γ_{02}	γ_{10}	γ_{11}	γ_{12}	γ_{20}	γ_{21}	γ_{22}	ρ^2	τ_{00}	τ_{11}	τ_{22}
<i>Model 1^b</i>													
$JS_{ij} = \beta_{0j} + r_{ij}$													
$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{average-PA}) + \gamma_{02}(\text{average-NA}) + U_{0j}$	.00	.37**	-.44*	—	—	—	—	—	—	.15	.19**	—	—
<i>Model 2^c</i>													
$JS_{ij} = \beta_{0j} + \beta_{1j}(\text{PA}_{ij}) + \beta_{2j}(\text{NA}_{ij}) + r_{ij}$													
$\beta_{0j} = \gamma_{00} + U_{0j}$	.00	—	—	.23**	—	—	-.27**	—	—	.10	.30**	.02**	.09**
$\beta_{1j} = \gamma_{10} + U_{1j}$													
$\beta_{2j} = \gamma_{20} + U_{2j}$													
<i>Model 3^d</i>													
$JS_{ij} = \beta_{0j} + \beta_{1j}(\text{PA}_{ij}) + \beta_{2j}(\text{NA}_{ij}) + r_{ij}$													
$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{N}) + \gamma_{02}(\text{E}) + U_{0j}$	.00	-.17	.26	.23**	.12 [†]	-.03	-.25**	-.10	.15	.10	.29**	.02**	.08**
$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{N}) + \gamma_{12}(\text{E}) + U_{1j}$													
$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{N}) + \gamma_{22}(\text{E}) + U_{2j}$													

Note. The regression coefficients presented in the table are not standardized. For point of comparison to standardized estimates, the standardized level 2 coefficients for Model 1 are $\gamma_{01}^* = .63$ and $\gamma_{02}^* = .33$, and the standardized level 1 coefficients for Model 2 are $\gamma_{10} = .39$ and $\gamma_{20}^* = .23$ (these coefficients were standardized using the standard deviations presented in Table 1).

^a We do not present equations involving lagged job satisfaction as these equations are not of substantive interest. We also do not show the lagged job satisfaction predictor (control) in the equations. We did control for lagged job satisfaction when estimating all model parameters.

^b β_{0j} are the average levels of job satisfaction for the 27 respondents; γ_{00} is the grand mean of job satisfaction scores, after the between-individual effects of average-PA and average-NA were removed; γ_{01} the between-individual regression weight for predicting average levels of job satisfaction with average-PA; γ_{02} the between-individual regression weight for predicting average levels of job satisfaction with average-NA; $\rho^2 = \text{var}(r_{ij})$ the within-individual variance in job satisfaction; and $\tau_{00} = \text{var}(U_{0j})$ is the between-individual variance in job satisfaction that was not explained by average-PA and average-NA.

* $p < .05$.

** $p < .01$.

^c β_{0j} are the level 1 intercept; β_{1j} the individuals' slopes for predicting momentary job satisfaction with PA; β_{2j} the individuals' slopes for predicting momentary job satisfaction with NA; γ_{00} is the grand mean of job satisfaction scores after the effect of mood within individuals was accounted for; γ_{10} the pooled slope for predicting momentary job satisfaction with PA; γ_{20} the pooled slope for predicting momentary job satisfaction with NA; $\rho^2 = \text{var}(r_{ij})$ the remaining within-individual variance in job satisfaction, after the within-individual effects of momentary mood were removed; $\tau_{00} = \text{var}(U_{0j})$ the between-individual variance in job satisfaction (the mood predictors were individual-mean centered thus they do not explain any between-individual variance); $\tau_{11} = \text{var}(U_{1j})$ the between-individual variance in the level 1 PA slope; and $\tau_{22} = \text{var}(U_{2j})$ is the between-individual variance in the level 1 NA slope.

^d N is neuroticism and E extraversion. β_{0j} are level 1 intercepts; β_{1j} the individuals' slopes for predicting momentary job satisfaction with PA; β_{2j} the individuals' slopes for predicting momentary job satisfaction with NA; γ_{00} is the level 2 intercept for predicting β_{0j} with N and E; γ_{01} the level 2 slope for predicting β_{0j} with N; γ_{02} the level 2 slope for predicting β_{0j} with E; γ_{10} the level 2 intercept for predicting the level 1 PA slope with N and E; γ_{11} the level 2 slope for predicting the level 1 PA slope with N; γ_{12} the level 2 slope for predicting the level 1 PA slope with E; γ_{20} the level 2 intercept for predicting the level 1 NA slope with N and E; γ_{21} the level 2 slope for predicting the level 1 NA slope with N; γ_{22} the level 2 slope for predicting the level 1 NA slope with E; $\rho^2 = \text{var}(r_{ij})$ the remaining within-individual variance in job satisfaction, after the effects of momentary mood were removed; $\tau_{00} = \text{var}(U_{0j})$ the between-individual variance in job satisfaction that was not explained by N and E; $\tau_{11} = \text{var}(U_{1j})$ the between-individual variance in the level 1 PA slope that was not explained by N and E; and $\tau_{22} = \text{var}(U_{2j})$ is the between-individual variance in the level 1 NA slope that was not explained by N and E.

[†] $p < .10$

($\gamma_{01} = .44, p < .05$) were significant predictors of job satisfaction across individuals. Jointly, these two variables explained 37% of the between-individual differences in job satisfaction (see Appendix). These results give support to our first hypothesis (H1a).

To assess the within-individual relationship between mood and job satisfaction we tested Model 2. This test showed strong support for the hypothesis (H1b). As shown in Table 2, the pooled within-individual gamma coefficients for PA and NA were .23 and $-.27$ (both $p < .001$). Jointly, PA and NA explained 29% of the within-individual variance in job satisfaction (after accounting for lagged job satisfaction; see Appendix). Model 2 also showed that there is significant between-individual variance in the PA and NA slopes ($\tau_{11} = .02, p < .001$ and $\tau_{22} = .09, p < .001$ for PA and NA, respectively). Because there is significant variability in the effects of PA and NA on job satisfaction, testing cross-level moderation effects is warranted (H5).

Finally, to illustrate the relationship between mood and job satisfaction between and within individuals, we present two figures. Fig. 1 shows the partitioning of job satisfaction variance into between- and within-individual variance, and the distinct proportions of total job satisfaction variance explained by lagged job satisfaction, average levels of mood, and momentary mood. Fig. 2 considers only the within-individual variance in job satisfaction and shows how this variance is partitioned between lagged job satisfaction, mood, and unexplained effects. The Appendix shows how the proportions of variance presented in the figures were computed.

3.2. Personality, mood, and job satisfaction

We expected personality traits to be related to average levels of mood (H2). The correlations between Extraversion and Neuroticism, and average levels of mood are shown in Table 1. Across individuals, Extraversion was significantly related to PA ($r = .40, p < .05$). Neuroticism's association with average levels of NA, although in the expected direction ($r = .25$) did not reach significance. Thus, H2 received partial support. Both Neuroticism and Extraversion were more strongly correlated with PA than NA.

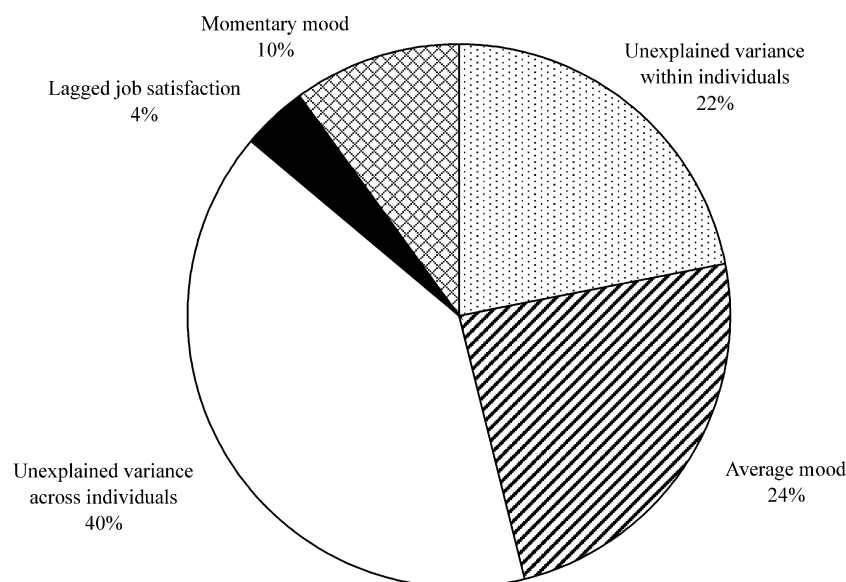


Fig. 1. Partitioning the total variance in job satisfaction.

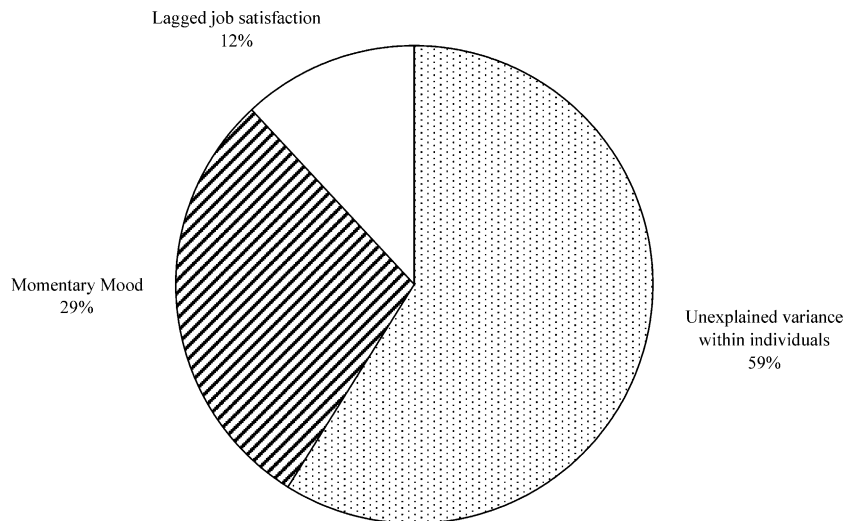


Fig. 2. Partitioning the within-individual variance in job satisfaction.

Ratings of momentary mood and job satisfaction varied considerably across occasions ($SDs = .63, .31,$ and $.37$ for PA, NA, and job satisfaction, respectively; see Table 1). The average standard deviation in PA was twice as large as the average standard deviation in NA, which is consistent with basic mood theory which predicts PA variations to be larger than variations in NA (Watson, 2000). Individuals' measures of variability in PA and NA were positively related, as predicted by theory (e.g., McConville & Cooper, 1992), but the correlation did not reach significance ($r = .20, ns$; Table 1).

The third hypothesis predicted variability in job satisfaction within individuals to be related to variability in mood within individuals. The correlations between the within-individual standard deviation in job satisfaction and the within-individual standard deviations in PA and NA were $r = .29$ and $r = .60$, respectively (see Table 1). The first correlation did not reach significance but the second was highly significant ($p < .001$). These results show partial support for H3.

Hypothesis 4 predicted Neuroticism to be related to the within-individual variability in NA and to the within-individual variability in job satisfaction. The prediction was fully supported by the data, with Neuroticism being correlated $.38$ ($p < .05$) with the within-individual variability in NA and $.56$ ($p < .01$) with the within-individual variability in job satisfaction (see Table 1). Extraversion was weakly related to variability in time-sampled measures ($r = .07, r = -.07,$ and $r = .19$ for the associations between Extraversion and variability in PA, NA, and job satisfaction, respectively), and none of the correlations reached significance.

The last hypothesis, which predicted Neuroticism to be positively associated with individuals' strength of association between mood and job satisfaction, received only partial support. Model 3 regressed job satisfaction on PA and NA within individuals (level 1), then it regressed the within-individual slopes on Neuroticism and Extraversion, at level 2. The only significant level 2-relationship was that between Neuroticism and the within-individual slope for PA, and its significance was only marginal ($\gamma_{11} = .12, p < .06$). This result suggests that individuals who score higher on Neuroticism show a higher-strength relationship between their job satisfaction and PA, but replication in larger samples is required before drawing firm conclusions with regard to this cross-level effect.

With regard to the exploratory question whether Extraversion moderates the within-individual relationship between mood and job satisfaction, Extraversion did

not significantly predict (at level 2) the PA and NA within-individual slopes for predicting job satisfaction.

We also investigated, on an exploratory basis given the small sample size, whether mood mediates the relationship between personality and job satisfaction. Because mediation analysis procedures using HLM are less well developed, we conducted the mediation analyses using ordinary least squares (OLS) regression. At the first step of the mediation analysis, we regressed job satisfaction on the traits. Results indicated that neither Neuroticism ($\beta = -.13$, *ns*) nor Extraversion ($\beta = .19$, *ns*) were statistically significant predictors of job satisfaction, suggesting that there was not a significant effect to mediate. Because the sample size was small, however, the insignificance of the traits may be due to low statistical power for this analysis. Accordingly, we proceeded to the next step of the analysis by estimating a second equation that added average mood (PA and NA) as predictors of job satisfaction. When PA and NA were added to the regression, the effect for Neuroticism changed direction but remained nonsignificant ($\beta = .06$, *ns*) while the effect for Extraversion was considerably weaker and still nonsignificant ($\beta = .01$, *ns*). Because controlling for mood weakened the trait effects, the results are suggestive of a mediation effect, but future research is required to test this hypothesis more fully.²

4. Discussion

In 1976, Locke suggested job satisfaction to have both affective and cognitive components. Today, even though most researchers accept the fact that job satisfaction comprises affective reactions to work stimuli or events, there is little understanding of the nature of these affective reactions. Virtually no research has investigated how affective reactions to one's job experiences, as reflected by job satisfaction, vary during the workday across time. To avoid a methodological stalemate (Larson & Csikszentmihalyi, 1983), where our research methods are not well suited to address the research question at hand, our methods for studying daily experiences at work must reflect the dynamic character of those experiences. It has been our contention in this paper that measuring job satisfaction with an ESM approach will uncover important variations in job satisfaction across time (i.e., within-individual variance). We also expected the joint investigation of personality and mood as antecedents of job satisfaction, in the context of temporal variations in job satisfaction, to lead to the identification of new dispositional parameters of the job evaluation process.

By measuring job satisfaction with an ESM approach we found that for the average individual, job satisfaction ratings vary across time almost as much as average levels of job satisfaction vary across individuals. To be more precise, 36% of the differences in job satisfaction ratings were due to differences within individuals. This sizeable within-individual variance has not previously been addressed in research that utilized static research designs. Thus, at the broadest level, our study contributes to the job satisfaction literature by uncovering new sources of variation in job satisfaction and by illuminating the impact of affect and personality on these differences. At a more specific level, the contribution of the present study concerns three main issues: variability in mood and job satisfaction, within-individual (idiographic) relationships between mood and job satisfaction, and the joint impact of personality and mood on job satisfaction.

² We also tested whether mood variability mediates the effect of personality on the variability in job satisfaction. Results suggest that NA variability mediates about one-third of the impact of Neuroticism on job satisfaction variability. Extraversion did not significantly predict job satisfaction variability.

4.1. *Variability in mood and job satisfaction*

Our results show mood and job satisfaction ratings to vary considerably over time, and that the fluctuation magnitudes of the two measures were related. More specifically, respondents whose negative affect fluctuated more widely across time also rated their job satisfaction more variably across occasions. Thus, not only is the level of job satisfaction influenced by mood, the variability in satisfaction is affected by mood as well. This finding implies the existence of individual differences in the variability of job satisfaction evaluations. Indeed, we found that Neuroticism is strongly associated with the variability in job satisfaction ($r = .56$), which means that individuals who score higher on Neuroticism experience more variability in job satisfaction. Thus, variability in job satisfaction is, in part, dispositionally-based.

The existence of individual differences in affect and job satisfaction variability has important implications for work behaviors. First, affect and job satisfaction variability may be related to consistency in performance. Previous research suggested that fluctuations in experienced affect translate into fluctuations in work behaviors (e.g., George & Brief, 1994; Isen & Baron, 1991), and these behavioral fluctuations may ultimately lead to fluctuations in job performance. In other words, people who experience highly variable affect and satisfaction may show a pattern of inconsistent performance over time. Second, increased variability in affect and job satisfaction may be taxing to the well-being of individuals, resulting in stress, emotional exhaustion, and burnout. Suggestive evidence for this effect comes from Larson, Csikszentmihalyi, and Graef (1980), who found life stress to be associated with increased mood variability (measured as the standard deviation of multiple time-sampled mood ratings) in a sample of adolescents ($r = .35$), and the effect is also consistent with the association between trait-level negative affectivity and stress documented in previous research (Watson, 2000).

4.2. *Time-sampled mood and job satisfaction*

The second specific contribution of our study relates to explaining individuals' variations in job satisfaction across time. The pooled within-individual analyses, showed that mood was significantly associated with job satisfaction (Model 2). That is, mood and job satisfaction did not vary independently but rather individuals' job satisfaction varied in synchrony with their moods. This is an important result, in that it suggests that work stimuli or events that influence mood (e.g., goal progress; Alliger & Williams, 1993) may also influence job satisfaction (i.e., through mood).

Affective states can also direct and motivate behavior (Watson, 2000). For example, George (1989) suggested that absenteeism is a mechanism of controlling the quality of work experiences as reflected by mood at work. If the work environment is less conducive to positive affect than the non-work environment, people will be likely to be absent from work in order to increase their overall level of positive affect. In other words, when people experience positive affect at levels below a certain threshold they will leave work. From a broader perspective, more than two decades ago Locke (1976) suggested that the emotional appraisal of the job leads to approach or avoidance behaviors at work. The present study found job satisfaction to exhibit substantial variations across time. It follows that momentary job satisfaction may lead to impulse-driven behaviors at work, such as organizational citizenship behaviors on the positive side, and leaving work, organizational or interpersonal deviance, or other withdrawal behaviors on the negative side.

Even though the proportion of within-individual variance in job satisfaction explained by mood is not trivial, a substantial portion of variance was unexplained. Of course, this is to be expected as no theoretical model or sets of variables explain all of the variation in a construct. What might be the sources of this unexplained variance?

First, estimates were not corrected for the effects of measurement error. Although the constructs in this study were measured reliably, relatively speaking, variance explained would have been higher if measurement error were taken into account. The second major source of unexplained variance comprises other influences on job satisfaction. Though the focus of this study was on the affective causes of job satisfaction, which have been understudied in the literature (Brief, 1998; Weiss & Cropanzano, 1996), we did not take into account cognitive or situational influences. For example, many of the models of job satisfaction are relatively cognitive (e.g., value-percept theory; Mobley & Locke, 1970) or largely situational (e.g., job characteristics model; Hackman & Oldham, 1980) in orientation. Though our purpose was not to model all of the influences on job satisfaction, future research would benefit from taking both affective and situational variables into account.

4.3. Joint impact of personality and mood on job satisfaction

At a broad level, we tested a meditation effect of mood on the personality–job satisfaction relationship. Even though our results were not statistically significant, they do suggest that such an effect may exist. The data gathered for this paper cannot address specific processes that may link mood to job cognitions and job affect. Clearly, this is an important area for future research. The prospect of independently measuring work-related mood and job cognitions is not a simple one. Furthermore, we do not believe that the relationship between the affect system and job cognition is unidirectional; rather, job cognitions may also impact basic mood. Testing a model involving personality, job affect, job cognitions, and job satisfaction is a daunting task empirically and theoretically. Yet, it is the logical and necessary extension of the results presented here, as well as in previous investigations (Weiss et al., 1999).

Finally, our study contributes to the literature on dispositional effects on job satisfaction by suggesting a moderating effect of Neuroticism on the idiographic relationship between mood and job satisfaction. Results revealed that individuals who scored high on Neuroticism were more likely to have their mood affect their job satisfaction. This finding needs further empirical investigation as the number of participants in this study was small, and the significance of the cross-level moderation was marginal. The present results show that there is more to the dispositional source of job satisfaction than main effects. Specifically, the effects of Neuroticism on variability in mood and in job satisfaction and the moderator effect of Neuroticism on the idiographic mood–job satisfaction relationship appear to be as important as the main effect of Neuroticism on job satisfaction.

In interpreting our results, it is important to place them in the context of prior research, most notably the Weiss et al. (1999) study, which bears some similarity to the present study. Weiss et al. are to be credited for being the first researchers to use ESM to link mood to job satisfaction. Our study was inspired by their study, and provides several advances beyond it. First, the present study provides a more complete test of the role of mood in job satisfaction by explicitly studying both average mood levels and within-subjects variability in mood in their relation to job satisfaction. Second, we included personality in our analyses, which provided additional insights (though it should be noted that Weiss et al. included cognitions in their study, which we did not). Third, by using hierarchical linear modeling, we were able to decompose mood–job satisfaction covariance into between- and within-person parts. We showed that important temporal fluctuations in job satisfaction exist, and these fluctuations are partly predicted by mood fluctuations.

Though not an advantage over Weiss et al. (1999), our study is different in that we used the dimensions of positive and negative affect, in keeping with Watson's (2000) measurement framework of affect, as opposed to the pleasantness-activation dimensions utilized by Weiss et al. Weiss et al. found that average pleasantness was a much

stronger correlate and predictor of job satisfaction ($r = .64 [p < .01]$, $\beta = .58 [p < .01]$) than was activation ($r = .35 [ns]$, $\beta = .18 [ns]$). The issue of the proper dimensional structure of affect continues to be debated in the literature (for a comparison and integration of the models of affect see Russel & Feldman-Barret, 1999). Clearly, it is beyond the scope of this article to resolve this issue. For point of comparison, however, in our study pleasantness ($r = .78$, $p < .01$) and activation ($r = .59$, $p < .01$) displayed a pattern of correlations with job satisfaction similar to that reported by Weiss et al., but the magnitudes of the correlations obtained in our study were larger, possibly due to very little measurement error present in our estimates (aggregation resulted in reliabilities between .93 and .95 for our job satisfaction and mood measures).

Although our results contribute beyond the Weiss et al. (1999) study, like all studies, this study has limitations that merit discussion. First, as previously mentioned, situational attributes of the job were not included in this investigation. More complete tests of Weiss and Cropanzano's (1996) Affective Events Theory will need to take situational factors and cognitive evaluations of the job into account, to assess the degree to which affective experiences are influenced both by the person (their personality) and the situation (the job). Second, due to rigors on the data collection process (in this study, four surveys per day for four weeks), like the Weiss et al. (1999) study ($n = 24$) and most ESM studies, our sample size was quite small. The most important results of this study though, resulted from within-individual analyses. For within-individual analyses, the operational sample size was large; thus the small number of participants does not impact the statistical validity of these results. Furthermore, with a small sample, it is possible our results are specific to the type of people studied. We addressed this issue by recruiting participants from three organizations and across a wide range of jobs, but the generalizability of our results remains an issue that requires replication.

Taken as a whole, this study adds to our understanding of the affective and dispositional antecedents of job satisfaction. Though perhaps there are areas of organizational behavior and applied psychology for which experience sampled measures are not appropriate, the results presented here show that experience sampling methodology has much to contribute to our understanding of mood-dispositional predictors of job satisfaction.

Acknowledgments

We would like to thank Terry Boles, Joyce Bono, Amir Erez, Andrew Miner, Michael Mount, and David Watson for their helpful comments on earlier versions of the paper.

Appendix

This appendix presents: (1) descriptions of the null models that investigated whether HLM modeling is appropriate for these data (Null Model 1) and whether controlling for lagged job satisfaction is necessary (Null model 2), and results of the analyses, and (2) computations of proportions of variance in job satisfaction explained by predictors.

Null models: description and results

Null Model 1

The first null model, at level 1 of analysis simply computed individuals' average job satisfaction levels (the 27 level 1 intercepts) and the within-individual variance in job satisfaction scores (the variance of the level 1 residuals; this variance is the

average squared distance from individual momentary scores to the individuals' respective mean scores); the level 2 analysis computed the grand-mean job satisfaction score (the level 2 intercept) and the variance of individuals' average job satisfaction scores (between-individual variance; the variance of the level 2 residuals).

Null model 2

This model accounted for the serial dependence in job satisfaction by including lagged job satisfaction as a level 1 predictor. This step allowed us to investigate if the variation of job satisfaction around its mean level across time is randomly distributed or serially dependent. If lagged job satisfaction is a significant predictor of job satisfaction, indicating serial dependence in the data, all subsequent models should control for lagged job satisfaction to remove the serial dependence from the data.

Results

The test of the first null model (Null Model 1) showed that there was significant between-individual variance in job satisfaction ($\tau_{00} = .30, p < .001$; τ is the amount of between-individual variance in job satisfaction; see table in Appendix), thus allowing us to proceed with the tests of the models designed to answer the substantive questions of this study. Thirty-six percent of the total variance in job satisfaction was within individuals (to be explained shortly), showing that within-individual analyses are appropriate. Testing the null model with the serial dependence in job satisfaction removed from the data (Null Model 2) revealed—as expected—the same results with respect to the between-individual variance in the criterion ($\tau_{00} = .30, p < .001$; see table in Appendix), and gave a slightly lower proportion of variance due to differences within individuals (33%) than the first null model. Lagged job satisfaction was a significant predictor of momentary job satisfaction for the average respondent ($\gamma_{10} = .35, p < .001$; see table in Appendix), showing that people's momentary variations in satisfaction with their jobs around their average satisfaction levels are indeed serially dependent and not randomly distributed across occasions.

Variance components

Proportion of within-individual variance in job satisfaction

Null Model 1 estimates the amount of within- and between-individual variance in job satisfaction. It follows that within-individual variance accounts for $\rho^2/(\rho^2 + \tau_{00}) = .17/ (.17 + .30) = 36\%$ of the total job satisfaction variance (see table in Appendix).

Variance explained by lagged job satisfaction

Comparing level 1 variance components of the two null models shows that lagged job satisfaction explains $(.17 - .15)/.17 = 12\%$ of the within-individual variance in job satisfaction (where $\rho^2 = .17$ and $\rho^2 = .15$ for Null Model 1 and Null Model 2, respectively; see table in Appendix). Of the total variance in job satisfaction, lagged job satisfaction explained $.12 (.36) = 4\%$.

Variance explained by average-PA and average-NA

Comparing the level 2-variance components of Model 1 and Null Model 2 reveals that jointly, average-PA and average-NA explained $(.30 - .19)/.30 = 37\%$ of the between-individual differences in job satisfaction (where $\tau_{00} = .30$ and $\tau_{00} = .19$, for Null Model 2 and Model 1, respectively; see the table in Appendix and Table 2). It follows that average levels of PA and NA explained $.37 (.64) = 24\%$ of the total job satisfaction variance.

Variance explained by momentary mood

Mood explained (.15-.10)/.17 = 29% of the within-individual variance in job satisfaction, after lagged job satisfaction was partialled out (where $\rho^2 = .17$, $\rho^2 = .15$, and $\rho^2 = .10$ for the two null models and Model 2, respectively; see the table in Appendix and Table 2). It follows that momentary PA and NA accounted for the .29 (.36) = 10% of the total variance in job satisfaction.

Parameter estimates and variance components of null models tested

Model equations	γ_{00}	γ_{10}	ρ^2	τ_{00}	τ_{11}
<i>Null Model 1^a</i>					
$JS_{ij} = \beta_{0j} + r_{ij}$	.00	—	.17	.30**	—
$\beta_{0j} = \gamma_{00} + U_{0j}$					
<i>Null model 2^b</i>					
$JS_{ij} = \beta_{0j} + \beta_{1j}(JS_{ij,t-1}) + r_{ij}$					
$\beta_{0j} = \gamma_{00} + U_{0j}$	.00	.35**	.15	.30**	.00
$\beta_{1j} = \gamma_{10} + U_{1j}$					

^a β_{0j} is the average level of job satisfaction for individual j ; γ_{00} the grand mean of job satisfaction scores; $\rho^2 = \text{var}(r_{ij})$ the within-individual variance in job satisfaction (computed as the average squared distance from individual momentary scores and the individual's mean score); and $\tau_{00} = \text{var}(U_{0j})$ the between-individual variance in job satisfaction (the variance of the 27 average job satisfaction scores).

** $p < .01$.

^b β_{0j} is the average level of job satisfaction individual j ; β_{1j} are the individuals' lagged job satisfaction slopes; γ_{00} is the grand mean of job satisfaction scores; γ_{10} the pooled lagged job satisfaction slope; $\rho^2 = \text{var}(r_{ij})$ the remaining within-individual variance in job satisfaction, after the effects of the lagged variable were removed; $\tau_{00} = \text{var}(U_{0j})$ the between-individual variance in job satisfaction; and $\tau_{11} = \text{var}(U_{1j})$ the between-individual variance in the lagged job satisfaction slope.

References

Agho, A. O., Price, J. L., & Mueller, C. W. (1992). Discriminant validity of measures of job satisfaction, positive affectivity and negative affectivity. *Journal of Occupational and Organizational Psychology*, 65, 185–196.

Alliger, G. M., & Williams, K. J. (1993). Using signal-contingent experience sampling methodology to study work in the field: A discussion and illustration examining task perceptions and mood. *Personnel Psychology*, 46, 525–549.

Blaney, P. H. (1986). Affect and memory: a review. *Psychological Bulletin*, 99, 229–246.

Bower, G. H. (1981). Mood and memory. *American Psychologist*, 36, 129–148.

Brayfield, A. H., & Rothe, H. F. (1951). An index of job satisfaction. *Journal of Applied Psychology*, 35, 307–311.

Brief, A. P. (1998). *Attitudes in and around organizations*. Thousand Oaks, CA: Sage Publications.

Brief, A. P., & Roberson, L. (1989). Job attitude organization: An exploratory study. *Journal of Applied Social Psychology*, 19, 717–727.

Byrk, A. S., & Raudenbush, S. W. (1992). *Hierarchical linear models: Applications and data analysis methods*. Thousand Oaks, CA: Sage.

Byrk, A. S., Raudenbush, S. W., & Congdon, R. T., Jr. (2000). *HLM 5 for Windows*. Chicago: Scientific Software International.

Camman, C., Fichman, M., Jenkins, D. J., & Klesh, J. R. (1983). Assessing the attitudes and perceptions of organizational members. In S. E. Seashore, E. E. Lawler III, P. H. Mirvis, & C. Cammann (Eds.), *Assessing organizational change: A guide to methods measures and practices* (pp. 71–138). New York: Wiley.

Costa, P. T., Jr., & McCrae, R. R. (1980). Influence of extraversion and neuroticism on subjective well-being: happy and unhappy people. *Journal of Personality and Social Psychology*, 38, 668–678.

Costa, P. T., Jr., & McCrae, R. R. (1992). *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor (NEO-FFI) Inventory professional manual*. Odessa, FL: PAR.

Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology*, 47, 1105–1117.

Eckenrode, J. (1984). Impact of chronic and acute stressors on daily reports of mood. *Journal of Personality and Social Psychology*, 46, 907–918.

- Eysenck, H. J., & Eysenck, M. W. (1985). *Personality and individual differences*. New York: Plenum Press.
- Fisher, C. D., & Locke, E. A. (1992). The new look in job satisfaction research and theory. In C. J. Cranny, P. C. Smith, & E. F. Stone (Eds.), *Job satisfaction how people feel about their jobs and how it affects their performance* (pp. 165–194). New York: Lexington.
- George, J. M. (1989). Mood and absence. *Journal of Applied Psychology*, *74*, 317–324.
- George, J. M., & Brief, A. P. (1994). Feeling good-doing good: A conceptual analysis of mood at work—organizational spontaneity relationship. *Psychological Bulletin*, *112*, 310–329.
- Gray, J. A. (1981). A critique of Eysenck's theory of personality. In H. J. Eysenck (Ed.), *A model for personality* (pp. 246–276). New York: Springer.
- Hackman, J., & Oldham, G. (1980). *Work redesign*. Reading, MA: Addison-Wesley.
- Hepburn, L., & Eysenck, M. W. (1989). Personality, average mood and mood variability. *Personality and Individual Differences*, *10*, 975–983.
- Hofmann, D. A., Griffin, M. A., & Gavin, M. B. (2000). The application of hierarchical linear modeling to organizational research. In K. Klein & S. Kozlowski (Eds.), *Multilevel Theory, Research, and Methods in Organizations: Foundations, extensions, and new directions* (pp. 467–511). San Francisco: Jossey-Bass.
- Hormuth, S. E. (1986). The sampling of experiences in situ. *Journal of Personality*, *54*, 262–293.
- Isen, A. M., & Baron, R. A. (1991). Positive affect as a factor in organizational behavior. *Research in Organizational Behavior*, *13*, 1–54.
- Judge, T. A. (1992). The dispositional perspective in human resources research. *Research in Personnel and Human Resources Management*, *10*, 31–72.
- Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits—self-esteem, generalized self-efficacy, locus of control, and emotional stability—with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology*, *86*, 80–92.
- Larsen, R. J. (1987). The stability of mood variability: A spectral analytic approach to daily mood assessments. *Journal of Personality and Social Psychology*, *52*, 1195–1204.
- Larsen, R. J., & Kasimatis, M. (1990). Individual differences in entrainment of mood to the weekly calendar. *Journal of Personality and Social Psychology*, *58*, 164–171.
- Larsen, R. J., & Ketelaar, T. (1991). Personality and susceptibility to positive and negative emotional states. *Journal of Personality and Social Psychology*, *61*, 132–140.
- Larson, R. S., & Csikszentmihalyi, M. (1983). The experience sampling method. In H. R. Reis (Ed.), *New directions for methodology of social and behavioral science: Naturalistic approaches to studying social interaction* (vol. 2, pp. 41–46). San Francisco: Jossey-Bass.
- Larson, R. S., Csikszentmihalyi, M., & Graef, R. (1980). Mood variability and the psychological adjustment of adolescents. *Journal of Youth and Adolescence*, *9*, 469–490.
- Locke, E. A. (1976). The nature and causes of job satisfaction. In M. D. Dunnette (Ed.), *Handbook of industrial and organizational psychology* (pp. 1297–1349). Chicago: Rand McNally.
- McConville, C., & Cooper, C. (1992). Mood variability and personality. *Personality and Individual Differences*, *13*, 1213–1221.
- McConville, C., & Cooper, C. (1999). Personality correlates of variable moods. *Personality and Individual Differences*, *26*, 65–78.
- McCrae, R. R., & Costa, P. T., Jr. (1991). Adding liebe und arbeit: The full five-factor model and well-being. *Personality and Social Psychology Bulletin*, *17*, 227–232.
- Mobley, W. H., & Locke, E. A. (1970). The relationship of value importance to satisfaction. *Organizational Behavior and Human Performance*, *5*, 463–483.
- Penner, L. A., Shiffman, S., Paty, J. A., & Fritzsche, B. A. (1994). Individual differences in intraperson variability in mood. *Journal of Personality and Social Psychology*, *66*, 712–721.
- Russel, J. A., & Feldman-Barret, L. (1999). Prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, *76*, 805–819.
- Rusting, C. L. (1999). Interactive effects of personality and mood on emotion-congruent memory and judgment. *Journal of Personality and Social Psychology*, *77*, 1073–1086.
- Rusting, C. L., & DeHart, T. (2000). Retrieving positive memories to regulate negative mood: Consequences for mood-congruent memory. *Journal of Personality and Social Psychology*, *78*, 737–752.
- Spector, P. E. (1997). *Job satisfaction: Application, assessment, causes, and consequences*. Thousand Oaks, CA: Sage Publications.
- Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety, with an emphasis on self-report. In A. H. Tuma & J. D. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 681–706). Hillsdale, NJ: Erlbaum.
- Watson, D. (1988). Intraindividual and interindividual analyses of positive and negative affect: Their relationship to health complaints, perceived stress, and daily activities. *Journal of Personality and Social Psychology*, *54*, 1020–1030.
- Watson, D. (2000). *Mood and temperament*. New York: Guilford Press.
- Watson, D., & Clark, L. A. (1992). On traits and temperament: General and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality*, *60*, 441–476.

- Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the Positive and Negative Affect schedule—expanded form*. Iowa City: University of Iowa.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070.
- Watson, D., & Slack, A. K. (1993). General factors of affective temperament and their relation to job satisfaction over time. *Organizational Behavior and Human Decision Processes*, *54*, 181–202.
- Watson, D., & Tellegen, A. (1985). Toward a consensual structure of mood. *Psychological Bulletin*, *98*, 219–235.
- Watson, D., Wiese, D., Vaidya, J., & Tellegen, A. (1999). The two general activation systems of affect: Structural findings, evolutionary considerations, and psychobiological evidence. *Journal of Personality and Social Psychology*, *76*, 805–819.
- Weiss, H. M., & Cropanzano, R. (1996). Affective events theory: A theoretical discussion of the structure, causes, and consequences of affective experiences at work. *Research in Organizational Behavior*, *18*, 1–74.
- Weiss, H. M., Nicholas, J. P., & Daus, C. S. (1999). An examination of the joint effects of affective experiences and job beliefs on job satisfaction and variations in affective experiences over time. *Organizational Behavior and Human Decision Processes*, *78*, 1–24.
- Wheeler, L., & Reis, H. T. (1991). Self-recording of everyday life events: Origins, types, and uses. *Journal of Personality*, *59*, 339–354.
- Williams, D. G. (1990). Effects of psychoticism, extraversion, and neuroticism in current mood: A statistical review of six studies. *Personality and Individual Differences*, *11*, 615–630.
- Williams, D. G. (1993). Are personality effects upon average mood due to personality effects upon mood variation? *Personality and Individual Differences*, *14*, 199–208.
- Wood, P., & Brown, D. (1994). The study of intraindividual differences by means of dynamic factor models: Rationale, implementation and interpretation. *Psychological Bulletin*, *116*, 166–186.

Received 5 June 2001