Does Leisure Time as a Stress Coping Resource Increase Affective Complexity?
Applying the Dynamic Model of Affect (DMA)

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Abstract

Affective complexity, a manifestation of psychological well-being, refers to the relative independence between positive and negative affect (PA, NA). According to the Dynamic Model of Affect (DMA), stressful situations lead to highly inverse PA-NA relationship, reducing affective complexity. Meanwhile, positive events can sustain affective complexity by restoring PA-NA independence. Leisure, a type of positive events, has been identified as a coping resource. This study used the DMA to assess whether leisure time helps restore affective complexity on stressful days. We found that on days with more leisure time than usual, an individual experienced less negative PA-NA relationship after daily stressful events. The finding demonstrates the value of leisure time as a coping resource and the DMA's contribution to coping research.

KEYWORDS: Leisure time, coping, The Dynamic Model of Affect (DMA), daily stress, within-person change

Accumulating evidence shows that daily stressors have powerful impact on health and well-being (Almeida, 2005; Lazarus, 1999; Zautra, 2003). In fact, some studies found that daily stressors have a stronger impact on health than major life events or chronic stressors (Jandorf, Deblinger, Neale, & Stone, 1986; Weinberger, Hiner, & Tierney, 1987). Therefore, recovery from and resilience to daily stressors is crucial for health and well-being. To hasten recovery and to maximize resilience, it is important to sustain affective complexity, which refers to simultaneous presence of and relative independence between positive affect (PA) and negative affect (NA) (Ong, Bergeman, & Bisconti, 2004 NOT IN REFS; Reich, Zautra, & Davis, 2003). According to the Dynamic Model of Affect (DMA) (Zautra, Affleck, Davis, Tennen, & Fasman, 2007), PA and NA are relatively independent in stress-free situations but are highly inversely related in stressful situations. Meanwhile, positive events can help restore PA-NA independence, facilitating recovery from stressful experience (Zautra, Affleck, Tennen, Reich, & Davis, 2005).

The DMA holds potential for making significant contributions to research on leisure as a coping resource. The theory can be used to examine the effectiveness of stress coping resources. If a coping resource is effective, one manifestation is helping individuals retain affective complexity by turning a highly negative PA-NA relationship caused by stressful events into a less negative one. Additionally, a good number of positive events measured by Zautra and colleagues (Zautra et al., 2007; Zautra et al., 2005) are leisure activities, e.g., playing a sport with friends, going shopping for pleasure. Leisure has been identified as a coping resource by both stress and leisure researchers (Coleman & Iso-Ahola, 1993; Reich & Zautra, 1981). However, Zautra et al. did not discuss the implications of their findings for coping research, nor did they mention the potential contribution of leisure to regaining affective complexity after stressful experiences.

Leisure researchers have demonstrated the value of leisure as a coping resource (Iwasaki & Schneider, 2003), by studying participation in particular *activities* (e.g., social gatherings, exercise; Caltabiano, 1995; Kirkcaldy & Cooper, 1993) and assessing the underlying psychosocial mechanisms of leisure as a coping resource (Iso-Ahola & Park, 1996; Iwasaki & Mannell, 2000). There has also been evidence that the *time* aspect of leisure contributes to coping as well, e.g., leisure time sufficiency (Heintzman & Mannell, 2003), satisfaction with time for leisure (Bedini, Gladwell, Dudley, & Clancy, 2011). However, it is unknown whether the amount of leisure time a person has helps the person cope with stress. This gap needs to be filled, because leisure time availability is an important marker of quality of life (Robinson, 1995) and has been linked to more frequent experience of PA (Qian & Yarnal, 2011). Moreover, previous research on leisure coping mainly examined *between*-person difference, i.e., comparing coping outcomes of people with more leisure to those with less. Between-person comparison has contributed to our knowledge of leisure as a coping resource. Meanwhile, more research is also needed to study leisure coping as a *within*-person phenomenon, i.e., whether a person copes better with more leisure time than with less, given that stress coping is inherently a within-person process (Caspi, Bolger, & Eckenrode, 1987). In short, studying leisure as time availability and focusing on leisure coping as a within-person process will extend our knowledge of leisure as a coping resource.

Therefore, the purpose of the current study is to use the Dynamic Model of Affect to examine whether leisure time, as a coping resource, helps individuals regain affective complexity on stressful days.

Literature Review

Daily Stress and its Affective Outcomes

Daily stressors are a different form of stress from major life events and chronic stressors (Kanner, Coyne, Schaefer, & Lazarus, 1981). According to Almeida (2005), daily stressors are "routine challenges of day-to-day living" (p. 64), e.g., meeting work deadlines, commuting hassles. Daily stressors also include "unexpected small occurrences…that disrupt daily life" (p. 64), such as arguments with a family member or a malfunctioning household appliance. Using eight-day diary data collected from a national sample of adult Americans, Almeida, Wethington, and Kessler (2002) found that participants experienced at least one daily stressor on nearly 40% of the study days. On more than 10% of the study days, participants experienced multiple daily stressors.

Researchers have also studied affective outcomes of daily stressors. Empirical evidence suggests that daily stressors lead to a significant increase in negative affect (NA) (Almeida & Kessler, 1998; Bolger, DeLongis, Kessler, & Schilling, 1989; Eckenrode, 1984). Other researchers identified a small to moderate decrease in positive affect (PA) after daily stressful experiences (Neale, Hooley, Jandorf, & Stone, 1987; Repetti, 1993; Watson, 1988). More recently, researchers examined PA and NA as stress outcomes simultaneously. The consistent finding is that daily stress can increase NA and reduce PA at the same time (David, Green, Martin, & Suls, 1997; Stawski, Sliwinski, Almeida, & Smyth, 2008; van Eck, Nicolson, & Berkhof, 1998).

The impact of daily stress on PA and NA led researchers to ponder how PA and NA are related to each other in stressful situations. In other words, rather than examining PA and NA as two separate stress outcomes, the relationship between the two becomes the focal outcome. Intrigued by this line of thinking, Zautra and colleagues developed the Dynamic Model of Affect (Reich et al., 2003) to explain the changing relationship between PA and NA in stress-free and stressful situations.

The Dynamic Model of Affect (DMA)

The essence of the DMA lies in the concept of "affective complexity" (Zautra, et al., 2005, p. 1526), which is a manifestation of psychological well-being (Ong, et al., 2004). Affective complexity refers to the extent to which PA and NA are differentiated and simultaneously represented (Ong et al., 2004). Relative independence between PA and NA signals high affective complexity, while highly inverse PA-NA relationship indicates low affective complexity. Affective complexity is influenced by contextual factors (Zautra, Potter, & Reich, 1997). Indeed, when developing the DMA, Zautra and colleagues emphasized the importance of understanding the effect of contextual factors, as people process information about their environment and their affective reactions to that environment (Reich et al, 2003; Zautra et al., 1997). The ability to process information resides on a continuum, with "simple, unitary, undifferentiated, and unidimensional" on one end and "complex, highly

differentiated, and multidimensional" on the other end (Reich et al., 2003, p. 70). A stress-free situation allows complex information processing, enabling individuals to process both positive and negative affective inputs from the situation, and then to develop adaptive responses to the situation. In time of low stress, then, affective complexity is high, with PA and NA relatively independent (i.e., little correlation between the two). A stressful situation, however, reduces affective complexity and information processing ability, with narrowed attention concentrated on the immediate demands of the situation, "preferentially process[ing] negative information at the expense of positive" (Zautra et al., 2005, p. 1517). Such process, while enabling quick adaptation to the stressful situation, also results in a narrowed affective space, in which PA and NA "collapse into a simple bipolar dimension" and become highly inversely related (Reich et al., 2003, p. 70). In short, the DMA, emphasizing the effect of contextual factors on information processing ability, demonstrates how affective complexity, operationalized as the relationship between PA and NA, changes in stress-free and stressful situations.

Reich, Zautra, and colleagues have studied stress and affective outcomes in multiple studies that differ in sample characteristics, methodologies and time frames of measurement (Reich et al., 2003). Yet, there is a "high degree of agreement across the different studies," providing support for the DMA (p. 71). It is also worth pointing out that Zautra and colleagues studied stress as stressful events (i.e., concrete stressors) rather than perceived stress (i.e., stress as a psychological feeling). For example, Zautra et al. (1997) studied women with rheumatoid arthritis over a period of 12 weeks. They reported that PA and NA were relatively independent in weeks with few stressful events. However, the PA-NA relationship became highly negative in weeks with many stressful events. In a laboratory study with a sample of older adults, Zautra, Reich, Davis, Nicolson, and Potter (2000) assigned a stressful task (giving a speech) to the participants, and measured their PA and NA four times: before the task; immediately after, 40 minutes after, and 60 minutes after the task. The results showed that PA and NA had a strong inverse relationship only immediately after the task, and were independent before the task and 60 minutes after it. Later on, Zautra, Berkhof, and Nicolson (2002) studied workplace stress with 85 males using experience sampling methods, and found that PA-NA relationship was significantly more negative in moments of high work stress than in those of low work stress. In summary, these studies showed that PA and NA are highly negatively related in stressful situations but largely independent in the absence of stress, as predicted by the DMA. As such, individuals tend to demonstrate higher affective complexity in less stressful situations but significantly lower affective complexity in stressful situations.

More recently, Zautra et al. (2005) applied the DMA to positive events. The researchers hypothesized that positive events should "relax information demands" (p. 1518) and increase information processing ability, resulting in uncoupling—separating PA and NA that are inversely coupled under stress and restoring their independence (Reich et al., 2003). To test the hypothesis, the researchers analyzed data from a study of 93 adults with rheumatoid arthritis. The participants reported experiences of both positive and negative events in a diary at the end of each day for 30 days. Controlling for the number of positive events, the PA-NA rela-

tionship was significantly more negative on days with more negative events than usual. Meanwhile, PA and NA were relatively independent from each other on days with more positive events than usual, controlling for the number of negative events. The finding supports the hypothesis that positive events can help restore the independence between PA and NA, which is important to increasing affective complexity. The finding also echoes a suggestion by Reich et al. (2003) that it is important to investigate processes that can uncouple NA and PA in time of stress in order to facilitate psychological recovery and to sustain affective health.

Given the strengths and implications of the DMA, it is surprising that no study has used the DMA to examine the effectiveness of stress coping resources. That is, one way to examine the effectiveness of a coping resource is to test whether the resource helps individuals increase affective complexity by uncoupling NA and PA in time of stress. In order to fill the void in the literature and to extend the DMA to coping research, the current study focuses on one coping resource—leisure time, and examines whether having more leisure time than usual helps restore affective complexity on days with relatively more daily stressors.

Leisure Time as a Coping Resource and Its Affective Outcomes

There has been extensive research on the trend of leisure time availability in the U.S., Canada, Australia, and selected European countries (Bittman, 1998; European commission, 2004; Robinson & Godbey, 1999; Zuzanek & Smale, 1997). Researchers have also studied the costs and benefits of leisure time availability. For example, lack of leisure time has been related to negative psychological outcomes (Beck & Arnold, 2009; Zuzanek, 1998), and leisure time availability has been identified as an important parameter of quality of life (Robinson, 1995). Meanwhile, having too much leisure time can result in *increased* stress, feelings of boredom, and deviant behaviors (Barnett, 2005; Caldwell, Smith, & Weissinger, 1992; Iso-Ahola & Weissinger, 1990; Patry, Blanchard, & Mask, 2007; Rojek, 1997). Clearly, leisure time (or lack thereof) has consequential psychological outcomes and deserves attention.

Most studies of leisure as a coping resource either examined leisure as participation in particular *activities* (e.g., Caltabiano, 1995; Kirkcaldy & Cooper, 1993; Patterson & Coleman, 1996; Zuzanek, Robinson, & Iwasaki, 1998) or focused on the underlying psychosocial mechanisms of leisure coping (e.g., Iso-Ahola & Park, 1996; Iwasaki & Mannell, 2000). At the same time, some researchers have paid attention to the *time* aspect of leisure as a coping resource. For example, Heintzman and Mannell (2003) studied the effect of leisure time sufficiency, along with leisure motivation and participation, on spiritual well-being by surveying 248 Canadian adults. They found that leisure time sufficiency protected spiritual well-being by facilitating the spiritual functions of leisure, and the effect was particularly strong among individuals with high time pressure. Later on, Bedini et al. (2011) showed that satisfaction with time for leisure, along with satisfaction with leisure experience, contributed to quality of life by reducing perceived stress among informal caregivers. Korpela and Kinnunen (2011) reported that time spent in nature helped individuals recover from work demands by providing relaxation and enhancing life satisfaction. Additionally, time spent exercising and being outdoor was rated as highly effective in facilitating recovery from work stress.

These past studies demonstrated the promise of the time aspect of leisure in coping research. However, leisure time sufficiency, satisfaction with time for leisure, and time spent in particular leisure settings are different from leisure time availability—the amount of time an individual allocates to leisure. Therefore, while past studies contributed to our understanding of leisure time as a coping resource, they did not tell us much about whether the amount of time an individual allocates to leisure matters to stress coping. Additionally, the above three studies all conducted between-person comparison. Studying how the effectiveness of leisure time as a coping resource differs between individuals is important, but does not tell a complete story. It is equally important to understand how the stress coping process unfolds *within*-person over time (Caspi et al., 1987; DeLongis et al., 1998). That is, more knowledge will be added by assessing whether the protective effect of leisure time as a coping resource is stronger when a person has a stressful day than when the same person has a stress-free day. Furthermore, the focus of previous research on spiritual well-being, quality of life and recovery from work demands as coping outcomes is less relevant to studying affect as an outcome of coping with daily stressors.

There has been scattered research on affective outcomes of leisure coping. For example, Iwasaki and colleagues (Iwasaki, 2001a; Iwasaki & Mannell, 2000) studied stress severity and the underlying psychosocial mechanisms of leisure as a coping resource among Canadian undergraduate students. The researchers examined both positive and negative emotions as immediate coping outcomes and found that leisure, via its underlying psychosocial mechanisms, reduced negative emotions and increased positive emotions after students experienced stressors of different types. In another study with police and emergency response service workers in a Canadian city, Iwasaki, Mannell, Smale, and Butcher (2002) studied both immediate and long-term outcomes of using leisure to enhance mood as a coping strategy. Mood enhancement incorporates both increasing positive mood and reducing negative mood, and this mood regulation through leisure was perceived by study participants as beneficial to stress reduction, coping effectiveness, and coping satisfaction (i.e., immediate coping outcomes). Meanwhile, mood enhancement through leisure did not have a long-term impact on workers' health, either physical or mental. These and other research findings prompted Kleiber, Hutchinson, and Williams (2002), in their conceptual paper on the effect of leisure as a coping resource, to suggest that leisure is a resource in emotion-focused coping. The researchers also proposed four ways in which people use leisure to cope with stress, one of which is diverting people's attention away from stress and generating positive affect.

More recently, Iwasaki, MacKay, and MacTavish (2005), in a qualitative study with professional managers, found that female but not male managers "directly and explicitly" linked their leisure experience to positive affect (p. 22). Later on, Patry et al. (2007) developed a scale to measure two types of leisure coping styles: leisure as a planned breather and leisure as avoidance. The former style, self-regulatory and adaptive, is related to increase in positive affect. The latter style, maladaptive and related to escapism, is associated with decrease in positive affect and increased negative affect. By paying attention to both positive and negative

affect in the leisure coping process, these studies advanced our knowledge about affective outcomes of leisure coping. However, by studying positive and negative affect as separate coping outcomes, this line of research reveals little about the effect of leisure on affective complexity, i.e., whether leisure helps restore affective complexity on stressful days by restoring the independence between positive and negative affect.

Study Purpose and Research Questions

Given the significance of the DMA and identified gaps in the literature, the purpose of the current study is to use the DMA as a theoretical framework to explain the effect of leisure time availability as a stress coping resource. Specifically, we asked two within-person research questions. The first RQ (RQ1) examined the adverse impact of daily stress: Do individuals demonstrate lower affective complexity, operationalized as a more negative PA-NA relationship, on days with more daily stressors than usual (controlling for leisure time)? The second RQ (RQ2) examined the uncoupling effect of leisure time availability: do individuals demonstrate higher affective complexity, operationalized as a more independent PA-NA relationship, on days with more leisure time than usual (controlling for daily stress frequency)?

Methods

Sample and Procedure

The data for the current study comes from the National Study of Daily Experiences (NSDE; Almeida et al., 2002), the daily diary interview portion of the Midlife Development in the United States (MIDUS) Survey. NSDE collected data from a national sample of English-speaking adult Americans (N=2022, age range: 33-84, 57.2% female). At the end of each day for eight consecutive days, participants completed a telephone interview, answering questions about their experiences of stressful events, time use behaviors, physical symptoms, PA and NA, yielding a total of 16176 completed interviews (2022 respondents x 8 interview days). Each participant received $25 for participating in the NSDE (for details regarding data collection, see Almeida, McGonagle, & King, 2009). NSDE data collection was spread across an entire year, and consisted of separate "flights" of interviews, with each flight representing the eight-day interview sequence. Overall, data on daily stress frequency, leisure time availability, PA and NA are available on more than 92% person-days.

Measures

Daily stress frequency. Frequency of daily stressors was assessed through the semistructured Daily Inventory of Stressful Events (DISE, Almeida et al., 2002). The inventory consists of seven stem questions asking whether the following seven types of stressors occurred within the previous 24 hours: argument, tension (could have had an argument but avoided), work stressors, home stressors, network stressors (stressors that involve the respondent's network of relatives or close friends), discrimination stressors, and any other stressors. For each daily interview,

respondents received a value of 1 for the relevant stressor domain if answering affirmatively to the stem question, and 0 otherwise. The number of daily stressors, ranging from 0 to 7, was calculated by summing the values of the seven stem questions on each interview day for each respondent.

To focus on the within-person process of stress and coping, it is necessary to form the daily change scores of stress frequency and the other within-person variables for each participant across all study days (for a detailed discussion of the importance of doing so, see Qian et al., under review). To do so, we first calculated each participant's average daily stress frequency across the study days using SAS. Then for each study day, we subtracted personal average from the daily value to get the daily change score. In essence, the daily change score is the disparity between daily value and personal average, representing fluctuation in stress frequency within-person over days. The daily change score of stress frequency is also known as "person-centered" daily stress frequency (Zautra et al., 2005, p. 1524). A positive person-centered score represented a day with above-average stress frequency for a participant. A negative person-centered score represented a day of below average stress frequency for that participant.

Leisure time availability. Each day during the phone interview, participants were asked how much time they spent relaxing or doing leisure time activities in the previous 24 hours. If necessary, the interviewer would suggest to interviewees that leisure time activities refer to actively choosing to do things for oneself and may overlap with other categories of time use behavior, e.g., spending time with one's children. Participants then provided their own estimates of the amount of available leisure time in the previous 24 hours. In the current study, leisure time availability was constructed by calculating the number of *hours* each day that participants devoted to leisure activities, e.g., 0.5 means that a participant devoted 0.5 hour to leisure activities on a given day.

We also formed the daily change score of leisure time availability for each participant across all study days. First, we calculated each participant's average amount of leisure time across the study days using SAS. Then for each participant's every study day, we subtracted personal average from daily value to get the daily change score, which represented fluctuation in leisure time availability within-person over days. The daily change score of leisure time availability is also known as person-centered leisure time availability.

Daily positive affect (PA). Daily PA was assessed using 13 items. During each telephone interview, participants were asked whether in the previous 24 hours they felt: "in good spirits," "cheerful," "extremely happy," "calm and peaceful," "satisfied," "full of life," "close to others," "like you belong," "enthusiastic," "attentive," "proud," "active," and "confident." Participants indicated how much of the time during the previous 24 hours they experienced each PA item on a 0 to 4 point scale. The five response options were: none of the time, a little of the time, some of the time, most of the time, and all of the time. For each day in the daily study, the sum of these 13 PA items was calculated, giving PA the range of 0-52.

To form the daily change score of PA for each participant across all study days, we first calculated each participant's average PA across the study days using SAS. Then for each participant's every study day, we subtracted personal average from

personal value to get the daily change score, which represented fluctuation in PA within-person over days. The daily change score of PA is also known as person-centered PA.

Daily Negative Affect (NA). Daily assessment of NA was utilized as the outcome variable. The 14 items in the daily assessments asked participants whether in the previous 24 hours they felt: "restless or fidgety," "nervous," "worthless," "sad," "everything is an effort," "hopeless," "afraid," "jittery," "irritable," "upset," "angry," "frustrated," "ashamed," and "lonely." Participants indicated how much of the time during the previous 24 hours they experienced each NA item on a 0 to 4 point scale. The five response options were: none of the time, a little of the time, some of the time, most of the time, and all of the time. For each day in the daily study, the sum of these 14 NA items was calculated, giving NA the range of 0-56.

Data Analysis

The current study utilized multilevel modeling (MLM; Singer & Willet, 2003) to perform data analysis. According to Almeida and Wong (2009), the basic form of a multilevel model is as follows:

$$\text{Level 1: Outcome}_{ij} = \beta_{0j} + \beta_{1j}\text{Predictor}_{ij} + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + u_{0j}$$
$$\beta_{1i} = \gamma_{10} + u_{1j}$$

At level 1, the outcome is expressed as a function of a within-person intercept, a within-person predictor and a within-person error term. At level 2, the within-person intercept and coefficient are respectively expressed as a function of a fixed intercept and a between-person error term. In this way, MLM is able to include predictors and to partial variance at both within- and between-person levels (Sibthorp, Witter, Wells, Ellis, & Voelkl, 2004). Additionally, MLM treats variables as random rather than fixed effect, thus accounting for "the influence of [participants] on their repeated observations" and explaining "the correlational structure of longitudinal data" (Hedeker & Mermelstein, 2007, p. 183; see also Sibthorp et al., 2004). MLM also takes advantage of maximum likelihood estimation, which is "more precise and efficient than least squares estimation" (Reis & Gable, 2000, p. 211). Reich et al. (2003) forcefully argued that MLM is a well-established "cutting-edge tool" for further understanding "affective processes and their related variables" (p. 79).

We first calculated the intraclass correlation (ICC), which indicates the percentage of the variance in the outcome variable that is between-person (Hoffman & Stawski, 2009). A sufficient variation in the outcome variable at both intra-individual and inter-individual levels is necessary for further MLM analyses (Raudenbush & Bryk, 2002). Therefore, it is important to calculate ICC before conducting further analyses. We fit a baseline multilevel model (i.e., no predictor at either level) to calculate between- and within-person variances, which then allowed us to calculate how many percent of the variance in the outcome variable is between-person.

We then fitted two multilevel models. The first model answers research question one: Is there a more negative correlation between PA and NA on days with more daily stressors than usual (controlling for person-centered leisure time)? Following the approach of Zautra et al. (2005), we examined NA on a given day as a function of a within-person intercept, that day's person-centered daily stress frequency (DSF), that day's person-centered PA, the DSF×PA interaction, and a within-person error term at level 1 of the model. To control for the effect of leisure time, that day's person-centered leisure time availability was entered as a covariate. At level 2, the level-1 intercept and coefficients were respectively expressed as a function of a between-person intercept and a between-person error term.

We fitted the second multilevel model to answer research question two: Is there a less negative correlation between PA and NA on days with more leisure time than usual (controlling for person-centered daily stress frequency)? Again, we followed the approach of Zautra et al. (2005), and examined NA on a given day as a function of a within-person intercept, that day's person-centered leisure time availability (LTA), that day's person-centered PA, the LTA×PA interaction, and a within-person error term at level 1 of the model. To control for the effect of daily stress frequency, that day's person-centered daily stress frequency was entered as a covariate. At level 2, the level-1 intercept and coefficients were respectively expressed as a function of a between-person intercept and a between-person error term.

Results

Descriptive Statistics

Descriptive information of the variables was presented in Table 1. On average, the sample experienced fewer than one daily stressor (0.51) in a single day. However, there was a large variance (0.74) in daily stress frequency (DSF), indicating that there were many more daily stressors on some days than on other days. The sample mean of daily leisure time was a little over 3 hours, but again, the variance was large (2.75), implying that participants enjoyed a lot more leisure time on days than on others. Daily positive affect (PA) had a fairly high average (35.53) on a 0-52 scale, and the variation was modest (10.29). The mean of daily negative affect (NA) was low (2.72) on a 0-56 scale, but the variation was large, indicating that participants were in a negative affective state much more frequently on some days than on others.

In terms of correlations (Table 1), daily stress frequency was negatively correlated with daily leisure time availability and daily positive affect, and positively correlated with negative affect. Daily positive and negative affect were negatively correlated with each other. Daily leisure time availability was not significantly correlated with either positive or negative affect.

Table 1

Correlations between Variables and Descriptive Statistics of the Variables

	1.	2.	3.	4.
1. Daily Stress Frequency	1.00			
2. Daily Leisure Time Availability	-0.06*	1.00		
3. Daily Positive Affect	-0.22*	0.01	1.00	
4. Daily Negative Affect	0.38*	0.003	-0.49*	1.00
Mean	0.51	3.09	35.53	2.72
Standard Deviation	0.74	2.75	10.29	4.54

Notes: N=2,022, based on 14,885 stress days.
*$p<0.0001$.

Multilevel models

We first calculated intraclass correlation (ICC), and found that 54.72% of the variation in NA was between person and 45.28% within person. The rule of thumb is that at least 10% of the variance in the outcome variable should be within-person; otherwise, there is too little within-person variation to move on to within-person analysis (Mroczek & Griffin, 2007; Raudenbush & Bryk, 2002). The result here indicated that there was sufficient variation in the outcome variable at each level (between- and within-person) to conduct further analyses. We then fit the two multilevel models to answer the two research questions.

By fitting the first multilevel model, we tested the effect of person-centered DSF on the PA-NA relationship, controlling the effect of person-centered leisure time availability. As shown in Table 2, the interaction term (coefficient = -0.08, $p<0.0001$), though accounting for a moderate proportion of the variance in the outcome variable, was significant. The result means that, on days with more daily stressors than usual, the already negative PA-NA relationship became even more negative. In Figure 1, the slope of the two lines represents the PA-NA relationship, with a steeper slope portraying a more negative PA-NA relationship. The solid (dotted) line shows the PA-NA relationship on days with high (low) daily stress frequency. Clearly, the slope of the solid line is steeper, indicating that the PA-NA relationship was more negative on days with relatively high daily stress frequency.

We then fit the second multilevel model to test the effect of person-centered LTA on the PA-NA relationship, controlling the effect of person-centered daily stress frequency. As shown in Table 3, the interaction term (coefficient = 0.01, $p<0.05$) was significant, though it accounted for a moderate proportion of the variance in the outcome variable. The result means that, on days with more leisure time than usual, the PA-NA relationship became less negative. In Figure 2, the slope of the two lines represents the PA-NA relationship, with a steeper slope portraying a more negative PA-NA relationship. The solid (dotted) line shows the PA-NA relationship on days with high (low) leisure time availability. Clearly, the slope of the solid line is less steep, implying that the PA-NA relationship was less negative on days with relatively more leisure time.

Table 2

Unstandardized Estimates (and Standard Errors): The Effect of Person-Centered Daily Stress Frequency on the Relationship between Positive and Negative Affect

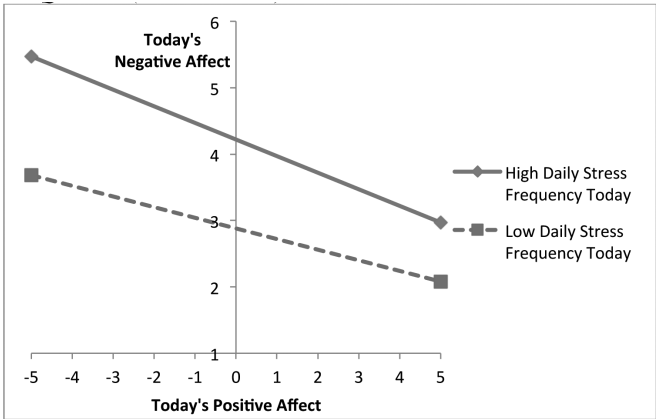|	Daily Negative Affect
Fixed Effects:	
Within-Person Intercept:	
Intercept	2.83 (0.08)*
Person-Centered Daily Stress Frequency (DSF):	
Intercept	1.32 (0.05)*
Person-Centered Daily Positive Affect (PA):	
Intercept	-0.18 (0.007)*
DSF×PA Interaction:	
Intercept	-0.08 (0.01)*
Person-Centered Leisure Time Availability as a Covariate:	
Intercept	-0.01 (0.01)
Random Effects:	
Variance, within-person intercept	13.18 (0.45)*
Variance, DSF	1.88 (0.15)*
Variance, PA	0.04 (0.003)*
Variance, DSF×PA interaction	0.05 (0.006)*
Within-person Variance	5.24 (0.08)*

Note: *$p < 0.0001$.

Figure 1. The Within-Person Relationship between Positive and Negative Affect was More Negative on Days with High (+1SD) Daily Stress Frequency (Solid Line) than on Days with Low (-1SD) Daily Stress Frequency (Dotted Line).

Table 3

Unstandardized Estimates (and Standard Errors): the Effect of Person-Centered Leisure Time Availability on the Relationship between Positive and Negative Affect

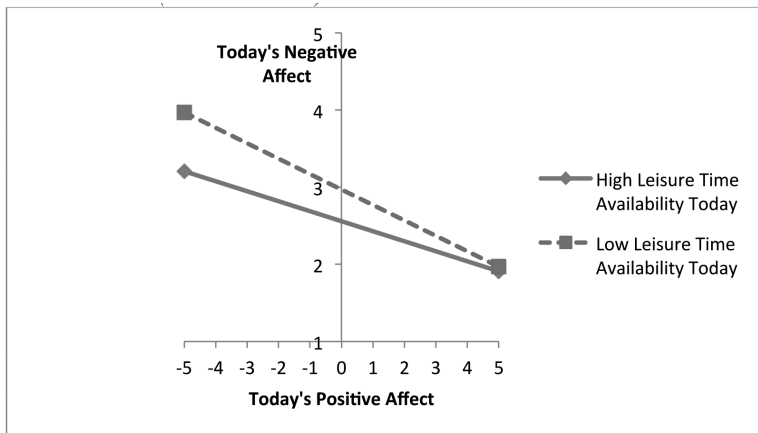|	Daily Negative Affect
Fixed Effects:	
Within-Person Intercept:	
Intercept	2.67 (0.03)**
Person-Centered Leisure Time Availability (LTA):	
Intercept	-0.04 (0.02)*
Person-Centered Daily Positive Affect (PA):	
Intercept	-0.2 (0.01)**
LTA×PA Interaction:	
Intercept	0.01 (0.005)*
Person-Centered Daily Stress Frequency as a Covariate:	
Intercept	1.37 (0.05)**
Random Effects:	
Variance, within-person intercept	13.07 (0.45)**
Variance, LTA	0.02 (0.006)**
Variance, PA	0.01 (0.002)**
Variance, LTA×PA interaction	0.008 (0.001)**
Within-person Variance	6.07 (0.08)**

Note: *$p<0.05$, **$p<0.0001$.

Figure 2. The Within-Person Relationship between Positive and Negative Affect was Less Negative on Days with High (+1SD) Leisure Time Availability (Solid Line) than on Days with Low (-1SD) Leisure time Availability (Dotted Line)

Discussion

The current study used the Dynamic Model of Affect (DMA) (Reich et al., 2003) to examine the effectiveness of leisure time as a stress-coping resource. We found that the slightly negative PA-NA relationship became highly negative on days when a participant experienced more daily stressors than usual, controlling for the effect of leisure time. The finding implies that, on days with relatively more daily stressors, participants' affective complexity was lower and affective experience simplified. Meanwhile, the PA-NA relationship became significantly less negative on days when a participant had more leisure time than usual, controlling for the effect of daily stress frequency. Hence, having relatively more leisure time on a stressful day makes it possible for participants to regain affective complexity on that day, facilitating psychological recovery from stress. Using the DMA as the theoretical framework presents a more dynamic view and a more comprehensive understanding of affective outcomes of daily stress, a step forward from previous research on daily stress that examined PA and NA as two separate stress outcomes (e.g., Almeida & Kessler, 1998; Bolger et al., 1989b; David et al., 1997; Eckenrode, 1984; Neale et al., 1987; Repetti, 1993; Stawski et al., 2008; van Eck et al., 1998; Watson, 1988). Our findings, supporting the DMA, have multiple implications for leisure research and the DMA.

Contributions to Understanding Leisure Time as a Coping Resource

The current study makes three contributions to the leisure literature. First, we focused on affect as a stress-coping outcome. Affect is important to study, because it is a cornerstone of well-being (Mroczek, 2001) and is sensitive to ebbs and flows in daily stressful events (Almeida et al., 2009). In their conceptual paper on leisure as a coping resource, Kleiber et al. (2002) eloquently argued for the importance of using leisure to experience positive affect after negative life events as a form of self-protection. In their study with emergency response personnel, Iwasaki et al. (2002) showed that using leisure to enhance mood contributed to immediate coping outcomes. The researchers regarded mood enhancement through leisure as a coping strategy, so they did not examine PA or NA as immediate coping outcome per se. However, the study did manifest that mood regulation through leisure generated immediate benefits. By studying affective complexity as a coping outcome on a daily basis, the current study provides empirical support for the proposition by Kleiber et al. and echoes Iwasaki et al. by confirming the immediate benefit of leisure in terms of affective regulation. Meanwhile, given the nature of the daily diary method, it is not feasible to examine the effect of leisure time as a coping resource on longer-term outcomes, e.g., mental health, quality of life.

In two other studies, Iwasaki and colleagues (Iwasaki, 2001b; Iwasaki & Mannell, 2000; Iwasaki et al., 2005) found that leisure coping was associated with increase in positive affect and decrease in negative affect. Recent theoretical advancement in affective complexity, however, has enabled us to move beyond studying positive and negative affect as separate coping outcomes and to assess affective complexity as the outcome instead. Greater affective complexity, conducive to sustaining affective health, facilitates psychological recovery from stressful events and manifests psychological well-being (Ong et al., 2004; Reich et al.,

2003). Hence, the current study fills a void in leisure literature by using the DMA, a dynamic model that operationalizes affective complexity as the changing PA-NA relationship, as our theoretical framework. The result shows that the highly inverse PA-NA relationship caused by frequent daily stressors became less negative on days with more leisure time than usual. The finding indicates that leisure time may "relax information demands" (Zautra et al., 2005, p. 1518) of daily stressful events and increase information processing ability, thus helping individuals gain greater affective complexity. This implication also resonates with the "leisure for self-restoration" (p. 225) proposition by Kleiber et al. (2002), although their focus on major life events is different from ours on daily stressors. In short, our study not only brings more attention to the importance of affect as an immediate coping outcome, but also uses an innovative theory to demonstrate the effectiveness of leisure time as a coping resource.

Our second contribution to leisure literature is emphasizing the time aspect of leisure as a coping resource. Research on leisure time (e.g., Robinson, 1995; Zuzanek, 1998) did not examine its psychological outcomes in the context of daily stressful events, while most studies of leisure coping (e.g., Iso-Ahola & Park, 1996; Iwasaki & Mannell, 2000; Patterson & Coleman, 1996) ignored the time aspect of leisure. Fortunately, there has been scattered evidence that leisure time sufficiency (Heintzman & Mannell, 2003), satisfaction with time for leisure (Bedini et al., 2011), and leisure time spent in natural settings (Korpela & Kinnunen, 2011) facilitate stress coping. However, the studies' respective focus on time pressure, caregiving stress, and work demands is not directly relevant to daily stressors. Additionally, none of the studies examined whether the amount of time allocated to leisure matters to stress coping. The current study filled this gap, and the promising finding implies that having leisure time provides individuals with an opportunity to achieve greater differentiation between PA and NA, hence bouncing back from affective simplification caused by daily stressful events. It may also be possible that leisure time functions as a "breather" for individuals to regulate their affect so as to realize simultaneous representation of PA and NA—a manifestation of affective complexity (Ong et al., 2004). Indeed, an earlier study (Patry et al., 2007) identified two leisure coping styles: leisure as a planned breather and leisure as avoidance. While the former style is adaptive and related to increased positive affect, the latter is maladaptive and related to worsened affective outcomes. In the current study, we focused on the within-person effect of leisure time, but did not assess whether the within-person effect differs between individuals. Is it possible that the effect of leisure time on affective complexity is stronger among busy individuals who usually have little leisure time but weaker among individuals with abundant leisure time in their lives? Further research in this direction may yield revealing findings.

At the same time, it is noteworthy that the adverse effect of relatively frequent daily stressors is stronger than the remedying effect of having more leisure time than usual. In other words, increase in leisure time may only partially uncouple the highly negative PA-NA relationship caused by daily stressors. It is not realistic to expect leisure time to completely restore affective complexity to the level before daily stressful events. Indeed, Sommerfield and McCrae (2000) suggested that cop-

ing resources, in many situations, may be close to the ceiling of their adaptive capacities. Therefore, individuals also need coping resources other than leisure time to gain greater affective complexity after experiencing daily stressors.

We also want to point out that our focus is on the contribution of leisure time as a coping resource to psychological recovery after daily stressful experiences. At first, affective complexity declined after individuals encountered relatively frequent daily stressors. Then, there was a rebound in affective complexity stimulated by having more leisure time than usual, as shown by our findings. This rebound in turn may facilitate psychological recovery from daily stressors. However, how leisure time can prevent the decline in affective complexity from happening on stressful days is beyond the scope of current examination. Although not an inherent limitation of our study, we do encourage future research to explore the possibility of using leisure time to prevent affective simplification from taking place after individuals experience daily stressors.

The third contribution of our study to the leisure literature is studying leisure coping as a within-person process. Previous research in the leisure field mainly conducted between-person comparison to study leisure coping (e.g., Heintzman & Mannell, 2003; Iso-Ahola & Park, 1996; Zuzanek et al., 1998). Although revealing, the findings that people with more leisure cope better than people with less leisure tells little about whether the same person copes better on days with more leisure than on days with less leisure. Indeed, between-person difference and within-person change may differ in magnitude and even in direction (Molenaar, 2004). Our study used multiple-day diary data and formed daily change scores of stress frequency and leisure time availability. Doing so enabled us to focus on the within-person aspect of these variables and to study the stress coping process as a within-person phenomenon, thus contributing to a more comprehensive understanding of leisure as a coping resource.

Contributions to the DMA

The current study also makes two contributions to the DMA. First, the findings demonstrated the usefulness of the model in assessing the effectiveness of coping resources, an important topic to study for coping research (Lazarus, 2000). When Zautra et al. (2005) broadened the scope of the DMA to examine the effect of positive events, they emphasized how positive events can counter the detrimental impact of negative events in daily lives. Although the researchers did not conceptualize their examination of positive events in light of stress coping, their work laid the foundation for applying the DMA to coping research. The current study, though focusing on only one coping resource—leisure time, is the first to apply the DMA to testing coping effectiveness and to demonstrate the theory's relevance to coping research. Given our findings, we believe that the DMA can benefit coping research in innovative ways.

Second, the measures of positive events used by Zautra et al. (2005) in their testing of the DMA included a good number of leisure activities, e.g., played a sport with friends, went shopping for pleasure, etc. Although the researchers extensively discussed the importance of positive events, they did not mention the potential contribution of leisure to remedying the affective damage of stressful experiences. This is understandable to some extent, since the focus of Zautra et al.

was on broadening the scope of a theoretical model rather than on more applied and focused areas such as leisure. Nonetheless, the current study, by providing evidence for the ability of leisure time to help individuals regain affective complexity after daily stressful experiences, highlights the value of leisure time, at the same time, fulfilling the positive implication of the DMA. Hence, we argue that paying attention to leisure time provides a more detailed and vivid picture of how specific areas of daily life shape affective experiences, a fruitful direction for further studies of the DMA and coping research in general.

Study Limitations and Suggestions for Future Directions

Although the current study yields promising results, it has four limitations. First, NSDE did not collect data regarding whether the amount of leisure time a person had met the person's *need* for leisure time (i.e., leisure time sufficiency, as measured by Heintzman & Mannell, 2003). Previous research reported the negative outcomes of having too much leisure time (Barnett, 2005; Caldwell et al., 1992) and of avoiding stress in excessive leisure time (Patry et al., 2007). However, given the lack of data, it is not possible for this study to examine whether having too much leisure time will hinder coping effectiveness. Second, previous research showed gender difference in leisure coping (Caltabiano, 1994, 1995; Iwasaki et al., 2005) and age difference in affective reactions to daily stressors (Mroczek & Almeida, 2004; Stawski et al., 2008). However, the effects of gender and age were not controlled for in this study. The third limitation concerns the self-report of daily stressors. Telephone interviews were conducted in the evenings, possibly many hours after stressful events took place. It is likely that a stressor that happened in the morning was not reported. It is also possible that the same event (e.g., a work deadline) was reported by some individuals but not by others, due to differences in personality traits and other personal characteristics. Therefore, the report of daily stress frequency may have been distorted. Fourth, although we have a national sample of adult Americans, the participants are predominantly Caucasians. A series of qualitative studies by Iwasaki and colleagues (Iwasaki, 2006, 2008; Iwasaki, MacKay, MacTavish, Ristock, & Bartlett, 2006) revealed that leisure coping has meanings that are both unique to particular cultures and applicable across different cultures. However, given the characteristics of the sample, it is not clear whether our findings will be applicable to minority groups.

In light of the findings and the limitations, we suggest four directions for future research. First, we suggest that future studies examine whether the congruence between need for and supply of leisure time affects the effectiveness of leisure time as a coping resource. A finer-grained approach will provide empirical evidence for whether having too much leisure time leads to maladaptive coping outcomes. Second, we suggest follow-up research on how gender and age, two relatively stable personal factors, influences the within-person process examined in the current study. That is, does the within-person process differ across age and gender? Examining the effect of age and gender will supplement the current study by providing insights into between-person differences in the within-person stress coping process. Third, we encourage future research to replicate the current study with samples from minority groups, so as to validate the results in a more diverse population and to uncover cultural difference. Lastly, we focused on daily stress

frequency, but it is possible that *severity* of daily stressors also exert significant impact on affective complexity. Therefore, future research should examine whether high daily stress severity leads to affective simplification and whether leisure time helps individuals recover from severe daily stressors by increasing affective complexity.

Conclusion

This study used the Dynamic Model of Affect (DMA) to examine the effectiveness of leisure time as a stress coping resource. The findings indicate that higher daily stress frequency can reduce affective complexity, with PA and NA "collaps[ing] toward a simpler bipolar dimension" and highly negatively correlating with each other (Zautra et al., 2005, p. 1517). Meanwhile, having more leisure time than usual can help individuals cope with daily stressors by increasing affective complexity, manifested by restored independence between PA and NA (Reich et al., 2003). Together, these results suggest that individuals can increase the amount of time allocated to leisure on days with more daily stressors than usual and use the leisure time to process and regulate their affect. Doing so can help remedy the affective damage caused by daily stressors and restore affective complexity, which is crucial to well-being.

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