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Is leisure time availability associated with more or less severe daily stressors? An examination using eight-day diary data

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Abstract

The stress suppressing model proposes that sufficient resources reduce stress. The stress exposure model suggests that certain factors expose individuals to *more* stress. The current study tested these two models by assessing the within-person lagging effect of leisure time on perceived severity of daily stressors. Analyzing eight-day diary data ($N=2,022$), we found that having more leisure time than usual on a day reduced perceived severity of daily stressors the *next* day and that the decrease in severity became larger with further increase in leisure time. Additionally, the effect is much stronger among busy individuals who usually had little leisure time. The findings demonstrated an accelerated suppressing effect that differed between-person, and the lagging effect affords stronger implication for causality than correlational analysis.

Keywords

leisure time; stress severity; stress suppressing; stress exposure; within-person lagging effect

Daily stressors (e.g., arguing with a co-worker) are a unique form of stress, different from major life events (e.g., death of a loved one) and chronic stressors (e.g., unsafe living conditions) (Bolger, DeLongis, Kessler, & Schilling, 1989; Caspi, Bolger, & Eckenrode, 1987). Researchers have found that daily stressors have powerful effects on health, by having separate and immediate effects that are confined to a single day, and by piling up over several days to create lasting frustrations and irritations (Almeida, 2005; Zautra, 2003). Moreover, perceived severity of daily stressors also influences well-being (Gunthert, Cohen & Armeli, 1999; Stawski, Sliwinski, Almeida, & Smyth, 2008), and the effect can be stronger than that of stress frequency (Grzywacz, Almeida, Neupert & Ettner, 2004).

Given the significance of daily stressors, researchers introduced two models to examine resources that reduce stress and factors that expose individuals to more stress. One model is the stress suppressing model (Ensel & Lin, 1991), and the other the stress exposure model (Almeida, 2005). According to the suppressing model, psychological and social resources that an individual has can reduce the likelihood of encountering stress. The exposure model, on the other hand, suggests that certain socio-demographic, psychosocial, and situational factors can expose an individual to *more* stress. Using the two models, past studies have

found that advantageous socioeconomic status is associated with lower severity appraisal of daily stressors (Serido, Almeida, & Wethington, 2004) while neuroticism (a type of personality) is related to higher severity appraisal (Bolger & Zuckerman, 1995).

Leisure is another factor that may affect stressful experience (Bedini, Gladwell, Dudley, & Clancy, 2011; Patry, Blanchard, & Mask, 2007). So far, there has been mixed support for the suppressing model (Iwasaki, 2003; Iwasaki & Mannell, 2000), and the exposure model has received no empirical testing. Meanwhile, Patry et al. (2007), in their study of undergraduate students' leisure time use behavior, suggested that allocating *too much* time to leisure can lead to *more* stress, indicating a possible exposure effect. Another implication of Patry et al. (2007) is studying leisure as time use (i.e., the amount of time allocated to leisure). In fact, there has been evidence that lacking leisure time is associated with high level of psychological stress (e.g., Zuzanek, 1998), although it remains unknown whether having leisure time can help people appraise daily stressors as less severe.

Most past studies of leisure time examined between-person differences, for example, comparing psychological stress of those with much leisure time to that of individuals with little leisure time. However, we do not know whether the *same* person would perceive less stress on days with more leisure time than on days with less leisure time. In other words, we need further research that studies the *within*-person effect of leisure time. Additionally, within-person research can be augmented by examining the lagging effect (Almeida & Wong, 2009) of leisure time, that is, whether having more leisure time than usual on a day reduces perceived severity of daily stressors the *next* day. Doing so will provide stronger implication of causality than correlational analysis that uses same-day data. Given the needs for further research, the purpose of the current study is to assess the applicability of the stress suppressing and exposure models by examining whether having more leisure time than usual on a day suppresses or increases perceived severity of daily stressors the next day.

Literature review

Significance and Severity of Daily Stressors

Researchers have identified daily stressors as a type of stress different from major life events and chronic stressors (Almeida, Wethington, & Kessler, 2002). Wheaton (1994) argued that daily stressors “capture a level of social reality that is untapped by other conceptualizations of stress, and...offer insight into the mundane realities of daily life” (p. 87). According to Almeida (2005), daily stressors are defined as “routine challenges of day-to-day living” (p. 64), such as meeting work deadlines, bad commute traffic. Daily stressors also include “unexpected small occurrences...that disrupt daily life” (p. 64), such as arguments with a family member, a malfunctioning household appliance. Analyzing eight-day diary data collected from a national sample of adult Americans, Almeida et al. (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.

To understand the effect of daily stressors, it is important to distinguish between the occurrence of a stressor and its meaning (Wethington, Brown, & Kessler, 1995), including perceived severity of the stressor (Lazarus & Folkman, 1984). Multiple studies have shown the significant impact that severity appraisal has on psychological outcomes. For example, Gunther et al. (1999) revealed a strong effect of stress severity on negative mood. Using data from the national diary study, Grzywacz et al. (2004) reported that perceived severity of daily stressors, compared to stress frequency, had a stronger impact on individuals' daily negative affect. Additionally, severe stressors that “disrupted daily routines or posed a risk to physical health and self-concept” resulted in more frequent experience of psychological

distress (Almeida, 2005, p. 67). More recently, Stawski et al. (2008) found that greater stress severity led to higher levels of negative affect “within persons across stress days” among young adults (p. 58).

Given the significance and severity of daily stressors, researchers examined various factors that may reduce or increase individuals’ exposure to daily stress. For example, Almeida and colleagues examined the effect of socioeconomic status, using educational achievement as a proxy (Almeida, Neupert, Banks & Serido, 2005; Grzywacz, et al., 2004). They found that better educated adults reported higher daily stress frequency, but those less educated perceived their daily stressors as more severe. Another factor that can affect individuals’ exposure to stress is leisure (Iwasaki, 2003; Patry, et al., 2007). Although there is a shortage in research on the effect of leisure in the stress and health literature, leisure researchers have utilized various theoretical models to try explaining the relationship between leisure and stress exposure.

Leisure and Stress: Stress Suppressing and Exposure Models

Leisure researchers have used the stress suppressing model (Ensel & Lin, 1991) to study the effect of leisure on stress. The suppressing model reasons that psycho-social resources reduce the likelihood of stressful experiences, and is consistent with Wheaton’s (1985) stress-detering model which assumes that resources are negatively related to the likelihood of stressful experience (Iwasaki, 2003). Psycho-social resources, according to Ensel and Lin (1991), include both psychological resources “possessed by an individual” and social resources “embedded in one’s social network” (p. 323).

Iwasaki and colleagues tested the stress suppressing model in two studies. The first study (Iwasaki and Mannell, 2000) was conducted with a sample of undergraduate students from a Canadian university. The findings supported the model by demonstrating that beliefs in the capacity of leisure to facilitate stress coping reduced the likelihood of experiencing weekly hassles. However, the Likert-type scale used to measure weekly hassles is problematic. The scale ranges from 1 (did not occur in the past week) to 7 (caused extreme stress). Thus, when a participant chose 7 as the answer to a weekly hassle question, it is not clear whether the participant referred to severity or frequency of the hassle, though the researchers claimed that the scale measured frequency of weekly hassles. The second study (Iwasaki, 2003) tested the suppressing model with a sample of employees from the Police and Emergency Response Services Department in a Canadian city. This time, the result failed to support the model. However, the study had at least two limitations. First, the study had the same measurement issue as Iwasaki and Mannell (2000) mentioned above. Second, the conceptualization of stress included not only daily stressors but also chronic stressors and major life events. Doing so confounded types of stressors, leaving it unknown to which type(s) of stressors the suppressing model was not applicable.

More recently, Bedini et al. (2011), adapting the Leisure Time Satisfaction scale developed by Stevens et al. (2004), found that leisure participation, satisfaction with time for leisure, and satisfaction with quality of leisure reduced perceived stress and increased quality of life among informal caregivers. Although the study did not explicitly test the suppressing model, it nonetheless demonstrated the stress-suppressing effect of leisure. At the same time, it is necessary to point out that perceived stress, as measured by Bedini et al., refers to “nonspecific appraised stress” (Cohen, Kamarck, & Mermelstein, 1983, p. 385). Although different from each other, both perceived stress and severity appraisal of a stressor tap into individuals’ subjective experience of stress. In short, Iwasaki and colleagues introduced to leisure literature the stress suppressing model, the effect of which has been indicated by more recent research. Meanwhile, our understanding of the stress-suppressing effect of

leisure can be deepened with additional research that focuses on daily stress and utilizes sound measurement of stress.

While access to leisure may reduce stress, it is also possible that *too much* leisure can result in *increased* stress. Patry et al. (2007), for example, found that setting aside some time for leisure to take a break and to replenish energy helps university students cope effectively with stress. However, the researchers also found that allocating *too much* time to leisure not only hinders effective coping but also correlates with *increase* in perceived stress, implying the possible applicability of a second model—stress exposure (Almeida, 2005). Stress exposure is “the likelihood that an individual will experience [stress] based on combinations of life course factors” (Almeida & Wong, 2009, p. 147). Socio-demographic, psychosocial, and situational factors can all cause differences in stress exposure (Almeida & Wong, 2009). For example, women were more likely than men to be exposed to network stressors—stressors that involve “one’s network of relatives or close friends” (Almeida, 2005, p. 66), demonstrating the effect of gender, a demographic factor, on stress exposure. While previous research assessed various factors that may affect stress exposure, we are not aware of any study that examined whether having *too much* leisure time increases the odds of stress exposure. Although the discussion by Patry et al. offered implications for the exposure model, they did not empirically test the model. Therefore, it remains unknown whether the stress exposure model applies to the effect of leisure on severity appraisal of daily stressors.

In summary, more research is needed to further test the suppressing model and to empirically test the exposure model. Moreover, given the findings and discussion of Patry et al. (2007), it is possible that the relationship between leisure and daily stress severity is not linear. At first, increase in leisure leads to less severe appraisal of daily stressors (i.e., a negative relationship between the two). However, too much leisure may result in more severe appraisal of daily stressors (i.e., the relationship becomes *positive*). In essence, it is possible that both suppressing and exposure models are applicable, but in different situations.

Meanwhile, it is worth noting that, in suppressing and exposure models, leisure time is positioned as a factor that may reduce or increase the likelihood of experiencing stress. In essence, leisure time is treated as an antecedent to daily stressful events in both models, rather than being used as a coping resource that individuals use *after* experiencing daily stressors (e.g., Iwasaki, 2001; Zuzanek, Robinson, & Iwasaki, 1998). It is not enough to understand how individuals react to daily stressors with their coping resources. It is equally important to identify the psycho-social resources that reduce the likelihood of experiencing stress and the factors that expose individuals to more stress. Furthermore, studying leisure as a protective psycho-social resource or a stress-exposure factor is also different from examining how individuals respond to and cope with hassles and conflicts in outdoor recreation settings (e.g., Schneider & Hammitt, 1995; Schuster, Hammitt, & Moore, 2003), in which case leisure experience itself is the stressful event.

Leisure as Time Use

Besides indicating the possible applicability of the stress exposure model, the study by Patry et al. (2007) also provided implication for the value of studying leisure as time use. Studying leisure as particular activities has provided valuable knowledge about the psychological benefits of leisure. Meanwhile, the activity approach is not without limitations. For example, Shaw (1984) argued that using activity type to define leisure means that “the essential subjectivity of the leisure experience is ignored” (p. 93), considering “the definition of events is dependent upon specific situational or individual factors rather than on the activity per se” (p. 96). Pentland and Harvey (1999) further reasoned that the concept of leisure is different across time and people. For example, personal maintenance for one individual can

be leisure for another person, and the same activity can be leisure in one occasion but work in another occasion for the same individual. Given the subjective nature of leisure, some researchers focused on leisure as time use (e.g., Heintzman & Mannell, 2003; Thompson, Grant, & Dharmalingam, 2002). Such practice, not meant to replace the activity approach but to complement it, acknowledges “the fundamentally interpretative notion of the concept of leisure” while providing “a standardized variable for analysis” (Thompson, et al., 2002, p. 130).

In the leisure literature, there has been scattered evidence that leisure time availability is related to stress. For example, Zuzanek (1998) found that lowest amount of leisure time is associated with highest level of psychological stress among participants in the Canadian General Social Survey. The results echoed earlier findings in the US (Robinson & Godbey, 1997). Although the studies focused on lack of leisure time and high time pressure, they implied the possibility that increase in leisure time and decrease in time pressure may reduce psychological stress. At the same time, it is necessary to point out that time pressure, while related to leisure time availability (Zuzanek, et al., 1998), is different from it. Additionally, psychological stress refers to pressures and subjective feelings that individuals face in everyday lives (Zuzanek, 1998). Although different from perceived severity of a concrete stressful event, both psychological stress and severity appraisal tap into the subjective aspect of stress.

Previous time use research, using data from national surveys, were focused on between-person differences, which did not tell us much about within-person change. For example, the result of Zuzanek (1998) should be interpreted as: those with little leisure time, compared to people with much leisure time, experienced more psychological stress. This between-person comparison is important, but it does not inform us whether the same individual would experience more psychological stress on days with little leisure time than on days with much leisure time. Studying within-person change provides a more comprehensive understanding of the leisure-stress relationship. Equally important, results of previous research are correlational in nature, thus shedding little light on causality. To study within-person change and to infer stronger causality, researchers have proposed studying lagging effect (Almeida & Wong, 2009), for instance, whether leisure time on day one increases or reduces severity appraisal of daily stressors on day two. Studying lagging effect requires collecting data from the same participants for multiple times rather than using conventional cross-sectional survey design (Almeida & Wong, 2009), and we are not aware of any study that utilized this type of data to examine the lagging effect of leisure on stress.

Research Purpose and Questions

Given the gaps in the literature, the purpose of the current study is to examine whether the stress suppressing and exposure models explain the relationship between leisure time availability and severity appraisal of daily stressors. Specifically, we asked three research questions (RQ). First, does having more leisure time on one day *suppress* perceived severity of daily stressors the next day? Second, does having *too much* more leisure time on one day lead to *higher* severity appraisal of daily stressors the next day? Third, does the within-person relationship between leisure time and severity appraisal of daily stressors differ between busy individuals who usually had little leisure time and those with abundant leisure time in daily lives? RQs one and two focus on the within-person lagging effect of leisure time on severity appraisal of daily stressors, and together, assess whether the effect of leisure time is polynomial (i.e., U-shape). RQ three focuses on between-person differences in the within-person effect. Given identified gender, age and socioeconomic differences in subjective appraisal of stress severity and leisure time availability (Bittman, 1998; Grzywacz, et al., 2004; Jackel & Wollscheid, 2007; Juster & Stafford, 1991; Mattingly &

Bianch, 2003; Nickols & Abdel-Ghany, 1983; Robinson & Godbey, 1997), we controlled for the effects of gender, age and socioeconomic status in data analyses.

Method

Sample and Procedure

The data for the current study comes from the National Survey of Midlife Development in the United States (MIDUS; Keyes & Ryff, 1998). The original purpose of the MIDUS, conducted in 1995–1996, was to examine successful aging in terms of physical health, psychological wellbeing, and social responsibility (Serido, et al., 2004). In 2005–2006, the second wave of MIDUS (referred to as “MIDUS II” henceforth) was conducted, allowing a follow-up of the original MIDUS sample 9–10 years later. For the current study, we used data from MIDUS II.

MIDUS II is composed of five projects. The primary aim of project 1 is to examine a wide array of psychosocial, sociodemographic, and behavioral factors that may influence health and illness. Socioeconomic status was measured in project 1. The primary aim of project 2, the National Study of Daily Experiences (NSDE; Almeida, et al., 2002), is to examine the link between various aspects of daily stressors, time use behaviors and health. Severity of daily stressors, leisure time availability, age and gender were measured in project 2. The entire sample of project 2 (NSDE) also participated in project 1. Therefore, we merged the data from projects 1 and 2 to perform analyses for the current study.

MIDUS II participants are a national sample of non-institutionalized, English-speaking adult Americans. Participants in the NSDE are a representative subsample of MIDUS participants, and received \$25 for their participation in the NSDE (Almeida, 2005). A random subsample of 3,600 MIDUS II participants was recruited to participate in NSDE, and 2,022 participants (age 33 to 84, 57.2% female) completed the NSDE interviews, resulting in a response rate of 78%. The NSDE subsample, compared to the MIDUS II sample, is similar in distributions for age as well as marital and parenting status, but were better educated, had slightly more females and fewer minority respondents (Almeida, McGonagle, & King, 2009)

NSDE used the daily diary method to collect data, with each participant completing a telephone interview in the evening for eight consecutive days. During each phone interview, participants were asked about their daily stressful experiences, time use, physical symptoms, and affect in the previous 24 hours, yielding a total of 16176 daily interviews (2022 participants * 8 interview days; for details regarding data collection, see Almeida, et al., 2009). NSDE data collection was spread across an entire year, and consisted of separate “flights” of interviews, with each flight representing the eight-day sequence of interviews.

Measures

For the current study, we utilized measures of daily leisure time availability, perceived severity of daily stressors, gender and age from the NSDE dataset. As indicated earlier, the measure of socioeconomic status was merged from project 1 data.

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 the participant 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. In the current study, leisure time availability was constructed by calculating the

amount of *hours* each day that participants devoted to leisure activities, for example, 0.5 means that a participant spent 30 minutes or 0.5 hour on leisure activities on a given day.

Recently, the validity and quality of self-report time use data have been confirmed (Jacobs & Gerson, 2004). While errors do exist, they “tend to average out in samples of many people” (Jacobs & Gerson, 2004, p. 17). In fact, the self-reports of available leisure time using such a big sample overcomes a common problem that exists among previous national time use studies, namely, the activity-coding approach to calculating leisure time. After participants in previous national time use studies provided their time diary data, researchers used predetermined activity codes to code the data, for instance, grocery shopping belongs to domestic/unpaid work. Therefore, it is researchers, rather than the participants themselves, who determined if an activity belongs to the category of work, domestic work, personal maintenance, travel/commute, or leisure. However, as critiqued by multiple researchers (e.g., Harvey & Pentland, 1999; Shaw, 1984), coding for activity type ignores individuals’ subjective feelings towards the activities, rendering the danger of misplacing an activity into a wrong category. Given the quality of NSDE data and its sample size, the data on leisure time qualifies for producing reliable results.

To study within-person change and between-person difference in within-person change, we 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. In essence, the daily change score is the disparity between daily value and personal average, representing fluctuation in leisure time availability within-person over days. The daily change score of leisure time is also known as “person-centered” leisure time availability (Zautra, et al., 2005, p. 1524). A positive person-centered score represented a day with above-average leisure time for a participant. A negative person-centered score represented a day of below average leisure time for that participant. The person-centered score represents the within-person aspect of leisure time, as we can compare a person’s day one to his/her day two. The personal average represents the between-person aspect of leisure time, as we can compare a person’s average to that of other persons.

Perceived severity of daily stressors—Daily stressful events were assessed through the semi-structured 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/school stressors, home stressors, network stressors (stressors that involve the participant’s network of relatives or close friends), discrimination stressors, and any other stressors. For each daily interview, participants who answered affirmatively to any of the seven stem questions about daily stressors also answered a series of probe questions about the stressor. One question assesses perceived severity of the stressor: “How stressful was this for you?” Participants indicated how severe the stressor is on a 0 to 3 point scale. The four response options were: not at all, not very, somewhat, and very. For each study day, the sum of the severity ratings was calculated to represent perceived severity of daily stressors, ranging from 0 to 21.

Covariates—Gender was measured as a categorical variable, with male coded as 0 and female coded as 1. Age was measured in years, and was centered at sample mean (56 years old). Educational achievement was used as a proxy of socioeconomic status (Almeida, et al., 2005; Grzywacz, et al., 2004). It was measured as a categorical variable, with no more than 12 years of education coded as 0 and 13 or more years of education coded as 1.

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:

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

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

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. For a detailed discussion of the principles and advantages of MLM, see Qian (2012). 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 was fitted to answer research questions one and two, by testing whether there is a U-shape within-person relationship between leisure time and perceived severity of daily stressors. In order to do so, we included both a zero-order term and a quadratic term of person-centered leisure time at level 1. The second model was fitted to answer research question three about between-person difference in the within-person effect, by adding personal average of leisure time as a level-2 predictor. The effects of gender, age, and education were controlled for in all analyses.

The final sample size was 14881 interview days, which is 91% of the total 16176 interview days. MLM allows unbalanced numbers of cases per participant (Reis & Gable, 2000), thus having the capacity of handling missing data. Therefore, participants with incomplete data were included in the analysis (Raudenbush, Brenner, & Barnett, 1995).

Results

Descriptive Statistics

Table 1 presents descriptive statistics of and correlations between the variables. On average, participants perceived their daily stressors as somewhat severe, though some participants perceived their stressors as much more severe than others. On average, participants reported having a little more than 3 hours of leisure time per day, but this also varied significantly from person to person. Average stress severity and average amount of leisure time were negatively correlated. Females and younger adults, compared to males and older adults, perceived their stressors as more severe and had less leisure time on average. Education level was not related to average severity or daily stressors or average amount of leisure time.

Multilevel Models

We first calculated intraclass correlation (ICC) for the outcome variable. Overall, 22.5% of the variation in daily stress severity was between person, and 77.5% was within person. The result here indicated that there was sufficient variation in the outcome variable at each level

(between- and within-person) to conduct further analyses (Mroczek & Griffin, 2007; Raudenbush & Bryk, 2002). We then fitted the two multilevel models to answer the three research questions.

To answer Research Questions (RQs) one and two, we fitted the first model to examine whether person-centered leisure time had a U-shape within-person lagging effect on perceived severity of daily stressors. The result (the left panel in Table 2) shows that the coefficients for the zero-order term ($b=-0.006$, $p>0.70$) and the quadratic term ($b=-0.007$, $p>0.07$) of person-centered leisure time were not significant. Although the within-person effect was not significant, it is possible that the effect differed between individuals—applicable to some but not to others. Therefore, we fitted the second model to assess whether personal average of leisure time, the between-person factor, affected the within-person relationship. According to the result (the right panel in Table 2), the quadratic term of person-centered leisure time had a significant effect ($b=-0.01$, $p<0.05$) on perceived severity of daily stressors. However, the zero-order term was not significant ($b=-0.04$, $p>0.14$), indicating that a polynomial within-person effect did not exist. Additionally, the within-person effect of person-centered leisure time did not differ by average amount of leisure time.

Given the non-significance of the zero-order term, we decided to drop the term from the level-1 equation while keeping the quadratic term. Although earlier results indicated that person-centered leisure time did not have a U-shape lagging effect on perceived severity of daily stressors, it is possible that another form of curvilinear relationship exists, especially given the fact that the quadratic term became significant in model 2 above. Again, we first examined the within-person relationship while controlling for the effects of age, gender and education level. The result (the left panel of Table 3) shows that the quadratic term of person-centered leisure time did not have a significant effect on severity appraisal ($b=-0.006$, $p>0.09$). We then proceeded to add the between-person factor to the level-2 equation. The result (the right panel of Table 3) shows that the quadratic term of person-centered leisure time had a significant effect on perceived stress severity ($b=-0.01$, $p<0.05$), and the effect differed significantly by average amount of leisure time ($b=0.001$, $p<0.05$). The finding means that having more leisure time than usual on a day led to a decrease in perceived severity of daily stressors the next day, and the decrease became more dramatic with further increase in leisure time. Additionally, this within-person lagging effect differed significantly between individuals: the lower the average amount of leisure time was, the more dramatic the effect became. That is, the lagging effect of person-centered leisure time was stronger among individuals with little leisure time on average than among those with high average amount of leisure time.

To demonstrate the between-person difference in the within-person curvilinear lagging effect, we plotted the within-person relationship between person-centered leisure time and perceived stress severity for individuals with average amount of leisure time one standard deviation above and below sample mean respectively (Fig. 1). Among individuals with average amount of leisure time one standard deviation above sample mean (the solid line), person-centered leisure time on a day had close to zero effect on perceived severity of daily stressors the next day. That is, the within-person effect of leisure time on perceived stress severity was minimal among leisure-rich individuals. Meanwhile, the lagging effect of person-centered leisure time on perceived severity of daily stressors was much stronger among individuals with average amount of leisure time one standard deviation *below* sample mean (the dotted line). Among these busy individuals, a small increase in leisure time above personal average on a day led to a small decrease in perceived stress severity the next day. However, further increase in leisure time leads to accelerated (i.e., much larger) decrease in stress severity.

Discussion and Conclusion

The current study tests the applicability of the stress suppressing (Ensel & Lin, 1991) and exposure (Almeida, 2005) models to the within-person effect of leisure time on perceived severity of daily stressors using eight-day diary data. Our major finding is a within-person curvilinear lagging effect of leisure time on perceived severity of daily stressors. Equally important, this within-person effect differed significantly between individuals. Having more leisure time than usual on a day reduced perceived severity of daily stressors the next day, and the magnitude of the decrease in severity appraisal, instead of being constant, became larger with further increase in leisure time. Meanwhile, the within-person effect is not universal: it is much stronger among those with little leisure time on average than among leisure-rich individuals. The significant within-person effect supports the suppressing model (Ensel & Lin, 1991), and echoes past studies (Bedini et al., 2011; Iwasaki & Mannell, 2000) by confirming the value of leisure in reducing stress.

Our finding contributes to the leisure literature in at least four ways. First, past leisure studies that supported the suppressing model examined leisure participation and the psychosocial aspect of leisure (Bedini, et al., 2011; Iwasaki, 2003; Iwasaki & Mannell, 2000). However, no known research on the suppressing model has examined leisure as time use, that is, whether the amount of leisure time an individual has matters. Our study shows that examining leisure as time use is important, supporting earlier work (Shaw, 1984; Thompson, et al., 2002). By complementing research that examines leisure as particular activities and the psychosocial aspect of leisure, studying leisure as time use enables us to more comprehensively understand the effect of leisure in people's daily lives. Our finding also reveals that having more leisure time than usual on a day helps an individual, particularly a busy one, appraise daily stressors as less severe the next day.

In prior studies of leisure time, the negative effect of lacking leisure time (Robinson & Godbey, 1997; Zuzanek, 1998) has been the focus. Our study extends previous research by making it clear that understanding the positive outcome of having leisure time is equally constructive. Meanwhile, the effect of leisure time on subjective appraisal of stress severity that we found resonates with past studies that examined psychological stress as the outcome. Psychological stress and severity appraisal, though different from each other, both tap into individuals' subjective feelings. By focusing on daily stressors and using a high quality measurement, our study provides stronger evidence for the effect that leisure time can have on the subjective aspect of stressful experience.

Our second contribution is demonstrating a curvilinear rather than linear effect of person-centered leisure time on perceived severity of daily stressors (the dotted line in Fig. 1). The finding means that the marginal benefit of every unit increase in available leisure time is not the same but becomes larger with further increase. While having a *little* more leisure time than usual on a day led to a small decrease in perceived severity of daily stressors the next day, the benefit of leisure time is the largest when a person (especially a busy one) gets a *big* boost in available leisure time. Although busy individual may not have a dramatic increase in leisure time frequently, when they do get a large increase in leisure time, such a leisurely day enables the appraisal of the daily stressors that they encounter the next day to be much less severe. Meanwhile, busy individuals should not overlook the benefit of taking a brief break from the demands of work and life, considering the negative effect of stress severity on well-being (Grzywacz et al., 2004; Gunthert, et al., 1999; Stawski, et al., 2008). Indeed, Iwasaki (2005), based on his study of managers' use of leisure in stress coping, argued that "leisure might be an important source of more proactively preventing people from experiencing high stress" (p. 23). The managers in Iwasaki's focus groups were busy individuals who did not have a leisure-rich life, while the effect of leisure time that we

identified was particularly salient among busy individuals. Hence, the current study supported Iwasaki's argument by showing that the small extra amount of leisure time that a busy individual can get on a day helps prevent the person from appraising daily stressors that happen the next day as highly severe.

Our third contribution is testing the lagging effect of person-centered leisure time, which provides stronger implication for causality than conducting correlational analysis using data from the same day. This is a major step forward from past studies, none of which had suitable data to assess lagging effects. Analyzing lagging effects makes sure that leisure time precedes the occurrence of daily stressors and related severity appraisal. Although examining lagging effects does not completely address causality, it is one step closer compared to traditional correlational analysis that cannot exclude reciprocal effect—the possibility that high severity prompts a person to allocate more time to leisure rather than the other way around. We also point out that the effects of gender, age and education level were controlled for in all analyses, given identified gender, age and socioeconomic differences in severity appraisal (Almeida & Horn, 2004; Grzywacz, et al., 2004) and leisure time availability (e.g., Bittman, 1998; Jackel & Wollscheid, 2007; Juster & Stafford, 1991; Mattingly & Bianchi, 2003; Nickols & Abdel-Ghany, 1983). Therefore, our finding is not confounded with the effects of gender, age or education level.

Our fourth contribution is separating the within- and between-person aspects of leisure time availability. Doing so enables us to assess both within-person effect of leisure time and between-person difference in the within-person effect without confounding the two aspects. Most previous research conducted between-person comparison (e.g., Bedini, et al., 2011; Zuzanek, 1998), which did not explain within-person change. By utilizing a within-person approach, our study contributes to a more comprehensive understanding of the effect of leisure time. Even more importantly, venturing into between-person difference in the within-person effect makes it possible for us to reach current findings. Otherwise, we would have concluded that there was no within-person lagging effect of leisure time and that leisure time made no contribution to suppressing severity appraisal of daily stressors. Given our findings, it is clear that the within-person curvilinear lagging effect of leisure time manifests itself mainly among busy individuals. Those who already have abundant leisure time on average in their daily lives will reap minimal, if any, benefit from further increase in leisure time. In fact, previous research has found that an over-abundance of leisure time can result in feeling of boredom and even deviant behaviors (Barnett, 2005; Caldwell, Smith, & Weissinger, 1992; Rojek, 1997). Therefore, leisure-rich individuals need to mobilize resources other than increasing leisure time (e.g., cognitive reappraisal, social support) in order to appraise their daily stressors as less severe.

Lastly, the current study did not provide empirical evidence for the exposure model (Almeida, 2005). Patry et al. (2007) alluded to a stress exposure effect of having too much leisure time in their study of leisure coping style, while Schuldborg (2007) argued that discussions of “the effects of putative goods or virtues” can ignore nonlinearities in these effects and “fall prey to the linear virtue problem” (p. 425). To seek evidence for the possible exposure effect and to take nonlinearity into account, we started by testing whether there is a polynomial relationship between leisure time and severity appraisal of daily stressors. However, we did not find a polynomial relationship, thus cannot claim that having too much leisure time on a day leads to higher severity appraisal of daily stressors the next day. The result does not necessarily refute the suggestions by Patry et al., since we examined daily stressors among adult Americans while Patry et al. focused on academic stress among undergraduate students. Rather, the exposure effect of having too much leisure time may manifest itself in aspects of stressful experiences other than severity appraisal (e.g., stress occurrence, appraisal of threat or loss).

Study Limitations and Suggestions for Future Directions

While the current study yields promising findings, it is not without limitations. First, previous research found that satisfaction with time for leisure is inversely related to perceived stress (Bedini, et al., 2011) and has beneficial mental health effects (Brown, Brown, & Powers, 2001). But, NSDE did not collect data on satisfaction with leisure time, so whether satisfaction with time spent on leisure affects severity appraisal remains unknown. Second, we did not examine the effect of personality on the effect of leisure time on severity appraisal. For example, neuroticism has been related to greater stress exposure and higher severity appraisal (Bolger & Zuckerman, 1995; Gunthert, et al., 1999) – but we did not examine whether leisure time has the same effect among neurotics and non-neurotics. Third, although we controlled for the effects of age, gender and educational level, we did not examine whether these factors interact to influence the within-person relationship between leisure time and severe appraisal of daily stressors. Fourth, although we have a national sample of adult Americans, the participants are predominantly Caucasians. Therefore, 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 encourage researchers to examine both the amount of leisure time and satisfaction with the amount so as to understand which is more influential. Second, follow-up studies are needed to examine the effect of personality traits on the relationship between leisure time and severity appraisal of daily stressors. Doing so will reveal whether the within-person effect of leisure time unfolds differently among individuals with different personality traits. Third, future studies should tease out the nuanced effects of demographic factors by assessing how age, gender, and educational level interact to produce differences in the within-person relationship. Lastly, further research is needed to replicate the current study with samples from minority groups, to validate the results in diverse populations and to uncover cultural differences.

To conclude, the value of leisure as a resource to cope with stress (i.e., stress reactivity) has been well established in leisure literature (Iwasaki & Schneider, 2003). What we found in this study indicates that leisure is also valuable in proactively preventing busy individuals from appraising daily stressors as highly severe, thus helping avoid serious psychological costs engendered by high severity appraisal.

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Fig. 1. Between-person difference in the curvilinear lagging effect of person-centered leisure time on perceived severity of daily stressors, controlling for the effects of gender, age and education.

Table 1

Correlations between variables and descriptive statistics of the variables

	1.	2.	3.	4.	5.
1. Average Severity of Daily Stressors	1.00				
2. Average Amount of Leisure Time	-0.06***	1.00			
3. Gender	0.21***	-0.10**	1.00		
4. Age	-0.19***	0.14***	-0.02**	1.00	
5. Education	0.01	0.01	0.01	0.02*	1.00
Mean	2.21	3.08	N/A	56.24	N/A
Standard Deviation	1.10	1.83	N/A	12.20	N/A
Skewness	0.79	1.72	N/A	0.19	N/A
Kurtosis	2.12	5.51	N/A	-0.82	N/A

* $p < 0.05$

** $p < 0.005$

*** $p < 0.0001$.

Table 2

Unstandardized estimates and standard errors of the polynomial lagging effect of person-centered leisure time on perceived severity of daily stressors

	Severity of Daily Stressors			
	Within-person relationship		Effect of average amount of leisure time on the within-person relationship	
	Unstandardized coefficients	Standard error	Unstandardized coefficients	Standard error
Fixed effects:				
Severity of Daily Stressors				
Intercept	2.00**	0.04	2.09**	0.06
Age	-0.01**	0.002	-0.01**	0.002
Gender	0.43**	0.05	0.42**	0.06
Education	-0.003	0.009	-0.003	0.008
Average Amount of Leisure Time	--	--	-0.02	0.02
Person-Centered Leisure Time				
Within-person coefficient	-0.006	0.02	-0.04	0.03
Age	0.001	0.001	0.001	0.001
Gender	0.003	0.02	0.008	0.02
Education	0.007	0.004	0.008	0.004
Average Amount of Leisure Time	--	--	0.008	0.005
(Person-Centered Leisure Time) ²				
Within-person coefficient	-0.007	0.004	-0.01*	0.006
Age	-0.0002	0.0002	-0.0002	0.0002
Gender	0.006	0.005	0.006	0.005
Education	0.002	0.001	0.002*	0.001
Average Amount of Leisure Time	--	--	0.001	0.001
Random effects:				
Variance intercept	0.35**	0.04	0.34**	0.04
Variance linear slope	--	--	--	--
Variance quadratic slope	0.0002*	0.0001	0.0001	0.0001
Residual variance	1.60**	0.04	1.60**	0.04

*
 $p < 0.05$

**
 $p < 0.0001$

Table 3

Unstandardized estimates and standard errors of the curvilinear lagging effect of person-centered leisure time on perceived severity of daily stressors

	Severity of Daily Stressors			
	Within-person relationship		Effect of average amount of leisure time on the within-person relationship	
	Unstandardized coefficients	Standard error	Unstandardized coefficients	Standard error
Fixed effects:				
Severity of Daily Stressors				
Intercept	2.00**	0.04	2.10**	0.07
Age	-0.01**	0.002	-0.01**	0.002
Gender	0.43**	0.06	0.42**	0.06
Education	0.006	0.007	0.006	0.007
Average Amount of Leisure Time	--	--	-0.03	0.02
(Person-Centered Leisure Time) ²				
Within-person coefficient	-0.006	0.004	-0.01*	0.02
Age	-0.0001	0.0002	-0.0001	0.0002
Gender	0.007	0.004	0.007	0.004
Education	0.0004	0.0006	0.0004	0.0006
Average Amount of Leisure Time	--	--	0.001*	0.0007
Random effects:				
Variance intercept	0.35**	0.04	0.35**	0.04
Variance quadratic slope	0.0001*	0.0001	0.0001	0.0001
Residual variance	1.60**	0.04	1.60**	0.04

*
p < 0.05

**
p < 0.0001