DAILY STRESS, LEISURE TIME, AND AFFECTIVE OUTCOMES AMONG ADULT AMERICANS:

A WITHIN-PERSON EXAMINATION USING DAILY DIARY DATA

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by

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ABSTRACT

Daily stress is prevalent in modern society and has strong impact on well-being. To sustain well-being, researchers have been studying resources that can suppress the onset and perceived severity of daily stressors or can help individuals cope with daily stress. One resource that has been identified is leisure. Past leisure studies tried to explain the role of leisure in the stress process by testing multiple theoretical models, including moderation/buffer, mediation, and suppressing. So far, mixed findings exist for these models. It is also notable that most previous leisure studies mainly conducted between-person comparison. While contributing to our understanding of leisure in the stress process, between-person comparison alone does not tell the complete story. Stress coping is inherently a within-person process, and further research is needed to understand how the effect of leisure in the stress process unfolds within-person over time. More research is also needed on between-person differences in the within-person process. Additionally, previous research either studied leisure as particular pursuit(s) or examined the underlying psychosocial functions of leisure in the stress process. Few studies tested whether the time aspect of leisure matters in the stress process, despite significant psychological effect of leisure time that previous research has shown.

The purpose of this dissertation is threefold: 1) to examine whether having more leisure time than usual on a day suppresses or increases perceived severity of daily stressors the next day; 2) to examine whether leisure time moderates or mediates the effect of daily stress frequency on positive affect; and 3) to examine whether leisure time mediates the effect of daily stress severity on positive and negative affect of different arousal levels. The three within-person examinations are complemented by assessing whether there is between-person difference in the within-person effect.
I used data from the National Study of Daily Experiences (NSDE), the daily diary portion of the Midlife Development in the United States (MIDUS) Survey. NSDE has a national sample of the non-institutionalized, English-speaking population in the United States (N=2022, age 33 to 84, 57.2% female). Participants completed a telephone interview at the end of each day for eight consecutive days, answering questions about their daily stressful experiences, time use behaviors, positive and negative affect, and physical symptoms. In all analyses, the effects of age and gender were controlled for.

This dissertation is comprised of three manuscripts. In the first manuscript, I tested the applicability of the stress suppressing and exposure models. I found a curvilinear lagging effect of person-centered leisure time on perceived severity of daily stressors, and the effect is particularly strong among individuals with little leisure time on average. The findings demonstrated an accelerated suppressing effect that differed between-person. A small increase in leisure time on a day led to a small decrease in severity appraisal the next day. However, a larger increase in leisure time was followed by a much more dramatic decrease in severity appraisal. Meanwhile, the within-person suppressing effect is minimal among leisure-rich individuals, i.e., those with high average amount of leisure time in daily living. Besides the curvilinear suppressing effect of leisure time, another contribution of the study is examining the lagging effect which affords stronger implication for causality than correlational analysis.

In the second manuscript, I tested the applicability of the moderation and mediation models, focusing on daily stress frequency as the predictor and positive affect (PA) as the outcome. The moderation model was not supported, regardless whether a participant was “leisure-rich” or had little leisure time on average. The finding challenges some past studies that supported the moderation model. In previous research, the mediation model was mainly supported when stress severity, rather than frequency, was the predictor. However, I found a partial counteractive mediation effect, which is significantly stronger among busy individuals.
than among “leisure-rich” individuals. Encountering relatively frequent daily stressors resulted in experiencing PA less frequently. At the same time, higher daily stress frequency prompted the person to allocate more time to leisure than usual, which then increased PA.

In the third manuscript, I examined whether having more leisure time than usual mediates the effect of daily stress severity on affect of different valence-arousal dimensions. I found that relatively severe daily stressors had direct effect on all four types of affect: low-arousal PA, high-arousal PA, low-arousal negative affect (NA), and high-arousal NA. However, the partial mediation effect that I found only applied to two types of affect: low-arousal PA and high-arousal NA. Again, this within-person effect is significantly stronger among individuals with little leisure time on average than among “leisure-rich” individuals.

Overall, the findings from this dissertation suggested that the stress-affect relationship did not differ significantly by the amount of time allocated to leisure. The value of leisure as a coping resource is manifested by its ability to partially counteract the detrimental effect of daily stress by increasing PA (especially low-arousal PA) and reducing high-arousal NA. Additionally, the significant between-person difference in the within-person mediation effect implies that those at the greatest risk of lacking leisure time are those who benefit the most from an increase in leisure time. Leisure can also be a factor that reduces or increases stressful experience. My finding indicates that allocating more time to leisure than usual allows a busy person to take a break and relax well, which in turn enables the person to perceive next day’s stressors as less severe. Taken together, this dissertation contributed to the literature by testing the applicability of multiple theoretical models, using a within-person approach to study the topic, examining the time aspect of leisure, bringing more attention to daily stress, and focusing on affect as the outcome. At the same time, further research is needed to link the psychological process to physiological mechanism, which will provide further evidence for the value of leisure as a coping resource.
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Chapter 1

Introduction

Daily stressors refer to “routine challenges of day-to-day living” (e.g., meeting work deadlines) and unexpected small events that disrupt daily life (e.g., arguments with one’s spouse) (Almeida, 2005, p. 64). Researchers have reported that frequent experiences of daily stressors have powerful influences on well-being (Almeida & Kessler, 1998; Stawski, Sliwinski, Almeida, & Smyth, 2008). Severity of a stressor has strong impact on well-being as well, sometimes stronger than that of the actual occurrence of the stressor (Carver, Scheier, & Pozo, 1992; David, Green, Martin, & Suls, 1997). The significance of daily stress led researchers to examine various resources that help people cope with stress. One identified coping resource is leisure (e.g., Reich & Zautra, 1981; Wheeler & Frank, 1988), the value of which, according to stress researchers, deserves more attention (Folkman, Moskowitz, Ozer, & Park, 1997; Kabanoff & O’Brien, 1986). Stress researchers (Costa, Somerfield, & McCrae, 1996) have also suggested that studying how individuals use a particular resource to cope with various stressors, compared to examining many ways of coping with a certain stressor, may be more productive and informative.

Leisure researchers, echoing the suggestions by stress researchers, have focused on the effect of leisure in the stress coping process and have tested various theoretical models that may explain the effect. Moderation (buffer) and mediation are two models that have been extensively tested. In both models, leisure is positioned as a coping resource that individuals use after experiencing a stressful event. The moderation model has received mixed support (Caltabiano, 1995; Iso-Ahola & Park, 1996; Zuzanek, Robinson, & Iwasaki, 1998b), and the mediation model has been confirmed mainly when stress severity (but not frequency) was the predictor (Iwasaki, 2001, 2003a, 2003b). A third model that has been tested, though less extensively, is the stress
suppressing model, according to which leisure would reduce the frequency of stressful events or perceived stress severity. So far, the model has received inconsistent support (Bedini, Gladwell, Dudley, & Clancy, 2011; Iwasaki, 2003b). Leisure researchers have also indicated the possible applicability of the stress exposure model, since allocating too much time to leisure may increase stress (Patry, Blanchard, & Mask, 2007). However, there has been no empirical research that directly tested whether the exposure model applies to the effect of leisure on stress.

To study the role of leisure in the stress coping process, leisure researchers have taken various approaches, including classifying leisure activities in terms of their stress coping functions (Caltabiano, 1994), focusing on a particular leisure activity (Zuzanek, et al., 1998), and studying the underlying psychosocial mechanism of leisure (Iwasaki & Mannell, 2000b). Previous research has also implied the value of studying the time aspect of leisure (Patry, et al., 2007). For example, perceived leisure time sufficiency protected spiritual well-being against the effect of time pressure (Heintzman & Mannell, 2003). Additionally, leisure time spent in nature facilitates recovery from work demands by providing relaxation (Korpela & Kinnunen, 2011). However, perceived leisure time sufficiency and leisure time spent in a particular setting are different from the amount of time allocated to leisure. No empirical research has examined whether the amount of leisure time a person has moderates or mediates the effect of daily stress on well-being. Nor has there been research that tests the applicability of the suppressing and exposure models to the relationship between leisure time and daily stress.

Another gap in the leisure literature is the neglect of affect as an immediate coping outcome. A notable exception is a study of Canadian undergraduate students (Iwasaki, 2001; Iwasaki & Mannell, 2000a), in which the researchers found that leisure helped the students cope with academic and interpersonal stress by reducing negative affect and increasing positive affect. Given the intriguing findings, the researchers encouraged future research to examine affect as an immediate coping outcome. However, not much progress has been made since then in the leisure
literature. Few studies have paid further attention to affect as an immediate outcome of leisure coping. Additionally, most outcome measures used in studies of leisure coping are comparatively stable and less likely to fluctuate from day to day, e.g., mental health, psychological well-being. However, if the outcome measure used in a study of daily stress is “designed to assess that which is stable…for a given person, then the very change that is crucial for examining causal processes is systematically eliminated from examination” (DeLongis, Folkman, & Lazarus, 1988, p. 486). Affect, in contrast, is sensitive to “both rises and falls in levels of stress” (DeLongis, et al., 1988, p. 492), making it an appropriate outcome to examine when studying the effect of leisure time as a resource to cope with daily stressors.

Lastly, the leisure literature can also contribute to a better understanding of leisure as a coping resource by taking a within-person approach to studying the topic. The within-person approach refers to observing changes in some variable when the same person is examined across multiple time points (e.g., days, weeks, years; DeLongis, et al., 1988). For instance, did person A have more leisure time on Friday than on Thursday? Hence, the emphasis is no longer on between-person difference, e.g., whether person A had more leisure time than person B on Friday, but whether the amount of leisure time person A had changed across multiple days. Moreover, these two levels of measurement—between-person differences and within-person change—can be examined at the same time (Nesselroade, 1991). For example, two individuals may each experience increase in positive affect after using leisure time to cope with daily stress, but the increase may be significantly larger for one individual than for the other due to some personal characteristics (e.g., gender, personality). Therefore, to gain a comprehensive understanding of the effect of leisure in the stress coping process, it is important to examine both within-person change and between-person differences in the within-person change.

Overall, it is clear that daily stress has strong impact on well-being, that the time aspect of leisure may matter to stress coping, and that affect is an important stress coping outcome to
study. Oddly, no research has simultaneously examined these three components of the within-person stress coping process. We do not know if (and if yes, how) the three components relate to each other within-person over time. Nor do we know if there is between-person difference in the within-person process. Given the gaps in the literature, the overarching research questions for my dissertation are: What is the within-person relationship between daily stress, leisure time, and affective outcomes? Does the within-person relationship differ between individuals?

**Literature review**

**Daily stress: Frequency and severity**

Researchers have identified daily stressors as a different form of stress from major life events and chronic stressors (Kanner et al., 1981). Wheaton (1994) argued that daily stressors are important, since they “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). Multiple researchers have reported that daily stressors have powerful psychological impact, 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; Lazarus, 1999; Zautra, 2003). Given their significance, daily stressors have received growing attention in the past decade.

Almeida, Wethington and Kessler (2002) conducted a daily dairy study, collecting data from a national sample of adult Americans for eight consecutive days. The researchers found that, on nearly 40% of the study days, the participants experienced at least one daily stressor. On more than 10% study days, participants experienced multiple daily stressors. Researchers have also identified gender and age differences in daily stress frequency. For example, Bolger, DeLongis, Kessler, and Wethington (1989a) found that women experience daily stressors more frequently than men. Later, the finding was replicated by Almeida and colleagues in two studies using daily
diary methods (Almeida & Horn, 2004; Almeida & Kessler, 1998; Mroczek & Almeida, 2004). Findings of age difference in daily stress frequency have also been consistent. Early on, Zautra, Finch, Reich, and Guarnaccia (1991) reported a negative relationship between age and daily stress frequency. The finding was supported by Almeida and colleagues who found that younger and middle-aged adults tend to experience daily stressors more frequently than older adults (Almeida & Horn, 2004; Mroczek & Almeida, 2004; Stawski, et al., 2008).

Besides frequency of daily stressors, it is also important to study severity of a stressor (Lazarus & Folkman, 1984). For example, using data from the daily diary study, Grzywacz, Almeida, Neupert, and Ettner (2004) found that perceived severity of daily stressors, compared to stress frequency, had a stronger impact on individuals’ daily negative affect. More recently, Stawski, et al. (2008) argued that it is important to examine stress severity in order to understand the characteristics of a stressor that drive emotional reactivity. The researchers found that young adults, compared to older adults, are more reactive to severe daily stressors. Gender difference in appraisal of stress severity was also identified. For example, Almeida and Horn (2004) reported that women rated their stressors as more severe than men. In summary, it is important to pay attention to both frequency and severity of daily stressors to understand their psychological impact. Moreover, given age and gender differences in daily stress frequency and severity appraisal, studies of daily stress should, at the minimum, control for the effects of age and gender.

Given the significance of daily stressors, researchers started to examine various resources that help individuals cope with daily stressors, such as social support and self-esteem (e.g., Krause, 1987; Russell & Cutrona, 1991). One coping resource that has been identified is leisure. For example, Reich and Zautra (1981) found that regular weekly participation in pleasurable activities (including leisure) helped college students, especially those who experienced “considerable life stress” (p. 1002), reduce distress and increase psychological well-being. Kabanoff and O’Brien (1986) revealed that leisure is “a significant form of coping behavior” for
working people (p. 915). Wheeler and Frank (1988) identified leisure activity as one of four stress buffers. Given the promise of leisure as a stress coping resource, multiple researchers (Folkman, Moskowitz, Ozer, & Park, 1997; Kabanoff & O’Brien, 1986; Trenberth & Dewe, 2005) suggested that studying leisure is an important agenda, the result of which can contribute substantial knowledge about how people cope with stress. Leisure researchers have enthusiastically responded to the suggestion and have taken various approaches to study how people use leisure to cope with stress in everyday lives (Iwasaki, Mactavish, & MacKay, 2005).

**Leisure and stress coping**

Overall, three approaches have been adopted in studying the effect of leisure in the stress process: classifying leisure activities in terms of their stress coping functions, focusing on a particular activity (e.g., physical exercise), and studying the underlying psychosocial mechanism of leisure as a stress coping resource.

The rationale for classifying leisure activities is that different types of people use different leisure activities to cope with various stressors (Iwasaki & Schneider, 2003). Caltabiano (1994), by surveying 340 Australians, identified three clusters of leisure activities: outdoor-active sport, social activities, and cultural-hobbies. Cultural-hobbies have greater stress reduction effect for females than males, and older respondents were more likely to give higher stress-reduction ratings to social activities. Overall, Caltabiano (1994) suggested that escape is a key motivation to use leisure as a coping resource. Another study conducted in Australia (Coleman & Patterson, 1994; Patterson & Coleman, 1996) asked 98 university students the frequency with which they participated in various leisure activities when stressed and when stress-free respectively. According to Patterson and Coleman (1996), the major purpose of using leisure activities to cope with stress is seeking relaxation and enjoyment. In fact, leisure of even short duration can help students cope with stress (Coleman & Patterson, 1994). However, a major weakness of the study
is that the researchers solely relied on students’ self-report of their leisure behaviors, without monitoring them in either stress-free or stressful situations. Therefore, it is hard to tell whether the findings reflected students’ desired frequency of leisure participation or actual behaviors.

The second approach focuses on stress coping effects of particular leisure activities. For example, Ulrich, Dimberg, and Driver (1991) found that outdoor pursuits help individuals cope with stress in multiple ways, by reducing negative affect, boosting positive affect, providing temporary escape and a sense of freedom. Later, Hull and Michael (1995) found that highly stressed people experienced slight but significant decrease in negative mood during park visits. Physical exercise is another leisure activity that has been linked to stress coping. Zuzanek, Robinson, and Iwasaki (1998b) found that “physically active leisure seems to contribute to lower stress levels among the elderly, but not in the lives of busy life-cycle groups such as married employed parents” (p. 269).

The third approach is studying the underlying psychosocial mechanism of leisure as a stress coping resource. Researchers who take this approach are more interested in the psychosocial processes of using leisure to cope with stress than in any specific leisure pursuit. Iwasaki and Mannell (2000b) developed leisure coping scales, and distinguished leisure coping beliefs from leisure coping strategies. Leisure coping beliefs refer to the relatively stable beliefs that leisure can help people cope with stress. Leisure coping strategies are more situation-specific, and refer to multiple ways in which people use leisure to cope with stress. The beliefs scale and the strategies scale are independent from each other, hence, making it possible to test their individual effect on stress coping outcomes (Iwasaki & Mannell, 2000b).

After developing the scales, Iwasaki and colleagues (Iwasaki, 2001, 2003a, 2003b; Iwasaki, Mannell, & Butcher, 2002) tested the effects of general coping (e.g., planning, turning to religion, etc.) and leisure coping simultaneously, among university students and city workers. Overall, leisure coping strategies had a significant effect on mental health, while the effect of
general coping was not significant. The finding also applied to leisure coping beliefs among university students, though not among city workers. Based on the enlightening results, Iwasaki (2003a) called for more attention on “the role of leisure in coping with stress in order to facilitate a broader and more comprehensive understanding of ways of coping” (p. 54).

Besides taking different approaches to studying leisure as a coping resource, leisure researchers have also tested various models (e.g., buffer/moderation model, mediation model) that may explain the role of leisure in the stress coping process. According to the moderation (buffer) model, the occasions when the individual is most protected by a coping resource are the very occasions when an individual is at the greatest risk for detrimental outcomes of stress. On occasions when the coping resource is less needed, the individual also gains less from the resource. Therefore, the magnitude of the resource’s protective effect depends on “the scope and intensity of stressors” (Pearlin, 1999, p. 169).

Multiple leisure researchers have tested and confirmed the moderation model. For example, Caltabiano (1995) found that social leisure moderated the effect of distressful life events on illness symptoms (the number of physical and non-physical conditions) for both male and female adult Australians. Iso-Ahola and Park (1996) revealed that leisure companionship moderated the effect of stress on depression. Researchers have also studied the effect of physical activity, but the results were not promising. Kirkcaldy and Cooper (1993) failed to find a moderation effect of physical activity on the relationship between work stress and mental health. Zuzanek et al. (1998b) did not lend support to the moderation model in their study of physical activity either. Later on, Heintzman and Mannell (2003) provided further support for the moderation model, as perceived leisure time availability, as a component of leisure’s spiritual functions, had much more significant protective effect on spiritual well-being among individuals under time pressure than among those without. Schneider, Ainbinder, and Csikszentmihalyi (2004) revealed that pursuing leisure activities had much greater psychological benefits for high-
stress working parents than low-stress ones. More recently, Iwasaki (2006) identified a stress buffering effect of leisure as a coping resource on general health in a study of more than 1,000 Canadian adults. Overall, leisure can moderate the effect of stress on psychological outcomes, but the evidence so far has not been consistent.

Another model that has been tested is the mediation model. According to the mediation model, a mediator transmits the effect of stress “via a series of interlocking pathways: exposure to stress influences the mediator, which then influences mental health. Collectively, these pathways describe the indirect effects of stress on mental health” (Aneshensel, 1999, p. 220). The mediation model can take effect in two ways: deteriorative and counteractive (Ensel & Lin, 1991; Iwasaki, 2003b; Pearlin, 1999). According to the deteriorative effect, stressors reduce the capacity of coping resources, which subsequently undermine coping outcomes. According to the counteractive effect, stressful events prompt a person to mobilize coping resources and to increase coping effort, which then lead to better coping outcomes (Iwasaki, 2003b).

Early on, Iso-Ahola and Park (1996) found that leisure friendship mediated the effect of stress on depression. Recall their finding of stress moderation effect of leisure companionship on depression. These findings, in combination, indicated that leisure as a coping resource has multiple functions, and their mechanisms play out in different ways. Later, Iwasaki (2001), focusing on daily hassles among university students, found that leisure coping beliefs mediated the effect of stress severity on mental ill-health and psychological well-being. Using the same dataset, Iwasaki (2003a) found that leisure coping strategies mediated the effect of stress severity on immediate coping outcomes. In another study with city workers, Iwasaki et al. (2002) replicated the mediation effect of leisure coping strategies on the relationship between stress severity and mental health. However, using the same dataset but with stress frequency as the independent variable, the mediation model was not supported (Iwasaki, 2003b). Given the results
of previous research, it seems that the mediation effect of leisure mainly applies to stress severity, but not stress frequency.

A third model that has received attention in the leisure field is the stress suppressing model, which reasons that the resources an individual has can decrease the likelihood of stressful experiences. The model is consistent with Wheaton’s (1985) stress deterring model which assumes that resources are negatively related to stressful experience (Iwasaki, 2003b). While leisure is assumed to take place after stressful events in the moderation and mediation models, the suppressing model posits leisure as an antecedent to stressful experience (i.e., leisure taking place before stress). In their study with undergraduate students, Iwasaki and Mannell (2000a) revealed that leisure coping beliefs reduced the likelihood of experiencing weekly hassles. However, Iwasaki (2003b) failed to replicate the above findings in another study with city workers. More recently, Bedini et al. (2011) found that leisure participation reduced perceived stress and increased quality of life with a sample of informal caregivers, providing further support for the suppressing model.

Access to leisure may reduce stressful experience. However, it is also possible that too much leisure can lead to 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 undergraduate students cope effectively with stress. However, the researchers suggested that allocating too much time to leisure may lead to more stress, implying the possible applicability of the stress exposure model (Almeida, 2005). Stress exposure is “the likelihood that an individual will experience a daily stressor 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.
According to this line of reasoning, leisure would be an antecedent to stress occurrence, parallel to the stress suppressing model. However, the direction of the leisure-stress relationship is the opposite for the two models: positive in the exposure model but negative in the suppressing model. Although Patry et al. (2007) eloquently discussed the implication of their findings related to the exposure model, no direct empirical evidence was provided for the model. Therefore, further research is needed to examine whether allocating too much time to leisure exposes individuals to more stress.

Past studies have provided valuable insights, but some of them were limited in their conceptualization and measurement of stress. One manifestation of this limitation is confounding different types of stressors. For example, in his study with Canadian city workers, Iwasaki et al. (2002) measured traumas and more mundane stressors, but aggregated the severity of all types of stressors. In a similar vein, the conceptualization of stress utilized by Iwasaki (2003b) included not only daily stressors but also chronic stressors and major life events. Another issue with measurement of stress is confounding stress frequency with severity. For instance, in the survey that provided data for the study by Zuzanek, et al. (1998b), stress was measured by a single question that asks whether respondents experienced “a lot of stress, a moderate amount of stress, relatively little stress, or almost no stress at all” (p. 257). The way the question was asked left it unclear whether respondents referred to frequency of, severity of, or psychological reaction to stressful experiences when answering the question. In their study of undergraduate students, Iwasaki and Mannell (2000a) and Iwasaki (2003b) used a Likert-type scale that ranges from 1 (did not occur in the past week) to 7 (caused extreme stress) to measure weekly hassles. However, when participants chose 7 as the answer to a weekly hassle question, it is not clear whether they referred to frequency or severity of the hassle. Lastly, Calabiano (1995) and Iso-Ahola and Park (1996) used the Social Readjustment Rating Scale (Holmes and Rahe, 1967), the assumptions and construction of which has been widely criticized (Kanner, Coyne, Schaefer, & Lazarus, 1981).
Besides the need for better conceptualization and measurement of stress, daily stress included, there exist two more gaps in the current literature on leisure as a coping resource. First, few studies examined stress coping as a within-person phenomenon, though stress researchers (Caspi, et al., 1987) have long argued for the importance of doing so. According to DeLongis, et al. (1988), questions about stress coping concern how the same individual fares before and after stressful experiences and coping efforts, thus requiring a within-person strategy to answer. DeLongis, et al. (1988) also suggested that within-person research can be augmented by studying between-person difference in the within-person process (see also Nesselroade, 1991). To be fair, Iwasaki (2001, 2003a) tried to capture the within-person process of leisure coping by using a multiple-stage design to collect data from the same participants for several times. For example, participants reported their baseline mental health at stage 1, stressful events and coping efforts at stage 2, and resulting mental health at stage 3. However, in his analysis, Iwasaki (2001) aggregated stress severity and coping effort reported on multiple occasions. Therefore, the researcher essentially conducted between-person comparison and missed the opportunity to detect within-person change. In another study, Iwasaki (2003a) created a dummy variable for all but the last study participant, and entered all the dummy variables into hierarchical regression, making it one of the few studies in the leisure coping literature that are close to within-person analysis. In short, our understanding of leisure as a coping resource will be deepened if leisure research moves beyond between-person comparison and pays more attention to within-person change.

The other gap in the current literature is that the time aspect of leisure has been understudied. There has been scattered evidence for the value of taking the time use approach to studying leisure. For example, Heintman and Mannell (2003) demonstrated the importance of perceived leisure time availability to spiritual well-being. Patry et al. (2007) discussed the adaptive outcomes of using leisure as a planned breather and the maladaptive results of allocating too much time to leisure. More recently, Korpela and Kinnunen (2011) showed that time spent in
nature facilitated recovery from work demands by providing relaxation and enhancing life satisfaction. Bedini et al. (2011) reported that satisfaction with time for leisure enhanced quality of life by reducing perceived stress among informal caregivers. These past studies demonstrated the promise of the time aspect of leisure in coping research. However, perceived sufficiency of leisure time, satisfaction with time for leisure, and time spent in particular leisure settings are different from leisure time availability—the amount of time an individual has for leisure. There is a lack of research that examines whether having leisure time moderates or mediates the effect of stress on psychological outcomes. Nor has there been research that assesses whether leisure time availability suppresses or increases stress occurrence.

**Leisure time availability**

Leisure researchers (e.g., Shaw, 1985) have critically reflected on the activity approach to study leisure. 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). In a similar vein, Kelly and Godbey (1992) suggested, “The consciousness of the actor is central to distinguishing leisure” (p. 18). These arguments were supported by Pentland and Harvey (1999) who 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. Hence, it is not appropriate to use a set of selected “leisure-like” activities to define leisure (Harvey & Pentland, 1999, p. 12). Given the problems of the activity approach, some researchers adopted the time use approach to document leisure experiences of people in the Western Society (e.g., Thompson, et al., 2002). This approach acknowledges “the fundamentally
interpretative notion of the concept of leisure‖, at the same time, providing “a standardized variable for analysis‖ (Thompson, et al., 2002, p. 130).

Multiple time use studies documented the trend of free time availability in North America in the past 40 years. In the US, the results are more contradictory than consistent. Schor (1993) estimated that American people had less free time in the early 1990s than in the 1960s. A major reason is that American people trapped themselves in the “work and spend” cycle (p. 132). However, Jacobs and Gerson (2004), challenging the conclusion by Schor, argued that the increase in working time found by Schor “reflects a general trend toward people working more weeks per year rather than more hours per week” (p. 21). At the same time, Jacobs and Gerson identified a disparity between desired and available leisure time, though they failed to give the issue deeper thoughts in later chapters of their book. Robinson and Godbey (1997) presented a more optimistic picture of leisure time availability. By analyzing data of the National Study of Time Use in the U.S., Robinson and Godbey found that the amount of weekly free time for Americans aged 18 to 64 increased from 1965 to 1975, and further increased from 1975 to 1985. In Canada, people enjoyed an increase in leisure time from 1971 to 1981 (Harvey & Elliott, 1983). However, contrary to the trend in the U.S. (Robinson & Godbey, 1997), the amount of leisure time gradually decreased from 1981 to 1986, and further decreased from 1986 to 1992 for Canadians (Zuzanek & Smale, 1997; Zuzanek, Beckers, & Peters, 1998a).

Time use studies have also revealed gender and age differences in leisure time availability. Studies in Canada and the US have repeatedly found that women have less leisure time than men (Beck & Arnold, 2009; Larson & Richards, 1994; Mattingly & Bianch, 2003; Nickols & Abdel-Ghany, 1983; Zuzanek & Smale, 1992, 1997). Research findings on the effect of age have also been consistent across countries: older adults have more leisure time than middle-aged and younger adults (Bittman, 1998; Jackel & Wollscheid, 2007; Juster & Stafford, 1991; Zuzanek, 1998; Zuzanek, Beckers, & Peters, 1998a). These studies made it clear that, given
the effect of gender and age on leisure time availability, future research should take the two factors into account.

Besides recording the trend of leisure time availability, researchers have examined its psychological influence as well. So far, there has been a consistent finding that lack of leisure time is associated with negative psychological outcomes. For example, Zuzanek (1998) found that lowest amount of free time was associated with highest level of psychological pressure among Canadian adults. The finding was later replicated by Beck and Arnold (2009) in their ethnographic study of parents in the US. At the same time, negative psychological outcomes can also result from having too much leisure time on hand. Multiple leisure studies demonstrated that having too much free time available but too little to do results in feeling of boredom among adolescents and undergraduate students (Barnett, 2005; Caldwell, Smith, & Weissinger, 1992; Iso-Ahola & Weissinger, 1990). Previous research findings indicate that individuals with little leisure time and those with too much leisure time may experience vastly different psychological outcomes. Hence, paying attention to the differences between busy individuals and “leisure-rich” individuals can be revealing when examining the within-person effect of leisure time.

While having too much leisure time is not psychologically beneficial, we should not overlook the psychological contributions that leisure time availability can make to daily lives. For example, Larson and Richards (1994), in their study of adolescents’ free time use, found that having leisure time is associated with increase in positive affect. Robinson (1995) claimed that “the most central single quality-of-life parameter” emerging from time use study is how much free time people have (p. 43). More recently, Pressman et al. (2009) suggested that “taking the time to break from daily activities and work” may be crucial to well-being (p. 726). Additionally, Pentland and Harvey (1999) suggested that time use be included in “multivariate modeling to determine inferential relationships among behavioral, contextual, and demographic characteristics. There is relatively little work in this area” (p. 266). However, not much progress
has been made since Pentland and Harvey made their suggestion. Despite the value of leisure
time availability, it is still unknown whether having leisure time helps people cope with daily
stressors.

Apart from the lack of research on the potential of leisure time availability as a resource
to cope with daily stress, another gap in the time use literature is the neglect of affect as an
outcome of leisure time availability. Early on, Juster and Stafford (1991) suggested that research
could combine time use data with measures of affect to examine whether leisure time availability
influences well-being. However, except for Larson & Richard (1994), who assessed positive
affect as an outcome of leisure time availability, we are not aware of any other time use study that
paid attention to affect. Affect, an immediate outcome of stress and coping (Lazarus, 1990, 1991),
is important to study because “all of the effects of the stressful events … are integrated and have a
final psychological effect that emerges in affect” (Stone, 1995, p. 151). Affect has also been
identified as a cornerstone of psychological well-being (Carstensen, Charles, Isaacowitz, &
Kennedy, 2003; Mroczek, 2001) because “the preponderance of positive and negative affect
comes closest to an everyday meaning of well-being, or lack thereof” (Almeida, McGonagle, &
King, 2009, p. 221). Given the suggested importance of leisure time availability to well-being, it
is reasonable to study how affect, both positive and negative, responds to leisure time availability,
including on days with daily stressors.

**Affect as a stress outcome**

Past studies have examined both positive affect (PA) and negative affect (NA) as
outcomes of daily stressful experience. Early on, Eckenrode (1984) reported that NA was high on
days with daily stressors. Bolger et al. (1989b), also focusing on NA, found that daily stress led to
increased NA among married couples. Other studies assessed PA and NA as stress outcomes
simultaneously. For instance, David, et al. (1997) studied both undesirable and desirable events.
The authors found that undesirable events were stronger predictors of NA than were desirable events, but the effect of desirable events became stronger when predicting PA. Van Eck et al. (1998) showed that daily stressful events were followed by increase in NA and decrease in PA. Clearly, previous research supports the claim by Stone (1987) that stress can influence both NA and PA. There have also been cross-sectional studies that focused on PA as a stress outcome. For example, Watson (1988) reported a small but significant inverse relationship between daily stressful experiences and PA. Neale, Hooley, Jandorf, and Stone (1987) found a moderate decrease in PA associated with daily stress, a result replicated by Repetti (1993) for workplace stress. More recent studies utilized repeated-measure design and confirmed that daily stressors lead to decrease in PA (Smyth, Ockenfels, Porter, Kirschbaum, Hellhammer & Stone, 1998; Stawski, et al., 2008; Zautra, Affleck, Tennen, Reich, & Davis, 2005). These findings have made it clear the relevance of PA as a stress outcome. More importantly, PA, as an immediate stress outcome, can influence longer-term coping outcomes. Folkman and Moskowitz (2000) suggested that experiencing PA in stressful situations may “prevent decline into clinical depression” (p. 649), an argument later supported by Ong (2010). Lachman (2004) discussed the value of sustaining PA for overall well-being when middle-aged individuals are faced with overload stress. This empirical evidence prompted Zautra (2003) to argue that PA is “worthy of study in [its] own right for [its] contribution to our health and well-being” (p. 240).

Although the value of PA in the stress coping process has been recognized, exactly what coping strategies people use to derive PA in stressful situations is still understudied. Psychologists have associated pleasant events during leisure time with PA (Stone, 1987). For example, David et al. (1997) suggested that positive events, leisure included, “relate systematically to positive mood and…modestly to negative mood” (p. 150). Additionally, while negative events decreased PA, “their impact did not overwhelm the effect of positive events” (p. 156). More recently, Folkman & Moskowitz (2000) found that engaging in positive events
(including leisure) can generate PA when individuals experience chronic stress. Studies in the leisure field have also offered evidence that leisure pursuits are associated with PA (Carruthers & Hood, 2004; Ulrich, et al., 1991). For instance, Hills & Argyle (1998) studied four types of leisure activities (church, sports, music, TV watching), and found that all four types generated joy, excitement, positive feelings about life and towards others among study participants. Later, Mitas, Qian, Yarnal & Kerstetter (2011) found that social leisure activities enabled older women to experience positive emotions, which further led to the broadening and building processes theorized by Fredrickson (2001). However, neither psychologists nor leisure researchers have systematically examined both PA and NA as outcomes of daily stress and leisure time availability as a coping resource. It is not clear whether leisure time availability is able to sustain PA and/or reduce NA in time of daily stress.

When studying affect as a stress outcome, it is necessary to take into account affect structure as well. According to the circumplex model of affect (Russell, 1980), a theoretical representation of affect structure, each affective term consists of two dimensions: valence and arousal (the latter also termed as “activation”, e.g., Thayer, 1986). The valence dimension refers to “the hedonic quality or pleasantness of an affective experience” (Feldman, 1995, p. 153), i.e., whether an affect is assessed as positive or negative. The arousal dimension refers to perceived level of activation associated with an affective experience (Russell, 1989). For example, both “excited” and “content” are positive affect, but the former is high-arousal while the latter is low-arousal. Valence and arousal have been verified as two independent dimensions (Feldman-Barnett & Russell, 1998), and empirical evidence has shown that both positive and negative affect terms differ in arousal level (Thayer, 1986; Whissell, 1981). Hence, there are four types of affect according to the valence-arousal structure of affect: positive-high arousal, positive-low arousal, negative-high arousal, and negative-low arousal.
There has been scattered evidence that affect of different arousal levels reacts differently to stressful events. Clark and Watson (1988) found that physical problems were associated with high-arousal NA (distressed, nervous, angry). Van Eck, et al. (1998) reported that Agitation, a high-arousal NA scale, was more reactive to daily stressors than NA (consisting both high- and low-arousal items) in general. Based on their findings, the researchers suggested that future investigations of affective reactivity to stress should distinguish between affect “differing in arousal level” (p. 1583). More recently, Moskowitz (2011) suggested that research on stress coping should avoid relying solely on measuring high-arousal affect as the outcome. Despite repeated call for attention on the arousal dimension of affect, we are not aware of any study that examines whether affect of different valence-arousal dimensions reacts differently to daily stressors and coping resources.
Research purpose

Overall, previous research has provided valuable insights into daily stress, leisure as a stress coping resource, leisure time availability, as well as affect as a stress outcome. At the same time, previous research has raised additional questions. More studies are needed to further examine individuals’ experience and appraisal of daily stress, the within-person effect of leisure time availability as a coping resource, and affect—both PA and NA of high and low arousal—as a stress coping outcome. Therefore, the overarching research questions for my dissertation are: What is the within-person relationship between daily stress, leisure time availability, and affective outcomes? Is the within-person relationship different between individuals who usually have little leisure time and those with abundant leisure time?

In the first paper, I tested 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. In the second paper, I focused on daily stress frequency and positive affect, and tested the applicability of the moderation and mediation models to the effect of leisure time as a coping resource. In the third paper, I examined whether leisure time as a coping resource mediates the effect of daily stress severity on positive and negative affect of high and low arousal levels. In all three papers, the effects of gender and age were controlled for, given gender and age differences in daily stress experience and leisure time availability.
Methods

Sample

The data for my dissertation 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 was conducted, allowing a follow-up of the original MIDUS sample 9-10 years later. For the current study, we used data from the second wave of MIDUS.

The second wave of MIDUS 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, including education level, 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. The entire sample of project 2 (NSDE) also participated in project 1. Therefore, in order to utilize the measure of education level in project 1, the data from projects 1 and 2 were merged to perform analyses.

MIDUS participants are a national sample of non-institutionalized, English-speaking adult Americans. Participants in the NSDE are a representative subsample of MIDUS participants. Collecting data from a national sample is a significant progress from previous diary studies of daily stress that used “small and often unrepresentative samples that limit the generalizability of findings” (Almeida, 2005, p. 66), and will also benefit research on time use and related behaviors (Harvey, 1999).
Demographic information of the NSDE sample is provided in Table 1-1. Over half of the sample was between the age of 40 and 59, and close to 40% of the sample was 60 years or older. The remaining 8.7% were adults younger than 40 years old. There are 56% females and 44% males in the sample. The sample is predominantly White, with 92.07% Caucasian and 3.2% African Americans. The majority of the sample had at least some college-level education (70.25%), was married (72.37%) and had at least one child under 18 years old in the household (87.51%) at the time of the study. Almost two-thirds of the sample were employed (62.52%), and over one-quarter of the sample were retired (26.71%).
Data collection procedure

NSDE utilized the daily diary method to collect data. At the end of each day for eight consecutive days, participants completed a telephone interview, answering questions about the previous 24 hours, including their experiences of stressful events, time use behaviors, physical symptoms, and positive and negative affect. 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. Each participant received $25 for participating in the NSDE (for details regarding data collection, see Almeida, et al., 2009). Overall, 89% of the participants completed between 6-8 daily interviews across the 8-day period. 11% of the respondents had fewer than 6 days of data, and were excluded in current analyses.

The daily diary method has several virtues (Almeida & Wong, 2009) that are particularly relevant to this study. First, diary design collects information on day-to-day micro-level process in participants’ natural environments. Doing so makes it possible to study those phenomena that change fairly quickly (Bolger, et al., 2003; Shiffman, Stone, & Hufford, 2008), e.g., leisure time availability and affect—the coping resource and outcome that this study focuses on. Second, and related to the first point, the daily diary collects data about individuals’ real life experience, thus overcoming the issue of ecological validity related to laboratory research and enabling researchers to study those phenomena that are not replicable in a lab setting (Reis & Gable, 2000; Wheeler & Reis, 1991). Third, diary design, which is intensive and with a short time lag, reduces recall bias, since respondents do not have to recall experiences over a time frame longer than the previous 24 hours (Stone, et al., 1998). Fourth, previous national time use studies only asked each respondent to provide data on one day (Jacobs & Gerson, 2004; Robinson & Godbey, 1997; Zuzanek & Smale, 1992). Therefore, comparing time use behaviors on different days of the week does not make sense, considering it is comparing person A’s time use behavior on Monday with person B’s time use behavior on Tuesday. By collecting data from the same individual for eight
days, NSDE data are able to overcome the weakness of these previous studies. Fifth, the daily dairy method uses repeated-measure design. Such design, compared with traditional cross-sectional questionnaire, enables researchers to not only conduct between-person comparison (Eckenrode & Bolger, 1995) but also examine within-person processes (Hoffman & Stawski, 2009), e.g., how the stress coping process unfolds within the same individual over time (Almeida, 2005). Hence, NSDE data provides an opportunity to complement leisure research on between-person difference in leisure coping with examination of the within-person process of using leisure to cope with daily stressors. Additionally, multiple-day diary data makes it possible to study between-person differences in within-person processes (Nesselroade, 1991), e.g., whether leisure time as a coping resource is equally effective among individuals with a busy schedule and those who are leisure-rich.

At the same time, there are at least two limitations with the daily diary design used by NSDE. While researchers have confirmed the validity of 24-hour recall diary on time use (Juster & Stafford, 1985; Robinson & Godbey, 2005) and on affect (Stone, 1995), it is important to note that daily diary design does not completely avoid retrospection bias. Bolger et al. (2003) pointed out that transient subjective feelings such as affect may be more susceptible to recall bias than are objective events (e.g., number of work deadlines in a single day). In a similar vein, Shiffman et al. (2008) suggested that summarizing the whole day at the end of the day may miss important dynamic variation in the focal psychological constructs. Another limitation is that the large sample size and the use of telephone interviews made it difficult to collect daily data from the same participants for an extensive period of time (e.g., two weeks, a month). Therefore, compared to many other diary studies, NSDE sampled “a relatively modest number of days per participant” (Almeida, 2005, p. 53). Nonetheless, the size and quality of the dataset, rare in the leisure field, provides a valuable opportunity to examine the effect of leisure time as a coping resource.
Measures

Measures of daily stress frequency and severity, leisure time availability, positive and negative affect, age, and gender came from project 2 (i.e., NSDE). The measure of education level came from project 1, as all the participants of project 2 also participated in project 1.

Daily stress frequency

Frequency of daily stressors was assessed through the semi-structured Daily Inventory of Stressful Events (DISE, Almeida, et al., 2002). The inventory uses seven stem questions to ask each participant whether the following seven types of events occurred to him/her within the previous 24 hours: argument, tension (could have had an argument but avoided), work stressor, home stressor, network stressor (a stressor that involves the respondent’s network of relatives or close friends), discrimination, and any other stressor. For each daily interview, participants 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 was calculated by summing the values of the seven stem questions on each interview day for each participant (Stawski, et al., 2008). The way in which DISE identifies and classifies daily stressors avoids the misleading practice of drawing on the emotional responses by the participants (Zautra, 2003), instead, draws on the properties of the events themselves.

To study within-person change and between-person difference in within-person change, we formed the daily change score of stress frequency for each participant across all study days. First, we calculated each participant’s average stress frequency 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 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. The person-centered score represents the within-person aspect of daily stress frequency, as we can compare a person’s day one to his/her day two. The personal average represents the between-person aspect of leisure daily stress frequency, as we can compare a person’s average to that of other persons. Daily change scores were also calculated for stress severity and leisure time. The personal average of leisure time availability was used as the between-person factor in subsequent analyses.

**Daily stress severity**

In each daily interview, participants who answered affirmatively to any of the seven stem questions about daily stress occurrence also answered a series of probe questions about the stressor. One question assesses subjective appraisal of stress severity: “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 day in the daily study, the sum of the severity ratings was calculated to represent daily stress severity (Sliwinski, Almeida, Smyth, & Stawski, 2009).

**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. Respondents then provided their own estimates. In the current study, leisure time availability (LeisT) was constructed by calculating the number of hours each day that respondents
devoted to leisure activities, e.g., 0.5 means that a respondent spent 0.5 hour on leisure activities on a given day.

Recently, the quality and validity of self-report time use data has been confirmed (Jacobs, 1998; 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 calculate leisure time availability. After participants in those national time use studies provided their daily diary data, researchers used predetermined activity codes to code the data, e.g., 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, 1985), coding for activity type ignores individuals’ subjective feelings towards the activities, rendering the danger of misplacing an activity into a wrong category. Given the size of the NSDE sample and the fact that the time use estimate approach actually accommodates the subjective aspect of leisure, the data on leisure time availability qualifies for producing reliable research.

Affect

Frequency of positive affect (PA) and negative affect (NA) was measured during each daily interview, in keeping with the argument that it is frequency rather than intensity of affect that relates more closely to happiness (Diener & Larsen, 1993; Diener, Sandvik, & Pavot, 1991). Items in the affect scales were culled from the following valid and well-known instruments (Almeida, et al., 2002; Mroczek & Kolarz, 1998): the Affect Balance Scale (Bradburn, 1969), the University of Michigan’s Composite International Diagnostic Interview (Kessler, et al., 1994),
the Manifest Anxiety Scale (Taylor, 1953), the Health Opinion Survey (MacMillan, 1957), the General Well-Being Schedule (Fazio, 1977), and the Center for Epidemiological Studies Depression Scale (Radloff, 1977). Respondents indicated how much of the time during the previous 24 hours they experienced each affect 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 study day, the sum of the items in each affect (sub)-scale was calculated (Mcrozek & Kolarz, 1998).

The PA scale has 13 items: “in good spirits,” “cheerful,” “extremely happy,” “calm and peaceful,” “satisfied,” “full of life,” “close to others,” “feel like you belong,” “enthusiastic,” “attentive,” “proud,” “active,” and “confident.” Low-arousal PA was assessed using two items: “calm and peaceful” and “satisfied.” High-arousal PA was assessed using six items: “cheerful,” “extremely happy,” “full of life,” “enthusiastic,” “proud,” and “active.” Low-arousal NA was assessed using four items: “worthless,” “sad,” “hopeless,” and “lonely.” High-arousal NA was assessed using seven items: “restless,” “nervous,” “afraid,” “jittery,” “irritable,” “upset,” and “angry.”

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.
Rationale of using multilevel modeling

Multi-level modeling (MLM) includes two levels of models, with level one as the within-person model, and level two as the between-person model (Singer & Willet, 2003). Level 1 of MLM (within-person analysis) enables researchers to test whether experience of daily stressors covary with markers of health and wellbeing over time (DeLongis, et al., 1988; Lazarus, 1984). In a similar vein, MLM is a valid approach to test how PA and NA function as outcomes of stress and coping, which, according to Reich et al. (2003), is a within-person question. Level 2 of a MLM (between-person analysis) makes it possible to examine “temporally stable personality and environmental variables” that can partly explain the relationship between stress, leisure time availability, and affective outcome (Almeida, 2005, p. 129). In short, researchers are able to study within-person change, between-person differences, and their interactions simultaneously by using MLM to analyze a longitudinal dataset (Almeida & Wong, 2009; Singer & Willet, 2003). 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).

Various researchers have discussed the value of MLM, which can be summarized by five points. First, Molenaar (2004) argued that between-person difference and within-person change differ at least in magnitude, if not in direction. MLM separates the two effects and avoids the problem of analyzing between-person difference (level 2 of MLM) to answer questions about within-person change (level 1 of MLM). Second, MLM allows unbalanced numbers of cases per participant (Reis & Gable, 2000). In other words, MLM is capable of handling missing data, and participants with incomplete data can be included in the analysis (Raudenbush, et al., 1995). Third, participants do not have to be measured at the same time-points, as long as the spacing between two measurements is the same across participants (Willet & Sayer, 1994). This feature is particularly important to analyzing NSDE data, considering data collection is composed of separate flights throughout a year. Fourth, 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). Fifth, MLM takes advantage of maximum likelihood estimation, which is “more precise and efficient than least squares estimation” (Reis & Gable, 2000, p. 211). In summary, MLM lends itself well to analyzing daily diary data on stress, coping, and affective outcomes. In addition, MLM’s ability to handle dependency in study design, unbalanced data and limited numbers of measures per unit makes it a more powerful tool than the more traditional repeated-measure ANOVA (Sibthorp, Witter, Wells, Ellis, & Voelkl, 2004).

Limitations

As with all research, this study has inherent limitations. Although NSDE has a national sample of adult Americans, the participants are predominantly Caucasians, and more than two-thirds of them had at least some college-level education and were married at the time of data collection. Therefore, it is not clear whether study findings will be applicable to minority groups, individuals with less education, and people in relationship status other than married. In fact, Henrich, Heine, and Norenzayan (2010) argued that researched findings based on samples drawn from WEIRD societies (Western, Educated, Industrialized, Rich, and Democratic) cannot be readily generalized to populations in other types of societies. Second, daily stress frequency is operationalized as the sum of the frequency of the seven types of daily stressors measured by the DISE, and the same aggregating practice is used to operationalize daily stress severity. Hence, it is not feasible to tell whether the effect of leisure time as a coping resource is applicable to all types of daily stressors. Individuals tend to experience different types of stressors, which may require different coping resources (Ptacek, Smith & Zanas, 1992). Aggregating different types of daily stressors makes it impossible to tell with which type of daily stressors leisure time copes the most effectively. Third, previous research found that having too much leisure time is associated
with feelings of boredom (Iso-Ahola & Weissinger, 1990). On the other hand, dissatisfaction with the amount of time for leisure is related to increased stressful feelings (Bedini, et al., 2011). Moreover, satisfaction with leisure time experience can influence psychological outcomes of the experience as well (Kleiber, 1999). However, the only measure of leisure time that the NSDE dataset includes is the amount of leisure time that a participant had in the previous 24 hours. No data was collected on the amount of leisure time a person needs on a daily basis; nor was data collected on individual satisfaction with each day’s leisure time experience.
Orientation to Chapter 2

Chapter 2 is written as an independent manuscript. This manuscript is intended for submission to the peer-reviewed journal *Leisure Sciences* and is therefore formatted to the specifications of the journal. The role of Chapter 2 in the dissertation is to address the following research questions:

1. Does having more leisure time than usual on one day *suppress* daily stress severity on the next day?

2. Does having *too much* more leisure time than usual on one day lead to higher severity appraisal the next day?

3. Does the within-person relationship between leisure time and daily stress severity differ between busy individuals who usually had little leisure time and those with abundant leisure time in daily lives?
Chapter 2

Is Leisure Time Associated with More or Less Severe Daily Stressors? An Examination Using Eight-Day Diary Data

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
Introduction

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; Lazarus, 1999; 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, sufficient resources (e.g., social support) can reduce the probability of experiencing stress. The exposure model, on the other hand, suggests that certain socio-demographic, psychosocial and situational factors can expose individuals 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 (Iwasaki & Mannell, 2000; Patry, Blanchard, and Mask, 2007). So far, there has been mixed support for the suppressing
model (Bedini, Gladwell, Dudley, & Clancy, 2011; Iwasaki, 2003). The exposure model has received no empirical testing, although 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 the time aspect of leisure, i.e., the amount of leisure allocated to leisure. In fact, there has been evidence that lack of leisure time is associated with high level of psychological stress (e.g., Zuzanek, 1998), although it remains unknown whether taking time to relax can help people appraise daily stressors as less severe.

Most past studies of leisure time examined between-person differences, e.g., 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, i.e., 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 using 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 (Kanner, Coyne, Schaefer, & Lazarus, 1981). 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), e.g., 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, 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.

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, Gunthert 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 started to examine 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, Almeida, Neupert & Ettner, 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 (Figure 2-1) reasons that resources decrease the likelihood of stressful experiences, and is consistent with Wheaton’s (1985) stress-deterring model which assumes that resources are negatively related to the likelihood of stressful experience (Iwasaki, 2003). Iwasaki and colleagues have 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 is inapplicable.

More recently, Bedini et al. (2011) found that satisfaction with time for leisure, along with satisfaction with leisure experience, 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) rather than the severity of any particular type of stressors. 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 furthered by additional research that focuses on daily stress and utilizes sound measurement of stress.

**FIGURE 2-1: STRESS SUPPRESSING MODEL (ADAPTED FROM ENSEL & LIN, 1991)**

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 (Figure 2-2)—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 odd 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.

**FIGURE 2-2: STRESS EXPOSURE MODEL (ADAPTED FROM ALMEIDA, 2005)**

![Stress Exposure Model Diagram](image)

In summary, more research is needed to 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.

The study by Patry et al. (2007) provided implication for not only the potential applicability of the stress exposure model but also the value of studying the time aspect of leisure, i.e., the amount of leisure time an individual has. Indeed, there has been scattered evidence in the leisure literature 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. Zuzanek and colleagues also reported that high level of time pressure is related to more psychological stress in both Canada (Zuzanek & Mannell, 1998; Zuzanek & Smale, 1997) and the Netherlands (Zuzanek, Beckers, & Peters, 1998). 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 difference, 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 will provide 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), e.g., 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), presented in model format in Figure 2-3. First, does having more leisure time on one day suppress daily stress severity on the next day? Second, does having too much more leisure time on one day lead to higher severity appraisal? Third, does the within-person relationship between leisure time and daily stress severity 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 effect of leisure time on severity appraisal of daily stressors, while RQ three focuses on between-person difference in the within-person effect. Given identified gender, age and socioeconomic differences in subjective appraisal of stress severity and leisure time availability (Almeida, et al., 2005; Bittman, 1998; Grzywacz, et al., 2004; Jackel & Wollscheid, 2007; Juster & Stafford, 1991; Mattingly & Bianch, 2003; Nickols & Abdel-Ghany, 1983; Robinson & Godbey, 1997; Zuzanek & Smale, 1997), we controlled for the effects of gender, age and socioeconomic status in data analyses. Figure 3-3

FIGURE 3-3: RESEARCH QUESTIONS PRESENTED IN MODEL FORMAT

*Research questions 1 & 2
**Research question 3
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 was conducted, allowing a follow-up of the original MIDUS sample 9-10 years later. For the current study, we used data from the second wave of MIDUS.

The second wave of MIDUS 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 participants are a national sample of non-institutionalized, English-speaking adult Americans. Participants in the NSDE are a representative subsample of MIDUS participants (N=2022, age 33 to 84, 57.2% female), and received $25 for their participation in the NSDE (Almeida, 2005). 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, 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 sequence of interviews. Overall, 92% of the participants completed between 6-8 daily interviews across the 8-day period.

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, e.g., 0.5 means that a participant spent 0.5 hour on leisure activities on a given day.

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:

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

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

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. For a detailed discussion of the principles and advantages of MLM, see Qian, et al. (under review).

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 is fitted to answer research questions one and two, by testing whether there is a polynomial within-person relationship between leisure time and perceived severity of daily stressors. In order to do so, we included both
a first-order term and a quadratic term of person-centered leisure time at level 1. The second model is 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 analysis.

Results

Descriptive Statistics

Table 2-1 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 was 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 is not related to average severity or daily stressors or average amount of leisure time.

| Table 2-1. Correlations between Variables and Descriptive Statistics of the Variables |
|-----------------------------------------------|---|---|---|---|---|
| 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 | N/A |
| Standard Deviation | 1.10 | 1.83 | N/A | 12 | N/A |

Notes: *p<0.05, **p<0.005, ***p<0.0001.
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 there is a polynomial within-person relationship between leisure time and daily stress severity. The result (the left panel in Table 2) shows that the coefficients for the first-order term ($b=-0.006, p>0.70$) and the quadratic term ($b=-0.007, p>0.07$) of person-centered leisure time are not significant. Although the within-person effect is not significant, it is possible that the effect differs between individuals, i.e., 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, affects the within-person relationship. According to the result (the right panel in Table 2), the quadratic term of person-centered leisure time has a significant effect ($b=-0.01, p<0.05$) on perceived severity of daily stressors. However, the first-order term is not significant ($b=-0.04, p>0.14$). Additionally, the within-person effect of person-centered leisure time does not differ by average amount of leisure time.

Given the non-significance of the first-order term, we decided to drop the term from the level-1 equation while keeping the quadratic term. Although earlier results indicate that person-centered leisure time does not have a polynomial lagging effect on stress severity, it is possible that there exists another form of curvilinear relationship, especially given that the quadratic term in model 2 above is significant. 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 2-
3) shows that the quadratic term of person-centered leisure time does not have a significant effect on stress severity ($b=-0.006, p>0.09$). We then proceeded to add the between-person factor to the level-2 equation. According to the result (the right panel of Table 2-3), the quadratic term of person-centered leisure time has a significant effect on perceived stress severity ($b=-0.01, p<0.05$), and the effect differs 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 differs between individuals: the lower the average amount of leisure time is, the more dramatic the effect

| Table 2-2. 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**                  | **Effect of average amount of leisure time on the within-person relationship** |
| Within-person relationship                       |                                    |
| Intercept                                         | 2.00 (0.04)**                      |
| Age                                               | -0.01 (0.002)**                    |
| Gender                                            | 0.43 (0.05)**                      |
| Education                                         | -0.003 (0.009)                     |
| Average Amount of Leisure Time                    | --                                 |
| Person-Centered Leisure Time                      | -0.006 (0.02)                      |
| Intercept                                         | -0.04 (0.03)                       |
| Age                                               | 0.001 (0.001)                      |
| Gender                                            | 0.003 (0.02)                       |
| Education                                         | 0.007 (0.004)                      |
| Average Amount of Leisure Time                    | --                                 |
| (Person-Centered Leisure Time)$^2$                | 0.007 (0.004)                      |
| Intercept                                         | -0.01 (0.006)*                     |
| Age                                               | -0.0002 (0.0002)                   |
| Gender                                            | 0.006 (0.005)                      |
| Education                                         | 0.002 (0.001)                      |
| Average Amount of Leisure Time                    | --                                 |
| Random effects:                                   |                                    |
| Variance intercept                                | 0.35 (0.04)**                      |
| Variance linear slope                             | --                                 |
| Variance quadratic slope                          | 0.0002 (0.0001)*                   |
| Residual variance                                 | 1.60 (0.04)**                      |

Notes: *$p < 0.05$, **$p<0.0001$
becomes. That is, the lagging effect of person-centered leisure time is stronger among individuals with little leisure time on average than among those with high average amount of leisure time.

Table 2-3. Unstandardized Estimates (and Standard Errors) of the Curvilinear Lagging Effect of Person-Centered Leisure Time on Perceived Severity of Daily Stressors

<table>
<thead>
<tr>
<th>Severity of Daily Stressors</th>
<th>Within-person relationship</th>
<th>Effect of average amount of leisure time on the within-person relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fixed effects:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Severity of Daily Stressors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>2.00 (0.04)**</td>
<td>2.10 (0.07)**</td>
</tr>
<tr>
<td>Age</td>
<td>-0.01 (0.002)**</td>
<td>-0.01 (0.002)**</td>
</tr>
<tr>
<td>Gender</td>
<td>0.43 (0.06)**</td>
<td>0.42 (0.06)**</td>
</tr>
<tr>
<td>Education</td>
<td>0.006 (0.007)</td>
<td>0.006 (0.007)</td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>-0.03 (0.02)</td>
</tr>
<tr>
<td>(Person-Centered Leisure Time)^2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.006 (0.004)</td>
<td>-0.01 (0.02)*</td>
</tr>
<tr>
<td>Age</td>
<td>-0.0001 (0.0002)</td>
<td>-0.0001 (0.0002)</td>
</tr>
<tr>
<td>Gender</td>
<td>0.007 (0.004)</td>
<td>0.007 (0.004)</td>
</tr>
<tr>
<td>Education</td>
<td>0.0004 (0.0006)</td>
<td>0.0004 (0.0006)</td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>0.001 (0.0007)*</td>
</tr>
<tr>
<td><strong>Random effects:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance intercept</td>
<td>0.35 (0.04)**</td>
<td>0.35 (0.04)**</td>
</tr>
<tr>
<td>Variance quadratic slope</td>
<td>0.0001 (0.0001)*</td>
<td>0.0001 (0.0001)</td>
</tr>
<tr>
<td>Residual variance</td>
<td>1.60 (0.04)**</td>
<td>1.60 (0.04)**</td>
</tr>
</tbody>
</table>

Notes: *p < 0.05, **p<0.0001

To demonstrate between-person difference in the within-person curvilinear lagging effect, we plotted the within-person relationship between leisure time and stress severity for individuals with average amount of leisure time one standard deviation above and below sample mean respectively (Figure 4). 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 stress severity is minimal among leisure-rich individuals. Meanwhile, the lagging effect of person-centered leisure time on perceived severity of daily stressors is 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 leads to a small decrease in perceived severity of daily stressors the next day, but further increase in leisure time leads to accelerated (i.e., much larger) decrease in stress severity.

**FIGURE 2-4: 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**

![Graph showing the curvilinear lagging effect of leisure time on perceived severity of daily stressors.](image)

**Discussion**

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 that differs between-person. 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 above personal average. 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 of the suppressing model mainly examined the psychosocial aspect of leisure as a resource to reduce stress (Bedini, et al., 2011; Iwasaki, 2003; Iwasaki & Mannell, 2000). However, no known research on the suppressing model has examined the time aspect of leisure, i.e., whether the amount of leisure time an individual has matters. Our study shows that the time aspect of leisure is important, and reveals that having more leisure time than usual on a day helps an individual appraise daily stressors as less severe the next day. In other words, relaxing well today makes it less likely, particularly for busy individuals, to appraise daily stressors as highly severe tomorrow.

In past studies of leisure time, the negative effect of lacking leisure time and high time pressure (Robinson & Godbey, 1997; Zuzanek, 1998; Zuzanek & Mannell, 1998; Zuzanek & Smale, 1997; Zuzanek, et al., 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. Therefore, 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 Figure 4). 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 it is not likely for a busy individual to have a dramatic increase in leisure time frequently, when they do get a big chunk of leisure time to relax well, 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 seemingly small 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 are busy individuals who do 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 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.

The third contribution of our study is testing 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 the type of data that affords assessing lagging effect. Analyzing lagging effect makes sure that leisure time precedes the occurrence of daily stressors and related severity appraisal. Although lagging effect does not completely address causality, it is one step closer compared to traditional correlational analysis that cannot exclude reciprocal effect, i.e., 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; Almeida, et al., 2005; Grzywacz, et al., 2004) and leisure time availability (e.g., Bittman, 1998; Jackel & Wollscheid, 2007; Juster & Stafford, 1991; Mattingly & Bianch, 2003; Nickols & Abdel-Ghany, 1983; Zuzanek & Smale, 1997). 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; Zuzanek & Smale, 1997), which did not tell us much about 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 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 Schuldberg (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). However, NSDE did not collect data on satisfaction with leisure time. Therefore, 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). However, we did not examine whether leisure time has the same effect among neurotics and non-neurotics. Third, 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 three directions for future research. First, we urge future research to examine both the amount of leisure time and satisfaction with the amount so as to understand which aspect of leisure time 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 help us understand whether the within-person effect of leisure time unfolds differently among individuals with different personality traits. Lastly, 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.

**Conclusion**

The current study tested the applicability of two theoretical models—stress suppressing and exposure—on the within-person lagging effect of leisure time on severity appraisal of daily stressors. Examining within-person effect complements previous research that mainly focused on between-person difference, while testing lagging effect affords stronger implication of causality than correlational analysis that use same-day data. Our findings support a suppressing effect that is particularly strong among busy individuals who usually have little leisure time. Additionally, the suppressing effect is curvilinear rather than linear. A small increase in leisure time on a day led to a small decrease in severity appraisal the next day. However, a larger increase in leisure time was followed by a much more dramatic decrease in severity appraisal. Meanwhile, the within-person suppressing effect is minimal among leisure-rich individuals, i.e., those with high average amount of leisure time in daily living. Taken together, the findings suggest that giving oneself a break on a day makes it less likely for busy individuals to appraise the daily stressors that they encounter the next day as highly severe. In leisure literature, the value of leisure as a resource to cope with stress (i.e., stress reactivity) has been well established (Iwasaki &
Schneider, 2003). What we found 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.
Orientation to Chapter 3

Chapter 3 is written as an independent manuscript. This manuscript is intended for submission to the peer-reviewed journal *Journal of Leisure Research* and is therefore formatted to the specifications of the journal. The role of Chapter 3 in the dissertation is to address the following research questions:

1. Does having more leisure time than usual moderate or mediate the effect of daily stress frequency on PA?

2. Does the within-person relationship differ by the average amount of leisure time a person each day across the eight study days?
Chapter 3

Does Leisure Time Moderate or Mediate the Effect of Daily Stress on Positive Affect? An Examination Using Eight-Day Diary Data

Abstract

This study tested the applicability of stress moderation and mediation models to leisure time as a coping resource. Analyzing eight-day diary data (N=2,022), the study examined how the process of using leisure time to cope with daily stressors unfolds within-person over time. We found that relatively high daily stress frequency, while reducing positive affect (PA), prompted an individual to allocate more time to leisure than usual, which then increased PA, thus partially remedying the damage by high daily stress frequency. This within-person process, however, is significantly stronger among busy individuals than those with abundant leisure time on average. The findings support a partial counteractive mediation model, demonstrate between-person difference in the within-person stress coping process, and reveal the importance of PA as a coping outcome.

Keywords: leisure time, daily stress, mediation, moderation, positive affect
Introduction

Daily stressors refer to “routine challenges of day-to-day living” (e.g., meeting work deadlines) and unexpected small events that disrupt daily life (e.g., arguments with one’s spouse) (Almeida, 2005, p. 64). Researchers have reported that frequent experiences of daily stressors have powerful influences on psychological well-being (Almeida & Kessler, 1998; Stawski, Sliwinski, Almeida, & Smyth, 2008). The significance of daily stress led researchers to examine various resources that help people cope with stress. One identified coping resource is leisure (e.g., Reich & Zautra, 1981; Wheeler & Frank, 1988), the value of which, according to stress researchers, deserves more attention (Folkman, Moskowitz, Ozer, & Park, 1997; Kabanoff & O’Brien, 1986). Stress researchers (Costa, Somerfield, & McCrae, 1996) have also suggested that studying how individuals use a particular resource to cope with various stressors, compared with examining many ways of coping with certain stressors, may be more informative.

Leisure researchers, echoing suggestions by stress researchers, have focused on leisure as a coping resource and have tested various theoretical models that may explain how individuals use leisure to cope with stress, including moderation and mediation (Iwasaki & Mannell, 2000). According to the moderation model, a coping resource has the greatest protective effect when an individual is exposed to the most intense stressors (Pearlin, 1999). According to the mediation model, exposure to stress influences a mediator, which then affects psychological outcomes (Aneshensel, 1999). So far, empirical studies have produced inconsistent results for both moderation (Iso-Ahola & Park, 1996; Iwasaki & Mannell, 2000; Kirkcaldy & Cooper, 1993) and mediation (Iwasaki, 2003a; 2003b) models, indicating need for further research.

Besides mixed evidence for the two theoretical models, there are gaps in the leisure literature that call for more research. First, previous research (e.g., Heintzman & Mannell, 2003; Iso-Ahola & Park, 1996) mainly conducted between-person comparisons. Few studies have taken
a within-person approach to trace how the process of using leisure to cope with stress unfolds within the same person over time. Second, previous research either studied leisure as activities (e.g., Caltabiano, 1995; Zuzanek, Robinson, & Iwasaki, 1998) or assessed the underlying psychosocial mechanism of leisure as a coping resource (e.g., Iwasaki, 2003b). Despite the psychological benefits of having leisure time (Robinson, 1995), few studies examined the time aspect of leisure, i.e., whether the amount of leisure time a person has helps him/her cope with stress. Third, positive affect (PA) is a significant stress outcome (Folkman and Moskowitz, 2000), and the ability to sustain PA in time of stress can help prevent the onset of serious psychological symptoms (Ong, 2010). Despite the importance of PA, it is unclear whether leisure as a coping resource sustains PA in time of stress.

To fill the gaps in the literature, the purpose of this study is to examine whether the moderation or mediation model explains the effect of leisure time as a coping resource on PA on days with frequent daily stressors. We also examine whether there is between-person difference in the within-person coping effect.

**Literature review**

**Daily stress: Frequency and coping**

Researchers have documented frequency of daily stressors among adult Americans. For example, Almeida, Wethington and Kessler (2002) collected daily dairy data from a national sample of adult Americans for eight consecutive days, and found that the participants experienced at least one daily stressor on nearly 40% of the study days. On more than 10% of study days, participants experienced multiple daily stressors. Past studies (Almeida & Kessler, 1998; Stawski, et al., 2008) have also demonstrated that daily stressors have powerful influence on well-being, 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; Lazarus, 1999; Zautra,
Given the significance of daily stressors, researchers have examined various resources that facilitate coping, such as social support and self-esteem (e.g., Krause, 1987; Russell & Cutrona, 1991). Another coping resource that has been identified is leisure. For example, Reich and Zautra (1981) found that regular weekly participation in pleasurable activities (including leisure) is related to lower distress, especially among those who experienced “considerable life stress” (p. 1002). Wheeler and Frank (1988) discovered four stress buffers, one of which is leisure activity. Given the promise of leisure as a coping resource, multiple stress researchers (Folkman, et al., 1997; Kabanoff & O’Brien, 1986) suggested that studying leisure is an important agenda, the result of which can contribute substantial knowledge about how people cope with stress. While stress researchers have not advanced the agenda since then, leisure researchers have enthusiastically responded.

Leisure as a stress coping resource: Moderation or mediation

Leisure researchers have tested various models that may explain the role of leisure as a stress coping resource (e.g., Iso-Ahola & Park, 1996; Iwasaki, 2003b; Iwasaki & Mannell, 2000). Two models have received lasting attention: moderation (also termed the buffer model) and mediation. According to the moderation model (Figure 3-1), a coping resource has the greatest protective effect when an individual is exposed to the most intense stressors (Pearlin, 1999). On occasions when a coping resource is less needed, the individual also gains less from the resource. In other words, the occasions when the individual is most protected by the coping resource are the very occasions when an individual is at the greatest risk for detrimental outcomes of stress. Therefore, the magnitude of the resource’s protective effect depends on “the scope and intensity of stressors” (Pearlin, 1999, p. 169).

Leisure researchers have tested the moderation model, with stress frequency as independent variable, leisure as the moderator and various psychological outcomes. Caltabiano
(1995) found that social leisure activities moderated the effect of frequency of stressful life events on illness symptoms. Iso-Ahola and Park (1996) reported that leisure companionship moderated

FIGURE 3-1: MODERATION MODEL

the effect of life stress frequency on depression. Researchers have also studied the effect of physical activity, but the results were not promising. Kirkcaldy and Cooper (1993) failed to find a moderation effect of physical activity on the relationship between work stress and mental health. Zuzanek et al. (1998) did not lend support to the moderation model in their study of physical activity either. More recently, Schneider, Ainbinder, and Csikszentmihalyi (2004) revealed that pursuing leisure activities had much greater psychological benefits for high-stress working parents than low-stress ones. Overall, leisure can moderate the effect of stress frequency on psychological outcomes, but the evidence is not consistent.

Mediation is the other model tested by leisure researchers (Figure 3-2). In the model, a mediator is a factor that intervenes in the stress-health relationship (Aneshensel, 1999; Stone & Neale, 1984). A stressor influences the mediator, which then affects psychological outcomes (Aneshensel, 1999). Therefore, the effect of the stressor on psychological outcomes is transmitted through the mediator. The mediation model can take effect in two ways: deterioration and counteractive (Ensel & Lin, 1991; Pearlin, 1999). According to the deterioration effect, stressors reduce the capacity of coping resources, which subsequently undermine health and well-being. The counteractive effect, on the other hand, reasons that stressful events “mobilizes or elevates
resources to a higher level that consequently enhances health and well-being” (Iwasaki, 2003b, p. 186).

Leisure researchers have provided empirical evidence for the mediation model, and the results indicated that the mediation model mainly works for stress severity rather than stress frequency. Iwasaki (2001) reported that beliefs in leisure’s coping capacity mediated the effect of stress severity on mental ill-health and psychological well-being among undergraduate students. Using the same dataset, Iwasaki (2003a) found that multiple strategies of using leisure as a coping resource (termed as “leisure coping strategies”) mediated the effect of stress severity on immediate coping outcomes. In another study, Iwasaki, Mannell, and Butcher (2002) replicated the mediation effect of leisure coping strategies on the relationship between stress severity and mental health. However, using the same dataset but with stress frequency as the independent variable, the mediation model was not supported (Iwasaki, 2003b).

Clearly, mixed evidence exists for the moderation and mediation models, indicating that more studies are needed to test the models. Moreover, there are at least four gaps in the literature that require further research. First, past studies mainly conducted between-person comparison, i.e., assessing how the effectiveness of leisure as a coping resource differs between individuals. While informative, between-person comparison alone is not enough. Stress researchers have argued for and utilized a within-person strategy to examine how the stress coping process unfolds...
within-person over time (Casi, Bolger, & Eckenrode, 1987; DeLongis, Folkman, & Lazarus, 1988). Additionally, within-person research can be augmented by studying between-person difference in within-person processes (Nesselroade, 1991). Hence, adopting a within-person approach holds the promise of furthering our understanding of leisure as a coping resource.

Second, some studies did not have solid conceptualization and measurement of stress. For example, Caltabiano (1995) and Iso-Ahola and Park (1996) used the Social Readjustment Rating Scale (Holmes and Rahe, 1967), the assumptions and construction of which has been widely criticized (Kanner, Coyne, Schaefer, & Lazarus, 1981). In the survey used by Zuzanek, et al. (1998), stress was measured by a single question that asks whether respondents experienced “a lot of stress, a moderate amount of stress, relatively little stress, or almost no stress at all” (p. 257). The way the question was asked left it unclear whether respondents referred to frequency of, severity of, or psychological reaction to stressful experiences when answering the question. The conceptualization of stress utilized by Iwasaki (2003b) included not only daily stressors but also chronic stressors and major life events. Doing so confounded types of stressors, leaving it unknown to what type(s) of stressors the mediation model is not applicable.

Third, most studies either examined leisure as activities (e.g., Caltabiano, 1995; Zuzanek, et al., 1998) or assessed the underlying psychosocial functions of leisure as a coping resource (e.g., Iwasaki, 2003b; Iwasaki & Mannell, 2000). There has been scattered evidence that the time aspect of leisure is also important. For example, Heintzman and Mannell (2003) found that the protective effect of perceived leisure time availability on spiritual well-being was much stronger among individuals under time pressure than among those without, supporting the moderation model. More recently, Korpela and Kinnunen (2011) showed that time spent in nature facilitated recovery from work demands by providing relaxation and enhancing life satisfaction. Bedini, Gladwell, Dudley, and Clancy (2011) reported that satisfaction with time for leisure enhanced quality of life by reducing perceived stress among informal caregivers. These past studies
demonstrated the promise of the time aspect of leisure in coping research. However, perceived sufficiency of leisure time, satisfaction with time for leisure, and time spent in particular leisure settings are different from leisure time availability—the amount of time an individual has for leisure. Leisure time availability is important, because studies of time use found that lowest amount of leisure time is associated with highest level of psychological stress (Zuzanek, 1998). Meanwhile, having leisure time is associated with increase in positive affect (Larson & Richard, 1994). Patry, Blanchard, and Mask (2007) reported that allocating time to leisure as a planned breather to cope with academic stress increased positive affect among undergraduate students. Pressman, et al. (2009) suggested that “taking the time to break from daily activities and work” may be crucial to psychological well-being (p. 726).

The fourth gap in the current literature is lack of attention on positive affect (PA) as a leisure coping outcome. Iwasaki (2001a; Iwasaki & Mannell, 2000) found that leisure helps undergraduate students cope with different types of stressors by increasing positive emotions. Apart from this series of studies, PA has largely been ignored as an outcome of leisure coping. PA is important, because it is a cornerstone of well-being (Carstensen, Charles, Isaacowitz, & Kennedy, 2003; Mroczek, 2001) and is important for maintaining emotional well-being (Folkman, 1997). Given the suggested importance of leisure time to well-being, it is reasonable to study how PA responds to leisure time, including under stressful situations.

**Positive affect (PA) as stress outcome**

Multiple cross-sectional studies reported a small to moderate reduction in PA associated with daily stressful experiences (Neale, Hooley, Jandorf, & Stone, 1987; Repetti, 1993; Watson, 1988). More recent studies that utilized repeated-measure design also showed that daily stressors lead to decrease in PA (Smyth, Ockenfels, Porter, Kirschbaum, Hellhammer & Stone, 1998; Stawski, et al., 2008; van Eck, Nicolson & Berkhof, 1998; Zautra, Affleck, Tennen, Reich, &
Davis, 2005). Clearly, daily stressors influence PA, and these findings supported an early claim that PA “ebbs and flows with the daily tide of events” and “may in fact be the more interesting variable” to study in the context of daily lives (Clark & Watson, 1988, p. 305).

While stressful experiences reduce PA, researchers also pointed out that the ability to sustain PA in time of stress can provide “an important psychological time-out”, which may help prevent onset of serious psychological symptoms, e.g., depression (Ong, 2010, p. 361). Unfortunately, exactly what coping resources people use to derive PA in stressful situations is still understudied. Multiple stress researchers have associated pleasant events during leisure time with PA (David, Green, Martin, & Suls, 1997; Folkman & Moskowitz, 2000; Moskowitz, 2011). Studies of leisure have also demonstrated a positive relationship between leisure pursuits and PA (Carruthers & Hood, 2004; Hills & Argyle, 1998; Lawton, 1994, 1996; Lee, Dattilo, & Howard, 1994; Mitas, Qian, Yarnal, & Kerstetter, 2011; Ulrich, Dimberg, & Driver, 1991). However, none of these studies examined whether leisure is able to sustain PA when individuals are faced with daily stressors. In short, PA is an important stress outcome and leisure can generate PA, but no research has linked together and examined the relationship between daily stress, leisure and PA.

**Research purpose and questions**

The purpose of the current study is to examine, using a within-person approach, whether the moderation or mediation models explain the effect of leisure time as a resource to cope with daily stressors. Specifically, we asked two research questions (RQ), which are presented in model format in Figure 3-3. First, which model explains the relationship between daily stress, leisure time and PA, moderation or mediation? While the first RQ focuses on the within-person coping process, the second RQ examines between-person difference in the within-person process: Does the within-person process differ between individuals with little leisure time on average and those with abundant leisure time on average? In all analyses, we controlled for the effects of gender and

*FIGURE 3-3: RESEARCH QUESTIONS PRESENTED IN MODEL FORMAT: HYPOTHESIZED MODERATION MODEL (UPPER PANEL) AND HYPOTHESIZED MEDIATION MODEL (LOWER PANEL)*

*Research question 1

**Research question 2
Method\(^1\)

Sample and procedure

Data for the current study comes from the National Study of Daily Experiences (NSDE; Almeida, et al., 2002), which is the daily diary interview portion of the National Survey of Midlife in the United States (MIDUS). NSDE collected data from a national sample of the non-institutionalized, English-speaking population in the United States (N=2022, age 33 to 84, 56% female, 92% Caucasian, 70% with 13 years or more education, 72% married). Participants completed a telephone interview at the end of each day for eight consecutive days, yielding 16176 completed interviews (2022 participants * 8 interview days). During each of these interviews, participants answered several questions about the previous 24 hours, including their experiences of stressful events, time use behaviors, physical symptoms, and positive and negative affect. 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. Each participant received $25 for participating in the NSDE (for details regarding data collection, see Almeida, McGonagle, & King, 2009). Overall, 89% of the respondents completed between 6-8 daily interviews across the 8-day period. 11% of the respondents had fewer than 6 days of data, and were excluded in current analyses.

Measures

For the current study, we utilized measures of frequency of daily stressors, daily leisure time availability, positive affect, gender, and age.

\(^1\) A similar Methods section appears in Chapter 2.
**Frequency of daily stressors**

Daily stressors 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 daily stressors occurred within the previous 24 hours: arguments, tensions (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, and other stressors. For each daily interview, participants 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 examine the within-person process of stress coping and to assess between-person difference in the within-person process, it is necessary to form the daily change score of stress frequency for each participant across all study days. In order to do so, we first calculated each participant’s average stress frequency across the study days using SAS. We then subtracted each participant’s average from each of her daily value, obtaining a score that represents the participant’s daily change in stress frequency against her own 8-day average. 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). When the value of person-centered stress frequency is positive, stress frequency on this day is higher than personal average. When the value is negative, stress frequency on this day is lower than personal average.

**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. In the current study, leisure time was calculated as the number of hours each day that participants devoted to leisure activities, e.g., 0.5 means that a participant spent 0.5 hour on leisure activities on a given day. For each participant, we also calculated daily change score of leisure time availability (i.e., person-centered leisure time) for each study day and personal average amount of leisure time across the study days. The daily change score represents the within-person aspect of leisure time, and the personal average amount of leisure time was used as the between-person factor in data analyses.

**Daily positive affect (PA)**

Daily assessment of PA was utilized as the outcome. 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,” “feel like you belong,” “enthusiastic,” “attentive,” “proud,” “active,” and “confident.” Participants answered each PA item using a 0 to 4 point scale: none of the time, a little of the time, some of the time, most of the time, and all of the time. For each study day, the sum of the 13 PA items was calculated, giving PA a range of 0-52.

**Covariates**

Both gender and age were included as control variables. 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).
Data analysis

We used multilevel modeling (MLM, Singer & Willet, 2003) to analyze the data. According to Almeida and Wong (2009), the basic form of a multilevel model is as follows:

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

Level 2: \( \beta_{0j} = \gamma_{00} + u_{0j} \)
\( \beta_{1j} = \gamma_{10} + u_{1j} \)

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. We first calculated the intraclass correlation (ICC) to make sure that there is sufficient variation in the outcome variable at both within- and between-person levels, which is necessary for further MLM analyses (Hoffman & Stawski, 2009; Raudenbush & Bryk, 2002). We then fitted four multilevel models. The first model tested the within-person moderation effect, and the second one assessed whether the moderation effect differs by average amount of leisure time. Using the approach proposed and verified by Bauer, Preacher, and Gil (2006), we then tested the within-person mediation effect and assessed between-person difference in the mediation effect using the third and fourth models. The effects of age and gender were controlled for in all analyses.

Results

Descriptive Statistics

Descriptive information of personal average of daily stress frequency, leisure time and positive affect (PA) is presented in Table 3-1. The sample mean of average daily stress frequency is 0.5, but the variance is large, indicating that some participants encountered more daily stressors than others. Average daily leisure time is a little over three hours, and the large variance implies
that some participants had more leisure time than others. On average, the sample experienced PA fairly frequently. In terms of correlations, higher average amount of stress frequency was related to lower average amount of leisure time and less frequent PA. The correlation between leisure time and PA was not significant. On average, females experienced more daily stressors and less PA than men. Older adults, compared to younger adults, experienced fewer daily stressors and more PA, and had more leisure time.

| Table 3-1. Correlations between Variables and Descriptive Statistics of the Variables |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| 1. Average Daily Stress Frequency | 1.00            |                  |                  |                  |                  |
| 2. Average Leisure Time Availability | -0.10**        | 1.00            |                  |                  |                  |
| 3. Average Positive Affect       | -0.30**        | 0.01            | -0.006          | 1.00            |                  |
| 4. Gender                        | 0.08**         | -0.10**         | -0.02*          | 1.00            |                  |
| 5. Age                           | -0.23**        | 0.14**          | 0.19**          | -0.02*          | 1.00            |
| Mean                             | 0.53           | 3.08            | 55.27           | N/A             | 56.24           |
| Standard Deviation               | 0.48           | 1.83            | 9.30            | N/A             | 12.20           |

Notes: *p<0.005, **p<0.0001.

**Multilevel models**

We first calculated ICC, and found that 75.78% of the variation in daily PA was between person and 24.22% within person. The rule of thumb is that at least 10 percent of the variance in the outcome variable needs to be within-person in order to move on to within-person analysis (Mroczek & Griffin, 2007; Raudenbush & Bryk, 2002). The result indicated that there was sufficient within-person variance in the outcome variable to conduct further analyses. We then fit the four multilevel models to test the moderation and mediation models.

We first tested the within-person moderation effect. According to the left panel of Table 3-2, the interaction between person-centered daily stress frequency (DSF) and person-centered leisure time availability (LTA) was not significant (b=0.02, p>0.05). Although the within-person moderation effect is not significant, it is possible that such effect only works for certain individuals but not for others. Therefore, it is necessary to examine between-person difference in the within-person effect, and we introduced the between-person factor, average amount of leisure time.
time, at level 2. According to the right panel of Table 3-2, the result was not significant either ($b=0.008$, $p>0.05$). The findings did not support a within-person moderation effect, regardless whether a person had little or abundant leisure time on average.

Table 3-2. Unstandardized Estimates (and Standard Errors) of the Moderation Model

<table>
<thead>
<tr>
<th></th>
<th>Daily Positive Affect</th>
<th>Between-person difference in the within-person relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within-person relationship</td>
<td>Between-person relationship</td>
</tr>
<tr>
<td>Fixed effects:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within-person Intercept</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>35.31 (0.31)**</td>
<td>35.60 (0.48)*</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.05 (0.41)</td>
<td>-0.08 (0.41)</td>
</tr>
<tr>
<td>Age</td>
<td>0.15 (0.02)**</td>
<td>0.15 (0.02)*****</td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>-0.08 (0.11)</td>
</tr>
<tr>
<td>Person-Centered Daily Stress Frequency (DSF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.22 (0.12)**</td>
<td>-1.26 (0.19)*</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.25 (0.16)</td>
<td>-0.25 (0.16)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.003 (0.007)</td>
<td>-0.003 (0.007)</td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>0.01 (0.05)</td>
</tr>
<tr>
<td>Person-Centered Leisure Time Availability (LTA)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.02 (0.04)</td>
<td>0.14 (0.07)*</td>
</tr>
<tr>
<td>Gender</td>
<td>0.04 (0.05)</td>
<td>0.02 (0.05)</td>
</tr>
<tr>
<td>Age</td>
<td>-0.005 (0.002)*</td>
<td>-0.005 (0.002)*</td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>-0.03 (0.01)***</td>
</tr>
<tr>
<td>DSF×LTA Interaction (the moderation effect)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.02 (0.07)</td>
<td>-0.01 (0.11)</td>
</tr>
<tr>
<td>Gender</td>
<td>-0.03 (0.09)</td>
<td>-0.02 (0.09)</td>
</tr>
<tr>
<td>Age</td>
<td>0.005 (0.004)</td>
<td>0.004 (0.004)</td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>0.008 (0.02)</td>
</tr>
<tr>
<td>Random effects:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance, within-person intercept</td>
<td>79.07 (2.61)**</td>
<td>79.08 (2.61)****</td>
</tr>
<tr>
<td>Variance, DSF</td>
<td>1.83 (0.34)**</td>
<td>1.81 (0.34)****</td>
</tr>
<tr>
<td>Variance, LTA</td>
<td>0.25 (0.04)**</td>
<td>0.25 (0.04)****</td>
</tr>
<tr>
<td>Variance, DSF×LTA</td>
<td>0.37 (0.09)**</td>
<td>0.37 (0.09)****</td>
</tr>
<tr>
<td>Residual variance</td>
<td>22.91 (0.33)**</td>
<td>22.91 (0.33)****</td>
</tr>
</tbody>
</table>

* $p < 0.05$; ** $p<0.0001$.

Next, we tested the within-person mediation effect. According to the left panel of Table 3-3, while person-centered DSF had significant effects on person-centered LTA ($b=-0.17$, $p<0.05$) and PA ($b=-1.16$, $p<0.0001$), the effect of person-centered LTA on PA was not significant ($b=0.03$, $p>0.05$). We then assessed whether the within-person mediation effect differs by average amount of leisure time, and the result is significant (see the right panel of Table 3-3). As shown in Figure 3-4, relatively high daily stress frequency, while reducing PA ($b=-1.18$, $p<0.0001$), prompted an increase in leisure time ($b=0.24$, $p<0.05$), which then increased PA ($b=0.14$, $p<0.05$). The finding supports a counteractive rather than deteriorative effect, as increase
in stress frequency was related to an increase, rather than decrease, in leisure time. Moreover, the within-person effect differs significantly between individuals, as the lower the average amount of leisure

Table 3-3. Unstandardized Estimates (and Standard Errors) of the Mediation Model

<table>
<thead>
<tr>
<th></th>
<th>Daily Positive Affect</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within-person</td>
<td>Between-person</td>
<td>in the</td>
</tr>
<tr>
<td></td>
<td>relationship</td>
<td>difference</td>
<td>within-person</td>
</tr>
<tr>
<td>Fixed effects:</td>
<td></td>
<td></td>
<td>relationship</td>
</tr>
<tr>
<td>Intercept for LTA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.01 (0.03)</td>
<td>-0.01 (0.04)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.001 (0.03)</td>
<td>0.005 (0.03)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.0001 (0.001)</td>
<td>0.00001 (0.001)</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>0.002 (0.009)</td>
<td></td>
</tr>
<tr>
<td>DSF predicting the LTA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-0.13 (0.07)*</td>
<td>0.24 (0.09)*</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.06 (0.09)</td>
<td>-0.1 (0.08)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.006 (0.004)</td>
<td>0.007 (0.003)*</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>-0.11 (0.02)**</td>
<td></td>
</tr>
<tr>
<td>Intercept for PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>35.29 (0.37)**</td>
<td>35.59 (0.59)**</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.05 (0.49)</td>
<td>-0.09 (0.3)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.15 (0.02)**</td>
<td>0.15 (0.02)**</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>-0.09 (0.14)</td>
<td></td>
</tr>
<tr>
<td>LTA predicting PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.03 (0.04)</td>
<td>0.14 (0.07)*</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>0.02 (0.05)</td>
<td>0.001 (0.05)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.006 (0.002)**</td>
<td>-0.006 (0.002)**</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>-0.02 (0.01)**</td>
<td></td>
</tr>
<tr>
<td>DSF predicting PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.16 (0.12)**</td>
<td>-1.18 (0.19)**</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>-0.3 (0.16)*</td>
<td>-0.31 (0.16)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-0.003 (0.006)</td>
<td>-0.003 (0.007)</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time</td>
<td>--</td>
<td>0.01 (0.04)</td>
<td></td>
</tr>
<tr>
<td>Random effects:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance, intercept for mediator</td>
<td>1.9E-18</td>
<td>2.95E-18</td>
<td></td>
</tr>
<tr>
<td>Variance, DSF predicting LTA</td>
<td>1.95 (0.75)**</td>
<td>1.39 (0.63)*</td>
<td></td>
</tr>
<tr>
<td>Variance, intercept for outcome</td>
<td>115.39 (21.22)**</td>
<td>120.81 (19.47)**</td>
<td></td>
</tr>
<tr>
<td>Variance, LTA predicting PA</td>
<td>0.22 (0.03)****</td>
<td>0.31 (0.11)**</td>
<td></td>
</tr>
<tr>
<td>Variance, DSF predicting PA</td>
<td>1.89 (0.33)****</td>
<td>2.31 (1.03)**</td>
<td></td>
</tr>
<tr>
<td>Residual variance:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance, LTA</td>
<td>4.23 (0.05)**</td>
<td>4.23 (0.05)**</td>
<td></td>
</tr>
<tr>
<td>Variance, PA</td>
<td>25.02 (0.40)**</td>
<td>25.00 (0.40)**</td>
<td></td>
</tr>
</tbody>
</table>

Note: DSF=person-centered daily stress frequency (the independent variable), LTA=person-centered leisure time availability (the mediator), PA=daily positive affect (the outcome variable); *p<0.05; **p<0.005; ***p<0.0001.

time, the stronger the effect of stress frequency on leisure time \((b=-0.11, p<0.0001)\) and that of leisure time on PA \((b=-0.02, p<0.05)\). Taken together, experiencing more daily stressors than usual on a certain day reduced PA on that day. Meanwhile, high daily stress frequency prompted individuals to increase the amount of time allocated to leisure, which then increased PA.
Additionally, this partial counteractive effect is significantly stronger among those with little leisure time on average than those with high average amount of leisure time.

**FIGURE 3-4: SIGNIFICANT COUNTERACTIVE MEDIATION EFFECT: PERSON-CENTERED LEISURE TIME PARTIALLY MEDIATES THE EFFECT OF PERSON-CENTERED DAILY STRESS FREQUENCY ON PA AMONG INDIVIDUALS WITH LITTLE LEISURE TIME ON AVERAGE**

![Diagram](image)

**Note:** All coefficients are significant.

**Discussion**

The current study examined the effect of leisure time as a resource to cope with daily stressors by testing the moderation and mediation models (controlling for the effects of gender and age). We found that having more leisure time than usual partially mediates the effect of relatively high daily stress frequency on PA. On days when a person encounters more daily stressors than usual, s/he experiences PA less frequently. Meanwhile, higher daily stress frequency triggers the person to allocate more time to leisure than usual, which then increased PA on that day, partially remedying the negative impact of higher daily stress frequency. The result supports the counteractive rather than the deterioration effect (Ensel & Lin, 1991; Pearlin, 1999), indicating that people actively mobilize their coping resources to counter the negative effect of daily stressors rather than passively experiencing their psychological costs. Although it is not always possible to increase leisure time on a certain day, individuals seem to take advantage of
the extra leisure time they manage to have to cope with daily stress. The partial counteractive
effect of leisure time was particularly strong among busy individuals, i.e., those with little leisure
time on average. It seems that those at the greatest risk of lacking leisure time are those who
benefit the most from relative increase in leisure time when daily stress frequency is higher than
usual. At the same time, the coping effectiveness of allocating more time to leisure than usual is
likely to be smaller among those already having abundant leisure time in daily lives.

Our finding of the significant between-person difference in the within-person partial
counteractive mediation effect contributes to the leisure literature in five ways. First, we provided
empirical evidence for a partial mediation model with daily stress frequency as the predictor.
Previous research supported the mediation model when stress severity (Iwasaki, 2001b; Iwasaki,
et al., 2002) but not frequency (Iwasaki, 2003b) was the predictor. The disagreement between our
finding and that by Iwasaki (2003b) may be due to two reasons. First, Iwasaki tested the
underlying psychosocial functions of leisure as a coping resource, while we studied leisure as
time use. Emphasis on different aspects of the concept of leisure may cause the inconsistent
findings. Second, health, the outcome measure Iwasaki used, incorporated both physical and
mental health. However, PA, the outcome measure we used, reflects psychological well-being
(Carstensen, et al., 2003; Mroczek, 2001). Differences in the outcome measures may also help
explain the inconsistent findings.

Meanwhile, our study did not provide support for a within-person moderation effect,
regardless how much leisure time an individual has. The result implies that the effect of leisure
time on PA did not differ by daily stress frequency. That is, the magnitude of leisure time’s
psychological benefit does not depend on the frequency of daily stressors. Our finding echoed
Kirkcaldy and Cooper (1993) and Zuzanek, et al. (1998), who also failed to find a moderation
effect for leisure-time physical activity. Meanwhile, our finding challenges earlier studies that
identified a significant moderation effect of leisure (Caltabiano, 1995; Heintzman & Mannell,
Two reasons may explain the inconsistency in findings between our study and previous research. First, as presented in literature review, the conceptualization and measurement of stress in some earlier studies (e.g., Iso-Ahola & Park, 1996; Zuzanek, et al., 1998) was not solid. Problematic measurement can jeopardize the validity of results. Second, past studies (e.g., Caltabiano, 1995; Heintzman & Mannell, 2003) used a between-person approach to study leisure coping, which involves comparing different individuals rather than examining how stress and coping unfold within a person over time. Given the circumstances, it is not surprising that inconsistent findings emerge. Therefore, the applicability of the moderation model needs further research that uses a within-person approach to examine leisure coping and adopts sound conceptualization of stress.

Our second contribution is showing the value of taking the within-person approach (Caspi, et al., 1987; DeLongis, et al., 1988) to studying leisure coping. Past leisure studies (e.g., Caltabiano, 1995; Iso-Ahola & Park, 1996) mainly conducted between-person comparisons. However, studying how the effect of leisure coping differs between individuals does not tell us much about the within-person process of using leisure to cope with stress. In fact, between-person difference and within-person change are two inherently different concepts that differ at least in magnitude if not in direction (Molenaar, 2004). Our study, by examining leisure coping as a within-person phenomenon, contributes to a more comprehensive understanding of leisure as a coping resource. We also assessed whether there is between-person difference in the within-person process (Nesselroade, 1991). Doing so enabled us to find that the differential effect of a partial mediation model. Otherwise, we would have concluded that neither moderation nor mediation model was applicable.

Our third contribution is highlighting the value of leisure time. Several earlier studies demonstrated the promise of the time aspect of leisure in coping research, by examining perceived sufficiency of leisure time (Heintzman & Mannell, 2003), satisfaction with time for
leisure (Bedini, et al., 2011), and time spent in particular leisure settings (Korpela & Kinnunen,
2011). The current study adds to the literature by assessing whether the actual amount of leisure
time that a person has helps the person cope with daily stressors. The result reveals that paying
attention to the amount of leisure time a person has can bring fruitful results, as individuals,
particularly busy ones, are able to experience PA on stressful days by giving themselves a break,
echoing Pressman et al. (2009). While Zuzanek (1998) focused on the adverse psychological
effect of lacking leisure t
ative psychological
effect of lacking leisure time, our study makes it clear that it is equally important to study the
benefits of having leisure time, as suggested by Patry et al. (2007).

The fourth contribution is bringing attention to PA as a leisure coping outcome. Previous
research has associated leisure, including the time aspect of leisure, with increase in PA (e.g.,
al., 1994; Mitas, et al., 2011; Moskowitz, 2011; Ulrich, et al., 1991). Our study extends previous
research by providing empirical evidence that leisure can increase PA on stressful days as well.
More importantly, earlier studies of leisure coping mainly assessed relatively stable psychological
constructs (e.g., psychological well-being, mental health) as outcomes. However, PA, ebbing and
flowing “with the daily tide of events”, is more sensitive to changes in everyday lives (Clark &
Watson, 1988, p. 305). Studying PA also bears practical value, since experiencing PA helps
maintain mental health (Folkman, 1997; Fredrickson, 2001) and prevent the onset of serious
psychological symptoms (Ong, 2010). Therefore, our study contributes to the leisure literature by
showing that PA is an appropriate and important outcome to assess when studying how
individuals use leisure to cope with daily stressors.

The fifth contribution of this study is highlighting the importance of daily stress, a unique
form of stress that has powerful effect on well-being (Lazarus, 1999; Stawski, et al., 2008; Zautra,
2003). Indeed, the effect of daily stress frequency on PA was bigger than that of leisure time,
indicating that increased leisure time cannot completely offset the adverse effect of higher daily
stress frequency. To recover from daily stress, individuals need to mobilize coping resources other than leisure time as well. Therefore, while advocating for the value of leisure time as a coping resource, we also need to be aware of the powerful impact of daily stress and be realistic about how far leisure time as a coping resource can go.

Lastly, the current study also contributes to the stress literature by highlighting the contribution of leisure as a coping resource. Early stress research identified leisure as a stress buffer (Reich & Zautra, 1981; Wheeler & Frank, 1988), and suggested that studying leisure is an important agenda that can contribute substantial knowledge about how people cope with stress (Folkman, et al., 1997; Kabanoff & O’Brien, 1986). More recent studies of stress, however, did not explicitly discuss the contribution of leisure as a coping resource, but rather, including leisure as a type of “positive event” (David, et al., 1997; Folkman & Moskowitz, 2000; Zautra, et al., 2005). Yet, Costa, et al. (1996) suggested that in-depth examination of how a particular coping resource is used to cope with various stressors, compared with examining many ways of coping with a certain stressor, is more productive and informative. Hence, by bringing leisure to the forefront of stress coping research, our study echoes the suggestion by Costa et al., and makes it clear that leisure as a coping resource deserves research attention.

**Study limitations and suggestions for future directions**

There are several limitations in the present study that should be addressed in future research regarding the effect of leisure time as a coping resource. First, we acknowledge possible recall bias of time use at the end of a day and the single measure of leisure time. We suggest future studies to examine whether the congruence between need for and supply of leisure time affects coping effectiveness. It is possible that having too much leisure time does not benefit stress coping, and may even lead to negative psychological outcomes (Iso-Ahola & Weissinger, 1990). Right now, we cannot tell whether the significantly weaker within-person mediation
among “leisure-rich” participants is due to an over-abundance of leisure time. A finer-grained approach will also provide empirical support for our speculation that those at the greatest risk of lacking leisure time are those who benefit the most from relative increase in leisure after experiencing daily stressors. Second, although we have a national sample of adult Americans, the participants are predominantly Caucasians. 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.

**Conclusion**

The current study examines whether the moderation or mediation model explains the within-person process of using leisure time to cope with daily stressors, with positive affect (PA) as the outcome. We also tested whether the within-person process differs between individuals. We found that relatively high daily stress frequency, while reducing PA, prompted busy individuals to allocate more time to leisure than usual, which in turn increases PA. The finding provides empirical evidence for a partial counteractive mediation effect that is particularly strong among individuals with little leisure time on average. Meanwhile, our findings did not support the moderation model. That is, the effect of leisure time on PA did not depend on frequency of daily stressors. Taken together, the results demonstrated the mechanism with which leisure time as a coping resource provides significant benefit. Our findings also confirmed the psychological impact of daily stressors and demonstrated the value of studying daily PA as a coping outcome.
Orientation to Chapter 4

Chapter 4 is written as an independent manuscript. This manuscript is intended for submission to the peer-reviewed journal *Journal of Personality and Social Psychology* and is therefore formatted to the specifications of the journal. The role of Chapter 4 in the dissertation is to address the following research questions:

1. Does increase in leisure time mediate the effect of increase in daily stress severity on low-arousal PA, high-arousal PA, low-arousal NA and high-arousal NA?

2. Does the within-person relationship differ by the average amount of leisure time a person each day across the eight study days?
Chapter 4

Does Leisure Time Mediate the Effect of Daily Stress on Affect? Taking into Account Stress Severity and Affect Arousal

Abstract

Severity of daily stressors has a powerful impact on well-being, and researchers have studied various coping resources that help maintain well-being, including leisure. Leisure researchers have tested various theoretical models that may explain the effect of leisure as a coping resource, and found that leisure mediates the effect of stress severity and protects well-being. However, these studies conducted between-person comparison, providing little knowledge about the within-person process of using leisure to cope with stress. Additionally, few studies examined the time aspect of leisure, although having leisure time contributes to well-being. Previous research also ignored affect—an important outcome of stress coping. Affect differs in both valence (positive vs. negative) and arousal (level of activation). However, stress coping research paid little attention to the arousal dimension. Analyzing eight-day diary data (N=2022), the current study examined the within-person effect of leisure time as a coping source and assessed whether there is between-person difference in the within-person effect. We found that increase in daily stress severity, while reducing low-arousal positive affect (PA) and increasing high-arousal negative affect (NA), prompted busy individuals (but not those with abundant leisure time on average) to allocate more time to leisure than usual, which then increased low-arousal PA and reduced high-arousal NA. The findings support a partial counteractive mediation model, and reveal significant between-person differences in the within-person stress coping process. The results also demonstrate the impact of daily stress severity, the value of leisure time as a coping resource, and the importance of both valence and arousal dimensions of affect.
Keywords: leisure time availability, stress severity, mediation model, affect arousal, within-person process
In recent years, accumulating evidence shows that daily stressors have powerful effect on health (Almeida, 2005; Lazarus, 1999; Zautra, 2003). Researchers have also reported that the severity of a stressor has significant impact on well-being, sometimes stronger than that of the actual occurrence of the stressor (Carver, Scheier, & Pozo, 1992; David, Green, Martin, & Suls, 1997). The significance of daily stressors led researchers to study how people cope with the stressors. One identified coping resource is leisure, which reduces psychological distress and sustains well-being in time of severe stress (e.g., Reich & Zautra, 1981; Wheeler & Frank, 1988).

Researchers have also tested various theoretical models (e.g., moderation/buffer, mediation) that may explain the effect of leisure as a coping resource (Caltabiano, 1995; Iso-Ahola & Park, 1996; Iwasaki, 2003; Iwasaki & Mannell, 2000a). For example, leisure has been found to mediate the relationship between stress severity and mental health (Iwasaki, 2001b, 2003a; Iwasaki, Mannell, & Butcher, 2002). This line of research, while contributing to our knowledge of leisure coping, was mainly focused on between-person differences in the effect of leisure as a coping resource. Stress coping is inherently a within-person process (Caspi, Bolger, & Eckenrode, 1987; DeLongis, Folkman, & Lazarus, 1988), and further research is needed in order to understand the within-person process of using leisure to cope with stress.

Additionally, previous research on leisure as a coping resource mainly focused on mental health and psychological well-being as coping outcomes (Iso-Ahola & Park, 1996; Iwasaki, 2003; Iwasaki, et al., 2002). In comparison, affect has received little attention, though it has been identified as an immediate coping outcome and important to study (Lazarus, 1990, 1991; Stone, 1995). According to the circumplex model of affect, there are two fundamental dimensions in the affect structure—valence (positive vs. negative) and arousal (level of activation) (Russell, 1980, 1989; Feldman, 1995a). Studies in the stress literature mainly paid attention to the valence dimension, but there has been scattered evidence that affect of different arousal levels responds to stress differently (Clark & Watson, 1988; van Eck, Nicolson, & Berkhof, 1998). However, given
leisure researchers’ neglect of affect as a coping outcome, we do not know whether affect of different valence-arousal dimensions responds differently to leisure as a coping resource.

Summarizing previous findings, it is clear that we need further research that uses a within-person approach to study whether leisure mediates the effect of daily stress severity on affect of different valence-arousal dimensions. Therefore, the purpose of the current study is to examine the within-person process of using leisure to cope with severe daily stressors, with positive and negative affect of different arousal levels as the outcomes.

**Severity of daily stressors**

Daily stressors, a unique and important form of stress, refer to those “relatively minor events arising out of day-to-day living” or “unexpected small events that disrupt daily life” (Serido, Almeida, & Wethington, 2004, p.18). 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). Given their significance, daily stressors have received growing attention in the past decade. For example, Almeida, Wethington, and Kessler (2002) conducted an eight-day diary study using a national sample of adult Americans. The researchers found that daily stressors are prevalent among the participants, some of whom tended to experience multiple daily stressors on a single day.

Besides frequency of daily stressors, it is also important to study severity of a stressor (Lazarus & Folkman, 1984). For example, Gunthert, Cohen, and Armeli (1999) showed that stress severity “had a strong impact on end-of-day negative mood” (p. 1097), highlighting the effect of stress severity on affective outcomes. Using data from the national diary study, Grzywacz, Almeida, Neupert, and Ettner (2004) found 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, Sliwinski, Almeida, and Smyth (2008) argued that it is important to examine stress severity in order to understand the characteristics of a stressor that drive emotional reactivity. The researchers reported that greater stress severity led to higher levels of negative affect “within persons across stress days” among young, but not older, adults (p. 58). In other words, young adults, compared to older adults, are more reactive to severe daily stressors. In summary, it is important to pay attention to severity appraisal when studying daily stressors and their affective outcomes.

In order to sustain health and well-being in time of stress, researchers have examined various resources that help people cope with daily stressors, e.g., social support, self-esteem (e.g., Krause, 1987; Russell & Cutrona, 1991). One coping resource that has been identified is leisure (Wheeler & Frank, 1988). For example, Reich and Zautra (1981) found that regular weekly participation in pleasurable activities (including leisure) is related to lower distress and to better psychological wellbeing, especially among those who experienced “considerable life stress” (p. 1002). Kabanoff and O’Brien (1986) identified leisure as “a significant form of coping behavior” for working people (p. 915). Given the promise of leisure as a stress coping resource, multiple researchers (Folkman, Moskowitz, Ozer, & Park, 1997; Kabanoff & O’Brien, 1986) suggested that studying leisure is an important agenda, the result of which can contribute substantial knowledge about how people cope with stress. Although there has been scarce response to the agenda among stress researchers, leisure researchers have advanced the agenda by studying the effect of leisure as a coping resource.

**Leisure as a stress coping resource: Mediating the effect of stress severity**

Leisure researchers have studied the underlying psychosocial mechanism of leisure as a stress coping resource. Iwasaki and Mannell (2000b), for example, developed Leisure Coping
Scales, and distinguished leisure coping beliefs from leisure coping strategies. Leisure coping beliefs refer to the relatively stable beliefs that leisure can help people cope with stress. Leisure coping strategies are more situation-specific, and refer to multiple ways in which people use leisure to cope with stress. The beliefs and strategies scales are independent from each other, making it possible to test their separate effect on stress coping outcomes (Iwasaki & Mannell).

Studies in the leisure field have also tested various theoretical models that may explain the role of leisure as a coping resource, for instance, moderation/buffer model, mediation model, process model (e.g., Iso-Ahola & Park, 1996; Iwasaki, 2003; Iwasaki & Mannell, 2000a). When testing these theoretical models, leisure researchers have also taken into account stress severity, and empirical evidence suggests that the mediation model best explains the relationship between stress severity, leisure as a coping resource and health outcomes. According to the mediation model (Figure 4-1), a mediator is a factor that intervenes in the stress-health relationship (Aneshensel, 1999; Stone & Neale, 1984). A mediator transmits the effect of stress “via a series of interlocking pathways: exposure to stress influences the mediator, which then influences mental health. Collectively, these pathways describe the indirect effects of stress on mental health.” (Aneshensel, 1999, p. 220) The mediation model can take effect in two ways: deteriorative and counteractive (Ensel & Lin, 1991; Iwasaki, 2003; Pearlin, 1999). According to the deteriorative effect, stressors reduce the capacity of coping resources, which subsequently undermine coping outcomes. According to the counteractive effect, stressful events prompt a person to mobilize coping resources and to increase coping effort, which then lead to better coping outcomes (Iwasaki, 2003).

Using Leisure Coping Scales and a sample of undergraduate students, Iwasaki (2001b) found that leisure coping beliefs partially mediated the effect of stress severity on mental ill-health and psychological well-being among undergraduate students. Using the same dataset, Iwasaki (2003a) found that leisure coping strategies partially mediated the effect of stress severity
on three immediate coping outcomes (perceived coping effectiveness, perceived coping satisfaction, and perceived stress reduction). In another study with a sample of employees in the Police and Emergency Response Services Department of a Canadian city, Iwasaki, et al. (2002)

FIGURE 4-1: MEDIATION MODEL: DETERIORATION (UPPER PANEL) AND COUNTERACTIVE (LOWER PANEL)

found a full mediation effect of leisure coping strategies on the relationship between stress severity and immediate coping outcomes. Additionally, leisure coping strategies partially mediated the effect of stress severity on mental health. Given the results of past studies, it seems that leisure is able to mediate the effect of stress severity on health outcomes.

While previous research has provided valuable insights, there are at least two gaps in the current literature. The first gap is lack of focus on daily stressors. In his study with undergraduate students, Iwasaki (2001b, 2003a) asked study participants to record and rate the severity of the most stressful events they encountered on Thursday and Sunday for two consecutive weeks. However, Iwasaki did not report the types of stressors that the participants recorded, and
aggregated the severity of all stressors in his analyses. Hence, it is possible that daily stressors and chronic stress were confounded. In his study with Canadian city workers, Iwasaki et al. (2002) measured both traumas and more mundane stressors, and once again aggregated the severity of all stressors. Therefore, it is unclear with which type of stressors leisure coping strategies were effective in coping.

Second, Iwasaki (2001b, 2003a) tried to capture the within-person process of stress coping by using multiple-stage design to collect data from the same participants for several times. For example, participants reported their baseline mental health at stage 1, stressful events and coping efforts at stage 2, and resulting mental health at stage 3. However, Iwasaki (2001b) aggregated stress severity and coping effort reported on multiple occasions in his analysis. Therefore, the researcher essentially conducted between-person comparison, although he did take into account baseline mental health and the time sequence in coping and coping outcomes. In his 2003 study, Iwasaki (2003a) created a dummy variable for all but the last study participant, and entered all the dummy variables into hierarchical regression, making it one of the few studies in the leisure coping literature that are close to within-person analysis.

Emphasizing the importance of the within-person approach is not meant to discount the importance of between-person comparison. Indeed, studies that examined between-person difference provided foundational knowledge of leisure as a coping resource. However, between-person comparison alone does not paint a complete picture. Stress coping is inherently a within-person process, so studying how the process of using leisure to cope with stress unfolds within-person over time will provide more comprehensive understanding of leisure as a coping resource.

Besides the psychosocial aspect of leisure as a coping resource, some studies have paid attention to the time aspect of leisure. For example, Heintzman and Mannell (2003), in their study of leisure and spirituality, found that perceived availability of leisure time contributes to spiritual well-being, particularly among individuals with high time pressure. Later on, Korpela and
Kinnunen (2011) showed that time spent in nature-facilitated recovery from work demands by providing relaxation and enhancing life satisfaction. Bedini, Gladwell, Dudley, and Clancy (2011) reported that satisfaction with time for leisure contributed to quality of life by reducing perceived stress among informal caregivers. 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 has for leisure.

Leisure time availability is important, because studies of time use found that lowest amount of leisure time is associated with highest level of psychological stress (Zuzanek, 1998). Moreover, high level of time pressure has been related to more psychological stress in the US (Robinson & Godbey, 1997), Canada (Zuzanek & Mannell, 1998; Zuzanek & Smale, 1997), the Netherlands (Zuzanek, Beckers, & Peters, 1998) and Finland (Lehto, 1998). Researchers have examined not only the negative outcomes of lacking leisure time but also psychological benefits of having leisure time. Early on, Larson and Richards (1994), using the experience sampling method, revealed that having leisure time is associated with increase in positive affect. More recently, Patry, Blanchard, and Mask (2007) reported that allocating time to leisure as a planned breather to cope with academic stress increased positive affect among undergraduate students. Pressman, et al. (2009) suggested that “taking the time to break from daily activities and work” may be crucial to psychological well-being (p. 726).

Both Larson and Richard (1994) and Patry et al. (2007) assessed positive affect as the outcome, echoing the suggestion by Juster and Stafford (1991) that studies could utilize time use data along with affect measures to assess factors that influence well-being. In fact, studies in both stress and psychology literatures have associated leisure activities with increase in positive affect (Carruthers & Hood, 2004; David, et al., 1997; Folkman & Moskowitz, 2000; Hills & Argyle, 1998; Lawton, 1994, 1996; Lee, Dattilo, & Howard, 1994; Mitas, Qian, Yarnal, & Kerstetter,
2011; Moskowitz, 2011; Ulrich, Dimberg, & Driver, 1991) and decrease in negative affect
(Iwasaki, 2001a; Iwasaki & Mannell, 2000a; Pressman et al., 2009). Affect, an immediate
outcome of stress and coping (Lazarus, 1990, 1991), is important to study because “all of the
effects of the stressful events … are integrated and have a final psychological effect that emerges
in affect” (Stone, 1995, p. 151). Affect has also been identified as a cornerstone of psychological
well-being (Carstensen, Charles, Isaacowitz, & Kennedy, 2003; Mroczek, 2001), because “the
preponderance of positive and negative affect comes closest to an everyday meaning of well-
being, or lack thereof” (Almeida, McGonagle, & King, 2009, p. 221). The following section
reviews psychological research that examined affect as a stress coping outcome.

Affect as a stress coping outcome: Valence and arousal

Russell (1980) introduced the circumplex model of affect (Figure 4-2), a theoretical
representation of the structure of affect. According to the model, each affective term consists of
two dimensions: valence and arousal (the latter also termed as “activation”, e.g., Thayer, 1986).
The valence dimension refers to “the hedonic quality or pleasantness of an affective experience”
(Feldman, 1995, p. 153), i.e., whether an affect is assessed as positive or negative. The arousal
dimension refers to perceived level of activation associated with an affective experience (Russell,
1989). For example, both “excited” and “content” are positive affect, but the former is high-
arousal while the latter is low-arousal. Valence and arousal have been verified as two independent
dimensions (Feldman-Barnett & Russell, 1998), and there is rich empirical evidence showing
that both positive and negative affect terms differ in arousal level (Thayer, 1986; Whissell, 1981).
Past studies have also confirmed that both valence and arousal dimensions account for a
meaningful amount of variances in self-reported affect (Feldman, 1995). Hence, there are four
types of affect according to the valence-arousal structure of affect: positive-high arousal, positive-
low arousal, negative-high arousal, and negative-low arousal. Low-arousal positive affect (PA)
and high-arousal negative affect (NA) are bi-polar to each other, while high-arousal PA and low-arousal NA form the other bi-polar pair (Russell, 1980; Feldman, 1995). Despite the identification of the valence and arousal dimensions, previous research on stress and coping mainly focused on the valence dimension, largely ignoring the arousal dimension.

FIGURE 4.2: CIRCUMPLEX MODEL OF AFFECT (ADAPTED FROM RUSSELL, 1980)

Early on, Eckenrode (1984) reported that negative affect (NA) was high on days with daily stressors. Bolger, DeLongis, Kessler, and Schilling (1989), also focusing on NA, found that daily stress led to increased NA among married couples. Other researchers studied positive affect (PA) as a stress outcome. For example, Watson (1988) reported a small but significant inverse relationship between daily stressful experiences and PA. Neale, Hooley, Jandorf, and Stone (1987) found a moderate effect of daily stress on PA. Similarly, Repetti (1993) reported a moderate effect of workplace stress on PA. More recently, researchers started to examine PA and NA as stress outcomes simultaneously. For instance, David, et al. (1997) studied both undesirable and desirable events. The authors found that undesirable events were stronger predictors of NA than were desirable events, but the effect of desirable events became stronger when predicting
PA. Another study showed that daily stressful events were followed by increase in NA and decrease in PA (van Eck, et al., 1998). Clearly, previous research supports the claim by Stone (1987) that stress can influence both NA and PA.

There is also scattered evidence that affect of different arousal levels reacts differently to stressful events. Clark and Watson (1988) studied the relationship between daily “common events” and affect (p. 296). While not focusing exclusively on stressors, the authors did find that physical problems were associated with high-arousal NA (distressed, nervous, angry). In addition, low-arousal PA (sluggish, drowsy) was correlated with health complaints. However, “sluggish” and “drowsy” have been positioned as low-arousal NA in the circumplex model of affect (Feldman, 1995; Feldman-Barrett & Russell, 1998; Russell, 1980). Therefore, the interpretation of the result by Clark and Watson (1988) should be that health complaints led to low-arousal NA. Later on, van Eck, et al. (1998) reported that Agitation, a high-arousal NA scale, was more reactive to daily stressors than NA in general. Based on their findings, the authors suggested that future investigations of affective reactivity to stress should distinguish between affect “differing in arousal level” (p. 1583). More recently, Moskowitz (2011) suggested that research on stress coping should not solely rely on measuring high-arousal affect as the outcome. Despite repeated call for attention on the arousal dimension of affect, we are not aware of any study that examines whether affect of different valence-arousal dimension reacts differently to daily stressors and coping resources.

**Research purpose and questions**

The purpose of the current study is to examine, using a within-person approach, whether leisure time availability mediates the effect of daily stress severity on affect of different valence-

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2 The NA scale consists of both high- and low-arousal NA items: depressed, anxious, worried, lonely, and miserable.
arousal dimensions. To fulfill the purpose, we asked two research questions (RQ). First, does leisure time mediate the effect of daily stress severity on low-arousal PA, high-arousal PA, low-arousal NA and high-arousal NA? While the first RQ focuses on the within-person relationship between daily stress severity, leisure time and affect, the second RQ examines between-person difference in the within-person relationship: Does the within-person relationship differ by the average amount of leisure time that a person usually has in daily living? The RQs are presented in model format in Figure 4-3. In all analyses, we controlled for the effects of age and gender.

FIGURE 4-3: RESEARCH QUESTIONS PRESENTED IN MODEL FORMAT: HYPOTHESES MEDIATION MODEL

*Research question 1
**Research question 2

Method

Sample and procedure

Data for the current study comes from the National Study of Daily Experiences (NSDE; Almeida, et al., 2002), which is the daily diary interview portion of the Midlife Development in the United States (MIDUS) Survey. NSDE collected data from a national sample of the non-institutionalized, English-speaking population in the United States (N=2022, age 33 to 84, 57.2%...
female). Participants completed a telephone interview at the end of each day for eight consecutive days, yielding 16176 completed interviews (2022 respondents * 8 interview days). During each of these interviews, participants answered several questions about the previous 24 hours, including the occurrence and subjective appraisal of daily stressors, time use behaviors, physical symptoms, and positive and negative affect. 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. Each participant received $25 for participating in the NSDE (for details regarding data collection, see Almeida, et al., 2009). Overall, 89% of the respondents completed between 6-8 daily interviews across the 8-day period. 11% of the respondents had fewer than 6 days of data, and were excluded in current analyses.

**Measures**

For the current study, we utilized measures of daily stress severity, daily leisure time availability, low-arousal positive affect (PA), high-arousal PA, low-arousal negative affect (NA), high-arousal NA, age, and gender.

**Daily stress severity**

Daily stressful experiences 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 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, participants who answered affirmatively to any of the seven stem questions about daily stressful events also answered a series of probe questions about the stressful event. One question assesses severity of
the stressor: “How stressful was this for you?” Respondents 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 day in the daily study, the sum of the severity ratings was calculated to represent daily stress severity.

To examine the within-person process of stress coping and to assess between-person difference in the within-person process, it is necessary to form the daily change score of stress severity for each participant across all study days. In order to do so, we first calculated each participant’s average stress severity across the study days using SAS. We then subtracted each participant’s average from each of her daily value, obtaining a score that represents the participant’s daily change in stress severity against her own 8-day average. In essence, the daily change score is the disparity between daily value and personal average, representing fluctuation in stress severity within-person over days. The daily change score of stress severity is also known as “person-centered” daily stress severity (Zautra, Affleck, Tennen, Reich, & Davis, 2005, p. 1524). When the value of person-centered stress severity is positive, stress severity on this day is higher than personal average. When the value is negative, stress severity on this day is lower than personal average.

**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. 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 spent 0.5 hour on leisure activities
on a given day. For each participant, we also calculated daily change score of leisure time availability (i.e., person-centered leisure time) for each study day and personal average amount of leisure time across the study days. The daily change score represents the within-person aspect of leisure time, and the personal average amount of leisure time was used as the between-person factor in data analyses.

**Daily affect**

Frequency of positive affect (PA) and negative affect (NA) was measured during each daily interview, in keeping with the argument that it is frequency rather than intensity of affect that relates more closely to happiness (Diener & Larsen, 1993; Diener, Sandvik, & Pavot, 1991). Items in the affect scales were culled from the following valid and well-known instruments (Almeida, et al., 2002; Mroczek & Kolarz, 1998): the Affect Balance Scale (Bradburn, 1969), the University of Michigan’s Composite International Diagnostic Interview (Kessler, et al., 1994), the Manifest Anxiety Scale (Taylor, 1953), the Health Opinion Survey (MacMillan, 1957), the General Well-Being Schedule (Fazio, 1977), and the Center for Epidemiological Studies Depression Scale (Radloff, 1977). Participants indicated how much of the time during the previous 24 hours they experienced each affect 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 study day, the sum of the items for each type of affect was calculated (Mrozek & Kolarz, 1998).

We reviewed literature on the circumplex model of affect (Feldman, 1995; Feldman-Barrett & Russell, 1998; Russell, 1980) to decide what items to use to form the score for affect of different valence-arousal dimensions. Daily low-arousal PA was assessed using two items: “calm and peaceful” and “satisfied.” Daily high-arousal PA was assessed using six items: “cheerful,” “extremely happy,” “full of life,” “enthusiastic,” “proud,” and “active.” Daily low-arousal NA
was assessed using four items: “worthless,” “sad,” “hopeless,” and “lonely.” Daily high-arousal NA was assessed using seven items: “restless,” “nervous,” “afraid,” “jittery,” “irritable,” “upset,” and “angry.”

_Covariates_

Both gender and age were included as control variables. 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).

_Data analysis_

The current study utilized multilevel modeling (MLM; Singer & Willet, 2003) to perform data analysis. We first calculated intraclass correlation (ICC) for each outcome variable, 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 between- and within-person levels is necessary for further MLM analyses (Raudenbush & Bryk, 2002). Therefore, it is important to calculate ICC before conducting further analyses. We then tested the applicability of the mediation model to the within-person effect of leisure time as a coping resource, using the method proposed and verified by Bauer, Preacher, and Gil (2006). For each of type of affect, we first examined the within-person effect, and then assessed whether there is the within-person effect differs by the between-person factor—average amount of leisure time. The effects of age and gender were controlled for in all analyses.
Results

Descriptive Statistics

We present descriptive statistics of and correlations between the variables in Table 4-1.

The sample mean of severity appraisal is fairly low, but the moderate variation in average severity appraisal indicates that the average severity appraisal of some participants was much higher than others. The sample mean of participants’ daily average amount of leisure time is about 3 hours, but there is a moderate variation in this number, indicating that some participants had more leisure time on average across the eight study days than other participants. Both daily low- and high-arousal positive affect (PA) have quite high mean values and modest variations. Daily low- and high-arousal negative affect (NA) have low mean values but large variations.

| Table 4-1. Correlations between Variables and Descriptive Statistics of the Variables |
|---------------------------------|-----|-----|-----|-----|-----|-----|-----|
| 1. Daily Stress Severity        | 1.00 |     |     |     |     |     |     |
| 2. Leisure Time Availability    | -0.06** | 1.00 |     |     |     |     |     |
| 3. Low-Arousal PA               | -0.40** | 0.10** | 1.00 |     |     |     |     |
| 4. High-Arousal PA              | -0.31** | -0.01 | 0.81** | 1.00 |     |     |     |
| 5. Low-Arousal NA               | 0.29** | 0.07** | -0.41** | -0.36** | 1.00 |     |     |
| 6. High-Arousal NA              | 0.42** | 0.001 | -0.52** | -0.41** | 0.58** | 1.00 |     |
| 7. Gender                       | 0.21** | -0.10** | -0.04** | -0.01 | 0.04** | 0.06** | 1.00 |
| 8. Age                          | -0.19** | 0.14** | 0.23** | 0.17** | -0.05** | -0.17** | -0.02* | 1.00 |

Mean: 2.21, 3.08, 5.64, 15.07, 0.37, 1.72, N/A, 56.24
Standard Deviation: 1.10, 1.83, 1.46, 4.94, 1.07, 2.25, N/A, 12.20

Notes: Correlations based on variables 1 to 6 used personal average values. PA=positive affect; NA=negative affect; N/A=not applicable.
*p<0.005, **p<0.0001.

Severity appraisal was negatively correlated with high- and low-arousal PA, and positively correlated with high- and low-arousal NA. Average amount of leisure time are positively correlated with low-arousal affect (both positive and negative) but not the high-arousal ones. Women, compared to men, had less leisure time and experienced less low-arousal PA and more NA. Older adults, compared to younger ones, rated daily stressors as less severe, had more leisure time, experienced more positive and less negative affect.
Multilevel models

We first calculated intraclass correlation (ICC) for the four outcome variables (Table 4-2). Between-person variance in the four outcomes ranges from 45% to 75%. The result shows that there is variation at both between- and between-person levels in all four outcomes, which is necessary for further analyses (Mroczek & Griffin, 2007; Raudenbush & Bryk, 2002). After calculating ICC, we tested the applicability of the mediation model to the within-person effect of leisure time and whether the effect differs between-person.

Table 4-2. Intraclass correlations (ICC) for Low-Arousal PA, High-Arousal PA, Low-Arousal NA and High-Arousal NA

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<tr>
<th></th>
<th>Grand Mean</th>
<th>Between-person Standard Deviation</th>
<th>Within-person Standard Deviation</th>
<th>ICC (between-person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-Arousal PA</td>
<td>5.65</td>
<td>1.91</td>
<td>1.26</td>
<td>60.25%</td>
</tr>
<tr>
<td>High-Arousal PA</td>
<td>15.09</td>
<td>23.26</td>
<td>7.45</td>
<td>75.74%</td>
</tr>
<tr>
<td>Low-Arousal NA</td>
<td>0.36</td>
<td>0.98</td>
<td>0.67</td>
<td>59.39%</td>
</tr>
<tr>
<td>High-Arousal NA</td>
<td>1.67</td>
<td>3.58</td>
<td>4.35</td>
<td>45.15%</td>
</tr>
</tbody>
</table>

Note: PA=positive affect; NA=negative affect.

We first tested the within-person mediation model for low-arousal PA (DV1), with person-centered daily stress severity as the independent variable (IV) and person-centered leisure time as the mediator (M). According to the result (left panel of Table 4-3), only the path between IV and DV1 is significant \( (b=-0.16, p<0.0001) \). The path between IV and M \( (b=-0.03, p>0.05) \) and that between M and DV1 \( (b=0.02, p>0.05) \) are not significant. The result means that the between-person relationship between stress severity, leisure time and low-arousal PA is not significant. Although the within-person mediation effect is not significant, it is possible that such effect only works for certain individuals but not for others. Therefore, it is necessary to examine between-person difference in the within-person effect, and we introduced the between-person factor, average amount of leisure time, at level 2. According to the results (right panel of Table 4-3), there is a significant between-person difference in the within-person mediation effect. Average amount of leisure time has significant effect on the relationship between IV and M \( (b=-0.05, p<0.005) \), that between M and DV1 \( (b=-0.01, p<0.005) \), and that between IV and DV1 \( (b=0.02, p<0.005) \).
Hence, the between-person factor moderates all three paths in the partial mediation model, signifying that the partial mediation effect is stronger among participants with little leisure.

Table 4-3. Unstandardized Estimates (and Standard Errors) of the Mediation Model: Low-Arousal Positive Affect as the Outcome

<table>
<thead>
<tr>
<th></th>
<th>Low-Arousal Positive Affect</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Within-person relationship</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fixed effects:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept for the mediator, $d_M$</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{dM0}$</td>
<td>-0.09 (0.04)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{dM1}$</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{dM2}$</td>
<td>-0.02 (0.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{dM3}$</td>
<td>0.002 (0.002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent variable predicting the mediator, $a_j$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{a0}$</td>
<td>-0.03 (0.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{a1}$</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{a2}$</td>
<td>-0.05 (0.06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{a3}$</td>
<td>0.005 (0.003)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept for outcome, $d_Y$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{dY0}$</td>
<td>5.35 (0.06)***</td>
<td>5.15 (0.08)***</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{dY1}$</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{dY2}$</td>
<td>-0.13 (0.07)</td>
<td>-0.12 (0.07)</td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{dY3}$</td>
<td>0.03 (0.003)***</td>
<td>0.03 (0.003)***</td>
<td></td>
</tr>
<tr>
<td>Mediator predicting the outcome, $b_j$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{b0}$</td>
<td>0.02 (0.01)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{b1}$</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{b2}$</td>
<td>0.02 (0.02)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{b3}$</td>
<td>-0.001 (0.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independent variable predicting the outcome, $a_j$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{a0}$</td>
<td>-0.16 (0.03)***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{a1}$</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{a2}$</td>
<td>-0.02 (0.03)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{a3}$</td>
<td>-0.001 (0.001)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Random effects:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 d_M$</td>
<td>0</td>
<td>1.63E-19</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 a_1$</td>
<td>0.19 (0.03)***</td>
<td>0.18 (0.03)***</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 d_Y$</td>
<td>1.74 (0.08)***</td>
<td>1.73 (0.08)***</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 b_1$</td>
<td>0.007 (0.003)*</td>
<td>0.006 (0.003)*</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 c_j$</td>
<td>0.02 (0.01)*</td>
<td>0.02 (0.01)*</td>
<td></td>
</tr>
<tr>
<td>Residual variance:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 e_{Mj}$</td>
<td>3.99 (0.08)***</td>
<td>3.98 (0.08)***</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 e_{Yj}$</td>
<td>1.48 (0.04)***</td>
<td>1.49 (0.04)***</td>
<td></td>
</tr>
</tbody>
</table>

Note: age centered at sample mean; *$p<0.05$; **$p<0.005$; ***$p<0.0001$. 
time on average than among those with high average amount of leisure time. Furthermore, it is the counteractive effect rather than the deterioration effect that works here ($b=0.12$, a positive

Table 4-4. Unstandardized Estimates (and Standard Errors) of the Mediation Model: High-
Arousal Positive Affect as the Outcome

<table>
<thead>
<tr>
<th></th>
<th>High-Arousal Positive Affect</th>
<th></th>
</tr>
</thead>
</table>
|                      | Within-person relationship    | Between-person difference in 
|                      | the within-person relationship |
| **Fixed effects:**   |                              |                      |
| Intercept for the mediator, $d_M$ | -0.08 (0.04)* | 0.08 (0.06) |
| intercept, $\gamma_{d_{M0}}$ |                              |                      |
| Average Amount of Leisure Time, $\gamma_{d_{M1}}$ | -0.05 (0.01)** | -0.05 (0.01)** |
| Gender, $\gamma_{d_{M2}}$ | -0.02 (0.05) | -0.03 (0.05) |
| Age, $\gamma_{d_{M3}}$ | 0.002 (0.002) | 0.003 (0.002) |
| **Independent variable predicting the mediator, $a_j$:** |                              |                      |
| intercept, $\gamma_{a0}$ | -0.04 (0.05) | 0.12 (0.07) |
| Average Amount of Leisure Time, $\gamma_{a1}$ | -0.05 (0.02)** | -0.05 (0.02)** |
| Gender, $\gamma_{a2}$ | -0.04 (0.06) | -0.05 (0.06) |
| Age, $\gamma_{a3}$ | 0.005 (0.002)* | 0.005 (0.002)* |
| **Intercept for outcome, $d_Y$:** |                              |                      |
| Intercept, $\gamma_{d_{Y0}}$ | 14.39 (0.18)*** | 14.79 (0.28)*** |
| Average Amount of Leisure Time, $\gamma_{d_{Y1}}$ | -0.13 (0.06)* | -0.2 (0.2) |
| Gender, $\gamma_{d_{Y2}}$ | -0.17 (0.23) | -0.2 (0.2) |
| Age, $\gamma_{d_{Y3}}$ | 0.06 (0.01)*** | 0.06 (0.01)*** |
| **Mediator predicting the outcome, $b_j$:** |                              |                      |
| intercept, $\gamma_{b0}$ | -0.005 (0.04) | 0.004 (0.06) |
| Average Amount of Leisure Time, $\gamma_{b1}$ | -0.004 (0.01) | -0.004 (0.01) |
| Gender, $\gamma_{b2}$ | -0.005 (0.05) | -0.004 (0.05) |
| Age, $\gamma_{b3}$ | -0.003 (0.002) | -0.003 (0.002) |
| **Independent variable predicting the outcome, $a_j$:** |                              |                      |
| intercept, $\gamma_{a0}$ | -0.32 (0.06)*** | -0.44 (0.09)*** |
| Average Amount of Leisure Time, $\gamma_{a1}$ | -0.04 (0.08) | -0.03 (0.08) |
| Gender, $\gamma_{a2}$ | -0.004 (0.003) | -0.004 (0.003) |
| **Random effects:** |                              |                      |
| Variance $\sigma^2_{d_M}$ | 6.71E-18 | 3.05E-18 |
| Variance $\sigma^2_{a_j}$ | 0.19 (0.03)*** | 0.18 (0.03)*** |
| **Residual variance:** |                              |                      |
| Variance $\sigma^2_{d_{Yj}}$ | 20.13 (0.8)*** | 20.08 (0.8)*** |
| Variance $\sigma^2_{b_j}$ | 0.08 (0.02)** | 0.08 (0.02)** |
| Variance $\sigma^2_{c_{j}}$ | 0.18 (0.05)** | 0.16 (0.05)** |
| **Note:** age centered at sample mean; *p<0.05; **p<0.005; ***p<0.0001.
value), indicating that busy participants allocated more time to leisure than usual on days with relatively severe daily stressors, which in turn partially countered the negative effect of high daily stress severity by increasing low-arousal PA.

Next, we tested the within-person mediation model for high-arousal PA (DV2). According to the result (left panel of Table 4-4), only the path between IV and DV2 is significant ($b=-0.32, p<0.0001$). The path between IV and M ($b=-0.04, p>0.05$) and that between M and DV2 ($b=-0.005, p>0.05$) are not significant. The result means that having more leisure time than usual did not mediate the effect of relatively severe daily stressors on daily high-arousal PA. We then tested the effect of the between-person factor, average amount of leisure time. As shown in the right panel of Table 4-4, although average amount of leisure time moderated the relationship between IV and M ($b=-0.05, p<0.005$) and that between IV and DV2 ($b=0.04, p<0.05$), it did not moderate the relationship between M and DV2 ($b=-0.004, p>0.05$), which remained insignificant ($b=0.004, p>0.05$). Therefore, the within-person mediation model does not apply to high-arousal PA.

We then tested the within-person mediation model for low-arousal NA (DV3). According to the result (left panel of Table 4-5), only the path between IV and DV3 is significant ($b=0.06, p<0.05$). However, the path between IV and M ($b=-0.03, p>0.05$) and that between M and DV3 ($b=0.005, p>0.05$) are not significant, indicating that having more leisure time than usual did not mediate the effect of relatively severe daily stressors on daily low-arousal NA. The next step is adding the between-person factor to the level-2 equation. As shown in the right panel of Table 5, although average amount of leisure time moderated the relationship between IV and M ($b=-0.05, p<0.005$), it did not moderate the relationship between M and DV3 ($b=0.001, p>0.05$) and that between IV and DV3 ($b=-0.01, p>0.05$). Additionally, The path between IV and M ($b=0.12, p>0.05$) and that between M and DV3 ($b=0.002, p>0.05$) remained insignificant. Therefore, the within-person mediation model does not apply to low-arousal NA either.
Table 4-5. Unstandardized Estimates (and Standard Errors) of the Mediation Model: Low-Arousal Negative Affect as the Outcome

<table>
<thead>
<tr>
<th>Fixed effects:</th>
<th>Low-Arousal Negative Affect</th>
<th>Negative Affect</th>
<th>Between-person difference in the within-person relationship</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept for the mediator, $d_M$:</td>
<td>$-0.09 (0.04)^*$</td>
<td>$0.08 (0.06)$</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{dM1}$</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{dM2}$</td>
<td>$-0.01 (0.05)$</td>
<td>$-0.03 (0.05)$</td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{dM3}$</td>
<td>$0.002 (0.002)$</td>
<td>$0.003 (0.002)$</td>
<td></td>
</tr>
<tr>
<td>Independent variable predicting the mediator, $a_j$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{a0}$</td>
<td>$-0.03 (0.05)$</td>
<td>$0.12 (0.07)$</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{a1}$</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{a2}$</td>
<td>$-0.04 (0.06)$</td>
<td>$-0.05 (0.06)$</td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{a3}$</td>
<td>$0.005 (0.002)^*$</td>
<td>$0.005 (0.003)^*$</td>
<td></td>
</tr>
<tr>
<td>Intercept for outcome, $d_Y$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{dY0}$</td>
<td>$0.4 (0.05)^{***}$</td>
<td>$0.2 (0.07)^{**}$</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{dY1}$</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{dY2}$</td>
<td>$0.15 (0.06)^*$</td>
<td>$0.17 (0.06)^{**}$</td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{dY3}$</td>
<td>$-0.005 (0.003)^*$</td>
<td>$-0.006 (0.003)^{**}$</td>
<td></td>
</tr>
<tr>
<td>Mediator predicting the outcome, $b_i$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{b0}$</td>
<td>$0.005 (0.01)$</td>
<td>$0.002 (0.02)$</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{b1}$</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{b2}$</td>
<td>$-0.01 (0.02)$</td>
<td>$-0.01 (0.02)$</td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{b3}$</td>
<td>$-0.0004 (0.0007)$</td>
<td>$-0.001 (0.001)$</td>
<td></td>
</tr>
<tr>
<td>Independent variable predicting the outcome, $a_i$:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, $\gamma_{c0}$</td>
<td>$0.06 (0.02)^*$</td>
<td>$0.09 (0.04)^*$</td>
<td></td>
</tr>
<tr>
<td>Average Amount of Leisure Time, $\gamma_{c1}$</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Gender, $\gamma_{c2}$</td>
<td>$0.06 (0.03)^*$</td>
<td>$0.06 (0.03)$</td>
<td></td>
</tr>
<tr>
<td>Age, $\gamma_{c3}$</td>
<td>$-0.001 (0.001)$</td>
<td>$-0.001 (0.001)$</td>
<td></td>
</tr>
<tr>
<td>Random effects:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 d_M$</td>
<td>$6.08E-18$</td>
<td>$0$</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 a_j$</td>
<td>$0.19 (0.03)^{***}$</td>
<td>$0.18 (0.03)^{***}$</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 d_Y$</td>
<td>$1.4 (0.06)^{***}$</td>
<td>$1.39 (0.06)^{***}$</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 b_i$</td>
<td>$0.008 (0.002)^{**}$</td>
<td>$0.009 (0.002)^{***}$</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 c_j$</td>
<td>$0.07 (0.01)^{***}$</td>
<td>$0.07 (0.01)^{***}$</td>
<td></td>
</tr>
<tr>
<td>Residual variance:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 e_M$</td>
<td>$3.99 (0.08)^{***}$</td>
<td>$3.98 (0.08)^{***}$</td>
<td></td>
</tr>
<tr>
<td>Variance $\sigma^2 e_Y$</td>
<td>$0.83 (0.02)^{***}$</td>
<td>$0.83 (0.02)^{***}$</td>
<td></td>
</tr>
</tbody>
</table>

Note: age centered at sample mean; *$p<0.05$; **$p<0.005$; ***$p<0.0001$.

Lastly, we tested the mediation model for high-arousal NA (DV4). The path between M and DV4 ($b=-0.06, p<0.05$) and that between IV and DV4 ($b=0.44, p<0.0001$) are significant (left panel of Table 4-6), but the path between IV and M is not ($b=-0.04, p>0.05$). The result means
that having more leisure time than usual did not mediate the effect of relatively severe daily stressors on daily high-arousal NA. We then introduced the between-person factor at level 2, and

Table 4-6. Unstandardized Estimates (and Standard Errors) of the Mediation Model: High-Arousal Negative Affect as the Outcome

<table>
<thead>
<tr>
<th>Fixed effects:</th>
<th>High-Arousal Negative Affect</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept for the mediator, (d_M)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, (\gamma_{dM0})</td>
<td>-0.09 (0.04)*</td>
<td>0.08 (0.06)</td>
</tr>
<tr>
<td>Average Amount of Leisure Time, (\gamma_{dM1})</td>
<td>--</td>
<td>-0.05 (0.01)**</td>
</tr>
<tr>
<td>Gender, (\gamma_{dM2})</td>
<td>-0.02 (0.05)</td>
<td>-0.03 (0.05)</td>
</tr>
<tr>
<td>Age, (\gamma_{dM3})</td>
<td>0.002 (0.002)</td>
<td>0.003 (0.002)</td>
</tr>
<tr>
<td>Independent variable predicting the mediator, (a_j):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, (\gamma_{a0})</td>
<td>-0.04 (0.05)</td>
<td>0.12 (0.07)</td>
</tr>
<tr>
<td>Average Amount of Leisure Time, (\gamma_{a1})</td>
<td>--</td>
<td>-0.05 (0.01)**</td>
</tr>
<tr>
<td>Gender, (\gamma_{a2})</td>
<td>-0.05 (0.06)</td>
<td>-0.06 (0.06)</td>
</tr>
<tr>
<td>Age, (\gamma_{a3})</td>
<td>0.005 (0.003)*</td>
<td>0.005 (0.003)*</td>
</tr>
<tr>
<td>Intercept for outcome, (d_Y):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, (\gamma_{dY0})</td>
<td>2.46 (0.1)***</td>
<td>2.2 (0.15)***</td>
</tr>
<tr>
<td>Average Amount of Leisure Time, (\gamma_{dY1})</td>
<td>--</td>
<td>0.08 (0.04)*</td>
</tr>
<tr>
<td>Gender, (\gamma_{dY2})</td>
<td>0.34 (0.13)**</td>
<td>0.36 (0.13)**</td>
</tr>
<tr>
<td>Age, (\gamma_{dY3})</td>
<td>-0.04 (0.005)***</td>
<td>-0.04 (0.005)***</td>
</tr>
<tr>
<td>Mediator predicting the outcome, (b_j):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, (\gamma_{b0})</td>
<td>-0.06 (0.03)*</td>
<td>-0.1 (0.05)*</td>
</tr>
<tr>
<td>Average Amount of Leisure Time, (\gamma_{b1})</td>
<td>--</td>
<td>0.009 (0.008)</td>
</tr>
<tr>
<td>Gender, (\gamma_{b2})</td>
<td>-0.02 (0.04)</td>
<td>-0.02 (0.04)</td>
</tr>
<tr>
<td>Age, (\gamma_{b3})</td>
<td>-0.002 (0.002)</td>
<td>-0.002 (0.002)</td>
</tr>
<tr>
<td>Independent variable predicting the outcome, (a_j):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept, (\gamma_{a0})</td>
<td>0.44 (0.05)***</td>
<td>0.43 (0.08)***</td>
</tr>
<tr>
<td>Average Amount of Leisure Time, (\gamma_{a1})</td>
<td>--</td>
<td>0.001 (0.02)</td>
</tr>
<tr>
<td>Gender, (\gamma_{a2})</td>
<td>0.08 (0.07)</td>
<td>0.08 (0.07)</td>
</tr>
<tr>
<td>Age, (\gamma_{a3})</td>
<td>-0.005 (0.003)</td>
<td>-0.005 (0.002)*</td>
</tr>
<tr>
<td>Random effects:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance (\sigma^2 d_M)</td>
<td>3.88E-34</td>
<td>0</td>
</tr>
<tr>
<td>Variance (\sigma^2 a_i)</td>
<td>0.18 (0.05)</td>
<td>0.17 (0.03)***</td>
</tr>
<tr>
<td>Variance (\sigma^2 d_Y)</td>
<td>4.86 (0.26)***</td>
<td>4.84 (0.26)***</td>
</tr>
<tr>
<td>Variance (\sigma^2 b_j)</td>
<td>0.03 (0.01)***</td>
<td>0.03 (0.01)***</td>
</tr>
<tr>
<td>Variance (\sigma^2 c_j)</td>
<td>0.16 (0.04)***</td>
<td>0.17 (0.04)***</td>
</tr>
<tr>
<td>Residual variance:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variance (\sigma^2 e_M)</td>
<td>3.99 (0.08)***</td>
<td>3.99 (0.08)***</td>
</tr>
<tr>
<td>Variance (\sigma^2 e_Y)</td>
<td>5.83 (0.16)***</td>
<td>5.83 (0.16)***</td>
</tr>
</tbody>
</table>

Note: age centered at sample mean; *p<0.05; **p<0.005; ***p<0.0001.
tested whether the between-person relationship differs significantly between individuals. As shown in the right panel of Table 4-6, average amount of leisure, the between-person factor, partially moderates the within-person relationship by having a significant effect on the relationship between IV and M ($b=-0.05$, $p<0.005$). Meanwhile, the within-person relationship between M and DV1 ($b=-0.1$, $p<0.05$) and that between IV and DV4 ($b=0.43$, $p<0.0001$) remain significant, and are not moderated by the between-person factor. Hence, the between-person factor partially moderates the within-person mediation model, indicating that increase in stress severity mainly prompts busy individuals to increase the amount of time allocated to leisure. However, the effects of stress severity and leisure time on high-arousal NA are significant regardless how much leisure time a person has on average. Additionally, it is the counteractive effect rather than the deterioration effect that works here ($b=0.12$), indicating that, on days with relatively severe daily stressors, busy individuals allocated more time to leisure than usual rather than cutting back on leisure time. The increase in leisure time, in turn, partially countered the negative effect of high stress severity by reducing high-arousal NA.

Taking the results together, increase in leisure time does not mediate the effect of daily stress severity on high-arousal PA and low-arousal NA, regardless how much leisure time a person has on average. Meanwhile, increase in leisure time partially mediates the effect of relatively high daily stress severity on low-arousal PA and high-arousal NA among individuals with little leisure time on average (Figure 4-4). For both types of affect, it is the counteractive effect, rather than the deteriorative effect, that is applicable. That is, relatively high daily stress severity reduced a busy person’s low-arousal PA and increased her high-arousal NA, at the same time, prompting the person to allocate more time to leisure than usual. The increase in leisure time then boosts her low-arousal PA and reduces her high-arousal NA. Therefore, busy individuals tend to mobilize their coping resource and increase their coping effort when faced with relatively severe daily stressors, thus sustaining affective well-being.
FIGURE 4-4: SIGNIFICANT COUNTERACTIVE MEDIATION EFFECT: PERSON-CENTERED LEISURE TIME PARTIALLY MEDIATES THE EFFECT OF PERSON-CENTERED DAILY STRESS SEVERITY ON LOW-AROUSAL PA (UPPER PANEL) AND HIGH-AROUSAL NA (LOWER PANEL) AMONG INDIVIDUALS WITH LITTLE LEISURE TIME ON AVERAGE

Note: *p<0.05; **p<0.005; ***p<0.0001.

Discussion

The current study examined the applicability of stress mediation model (Aneshensel, 1999; Pearlin, 1999) to the within-person relationship between daily stress severity, leisure time and daily affect, controlling for the effects of age and gender. By taking into account both valence and arousal dimensions of affect, we separately examined low-arousal positive affect (PA), high-
arousal PA, low-arousal negative affect (NA) and high-arousal NA as stress coping outcomes. Doing so enables us to demonstrate how affect of different valence-arousal dimensions reacts differently to daily stress severity and leisure time. We also assessed whether there is between-person difference in the within-person coping process, augmenting our research by revealing how the effect of leisure time as a coping resource varies for different individuals.

Our major finding is that increase in leisure time contributed to stress coping by partially mediating the effect of relatively severe daily stressors on low-arousal PA and high-arousal NA, and this within-person effect was significantly stronger among individuals with little leisure time on average. The results support a partial counteractive mediation model (Ensel & Lin, 1991; Pearlin, 1999), as increase in daily stress severity prompted individuals to allocate more time to leisure than usual (rather than reducing leisure time), which then increased low-arousal PA and reduced high-arousal NA. We also revealed a between-person difference in the within-person stress coping process, as the within-person effect of leisure time is significantly stronger among busy individuals than among leisure-rich individuals (i.e., those with high average amount of leisure time). The findings, along with our within-person approach, our focus on the time aspect of leisure, and the attention on the valence and arousal dimensions of affect, contribute to stress and leisure literatures in five ways.

First, the current study advanced the understanding of daily stress and its severity. Daily stress is a unique form of stress, different from major life events and chronic stress (Serido, et al., 2004). Hence, the effect of the same coping resource may be different when used to cope with different types of stress. However, previous research on leisure as a coping resource (Iwasaki, 2001b, 2003a; Iwasaki, et al., 2002) confounded daily stress with other types of stress, leaving it unclear whether leisure is effective in coping with daily stressors. Focusing exclusively on daily stress, our study not only paints a clearer picture for the capacity of leisure time as a resource to cope with daily stressors, but also shows the importance of paying more attention to daily stress.
Our study also confirmed that it is important to study stress severity, which, according to previous research, exerts significant impact on affective outcomes (Almeida, 2005; Grzywacz, et al., 2004; Gunthert, et al., 1999; Lazarus & Folkman, 1984; Stawski, et al., 2008). In fact, our results show that daily stress severity had significant direct effect on all four types of affect, though the partial mediation model only applies to two types. In other words, regardless the effect of leisure time, the impact of daily stress severity on affective outcomes remains significant across board. When individuals perceived the daily stressors that they encounter as highly severe, they experience much more NA and much less PA. In summary, it is advisable to consider stress severity when studying how individuals cope with daily stressors.

Our second contribution is further testing the mediation model (Aneshensel, 1999; Iwasaki, 2001b; Iwasaki et al., 2002; Pearlin, 1999) and found evidence for a partial counteractive mediation effect of leisure time as a coping resource. The result implies that, rather than passively accepting the negative outcomes of daily stressors, busy individuals react to daily stressors actively—by increasing the amount of time allocated to leisure—in order to mitigate the affective cost incurred by daily stressors. Although it is not likely for individuals, especially busy ones, to increase their leisure time whenever they want to, when they do manage to give themselves a break on days with severe stressors, the extra amount of leisure time helps them sustain affective well-being. The result also indicates that those at the greatest risk of lacking leisure time are exactly those who benefit the most from an increase in leisure time when experiencing relatively severe daily stressors. In other words, the capacity of leisure time to increase feelings of calm and contentment and to reduce feelings of restless, nervous and irritable is the strongest among individuals who are very busy.

Meanwhile, the partial counteractive effect of leisure time is much less salient among leisure-rich individuals. It is not likely for those already having abundant leisure time in daily living to reap psychological benefits from further increasing their leisure time on days with severe
stressors. Indeed, previous research demonstrated that having too much leisure time is related to feelings of boredom (Barnett, 2005; Caldwell, Smith, & Weissinger, 1992; Iso-Ahola & Weissinger, 1990). In addition, avoiding stress in excessive amount of leisure time is maladaptive (Patry, et al., 2007). Therefore, leisure-rich individuals need to mobilize coping resources other than more leisure time in order to cope effectively with severe daily stressors.

Our third contribution to the literature is using a within-person approach to examine the effect of leisure time as a coping resource. Early on, stress researchers strongly suggested that stress coping be studied as a within-person phenomenon (Caspi, et al., 1987; DeLongis, et al., 1988). While Iwasaki (2001b) tried to capture the within-person process with multiple-stage design, he essentially conducted between-person comparison, missing the opportunity to reveal within-person change. To address this shortcoming, we analyzed eight-day diary data using multilevel modeling. By creating the daily change scores for daily stress severity and leisure time availability, we focused on the within-person process of using leisure time to cope with severe daily stressors, and avoided confounding the within- and between-person aspects of stress severity and leisure time availability. Doing so also enabled us to avoid the common pitfall of using between-person difference to answer questions about within-person change (Molenaar, 2004). Furthermore, instead of stopping at the within-person level, we augmented the current study by assessing whether there is between-person difference in the within-person effect. Doing so enables us to unearth the differential effect of leisure time. Otherwise, we would have concluded that leisure time as a coping resource did not help people cope with daily stressors.

The fourth contribution of our study is bringing to the forefront the importance of the time aspect of leisure. Past studies have demonstrated the psychological cost of lacking leisure time (Zuzanek, 1998; Zuzanek & Mannell, 1998) and the benefits of having leisure time (Larson & Richards, 1994). However, none of these studies examined the psychological effect of leisure time (or lack thereof) in the context of daily stressors. Research on leisure as a coping resource
has examined the effect of perceived leisure time sufficiency (Heintzman & Mannell, 2003), satisfaction with time for leisure (Bedini, et al., 2011), and leisure time spent in the nature (Korpela & Kinnunen, 2011). However, it remains unknown whether the amount of leisure time an individual has matters to stress coping. By focusing on the effect of leisure time availability on stressful days, the current study brings together two threads of research that previously took separate directions and demonstrates that they can inform each other and together further our understanding of leisure as a coping resource. What we found also echoes the statement by Pressman, et al. (2009) that “taking the time to break from daily activities and work” may be crucial to well-being (p. 726).

Meanwhile, we also need to be realistic about the role and potential of leisure time as a coping resource. Having more leisure time than usual exerted a smaller effect on the affective outcomes than relatively high daily stress severity. The result indicates that, in order to recover more fully from severe daily stressors, individuals need to utilize other coping resources besides allocating more time to leisure. It is also possible that the coping capacity of leisure time is already “near the ceiling” (Somerfield & McCrae, 2000, p. 623). Hence, it is unrealistic to count on leisure time alone to fully reverse the adverse effect of severe daily stressors.

Lastly, our study demonstrates the importance of studying affect as a stress coping outcome. Affect is sensitive to ebbs and flows in daily stress (DeLongis, et al., 1988), and our study provided further empirical evidence in this regard by showing that severe daily stressors increased NA and reduced PA (Bolger, et al., 1989; David, et al., 1997; Eckenrode, 1984; Neale, et al., 1987; Repetti, 1993; van Eck, et al., 1998; Watson, 1988). The findings also confirmed that both NA and PA should be studied as stress outcomes (Clark & Watson, 1988; Stone, 1987). More importantly, we demonstrated the value of the circumplex model of affect (Feldman, 1995; Russell, 1980, 1989; Thayer, 1986) to stress coping research. By taking into account both valence and arousal dimensions of affect, we found that leisure time, as a coping resource, partially
counteracted the effect of daily stress severity on low-arousal PA and high-arousal NA among busy individuals. However, the coping function of leisure time is not applicable to high-arousal PA or low-arousal NA, regardless how much leisure a person has on average. The findings suggest that affect of different valence-arousal dimensions reacts differently to leisure time as a coping resource, supporting the argument that investigations of affective reactivity to stress should consider the arousal dimension of affect (Moskowitz, 2011; van Eck, et al., 1998).

Paying attention to both valence and arousal dimensions of affect also allows us to better understand leisure time as a coping resource in two ways. First, Kleiber (2000) argued that leisure research tended to “associate positive affect with action and interaction, with creating fun in an active sense” (p. 84). Kleiber also called for more attention on experiences “in the pleasant/deactivation quadrant” such as “contentment, serenity, relaxation and calm,” which are “vitally important to mental health” as well (p. 84). Findings in the current study support Kleiber’s argument that paying attention to only high-activation PA is not enough. In fact, it is the pleasant/deactivation quadrant of PA that was boosted by increased leisure time on days with relatively severe daily stressors. Therefore, this study answered Kleiber’s call by providing empirical evidence for the relevance of low-arousal PA.

Second, according to the circumplex model of affect (Russell, 1980; Feldman, 1995), low-arousal PA and high-arousal NA are bi-polar to each other, while high-arousal PA and low-arousal NA form the other bi-polar pair. Our results show that increase in leisure time influences the former bi-polar pair but not the latter. It is possible that the major function of an extra amount of leisure time is to regulate the bi-polar pair of low-arousal PA and high-arousal NA—increasing the former and decreasing the latter. The function at least partially helped busy individuals to regain the emotional balance (Aldwin & Levenson, 2001) disrupted by daily stressors. Furthermore, low-arousal PA has been associated with “a dampening of cardiovascular response” (p. 941) to stressors, a manifestation of the “antistress” (p.960) function of low-arousal PA.
(Pressman & Cohen, 2005; see also Folkman & Moskowitz, 2000). Meanwhile, high-arousal affect, both positive and negative, were related to increase in cardiovascular response to stress, and the increase associated with high-arousal NA is bigger in magnitude (Pressman & Cohen, 2005). Considering increase in leisure time enhances low-arousal PA and reduces high-arousal NA, is it possible that the extra leisure time also helps busy individuals to restore the cardiovascular equilibrium disrupted by relatively severe daily stressors? An additional support for such possibility is the non-significant relationship between leisure time and high-arousal PA (recall that high-arousal PA is associated with elevated cardiovascular response to stress).

Certainly, the discussion here is largely speculative, since we do not have accompanying cardiovascular measures. However, results from the current study, combined with findings from previous research, point to an exciting though uncharted direction—the unknown yet likely physiological benefits of leisure time for busy individuals faced with severe daily stressors.

**Limitations and suggestions for future directions**

Although the current study yields promising results, it has at least three limitations. First, we summed up the severity of different types of daily stressors, and did not examine the effect of each type separately. Hence, we may have masked differential effects of various types of daily stressors on leisure time and affective outcomes. Additionally, previous research found that individuals differ in the type of stressful events they experience and coping methods they use (Ptacek, Smith, & Zanas, 1992). Therefore, it is also possible that we have missed important between-person differences in the use of leisure time as a coping resource. Second, collection of data used in our analyses spanned an entire year. However, we did not control for the possible seasonal effect on leisure time availability and affective experiences. Third, 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 limitations, we suggest four directions for future research. First, we urge future studies to collect data on cardiovascular responses to daily stressors and coping. In this way, researchers will be able to link physiological mechanisms to psychological processes, providing even stronger evidence for the value of leisure time as a coping resource. Second, further research is needed to assess the effect of different types of daily stressors separately. This research will unearth whether the effectiveness of leisure time as a coping resource is the same when used to cope with different types of daily stressors. Third, we encourage future studies to control for seasonal effect on leisure time availability and affective experiences. In this way, researchers will be able to paint a clearer picture for affective dynamics during stress and coping. Lastly, 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.

**Conclusion**

The current study examines the applicability of the mediation model to leisure time as a stress coping resource, and supported a partial counteractive mediation effect that is particularly salient among busy individuals. Relatively severe daily stressors, while reducing low-arousal PA and increasing high-arousal NA, prompted busy individuals to allocate more time to leisure than usual, which in turn increased low-arousal PA and reduced high-arousal NA. Meanwhile, increase in leisure time had no effect on high-arousal PA or low-arousal NA. The findings demonstrate the value of leisure time as a coping resource and the importance of the time aspect
of leisure. By assessing how the stress coping process unfolds within-person over time, we also moved beyond the common practice of between-person comparison in the leisure literature. Additionally, by paying attention to both valence and arousal dimensions of affect, the findings provided a finer-grained understanding of the affective outcomes of using leisure to cope with severe daily stressors.
Summary and Conclusions

The purpose of this dissertation was to study the effect of leisure time in the stress coping process among adult Americans. This final chapter will summarize the key findings, discuss the theoretical, practical and methodological implications of the findings, and propose directions for future research in this area.

Summary of key findings

The key findings of this study address questions in three areas: the effect of leisure time in the stress process, the significance of daily stress, and affect as a stress coping outcome. Following is a summary of the key findings in each of the three areas.

The effect of leisure time in the stress process

In this dissertation, I tested the applicability of the mediation, moderation, suppressing and exposure models to the effect of leisure time in the stress process, controlling for the effects of age and gender in all analyses. I found that having more leisure time than usual on a certain day partially counteracted the effect of more frequent daily stressors on positive affect (PA), and the effect is significantly stronger among individuals with little leisure time on average than among those with abundant leisure time. The finding challenged previous research that did not support the mediation model when stress frequency was the predictor (Iwasaki, et al., 2002). My research also revealed that having more leisure time than usual on a certain day partially counteracted the effect of more severe daily stressors on low-arousal PA and high-arousal negative affect (NA). Again, the effects are significantly stronger among busy individuals than among “leisure-rich” individuals. The finding echoed previous between-person finding that leisure mediates the effect of stress severity on psychological outcomes (Iwasaki, 2001, 2003a).
Taken together, the findings in my dissertation support a partial mediation model that explains the effect of leisure time as a coping resource. At the same time, the model does not equally apply to the entire sample. Rather, the effect of the model is much stronger among busy individuals, i.e., those with little leisure time on average.

The moderation model has also been tested, but received no empirical support. In this particular sample, the effect of daily stress frequency on PA did not differ significantly between days with more leisure time than usual and days with less leisure time than usual, regardless whether an individual is “leisure-rich” or usually has little time for leisure. The result confirmed the non-significant findings of some past studies (Kirkcaldy & Cooper, 1993; Zuzanek, et al., 1998), but disagreed with others that supported the moderation model (Caltabiano, 1995; Heintzman & Mannell, 2003; Iso-Ahola & Park, 1996; Schneider, et al., 2004).

Previous leisure research provided mixed support for stress suppressing model (Bedini, et al., 2011; Iwasaki, 2003b; Iwasaki & Mannell, 2000a) and conducted no empirical testing of the exposure model. In this dissertation, I tested both suppressing and exposure models by examining whether person-centered leisure time has a curvilinear effect on severity appraisal of daily stressors. Additionally, rather than using same-day data, I tested lagging effect, i.e., whether leisure time on a day affects severity appraisal the next day. I found that person-centered leisure time has a non-linear suppressing effect on severity appraisal, and the effect is particularly strong among busy individuals. When a busy person has more leisure time than usual on a day, s/he will appraise the daily stressors encountered the next day as less severe. The rate of decrease in severity appraisal, rather than being constant, will become bigger with further increase in leisure time. This lagging suppressing effect of leisure time, however, is barely evident among leisure-rich individuals. Moreover, the finding did not support the suggestion that having too much leisure time may lead to more stress. Taken together, relaxing well today is likely to help busy individuals perceive the daily stressors that happen tomorrow as less stressful.
Besides theory-related findings, this dissertation also emphasizes the value of the time aspect of leisure. Over the years, multiple leisure researchers have critically reflected on the limitations of the activity approach to studying leisure (Kelly & Godbey, 1992; Pentland & Harvey, 1999; Shaw, 1984, 1985). Defining leisure as particular pursuits, particularly the practice of researchers’ coding research participants’ activities into leisure (or work/personal maintenance), ignores the subjective and situational nature of leisure. Using individual’s estimate of available leisure time in the previous 24 hours acknowledges “the fundamentally interpretative notion of the concept of leisure” and provides “a standardized variable for analysis” (Thompson, et al., 2002, p. 130). Doing so also allows me to demonstrate that it is worthwhile to examine the time aspect of leisure as a coping resource.

**The Significance of daily stress**

This dissertation provided further support for the significance of daily stress, confirming findings of previous research (Almeida, 2005; Grzywacz, et al., 2004; Lazarus, 1999; Lazarus & Folkman, 1984; Wheaton, 1994; Zautra, 2003). I found that the effect of daily stress frequency and severity on affective outcomes was not completely offset by leisure time. Rather, higher daily stress frequency had a significant direct effect on PA, and higher daily stress severity was able to exert direct impact on low-arousal PA and high-arousal NA. Furthermore, all these effects were stronger than those of leisure time. That is, the PA-dampening effect of higher daily stress frequency could not be completely wiped out by having more leisure time than usual. In a similar vein, the affective damages caused by higher daily stress severity cannot be completely remedied by having more leisure time above personal average. Additionally, the direct effect of daily stress frequency and severity on affective outcomes was not significantly different between busy individuals and “leisure-rich” individuals. In other words, the significance of daily stress applied to the entire sample, regardless how much leisure time an individual had on average. Therefore,
while acknowledging the usefulness of leisure time as a coping resource, especially among busy individuals, it is equally important to recognize the strong impact of daily stressors on affect.

**Affect as a stress coping outcome**

Previous research used both traditional cross-sectional methods and repeated-measure design to study PA as a stress outcome. The consistent finding is that stressful events lead to a significant decrease in PA (Neale, et al., 1987; Repetti, 1993; Smyth, et al., 1998; Stawski, et al., 2008; Watson, 1988; Zautra, et al., 2005). The result of the current study confirmed the finding, as frequency of experiencing PA significantly decreased on days with relatively more daily stressors. At the same time, PA responded to leisure time as a coping resource with increased frequency. Psychological research has associated pleasant events during leisure time with PA, especially in time of stress (David, et al., 1997; Folkman & Moskowitz, 2000). My finding supported previous studies, and provided further evidence for the value of leisure time.

Additionally, multiple studies in the leisure field demonstrated a positive relationship between leisure pursuits and PA (Carruthers & Hood, 2004; Hills & Argyle, 1998; Mitas, et al., 2011; Ulrich, et al., 1991), but the relationship has rarely been tested in the context of daily stressful events. This dissertation filled the gap by revealing that having more leisure time than usual was able to increase PA when individuals experienced relatively frequent daily stressors. By focusing on PA, the current study also responded to stress researchers’ repeated call for attention on PA as a stress outcome (Folkman & Moskowitz, 2000; Ong, 2010; Zautra, 2003).

The current study also took into account the structure of affect (Russell, 1980). According to Russell and colleagues (Feldman-Barnett & Russell, 1998; Russell, 1980), valence and arousal are two independent dimensions of affect, and empirical evidence has shown that both positive and negative affect terms differ in arousal level (Thayer, 1986; Whissell, 1981). Scattered evidence from previous research showed that high-arousal NA significantly increased
after individuals experienced stressful events (Clark & Watson, 1988; van Eck, et al., 1998). Finding from my dissertation provides further evidence, as relatively severe daily stressors led to significantly more frequent high-arousal NA. More importantly, I simultaneously tested PA and NA of different arousal levels as stress and coping outcomes, thus, making it possible to examine whether these four types of affect react to relatively severe daily stressors in the same way. The results show that higher daily stress severity significantly reduced low- and high-arousal PA, and increased low- and high-arousal NA. Recently, Moskowitz (2011) suggested that research on stress coping should avoid relying solely on measuring high-arousal affect as the outcome. My research findings supported the value of this suggestion by showing that not all four types of affect responded to leisure time as a coping resource. While low-arousal PA increased and high-arousal NA decreased upon using leisure time to cope with severe daily stressors, there was no significant increase in high-arousal PA, nor was there significant decrease in low-arousal NA.
Conclusions and implications

The findings of this dissertation have important implications for various theoretical models that may explain the effect of leisure time in the stress process. There are also methodological implications for daily diary methods and within-person analysis. Moreover, the findings offer practical implications for the use of leisure time in the stress process and regulation of one’s affect in time of stress. Lastly, findings from this dissertation point to several areas that deserve future research attention.

Theoretical implications

The current study provides implications for multiple theoretical models that may explain the effect of leisure in the stress process: mediation, moderation, and suppressing. The mediation model can take effect in two ways: deteriorative and counteractive (Ensel & Lin, 1991; Iwasaki, 2003b; Pearlin, 1999). In my dissertation, a partial counteractive mediation model received empirical support, as relatively frequent and severe daily stressors seemed to prompt individuals, especially those with little leisure time on average, to allocate relatively more time to leisure in order to cope with the stressors. The findings imply that leisure time is a coping resource that people actively mobilized when faced with daily stressors. It may be possible that individuals used leisure time as a temporary “breather” (Patry, et al., 2007, p. 427) in order to remedy the affective damages caused by daily stressors. Additionally, the lack of evidence for a deteriorative effect may point to the psychological need of giving oneself time to regulate both positive and negative affect in time of stress.

The moderation model was not supported in this study. The result means that the within-person relationship between daily stress frequency and PA did not differ significantly by the amount of time allocated to leisure. In order words, leisure time did not interact with daily stress
frequency to influence PA. The finding, combined with the support for the mediation model, signals that leisure time as a coping resource, rather than changing the magnitude of the stress-PA relationship, intervenes in the relationship by partially counteracting the effect of daily stress frequency on PA.

Leisure time, in both mediation and moderation models, is treated as a coping resource that individuals use after experiencing daily stressors. In the suppressing and exposure models, however, leisure time is positioned as a factor that may reduce or increase the likelihood of experiencing stress, i.e., an antecedent to daily stressful events. The support for a lagging suppressing effect indicates that paying attention to leisure time as a preventive method to reduce perceived severity of next day’s daily stressors can bring out fruitful results. Indeed, it is not enough to understand how individuals react to daily stressors with their coping resources. It is equally important to identify the resources that reduce subjective stressfulness and the factors that expose individuals to more daily stressors.

Methodological implications

The daily diary method was ideal for the questions addressed in this study because it allows examining the process of using leisure to cope with stress as a within-person phenomenon. Using end-of-day diary makes it possible to capture phenomena that change fairly quickly (Bolger, et al., 2003; Shiffman, et al., 2008), for instance, daily stressful experiences, affect frequency. Traditional cross-sectional survey will not be able to reveal within-person fluctuations in these quick-changing phenomena. However, findings in this study have shown that within-change fluctuations are not merely “noises” or random error. Rather, examining how fluctuations in stress and coping are related to affect from one day to the next reveals “the short-term effects of concrete daily experiences” (Almeida, 2005, p. 66). Therefore, it is important to use a study design that enables researchers to collect the type of data needed to answer their questions.
Another advantage of the daily diary method, compared to more traditional questionnaire methods, is alleviating recall bias (Almeida & Wong, 2009). The longer the duration of the recall interval is, the more salient one’s most recent experience is, the more variable the recalled subject is, the lower the validity of recall will be (Shiffman, et al., 2008). For coping research, global self-perception about how one generally copes can further reduce the validity of recalling actual coping behaviors (Stone, et al., 1998). In previous leisure research, some studies have recall intervals much longer than the previous 24 hours, ranging from two weeks (Zuzanek, et al., 1998), one month (Iso-Ahola & Park, 1996), to one year (Caltabiano, 1995). Using daily diary methods allows the current study to greatly reduce recall bias that past studies may have suffered.

A related issue is the average amount of leisure time a participant had each day across the eight study days. The average score used in this study is not personal recall of the past eight days. That is, the score is not a single recall measure taken at one time point by asking a participant how much leisure time he/she had on average each day in the past eight days. Instead, it is the numeral average of the data collected each day in the past eight days. Using the numeral average not only reduces recall bias but also increases reliability (Charles & Almeida, 2007).

Furthermore, daily diary design affords ecological validity, enabling researchers to study those phenomena that are not replicable in a lab setting (Reis & Gable, 2000; Wheeler & Reis, 1991). At the same time, the within-person approach allows researchers to “rule out temporarily stable personality and environmental variables as third-variable explanations” for the relationship between daily stressors and well-being, since the person serves as his/her own control (Almeida & Wong, 2009, p. 144). Therefore, daily diary design does not dramatically reduce the control of random factors that lab research emphasizes on one hand, while providing ecological validity that lab research cannot afford on the other hand.

Equally important, collecting data from the same participants for multiple days enables within-person analysis, overcoming limitations of previous research. In earlier national time use
studies (Jacobs & Gerson, 2004; Robinson & Godbey, 1997; Zuzanek & Smale, 1992), comparing time use behavior on different days is essentially comparing person A’s time use on Monday with person B’s time use on Tuesday, since each participant was asked to provide data for only one day. With NSDE data, it is possible to compare person A’s Monday to person A’s Tuesday, which makes more sense than previous practice. In the leisure field, Iwasaki (2001) did collect data from the same participants for several times. However, the researcher mainly conducted between-person comparison by aggregating data collected on multiple occasions in his analysis. This study took advantage of the latest statistical development in multilevel modeling (MLM), and examined how the stress-leisure-affect relationship unfolds within person over time. Using MLM is also a progress from earlier practice by Iwasaki (2003b), who created a dummy variable for all but the last study participants and entered all the dummy variables into hierarchical regression. Hierarchical regression uses least squares estimation, but MLM takes advantage of maximum likelihood estimation, which is “more precise and efficient than least squares estimation” (Reis & Gable, 2000, p. 211).

In summary, using daily diary design to collect data and MLM to analyze the data allows this study to examine the fast-changing within-person process of stress coping in real-life settings with more validity, reliability, and statistical precision.

Practical implications

The findings from this dissertation have implications not only for theory and research but also for application. Given the findings that the effect of leisure time as a coping resource is significantly stronger among individuals with little leisure time on average, it seems that leisure time as a coping resource is not universally effective. Rather, the value of leisure time is the greatest when its “supply” is low. Individuals who usually have abundant leisure time are much less likely to benefit from further increase in their leisure time on days with relatively frequent or
severe daily stressors. Indeed, multiple leisure studies demonstrated that having too much free
time but too little to do can result in feeling of boredom (Barnett, 2005; Caldwell, et al., 1992;
Iso-Ahola & Weissinger, 1990). Therefore, “leisure-rich” individuals may need to draw on
coping resources other than increasing leisure time. For busy individuals, however, an increase in
leisure time above personal average may provide a “time out” away from work and life demands,
which can be used to cope with the more frequent and severe daily stressors they encounter. The
findings are also relevant to time management education. Busy individuals can be suggested not
to overlook the value of giving oneself a break in coping with demands from their busy lives.
Time management education can also emphasize the importance of setting aside even a little time
for leisure, which can go a long way with regulating one’s affect and sustaining well-being,
especially when faced with daily stressors.

Discussing the effectiveness of leisure time as a coping resource leads to the next
implication, which is the type of coping goals that leisure time can help individuals achieve.
Giving oneself a bit more leisure time above personal average provides a way for individuals to
experience positive affect (PA) more frequently in time of stress. Maintaining frequency of PA in
time of stress is important to mental health, and individuals can be advised to make use of their
leisure time to experience PA, especially on days with more frequent daily stressors. When
regulating one’s affect is a goal of using leisure time to cope with stress, paying attention to types
of affect will also accrue benefits. Leisure time as a coping resource is more effective at
increasing low-arousal PA and reducing high-arousal negative affect (NA) when individuals
experience severe daily stressors. Therefore, if a busy individual aims at increasing feelings of
calm and peaceful and reducing feelings of restless, nervous or angry on days with relatively
severe daily stressors, leisure time can be an effective coping resource to use.

When educating individuals about the value of leisure time as a coping resource, it is
equally important to point out that one cannot rely solely on leisure time to cope with daily
stressors. To put it in another way, leisure time is only one of the many resources in a person’s coping repertoire. Given the findings that leisure time cannot completely offset the negative effect of daily stressors, individuals need to develop a realistic view of the extent to which leisure time can remedy the affective damage caused by daily stressors. To cope with daily stressors, it is necessary to mobilize multiple coping resources in order to realize optimal coping outcomes.

The essence of success in coping is effective reactions to daily stressors, yet it is also beneficial for individuals to take advantage of those resources that can prevent stressful experience. Given the finding that increase in leisure time on a day reduces perceived severity of daily stressors the next day, it is advisable that busy individuals make the most out of the extra time that they have for leisure so as to perceive daily stressors as less severe the next day. In short, the benefit of leisure time is not confined to the same day but can spill over to the next day.

**Suggestions for future research**

While this study has advanced knowledge of leisure time as a coping resource, it also highlights several areas that require future research. First, this study needs to be replicated with ethnically more diverse samples and samples with different education levels. Doing so will be able to validate the study results in populations with different characteristics and to uncover cultural as well as socio-demographic differences.

Second, further study is needed to examine the effect of leisure time as a coping resource on negative affect (NA). This study paid attention to NA of different arousal levels, but did not examine NA as a whole. A further examination of NA will lead us to understand on which type of affect leisure time has a stronger influence: positive or negative.

Third, future research is strongly encouraged to use more comprehensive measures of leisure time, including not only amount of leisure time each participant had in the previous day but also need for leisure time and satisfaction with leisure time experience. In the current study,
The coping effectiveness of leisure time is significantly weaker among individuals with abundant leisure time on average. However, without appropriate measures, it is not feasible to tell whether this finding is due to a surplus of supply compared to need or lower satisfaction with leisure time experience. Adopting more comprehensive measures of leisure time will be able to facilitate our understanding in this regard.

Fourth, future research is suggested to study whether the effectiveness of leisure time as a coping resource differs by personality traits. Past studies reported that neurotics, compared with non-neurotics, reacted to stressors with more NA (Gunthert, et al., 1999; Mroczek & Almeida, 2004). Additionally, the effectiveness of a coping resource tends to be lower among neurotics than among non-neurotics (Bolger & Zuckerman, 1995). By taking into account the influence of personality traits, future research will be able to facilitate our understanding of between-person differences in the within-person process of using leisure time to cope with daily stressors.

Fifth, future research is urged to move beyond studying the psychological outcomes of leisure as a coping resource and to link leisure to cortisol, the biological marker of individual response to stress (Almeida, et al., 2009). One speculation based on the findings in this study is that leisure time availability might help restore the cardiovascular equilibrium disrupted by severe daily stressors. Studying the effect of leisure time on cortisol will enable a direct examination of such possibility, linking psychological processes to physiological mechanisms and providing further evidence for the benefits of leisure time as a coping resource.
References


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Xinyi Qian

**Education**

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</table>

**Selected Publications:**


**Selected Conference Presentations:**

Qian, X., & Yarnal, C. (2011, November). *Does leisure time availability lead to more or fewer daily stressors?* Paper presented at 2011 National Recreation and Park Association Congress & Exposition, Atlanta, GA.