The Dynamic Process of Life Satisfaction

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ABSTRACT Drawing from the Cognitive Affective Personality System (Mischel & Shoda, 1995, 1998), we argue for a need to examine within-individual variation in life satisfaction. Thus, employing a diary study of 76 fully employed, married adults we examined the magnitude, antecedents, and consequences of intra-individual variation in life satisfaction. Our findings establish a substantial amount of intra-individual variation, comparable to other personal evaluations assessed with a state approach (e.g., self-esteem), but less than that observed with major mood dimensions. In addition, concurrent changes in life satisfaction were systematically related to fluctuations in job and marital satisfaction; however, contrary to prediction, our results did not support a cross-level moderating role of Neuroticism in these associations. Our findings also lend support for the lagged influence of life satisfaction on next-day domain satisfaction ratings. Taken together, our findings demonstrate the systematic nature and importance of within-subject variation in life satisfaction.

As part of a general recent trend towards a more "positive psychology" (Seligman & Csikszentmihalyi, 2000), the topic of subjective well-being (SWB) has generated considerable interest in the last decade (for a review, see Diener, Suh, Lucas, & Smith, 1999). However, this burgeoning line of research has typically treated SWB as a trait-like (i.e., in general) between-subject construct, ignoring potentially important within-subject variation (Diener, 1996). Thus, the main

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purpose of the current study is to examine the nature of this intra-individual variation in life satisfaction, including its magnitude, antecedents, and consequences. That is, we will show that this variation is not simply random error but rather is systematically related to both top-down/personological (e.g., personality) and bottom-up/situational (e.g., job and marital satisfaction) factors. Moreover, we will demonstrate that fluctuations in life satisfaction have important implications: They are predictive of next-day domain satisfaction ratings.

SWB and Life Satisfaction

Subjective well-being researchers typically distinguish between three components of subjective well-being, namely, pleasant affect, unpleasant affect, and life satisfaction (Diener, 1984). In this classification, life satisfaction represents a global *cognitive* evaluation or judgment of one's satisfaction with his or her life. According to this view, life satisfaction can be viewed as an attitude: "a summary evaluation of objects along a dimension ranging from positive to negative" (Petty, Wegener, & Fabrigar, 1997). In other words, life satisfaction is an evaluative summary of one's liking or disliking of his or her life (i.e., the attitudinal object). This construct is typically assessed with the Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985), a 5-item scale in which participants are asked to indicate their agreement with statements such as "In most ways my life is close to ideal" and "I am satisfied with my life." Although life satisfaction and the affective components of SWB are related, recent findings establish the discriminant validity of the different components (Lucas, Diener, & Suh, 1996; Schimmack, Radhakrishnan, Oishi, Dzokoto, & Ahadi, 2002).

Attitudes as Dispositional Tendencies Versus On-Line Constructions

As discussed earlier, life satisfaction represents a basic attitude a person holds about the favorability of his or her life. An ongoing debate in the attitudes literature relates to the nature and stability of attitudes (cf., Eagly & Chaiken, 1993; Schwarz & Bohner, 2001). In their influential textbook, Eagly and Chaiken (1993) define an attitude as "a psychological *tendency* that is expressed by evaluating a particular entity with some degree of favor or disfavor" (p. 1);

they further explain that this evaluative tendency or bias refers to an internal state that intervenes or accounts for "the covariation between certain classes of stimuli and certain classes of responses" (p. 3). In other words, an attitude represents a latent (i.e., unobservable) evaluative tendency that manifests itself through fairly stable responses to a related class of stimuli. Thus, in this view, people hold well-formed, enduring attitudes that they can access in their mental representations stored in memory.

In contrast, Schwarz and Bohner (2001) argue—based on the pervasive effects of context (e.g., question wording, format, or order)—that attitudes are evaluative judgments that people construct at the time they are generated, based on whatever information happens to be accessible. Furthermore, these authors demonstrate that a set of systematic cognitive and communication rules underlies this judgment process (see also Oishi, Schimmack, & Colcombe, 2003). It should be noted, however, that other researchers have taken more intermediate positions in an attempt to reconcile the two extreme positions—attitudes as tendencies versus attitudes as on-line constructions—by acknowledging the role of both contextual effects and stable memory structures in attitudes.

The Stability of Life Satisfaction

The aforementioned debate has had an important influence on the life satisfaction literature, as it has important implications for the nature and stability of the life-satisfaction construct. The traditional global and trait-like view of life satisfaction is very much based on a dispositional/tendency approach, in that it is believed that people exhibit considerable temporal stability and cross-situational consistency in their life-satisfaction ratings that are associated with stable personality characteristics (Diener & Lucas, 1999). In support of this view, several studies have reported evidence establishing the temporal stability of the SWLS (Magnus, Diener, Fujita, & Pavot, 1993; for a review see Pavot & Diener, 1993).

Nevertheless, recent work by Schwarz and colleagues in the judgment or constructionist tradition has documented evidence for several contextual effects during completion of the measure—including the influence of minor events (e.g., finding a dime, or the outcome of a soccer match), the presence of a handicapped person in the room, current mood, and the order in which items are answered—on life-satisfaction assessment (for a recent review, see Schwarz & Strack, 1999; see also

Oishi et al., 2003). For example, Schwarz, Strack, and Mai (1991) found that the order of presentation of general versus specific satisfaction questions had an impact on the observed correlations. Specifically, when relationship satisfaction preceded the life satisfaction question, a correlation of $r = .67$ (assimilation effect) was obtained; however, when the order was reversed, this correlation decreased to $r = .32$ (contrast effect). These results seem to support the constructionist view that life-satisfaction judgments are based on on-line constructions using the currently available accessible information (it should be noted, however, that attempts at replication of these findings have not always been successful; see Schimmack & Oishi, 2005). In any case, the constructionist approach to attitudes in general—and to life satisfaction in particular—is supportive of the need to examine fluctuations in life satisfaction judgments as a result of meaningful and important changes in the information available or salient to the person.

Rationale for Studying Intra-Individual Variation

Additional support for our main assertion regarding the importance of examining intra-individual variability in life satisfaction, in addition to inter-individual variability, can be found in social-cognitive process theories of personality. Recently, Mischel and Shoda (1995, 1998) have advocated the Cognitive Affective Personality System (CAPS) approach in which the personality system represents a mediating information-processing unit between situations and behaviors. This system is thought to generate temporal stability within particular situations and microlevel cross-situational instability. Consequently, Mischel and Shoda argue that it is important to study variations in intra-individual behavior as it unfolds in different situations. That is, this intra-individual variability in behavior across situations should not be treated as random measurement error that needs to be averaged or aggregated out, but rather as meaningful information that reflects the personality system itself (Mischel & Shoda, 1995, 1998). Applied to the study of life satisfaction, this rationale clearly supports the examination of within-individual variation in the construct—and the role played by different situations at school, work or in the marriage—in a dynamic, if . . . then . . . , situation-satisfaction process. Moreover, according to the logic of Mischel and Shoda's model, these situation-satisfaction associations may themselves reflect the influence of personality traits.

SWB Within-Subject Research

Four previous studies have examined the antecedents of various aspects of SWB within individuals across time. Oishi, Diener, Suh, and Lucas (1999)—employing a 23-day diary study of 151 students—examined the moderating role of values in the association between daily domain satisfaction (e.g., achievement and social satisfaction) and overall daily satisfaction. Daily satisfaction was measured by asking participants to rate at the end of each day how good or bad that day was using a 9-point scale, ranging from 1 (*extremely bad*) to 9 (*extremely good*). Achievement and social satisfaction were assessed using a 7-point scale, ranging from 1 (*extremely dissatisfied*) to 7 (*extremely satisfied*). As hypothesized, current satisfaction with achievement was a significantly stronger predictor of daily satisfaction for individuals high in achievement values than for those low in achievement values. Likewise, current satisfaction with social life was a significantly stronger predictor of daily satisfaction for those high in benevolence values than for those low in benevolence values.

Drawing from Self-Determination Theory, Reis and his colleagues (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Sheldon, Ryan, & Reis, 1996) conducted two daily diary studies to examine the role of basic needs fulfillment in daily SWB fluctuations. In both studies, SWB was computed as a composite of four measures: positive and negative mood adjectives, a psychological vitality scale, and a bodily symptom checklist. The first study—which involved collecting daily diaries over 2 weeks from 60 psychology students—showed that fulfillment of autonomy and competence needs in daily activities was associated with greater daily well-being (Sheldon et al., 1996). In a second study—a 2-week daily diary study of 67 psychology students—these results were replicated for autonomy and competence and further extended to a third basic need, relatedness. Taken together, these two studies show that—on a daily basis—the increased fulfillment of these three psychological needs is associated with greater well-being.

In a fourth study, Sheldon and Kasser (1998) examined how short-term SWB is influenced by perceived progress in the pursuit of personal goals. Ninety students completed a diary every 5th day over the course of 2 months; in these diaries, they rated their progress on five personal projects during the 5 days since the last report, as well as their feelings of well-being on that day (computed by subtracting

the short-term negative affect score from the positive affect score). Using hierarchical regression, these authors found that short-term progress in goals was associated with an increase in well-being. Furthermore, they found that organismically congruent goals (i.e., goals pursued for autonomous reasons—rather than for controlled reasons—or goals oriented towards intrinsic rather than extrinsic outcomes) moderated the association between progress and well-being. Specifically, progress in either autonomous or intrinsic goals was associated with larger changes in short term well-being relative to less organismically congruent goals (Sheldon & Kasser, 1998).

However, these four studies did not focus on life satisfaction per se; they either did not examine life satisfaction at all, or else examined it in conjunction with direct measures of positive and negative affect. Consequently, it is difficult to make direct inferences from these studies regarding people's cognitive evaluations of their lives (i.e., life satisfaction). To date, we are familiar with only one study that examined intraperson variability in life satisfaction.

Oishi, Schimmack, and Diener (2001, Study 2)—based on a 23-day daily diary study of 141 undergraduate students—examined the association between daily assessments of physical pleasure and daily satisfaction, as well as the moderating role played by individual differences in sensation seeking in this association. Physical satisfaction was measured by asking participants to rate how much physical pleasure (e.g., from sex, food) they had experienced that day using a 1 (*not at all*) to 9 (*extremely*) Likert scale. Daily satisfaction was measured by asking participants to indicate at the end of each day how good or bad the day was using a 1 (*extremely bad*) to 9 (*extremely good*) Likert scale. These authors found support for both of their main hypotheses: (a) daily physical pleasure was significantly associated with daily satisfaction and (b) the daily satisfaction of high sensation seekers was more dependent on physical pleasure than that of low sensation seekers.

Taken together, these previous findings strongly suggest that there is substantial within-subject variability in life satisfaction. Consequently, we hypothesize that:

H-1: Individuals will show substantial variation in their levels of life satisfaction over a period of three weeks.

Sources of Life Satisfaction

However, these fluctuations in life satisfaction could potentially represent nothing more than stochastic or random variation around the "true life satisfaction score." In response to this potential criticism, we will show that these fluctuations in life satisfaction represent meaningful changes that reflect variations in domain (job/marital) satisfaction and/or basic personality processes. Using a diary design with fixed intervals, we can track dynamic changes in life satisfaction as a function of fluctuations in domain satisfaction and also can examine the moderating role of stable personality characteristics on these relationships. Importantly, this design, analyzed with multilevel models, allows for the simultaneous investigation of both between- and within-subjects variables and their cross-level interactions (Bryk & Raudenbush, 1992). Next, we provide an overview of theoretical models and findings regarding the antecedents of life satisfaction.

Due to the lack of intra-individual investigation of life satisfaction, we were forced to use relevant between-subject findings in developing our hypotheses and theoretical arguments; we emphasize, however, that these findings are not necessarily reflective of within-person processes. Indeed, this is one of the main assumptions that motivated the current study. Consequently, when available, we also used within-subject findings and arguments from related literatures (e.g., affect and stress) to guide our thinking on the temporal process of life satisfaction.

Although multiple domain satisfactions (such as health, social, and school) could be investigated, we chose to focus on job and marital satisfaction as antecedents of life satisfaction in the current study. Meta-analytic findings indicate that job and life satisfaction are substantially correlated, with an average "true score" correlation of $\rho = .44$ (Tait, Padgett, & Baldwin, 1989). Moreover, logical considerations and empirical findings both indicate that marital satisfaction is closely related to life satisfaction. Whereas satisfying marriages tend to buffer spouses from psychological distress and negative life events, marital distress has negative consequences for the emotional and physical well-being of spouses (Karney & Bradbury, 1995). In a recent meta-analysis of this literature ($k = 14$, $N = 8{,}042$), a strong relationship was found between marital and life satisfaction ($\rho = .51$, corrected for measurement error in both variables; Heller, Watson, & Ilies, 2004).

In addition, a recent three-wave longitudinal study of 210 dual-earner couples showed that increases in both job and marital satisfaction were associated with reductions in psychological distress (i.e., anxiety and depression symptoms); the latter finding was significantly more pronounced for women than for men (Barnett, Raudenbush, Brennam, Pleck, & Marshal, 1995). Based on the above discussion, we hypothesized:

H-2: At the within-subject level, state job satisfaction will be positively related to state life satisfaction.

H-3: At the within-subject level, state marital satisfaction will be positively related to state life satisfaction.

The Moderating Role of Neuroticism

Drawing from the differential reactivity hypothesis (e.g., Gray, 1981, 1994), we argue here that the association between life satisfaction and domain satisfaction (e.g., job or marital satisfaction) may systematically differ across individuals with different personality characteristics. For instance, people high in Neuroticism may react more strongly to problems in their marriage or job compared to their more emotionally stable peers. Support for this cross-level interaction hypothesis can be further found in two recent laboratory studies that demonstrated that people high in Neuroticism are more reactive emotionally (controlling for preinduction mood) to negative mood inductions (Gross, Sutton, & Ketelaar, 1998; Rusting & Larsen, 1997).

Additional support for this notion of differential reactivity can be found in the stress and affective experience literatures (Bolger & Schilling, 1991; Bolger & Zuckerman, 1995; David, Green, Martin, & Suls, 1997; Marco & Suls, 1993; Suls, Green, & Hillis, 1998; Williams, Alliger, Suls, Learner, & Wan, 1991). For example, Bolger and colleagues demonstrated that Neuroticism can affect both exposure and reactivity to stressful events, with reactivity being the more important component in explaining the effects of Neuroticism on daily distress (Bolger & Schilling, 1991; Bolger & Zuckerman, 1995). Suls and his colleagues found support for the role of Neuroticism in reactivity to daily stressors in two studies (Marco & Suls, 1993; Suls et al., 1998) but failed to find evidence for the expected moderation effects for Neuroticism in two additional studies (David et al., 1997; Williams et al., 1991).

Finally, indirect support for the differential reactivity hypothesis can be found in a recent study (Gable, Reis, & Elliot, 2000). These authors examined the moderating role of the Behavioral Inhibition System (BIS,

which is closely related to Neuroticism; see Watson, Wiese, Vaidya, & Tellegen, 1999) in the relationship between daily events and daily negative affect (NA). As expected, they found that BIS sensitivity moderated the relation between negative events and NA. Overall, the evidence reviewed here indicates that people high in Neuroticism should be more reactive to problems or changes in their jobs or marriage. Thus,

H-4: Neuroticism will moderate the relation between job satisfaction and life satisfaction, such that individuals high on Neuroticism will be more affected (i.e., show a stronger positive association) by changes in job satisfaction than those low on Neuroticism.

H-5: Neuroticism will moderate the relation between marital satisfaction and life satisfaction, such that individuals high on Neuroticism will be more affected (i.e., show a stronger positive association) by changes in marital satisfaction than those low on Neuroticism.

Consequences

Based on between-subject findings, we expected that, at the within-subject level, life satisfaction would influence people's lagged job satisfaction. For instance, Judge and Watanabe provide evidence for reciprocal causal relations between the two constructs—job satisfaction does affect life satisfaction, but life satisfaction also affects job satisfaction (Judge & Watanabe, 1993; for support for the latter causal sequence, see also Headey, Veenhoven, & Wearing, 1991). Thus, we hypothesized that:

H-6: Life satisfaction at night will positively predict next-day job satisfaction (H-6a) and marital satisfaction (H-6b) in the afternoon.

METHOD

Participants

The participants were 82[1] fully employed, healthy (i.e., not currently undergoing long-term hospitalization or receiving psychiatric treatment),

1. Data from these participants are also reported in Watson and Heller (2004); however, whereas the previous article focuses on work-family spillover, the current article focuses on life satisfaction.

married adults under the age of 65 in the Iowa City area. Participants were recruited through a diverse set of methods: (a) advertisements for a happiness study in local area newspapers; (b) an email solicitation letter that was sent to a random sample of 500 employees listed in the University of Iowa's email directory, who were working in a diverse set of occupations (e.g., nurses, secretaries, social workers, librarians, computer technicians); (c) ads and flyers; and (d) word of mouth. Participation in the study was completely voluntary; participants who completed all the study requirements received $40 for their participation.

Procedure

First, participants were invited to attend a 1-hour laboratory session to complete an assessment battery that included: (a) demographic information (e.g., age, gender, type of job, length of marriage, number of marriages); (b) ratings of the importance of the current job and marriage; (c) measures of personality, affectivity, and self-esteem; and (d) typical/in-general assessments of three types of satisfaction: job satisfaction, marital satisfaction, and life satisfaction.

In addition, during the initial session each participant received a sealed short survey to be completed by his or her spouse. The spouses' survey included job, marital, and life satisfaction scales, as well as measures of domain importance. Spouses were instructed to complete the survey based on their perceptions of their partner's typical thoughts and feelings. In addition, they were told to complete the survey independent of the focal person and to return it directly to us in a separate postage paid envelope that was included with the questionnaire. Questionnaires were numbered so that spouses' responses could be matched with those of respondents. Seventy-four spouse surveys were returned, reflecting a 90% response rate. A comparison of the participants whose spouse returned the survey versus those participants whose spouse did not return the survey revealed no differences with respect to Neuroticism, job satisfaction, marital satisfaction, or life satisfaction.

Finally, each participant received a packet of 31 blank scan sheets, to use for recording their ongoing experiences. At this stage, we also provided the participants with instructions for completing the diary recordings and encouraged them to browse through the materials they received and to ask questions. We further reassured the participants that their individual responses would remain confidential. Several days later—on Monday of the following week—they began diary recording.[2] To minimize the effects of

2. Two participants misunderstood the instructions to start recording on Monday of the following week and began recording the next day after their initial session (i.e., Thursday and Friday for these two participants).

idiosyncratic events, participants were run in two batches of 3 weeks—43 in the first batch and 39 in the second—separated by an interval of approximately a month and a half. Finally, participants in both batches whose spouses did not return their questionnaire received an email reminder.

Diary Recordings

Participants made diary recordings twice a day for 3 weeks (excluding weekends), starting on a Monday. Specifically, they completed the diaries: (a) during the 1st hour after eating lunch, and (b) during the hour before they went to sleep. It was explained that in case they forgot to complete the diaries at these times, they could fill them out within 1 hour of the original time frame (e.g., for the first daily recording, they could complete the diary record within 2 hours from the time they had lunch). However, participants were told that if they did not remember to complete the diaries within this extended time frame, they should leave the daily record blank. In addition, participants were instructed not to complete diaries on days they were taking off from work. Participants were also told that, if they were short on daily recordings, they could complete additional daily recordings during a 4th week. As such, 24 participants completed a total of 161 diaries during a 4th week (and a 5th week for one person who took a week-and-a-half vacation). Participants were requested to indicate on the diary scan sheet the diary recording session (afternoon or night) and their location while completing their ratings.

To receive full compensation, the study participants needed to complete at least 80% percent of recordings (i.e., at least 24 of the 30 planned assessments); for participants who completed less than 24 records, compensation was prorated based on the number of recordings they completed. We set the number at 80% to encourage participants to complete as many recordings as possible, yet also to allow them to miss a few recordings without suffering a monetary penalty. To encourage compliance and to minimize the number of lost diaries, participants were instructed to return the completed diary recordings on the Wednesday and Friday of each week in postage-paid envelopes. Participants received daily reminder emails that also included the diary instructions as an attachment.

To be included in the analyses based on diary recordings, participants had to provide at least 18 diary recordings. We chose 18 recordings as the cut-off because it represented a substantial number of recordings per person (i.e., 60% of the maximum number of recordings per person); moreover, it was a natural cut-off point in the recording frequencies (e.g., the next lowest number of recordings was eight). Consequently, six individuals were eliminated from these analyses, leaving 76 individuals who provided at least 18 recordings. A comparison of the participants retained

in the study with those dropped from the study on the personality scales, satisfaction scales and demographic variables (e.g., gender, age) revealed no significant differences between the two groups.

The 76 participants completed a total of 2,171 diary recordings (an average of 28.57 recordings per person, $SD = 2.42$), which is equivalent to an overall response rate of approximately 95%. The overall response rate was computed as the ratio of the number of recordings received (2,171) to the maximum number of possible ratings (15 [days] × 2 [recordings per day] × 76 [participants] = 2,280). Approximately 51% of the participants completed all the diaries, and the number of missed recordings ranged between 0–12.[3]

Measures in the Initial Assessment Battery

Job satisfaction. Overall job satisfaction was measured with the 5-item Brayfield-Rothe (1951) measure. Participants were asked to indicate their agreement with statements such as "I feel fairly satisfied with my job" and "Each day at work seems like it will never end" (reverse scored). Spouses were instructed to respond to these five items based on their perceptions of the characteristics of their partners. The internal consistency reliabilities for the self- and spouse-reports were $\alpha = .86$ and $\alpha = .89$, respectively.

Marital satisfaction. Overall marital satisfaction was assessed with the 6-item Quality of Marriage Index (QMI; Norton, 1983). The QMI is composed of five items asking respondents to rate, on a 7-point scale, the extent to which they agree with various statements about their marriage (e.g., "Our marriage is strong"; "My relationship with my partner makes me happy"). The QMI also contains an additional item in which respondents rate their overall happiness with their marriage on a 10-point scale. Spouses were instructed to respond to these six items based on their perceptions of the characteristics of their partners. For convenience and consistency reasons, we adjusted the original 7- and 10-point response format to a common 5-point scale. The internal consistency reliabilities for the self- and spouse-reports were $\alpha = .97$ and $\alpha = .94$, respectively.

3. We further examined whether the fact that some participants had missing records (0–no missing, $N = 39$; 1–at least one record missing, $N = 37$) moderated the concurrent association between domain satisfaction and life satisfaction. Participants with at least one record missing reported somewhat higher life satisfaction than those who completed all the diary recordings; however, whether or not participants missed any diary survey did not influence the strength of the within-individual associations between life satisfaction and its predictors (because the interaction coefficients for both job and life satisfaction were not significant, we do not discuss these findings in greater detail).

Life satisfaction. Overall life satisfaction was assessed with the Satisfaction with Life Scale (SWLS; Diener et al., 1985), a widely used index of life satisfaction. Participants were requested to indicate their agreement with five statements (e.g., "In most ways my life is close to ideal" and "I am satisfied with my life") using a 5-point scale. In addition, spouses were instructed to respond to these five items based on their perceptions of the characteristics of their spouses. The internal consistency reliabilities for the self- and spouse-reports were $\alpha = .89$ and $\alpha = .86$, respectively.

Neuroticism. Participants completed the Big Five Inventory (BFI), a 44-item self-report inventory designed to assess the Big Five factors of personality (John & Srivastava, 1999). Eight items were used to assess Neuroticism. All items are rated on a 5-point Likert scale, ranging from "very uncharacteristic of myself" to "very characteristic of myself." The BFI Neuroticism scale has been shown to have acceptable internal consistency, retest reliability, and construct validity (John & Srivastava, 1999). In the current study, the scale had a reliability of $\alpha = .82$.

Measures in Daily Log

Job, marital, and life satisfaction. Participants again completed the same three measures of satisfaction: the Brayfield-Rothe (job satisfaction), QMI (marital satisfaction), and SWLS (life satisfaction). However, this time, they were instructed to complete these items based on their current momentary thoughts and feelings. Consequently, the wording of the items was slightly modified to be more congruent with momentary instructions. The internal consistency reliabilities for job, marital, and life satisfaction were $\alpha = .89$, $\alpha = .95$, and $\alpha = .88$, respectively.

Self-esteem. Participants completed Rosenberg's (1965) 10-item Self-Esteem Scale. However, they were instructed to complete the scale based on their current momentary thoughts and feelings. Consequently, items were modified to be more congruent with momentary instructions. The internal consistency of the measure over time was $\alpha = .89$.

Current mood. Participants completed the 20-item Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The PANAS assesses both positive and negative affect by asking participants to indicate for 10 positive and 10 negative emotions (e.g., determined, enthusiastic, jittery, afraid) "to what extent you feel this way right now, that is, at the present moment" on a 5-point scale (1 = *very slightly or not at all,* 2 = *a little,* 3 = *moderately,* 4 = *quite a bit,* 5 = *extremely*). The internal consistency reliabilities for positive and negative affect were $\alpha = .94$ and $\alpha = .88$, respectively.

Data Analyses

Overview of multilevel modeling. The diary data in this study have a multilevel structure in that each diary recording (e.g., momentary life satisfaction assessment) can be considered a lower-level unit nested under the upper-level unit persons (which also includes person-level variables, such as personality). The two obvious procedures to analyze this type of data have proven unsatisfactory. The first is to disaggregate all person variables to the individual level and then treat each as an independent entry, in essence ignoring nesting in the data structure (Reis & Gable, 2000). This method is problematic because the basic assumption of observation independence underlying most statistical techniques is violated and can introduce substantial bias in the interpretation of results. For example, this method artificially inflates the amount of independent information from the data (i.e., degrees of freedom), thereby increasing the Type I error rate and rendering all significance tests too liberal.

The other alternative is to aggregate the data across individuals (e.g., compute means and standard deviations of the job satisfaction ratings) and then relate them to the person-level variables. The main problem here is the loss of valuable within-subject information that can account for a considerable amount of variation (see also the earlier discussion of the importance of studying satisfaction at the within-person level). A second problem with the aggregation approach lies in differences in the number of records per person or in the within-person variances, resulting in improper estimates of standard errors and significance levels in ordinary least squares regression (Reis & Gable, 2000).

Multilevel modeling represents a more appropriate way to deal with our data. It includes a class of methods that takes hierarchical structure into account and enables the simultaneous estimation of the influence of variables from different levels (e.g., between- and within-person effects) and their cross-level interactions (Byrk & Raudenbush, 1992) on the outcomes of interest. These methods are more precise and efficient than least squares estimation when the number of observations per person is unbalanced (e.g., different number of diary recordings per person) by placing greater weight on those participants who provided more information. Furthermore, use of MLE—instead of ordinary least squares methods—does not require an equal number of observations for each person, thereby accommodating differential numbers of diary entries between subjects. It also treats predictor variables more appropriately as random, rather than fixed, effects, enabling generalization of results to the population from which the participants were sampled.

Multilevel modeling can be understood intuitively as a two-stage series of iterative regressions (Byrk & Raudenbush, 1992). At the first level of

analysis (Level 1), the relationship between the within-person variables (e.g., job and life satisfaction) is investigated by regressing the criterion (e.g., life satisfaction) on the predictor (e.g., job satisfaction) for each person in the study. At the second level (Level 2), the parameters estimated at Level 1 (intercepts and slopes) are regressed on Level 2 variables (e.g., Neuroticism). Importantly, a random error term is introduced in the Level 2 equations for both intercept and slope; this represents the random effect component of the model that will enable generalizations beyond the sample of this study.

We used Proc Mixed and the Restricted Maximum Likelihood Estimation method default (RMLE; SAS Institute, 1999; for a nontechnical introduction for using this procedure to fit multilevel models see Singer, 1998) to test the hierarchical models in H-1 through H-6. In all multilevel models, the between- subject variables (i.e., Neuroticism) were centered on the grand mean, and all Level 1 predictors (e.g., job satisfaction, marital satisfaction, mood) were centered around the individuals' means (i.e., group mean centering; see Byrk & Raudenbush, 1992). Group mean centering was used in order to eliminate between-individual variance in the predictors when estimating the pooled or average within-individual parameters. Finally, for all models, we specified the AR(1) option in Proc Mixed (SAS Institute, 1999). This option specifies a first-order, autoregressive, within-person, variance-covariance error structure, which takes into account time dependencies.

RESULTS

Initial Analyses

Overall, 80% of the participants were female, 94% identified their race as white/Caucasian, 80% identified their religion as Christian, and 91% had at least 1–3 years of college education. There was considerable variability in length of marriage, ranging anywhere from less than a year to more than 20 years. For 88% of the sample this was their first marriage, and 40% indicated they had no children. The current occupations of respondents were as follows: 5% laborers, 27% clerical workers, 2% skilled laborers, and 10% managers; 56% classified themselves as professionals. Eighty-eight percent reported working between 31 and 50 hours on an average week; 93% of the sample also reported having an employed spouse.

Means, standard deviations, and intercorrelations for all the initial study variables across individuals are presented in Table 1.

Research participants generally reported high levels of global ratings of job, marital, and life satisfaction. Spouse reports further confirmed these high ratings of satisfaction. These findings are consistent with previous research conducted in North America. It also is noteworthy that correlations between self- and spouse-satisfaction reports revealed substantial convergence between the two sources: $r = .74$, $r = .63$, $r = .40$, for job satisfaction, marital satisfaction, and life satisfaction, respectively.

Consistent with previous research (see Heller et al., 2004), Neuroticism was significantly related to both self- and spouse reports of marital and life satisfaction and to self-reports of job satisfaction. The associations between the different satisfaction scales revealed an interesting pattern: Self-reported life satisfaction was positively and significantly predicted by both job satisfaction ($r = .24$) and marital satisfaction ($r = .53$) self-reports, but the domain satisfaction scores were not related to each other ($r = .00$). These findings are quite consistent with recent meta-analytic findings (Heller et al., 2004) and are supportive of a model in which job satisfaction and marital satisfaction jointly determine a person's life satisfaction (i.e., a bottom-up model).

Tests of the Hypotheses

In the first hypothesis (H-1), we predicted the existence of substantial within-individual variation in life satisfaction. To test this hypothesis and to partition life-satisfaction variance into within-individual and between-individual variance components, we fitted an unconditional means model. This model is conceptually equivalent to a one-way ANOVA model, with life satisfaction as a dependent variable and person as the independent variable.

Both within- and between-individual variance estimates in life satisfaction (.10 and .45, respectively) were significantly different than 0; the between-individual variance component was approximately 4.5 times the size of the within-individual variance. That is, as shown in the top row of Table 2, within-individual variance accounted for approximately 18% of the overall variance in life satisfaction. For comparison purposes, Table 2 also presents the proportion of within-subject variability (out of the total variance) in domain satisfaction, self-esteem, and mood. It is noteworthy that the proportion of within-subject variance for life satisfaction was

Table 1
Means (*M*), Standard Deviations (*SD*) and Intercorrelations Across Individuals for All of the Initial Study Variables

	M	*SD*	1	2	3	4	5	6	7
1. Neuroticism (self-ratings)	2.77	.72	1.00						
2. Job Satisfaction (self-ratings)	3.91	.80	−.31**	1.00					
3. Job Satisfaction (spouse ratings)	3.41	.91	−.13	.74**	1.00				
4. Marital Satisfaction (self-ratings)	4.23	.89	−.40**	.00	−.12	1.00			
5. Marital Satisfaction (spouse ratings)	4.12	.80	−.42**	.00	.08	.63**	1.00		
6. Life Satisfaction (self-ratings)	3.61	.81	−.43**	.24*	.10	.53**	.39**	1.00	
7. Life Satisfaction (spouse ratings)	3.45	.77	−.41**	.16	.23*	.30*	.62**	.40**	1.00

Notes: $N = 82$ for correlation including self-reports only, $N = 76$ for correlations based on spouse reports.
*$p < .05$. **$p < .01$.

Table 2
Proportion of Within-Subject Variability in Experience-Sampled Scores

Variable	Proportion Within-subject
Life Satisfaction	18%
Marital Satisfaction	13%
Job Satisfaction	17%
Self-Esteem	19%
Negative Affect	57%
Positive Affect	42%

Notes: These proportions were obtained by estimating a null model that computes the average score for each individual and the residual within-individual variance at Level 1 and the overall average scores and the residual between-individual variance at Level 2.

very similar to that for self-esteem and job satisfaction and higher than that for marital satisfaction (but see Ilies & Judge [2002] for a substantially larger proportion of 36% for within-subject variability in job satisfaction). In contrast, both positive and negative affect—especially the latter—showed considerably larger proportions of within-subject variability than life satisfaction (42% and 57%, respectively). Thus, our data indicate that purely affective variables show relatively greater within-person variation than constructs containing a substantial cognitive component (i.e., self-esteem and various types of satisfaction). At the same time, however, these latter variables also clearly display a substantial amount of intra-individual variability.

Table 3 reports the results of a concurrent multilevel regression in which life satisfaction was regressed on domain satisfaction at Level 1, and at Level 2— individuals' slopes and intercepts were regressed on Neuroticism. In the top row we present the findings for job satisfaction, while in the bottom row we present our findings for marital satisfaction. In support of H-2 and H-3, both job satisfaction and marital satisfaction were positively and significantly associated with life satisfaction at the within-individual level. The domain satisfaction scores explained 13% (job) and 18% (marriage) of the within-individual (level 1) variance in life satisfaction. Noteworthy

Table 3
Concurrent Multilevel Regression for Predicting Life Satisfaction From Job Satisfaction or Marital Satisfaction (With Neuroticism [N] as a Moderator)

	Predictor			
Level 1 predictor	Intercept	Neuroticism	Domain Satisfaction	N × JS/ MS
Job Satisfaction (JS)	3.84**	− .41**	.23**	.04
Marital Satisfaction (MS)	3.84**	− .41**	.38**	− .01

Notes: *$p < .05$. **$p < .01$.
$N = 76$ individuals (2,168–2,169 observations). The models controlled for autocorrelation in the Level 1 residuals. Job and marital satisfaction explained 13% and 18% of the within-individual (Level 1) variance in life satisfaction, respectively; Neuroticism explained 19% of the between-individual (Level 2) variance in life satisfaction (these pseudo-R^2 values were computed as the proportional reduction in the variance component of Level 1 and in Level 2 intercepts after the introduction of predictors; see Hofmann, Griffin, & Gavin, 2000, and Snijders & Bosker, 1999).

here is our centering approach in the multilevel analyses (we centered the predictor scores relative to each individual's mean on the specific score), which eliminates any concerns that the within-individual associations are due to individual differences in satisfaction. Consistent with previous research, we obtained a significant negative main effect for Neuroticism; 19% of the differences between individuals in life satisfaction were explained by individual differences in this trait. However, contrary to our moderation hypotheses (H-4, H-5), Neuroticism did not moderate the within-individual associations among domain satisfaction and life satisfaction.

Table 4 reports the results of a bottom-up lagged[4] multilevel regression in which life satisfaction at night was regressed on same-day

4. To further ascertain the hypothesized causal associations in both the bottom-up and top-down lagged analyses, we conducted additional analyses (not reported in Tables 4 and 5) in which we controlled for previous levels of the dependent variable. However, the AR(1) specification and the lagged criteria inclusion are somewhat redundant. Whereas including both controls does not impact the substantive estimates, the double control strategy makes the Level 1 regression coefficients for the lagged criteria scores uninterpretable due to interference with the AR(1) term, and also renders the Level 1 pseudo-R^2 values hard to interpret. For

Table 4
Bottom-Up Multilevel Regression for Predicting Life Satisfaction at Night From Same-Day Job/Marital Satisfaction in the Afternoon (With Neuroticism [N] as a Moderator)

	Predictor			
Level 1 predictor	Intercept	Neuroticism	Domain Satisfaction	N × JS/ MS
Job Satisfaction (JS)	3.85**	− .42**	.10**	.10**
Marital Satisfaction (MS)	3.85**	− .42**	.07	− .02

Notes: *$p < .05$. **$p < .01$.
$N = 75$ individuals (941 observations). Life satisfaction was measured at night; job and marital satisfaction were measured in the afternoon. The models controlled for autocorrelation in the Level 1 residuals. For both marital and job satisfaction, the slopes were fixed in order for the job-satisfaction model to converge or because the null hypothesis that the marital-satisfaction slopes variance equals zero could not be rejected ($p = .23$). Job satisfaction accounted for a 3% reduction in the Level 1 residual variance; the pseudo-R^2 for marital satisfaction was essentially zero. The Level 2 intercept pseudo-R^2 was 19% for both models. That is, Neuroticism explained 19% of the between-individual (Level 2) variance in life satisfaction at night.

job satisfaction or marital satisfaction in the afternoon at Level 1, and at Level 2— individuals' slopes and intercepts were regressed on Neuroticism. Similar to Table 3, in the top row we present the findings for job satisfaction, while in the bottom row we report the results for marital satisfaction. H-2 was supported in that job satisfaction in the afternoon significantly predicted life satisfaction at night. H-3 received only marginal support in that the coefficient for marital satisfaction only approached significance ($p < .10$). Finally, support was obtained for H-4: as expected, those high on Neuroticism exhibited a stronger positive association between job and life satisfaction compared to their more emotionally stable peers. However, H-5 was not supported in that the magnitude of

instance, when predicting life satisfaction at night with job and marital satisfaction in the afternoon (see Table 4), previous night's life satisfaction predicts current life satisfaction positively (betas are .09 and .11, both significant at $p < .01$) when the model does not control for AR(1), but these coefficients become negative ($-.22$ and $-.23$) when we control for AR(1). Consequently, following the guidance of Daniel Russell, we opted not to pursue this approach any further.

Table 5
Top-Down Multilevel Regression for Predicting Job/Marital Satisfaction in the Afternoon From Previous Night's Life Satisfaction (With Neuroticism [N] as a Moderator)

	Predictor			
Criterion	Intercept	Neuroticism	Life Satisfaction (LS)	N × LS
Job Satisfaction	3.66**	− .30*	.09	.00
Marital Satisfaction	4.16**	− .32**	.07*	− .02

Notes: *$p < .05$. **$p < .01$.
$N = 75$ individuals (795–796 observations). Life satisfaction was measured at night; job and marital satisfaction were measured on the next day, in the afternoon. The models controlled for autocorrelation in the Level 1 residuals. The Level 1 pseudo-R^2 was 6% and 4% for predicting job and marital satisfaction, respectively. The Level 2 intercept pseudo-R^2 was 6% and 8% for predicting job and marital satisfaction, respectively. That is, Neuroticism explained 6% and 8% of the between-individual (Level 2) variance in job satisfaction and marital satisfaction, respectively.

the association between marital satisfaction and life satisfaction was not influenced by Neuroticism.

Table 5 reports the results of a top-down, lagged, multilevel regression in which job or marital satisfaction (assessed in the afternoon) were regressed on the previous night's life satisfaction at Level 1, and at Level 2—individuals' slopes and intercepts were regressed on Neuroticism. Similar to Tables 3 and 4, in the top row we present the findings for job satisfaction, while in the bottom row we report the results for marital satisfaction. In support of H-6a and H-6b, both afternoon job satisfaction and marital satisfaction (partial support for the former model, $p < .10$) were significantly positively associated with previous night's life satisfaction. However, the moderation effect for Neuroticism was again not supported, as evident in the two nonsignificant interaction coefficients.[5]

5. Following a suggestion by Daniel Russell, we also investigated the moderating role of subsample (i.e., whether the respondent was in the first or second batch of participants) and gender in the various concurrent and lagged associations between domain and life satisfaction. Because only one of these 12 exploratory models was significant, we do not pursue these analyses any further.

DISCUSSION

The current study was conducted to increase our understanding of the temporal process of life satisfaction as it unfolds in a natural context. Using a diary design and multilevel modeling, we examined the magnitude, antecedents, and consequences of intra-individual variation in life satisfaction.

Our findings indicate that a substantial proportion of the variance in life satisfaction (approximately 18%) lies at the within-individual level. It should be noted that this variance has been almost completely neglected by previous research. This amount of variation is similar in magnitude to the related construct of self-esteem although it clearly is less than the variability exhibited by the two major dimensions of mood (i.e., positive and negative affect). These findings are entirely consistent with both CAPS and the judgment approach to attitudes in that they suggest that different situations are associated with different levels of life satisfaction, presumably because of the activation or salience of different cognitive or affective representations.

Interestingly, in this study, there was slightly more within-subject variability in life satisfaction than in domain satisfaction. This may reflect the fact that life satisfaction judgments are based on many different pieces of information (including job satisfaction, marital satisfaction, and mood); consequently, changes in any one of these contributory factors increases the likelihood of fluctuations in life satisfaction. Alternatively, however, one might argue that life satisfaction should include more between-subject variability than job satisfaction because of the larger role played by personality factors in the former than in the latter (Heller et al., 2004; consistent with this argument, see also the large proportion of within-subject variability in job satisfaction reported by Ilies & Judge [2002]). Moreover, the broader and less concrete nature of life satisfaction judgments may render them more susceptible to personality influences and less susceptible to objective or situational influences (see also Oishi & Diener, 2001). Finally, these alternative mechanisms may be operating simultaneously, thereby leading to fairly similar estimates for intra-individual variability in domain and life satisfaction. In any case, the findings reported here support the notion that life satisfaction can be meaningfully studied at a state level; the portioning of variance in life and domain satisfaction into within-person and between-person components represents an interesting area for future research.

However, change per se is ambiguous, and it still is possible that this variation reflects nothing more than measurement error or transient error, rather than meaningful fluctuations in satisfaction; accordingly, we also examined antecedents and consequences of this variation. Our findings indicate that daily changes in both job and marital satisfaction are significantly related both concurrently and over time (only marginally for the lagged effect of marital satisfaction; see Table 4) to intra-individual fluctuations in life satisfaction. We also found that life satisfaction ratings influenced next day's marital satisfaction and (marginally) job satisfaction. Again, we emphasize that due to the use of mean centering in the multilevel analyses, it is safe to conclude that these associations are not caused by individual differences in satisfaction but rather reflect true within-individual effects. Consequently, our findings testify to the contextually sensitive, yet systematic, nature of life satisfaction judgments (for experimental evidence, see Oishi et al., 2003).

Contrary to our predictions, in five out of six models tested, Neuroticism did not significantly moderate the associations between: (a) job satisfaction and life satisfaction or (b) marital satisfaction and life satisfaction. Our nonsignificant findings indicate that the moderating role of personality is either weak or nonexistent. It must be emphasized, however, that whereas previous research has examined affective reactivity (Gable et al., 2000; Suls et al., 1998), the focus of the current study was on more cognitive variables (i.e., attitudinal reactivity). In any case, we call for additional work to examine the cross-level moderating role of personality variables. This line of research is important as it may shed light on one psychological mechanism—differential reactivity—that can partly explain the dispositional source of life satisfaction (Heller et al., 2004).

More conceptually, our findings are consistent with recent recommendations in the well-being literature (Diener et al., 1999; Heller et al., 2004) for integrative perspectives combining dispositional (i.e., top-down) and situational/contextual (i.e., bottom-up) approaches to life satisfaction. More specifically, our findings support both the top-down and bottom-up approaches in that they (a) show a lagged effect that goes from domain satisfaction to life satisfaction (a bottom-up process) and (b) demonstrate a lagged effect that goes from life satisfaction to domain satisfaction (a top-down process).

Limitations and Future Research

Small sample size. Our sample size ($n = 76$) was relatively small, which raises the question of whether the lack of significant findings for our tests of interactions may be due to low statistical power. To explore this issue, we conducted post-hoc power analyses using the Power IN Two-level designs program (PINT) written by Bosker, Snijders, and Guldemond (2003; see also Snijders & Bosker, 1993, 1999). For the concurrent analyses, for example, at alpha = .05, our design had a power of .93 to detect a small-to-moderate cross-level interaction between job satisfaction and Neuroticism and a power of .99 to detect a moderate-to-large effect.[6] For the cross-level interaction between marital satisfaction and Neuroticism, the power to detect a small-to-moderate effect at alpha = .05 was .66, and the power to detect a moderate-to-large effect was .93. On the basis of these post-hoc power analyses, it is possible that future studies using higher numbers of respondents (100 or more) and 30 or more observations per individual may be more likely to detect the cross-level effect of Neuroticism on the marital satisfaction–life satisfaction relationship, if such an effect indeed exists at the population level. However, for the cross-level influence on the job satisfaction–life satisfaction relationship, power does not seem to be a problem in our study. Furthermore, because the effective sample size at the within-individual level was large (Level 1 sample size $N = 795$–$2{,}169$), low power was not a concern for the within-individual analyses.

Homogeneous sample. As the participants in the current study do not represent a random sample of the overall married and fully employed adult population, it is important to assess the generalizability of our results to other types of respondents. As such, despite the variety of recruitment methods employed, our sample was predominately female, white, and Christian and with at least some college education. To examine this issue we compared our main between-subject variables (i.e., Neuroticism, job satisfaction, marital

6. In the absence of guidelines for defining a small/moderate/large cross-level effect for this type of design, we assumed that a cross-level interaction showing a .10 change (in standardized points) in the intra-individual slope for a standard deviation change in Neuroticism is small-to-moderate and an effect 50% larger (i.e., showing a .15 change) is a moderate-to-large effect.

satisfaction, and life satisfaction) with those from a longitudinal study of a large northeastern university's alumni sample (*N*s for the various variables range from 915–1,718; Brown, Heller, Ferris, & Keeping, 2005). *T*-tests and *F*-max analyses indicate that, with one exception, there were no statistically significant differences in means or standard deviations between the two samples; the one difference was that our sample was slightly higher in mean Neuroticism (Cohen's $d = .22$; $p < .05$). Taken together, these findings support the external validity of our study. Moreover, with respect to the within-individual analyses, both domain and life satisfaction ratings varied substantially within individuals (on average, 13%–18% of the total variance in satisfaction was within individuals).

Additional design issues. Our study is also somewhat limited in its focus on work and marriage domains; future research should examine the generalizability of our findings to additional domains (e.g., school satisfaction) and samples (e.g., nonmarried college students). Moreover, our correlational design does not enable strong causal inferences as there may be confounding third variables that may account for the within-individual associations. Finally, we acknowledge that our changing the instructions for the satisfaction variables may, to some extent, have introduced temporal variations in these measures. However, we believe that these observed fluctuations are systematic and meaningful because (a) fluctuations in satisfaction can be predicted from changes in other variables, and, (b) as expected, we see less fluctuation in satisfaction than in mood. So, even if our methodology somehow encourages fluctuations to occur, it also establishes that these fluctuations are meaningful, important, and worth studying.

This line of research can be extended in many other ways. Future research should extend our findings to examine the role of specific work and marital events in within-subject fluctuations in life satisfaction. However, this research would require the development of a taxonomy or theory of the psychological features of events (i.e., beyond valence and domain). In a related manner, additional research should investigate affective and cognitive mediators of both the concurrent and lagged associations between domain satisfaction and life satisfaction. Finally, based on findings indicating the role of affect in life satisfaction (for a review see Bless, 2001), future research should also examine the role of general positive and negative affect—as well

as more specific affects (e.g., sadness, anger, and joy)—in producing transient changes in life satisfaction.

Conclusion

Despite the aforementioned limitations and the obvious need for additional research, we feel the current study contributes to the literature on subjective well-being. Our results indicate that ignoring within-subject variation in life satisfaction—by averaging it out—may have limited progress in our understanding of this construct; that is, we argue that traditional research on trait-like life satisfaction needs to be supplemented with more dynamic research designs examining the process of life satisfaction as it unfolds naturally across time (for a similar recommendation, see also Diener, 1996). Furthermore, the empirical investigation presented herein supports a view of episodic life satisfaction in which individuals' evaluations of specific aspects of their lives (job and marriage in our study) throughout the day contribute to their more general daily well-being, as reflected in life satisfaction ratings. Our hope is that these findings will stimulate new work that further explicates the nature, sources, and consequences of intra-individual variations in life satisfaction.

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