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# Walk It Off!: the Relationship Between Physically Active and Passive Coping Style and Perseverative Cognition

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WALK IT OFF!: THE RELATIONSHIP BETWEEN PHYSICALLY ACTIVE AND  
PASSIVE COPING STYLE AND PERSEVERATIVE COGNITION

by

Michelle R. Di Paolo

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December 2013

ABSTRACT  
WALK IT OFF!: THE RELATIONSHIP BETWEEN PHYSICALLY ACTIVE AND  
PASSIVE COPING STYLE AND PERSEVERATIVE COGNITION

by

Michelle R. Di Paolo

The University of Wisconsin-Milwaukee, 2013  
Under the Supervision of Professor Marcellus Merritt

The main aim of the current study is to assess if a relationship exists between self-selected coping styles and levels of perseverative cognition (PC). Recent pilot studies have revealed a relative distinction between the coping styles people choose when coping with stress, i.e., those that are physically active (PAC) like going for a walk, jogging, or lifting weights, and those that are physically passive (PPC) like reading a book or listening to music. Additionally, research has shown that high levels of PC (rumination, worry) can be deleterious to one's health due to causal links between PC and reduced positive mood, and in turn, intense, prolonged cardiovascular responding in cases of chronically poor coping (Brosschot, Gerin, & Thayer, 2006; Verkuil, Brosschot, de Beurs, & Thayer, 2009). The current study utilized a sample ( $n = 29$ ) of men and women of all ethnic backgrounds and coping styles from a medium-sized, Midwestern University. Both PACs and PPCs completed a number of psychological assessments (e.g., RRS, PSWQ) and PACs were recruited for physiological, in-lab assessments where participants were randomly assigned to either walking on a treadmill or sitting quietly for 10 minutes after an anger-recall session. It was hypothesized that those who self-select PAC strategies will be lower on levels of PC, as well as a number of other psychosocial

factors related to PC (e.g., depression), than those who self-select PPC. It was also hypothesized that those PACs who engaged in a form of physical activity (i.e., treadmill walking) following a stressor task would feel more positive and less negative affect than those who had to sit in a chair and that mood enhancement would be moderated by the PACs level of PC. T-tests support these hypotheses in that PACs scored significantly lower on PC than PPCs [ $t(386) = -3.46, p = .001$ ] ( $M = 90.1, SD = 21$ ) vs. ( $M = 97.9, SD = 23.3$ ) as well as lower on important factors like depression and loneliness, but higher on traits of self-efficacy, striving towards a goal, and desire for control. It was found that walking on a treadmill produced significantly more positive affect than sitting in a chair and that PC moderated that effect for those who are high, [ $F(3, 45) = 5.497, p = .018, \epsilon = .716$ ] but not low, in PC scores. These results highlight the powerful benefits of utilizing physical activity for those who self-select PAC on affective responding in the context of stress reactivity. These benefits are especially relevant for individuals who are PAC *and* have high levels of PC, and are relevant as a potential behavioral intervention for those who enjoy physical activity and have a need for effective coping strategies for enhanced positive health outcomes.

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## LIST OF ABBREVIATIONS

1. Physically Active Coping – PAC
2. Physically Active Copers – PACs
3. Physically Passive Coping – PPC
4. Physically Passive Copers – PPCs
5. Self-Selected Coping Activity – SSA
6. Perseverative Cognition – PC
7. Cardiovascular – CV
8. Blood pressure – BP
9. Heart rate – HR

According to a 2012 press release by the American Psychological Association (APA) some of the most significant stressors to Americans are work, the economy, and 75% of Americans who completed this survey (n = 1226) reported that money problems are stressing them (APA, 2012). One of the most frequently reported side effects of stress is irritability or anger as reported by 42% of Americans who completed the survey. Finally, and of particular interest to the current study, are the most frequently reported coping strategies of Americans, including listening to music (48%), and exercise or walking (47%) (APA, 2012).

The dichotomy of self-selected coping activities (SSAs) reported by the APA (2012) is clear, a phenomenon echoed by a recent assessment of SSAs and daily blood pressure (BP) conducted by Zawadzki, Smyth, Merritt, & Gerin (in press). In addition to that, a pilot study conducted by Merritt and Di Paolo (N.d.) asked participants to list their top preferred coping activities when dealing with stress. Like the APA survey, two relatively distinct categories of coping activities emerged: those individuals that self-selected physical activity of moderate to high intensity (PACs) and those who self-selected physically passive coping (PPCs), activities that required extremely minimal or no physical movement. The most commonly reported among PACs was going for a walk/run (59%), going to the gym to “work out” (26%), and even rigorously cleaning/organizing one’s home (9%). Of the most commonly reported PPCs, listening to music (42%), reading a novel (22%), surfing the internet (19%), or even taking a nap (7%) (Merritt & Di Paolo, N.d.). This finding reveals first, that people do, as reported, have a *personal* preference for coping activities when stressed, and second, that the efficacy of these strategies for dealing with everyday stress should be established so that

people may potentially utilize an activity that is ideally suited for them; an activity they already enjoy. It would also logically follow to establish whether or not there is a significant and useful difference in the psychosocial profile and affective responding to stressful situations between people who prefer PAC versus those who prefer PPC. This information taken together will help in the development of an effective, personally-tailored, and innovative approach to helping individuals cope with stress.

### **Self-Selected Coping Activities and the Benefits of Distraction-Oriented Coping**

Classic, non-pharmacological stress management interventions such as deep breathing, mindfulness meditation, and progressive muscle relaxation are popular because of their benefits on acute blood pressure improvement, blood pressure being representative of one's level of stress (Deyo, Wilson, Ong, & Koopman, 2009; Gerin, Davidson, Christenfeld, Goyal, & Schwartz, 2006; Neumann, Waldstein, Sollers, Thayer, & Sorkin, 2004; Williams, Dunsiger, Jennings, & Marcus, 2012). The issue, therefore, is not the efficacy of the technique, but rather that well-established strategies for coping with stress, like meditation, are limited in their utility to those individuals who will consistently maintain the regimen. On top of potentially poor adherence, traditional interventions can be expensive and time-intensive which may only pose additional stress on the individual, instead of reducing it. Thus, it may be quite useful to instigate the continued use of an activity that the person already engages in and enjoys, i.e., a self-selected coping activity (SSA) as it logically stands that the person is already motivated to continue engagement in the activity, whereas a person who has a classic coping technique like meditation imposed on them, may not stick with the regimen due to the added time and effort commitment. Fortunately, there is also a great deal of evidence that

less traditional, yet personalized and innovative methods of stress reduction have similar efficacy on blood pressure maintenance (Chafin, Roy, Gerin, & Christenfeld, 2004; Zawadzki & Smyth, 2013; Zawadzki et al., in press).

A less traditional, yet empirically-supported intervention, music listening, has been highlighted in a number of studies due to its benefit in improving BP levels for at-risk individuals such as hypertensive patients (Allen et al., 2001; Leardi et al., 2007; Chafin et al., 2004). Preferred or self-selected musical selections serve as relevant and distracting stimuli and may raise the likelihood of reducing cardiovascular (CV) responses by providing stimuli that are familiar and comforting (Allen et al., 2001; Knight & Rickard, 2001).

### **Distraction-Oriented Coping**

What sets the above coping strategies apart from other others, like problem-focused and disengagement-oriented coping, is the cognitive mechanism of action, commonly known as distraction. There is preliminary evidence that coping interventions like meditation and listening to music have a common basis in that they all act as a distraction from the stressful events of life. Distraction-oriented coping is characterized by deliberately moving one's awareness away from one's distressed feelings to enjoyable or impartial images and thoughts (Lyubomirsky et al., 2003; Singer & Dobson, 2007). For instance, mindfulness, initially rooted in Buddhist teachings, revolves around a non-judgmental and constant moment-to-moment attention of psychological states and processes. A fundamental goal of mindfulness meditation is the development of a mind-set of acceptance towards pessimistic outlooks and feelings (Benson, 1976). One's focus

can be moved from the stressful situation to the sound, tempo, and feeling of one's breathing, for example, and in essence, the person is thus distracted away from their physiological and psychological feelings of stress.

As an example of the efficacy of distraction-oriented coping, a study conducted by Kuehner, Huffzinger, and Liebsch (2009) found that coping style affected cortisol levels, mood, and dysfunctional attitude in a sample of young adult college students. In this study, the researchers divided participants into three coping-style groups including rumination (i.e., continuous reflection on a negative event), distraction, and mindfulness. The researchers induced a sad mood by utilizing sad, "mood-suggestive" music and also asked participants to remember negative events that have occurred in their lives. Saliva cortisol samples were collected at four time periods during the session for analysis. Kuehner et al. (2009) found that compared to those in the induced rumination group, those in the induced distraction group showed a beneficial increase of positive mood. Also, those in the rumination group showed a significant increase in change scores of dysfunctional attitude from before the experiment compared to after the experiment, in that, they had more dysfunctional attitude following the completion of the experiment.

### **Benefits of Walking on Physical and Psychological Health**

Health care professionals have long understood that physical activity is beneficial for one's overall physiological and psychological health (Annesi, 2001). What is less understood, however, is the mechanism by which exercise or physical activity moderates stress reduction. This is pertinent especially considering that almost half of Americans surveyed by the APA last year, approximately 600 people, reported using exercise to

cope with stress (APA, 2012). Physical activity in the form of walking has been found to not only reduce everyday stress and improve momentary moods, but also to predict improved cardiovascular (CV) risk/function over time (Williams et al., 2012).

One of the most pervasive and enduring physical movements to humans is walking. The average human begins walking somewhere between the ages of nine and twelve months ([www.babycenter.com](http://www.babycenter.com), 2013) and therefore, walking can be interpreted as one of the most natural movements a human makes. The treadmill gives an individual who does not walk as much as they desire, or are unable to walk outside due to environmental factors like poor weather, the ability to walk in a stationary setting, whether it is at home or at a gym.

Treadmills have been utilized in experimental research for the better part of fifty years. The treadmill was initially developed for use in a clinical setting, and utilized to diagnose cardiovascular disease. During the 1960's the treadmill was developed for fitness purposes and designed for home and gym use (Levin, 2012). Furthermore, treadmill walking is utilized in a number of rehabilitation and therapeutic settings, for example after an injury, surgery, or other degenerative insult such as Parkinson's disease or a stroke (Bowden, Behrman, Neptune, Gregory, & Kautz, 2012). Treadmills have also been widely utilized in scientific research as a means of experimentally manipulating the speed, duration, and intensity of the walking (Bryan, Hutchison, Seals, & Allen, 2007; Williams et al., 2012).

Of relevance to the current proposal, a study conducted by Williams et al. (2012) investigated emotional affect during and after 10 minutes of treadmill walking and its

effects on current and future engagement in exercise. Moderate intensity walking, moderate in this case defined as 2.5 – 4 MPH walking speed, was done for 10 minutes for the first visit of the study, during a 6-month follow-up, and also a 12-month follow-up. Immediately before, at two, five, and eight minutes of walking, during a 2-minute cool down walk, and immediately after the walk, the experimenter verbally assessed how the participant was feeling, good or bad, on an 11-point scale valence scale, where +5 represented feeling very good and -5 represented very bad. The results of this study were that mood during treadmill walking (i.e., during the in lab protocol) and immediately following, was positively correlated with the participants' physical activity level 6-months and 12-months following, in that, more positive mood was correlated with increased physical activity (Williams et al., 2012). This evidence supports the association between moderate-level activity, positive mood, and an individual being motivated to continue utilizing such an activity as a means of coping with stress as it is enjoyable and easily sustainable over time.

### **Perseverative Cognition**

Perseverative cognition (PC) can be defined as persistent, sustained, and/or pervasive cognitive representations of past stressful experiences and/or the future potential for stressful experiences (Verkuil et al., 2009; Pieper, Brosschot, van der Leeden, & Thayer, 2010; Gerin et al., 2006). Though different interpretations of the construct of PC exist, worry and rumination are the two psychological factors almost always present (Verkuil et al., 2009). According to Verkuil et al. (2009), humans have the tendency to make mental representations of stressful events prior to, and after their occurrence. The amount of time one lingers on these thoughts differs from person-to-



person and this factor is what determines whether one is high or low on the construct of PC, of course then, those who ruminate and worry often having the highest PC scores. What makes high levels of PC risky to one's health is likely the prolonged negative affective (Gerin et al., 2006) and physiological activation (Brosschot et al., 2006) they produce.

Interestingly enough, Verkuil et al. (2009) note that it is more likely that it is not the stressful event itself, but the anticipation and continued reflection of the stressful event that is more physiologically harmful to the individual. Physiologically speaking, persistent thoughts of stressful events that are interpreted as threatening to the individual evoke a systemic fight-or-flight response, regardless of whether or not the stressful event actually happens or not, as the body's means of mobilizing the necessary bodily resources to combat the stressor. The fight-or-flight response results in a cascade of physiological changes throughout the body including CV reactivity as displayed, for instance, in changes in blood pressure and heart rate (HR) (Verkuil et al., 2009; Gerin et al., 2006, Brosschot, Gerin, & Thayer, 2006).

High levels of PC have been shown to negatively affect CV reactivity and recovery during stressful situations (Verkuil et al., 2009; Key, Campbell, Bacon, & Gerin, 2008; Johnson, Lavoie, Bacon, Carlson, & Campbell, 2012) an effect that chronically occurring can be deleterious to one's physical health (Zoccola & Dickerson, 2012; Brosschot, Verkuil, & Thayer, 2010). In support of the relationship between PC and CV health was another study that found that participants who were ruminating 10 minutes following the termination of a stressor had poorer CV recovery compared to those participants who were not ruminating (Key et al., 2008). Chronic, prolonged, and in

some cases inappropriate cardiovascular responding, and the negative affective response that follows, results in the degradation of the CV system and ultimately, is related to a number of chronic disease states (Wang, Trivedi, Treiber, & Snieder, 2005; Goodman, McEwen, Huang, Dolan, & Adler, 2005). It is for this reason that further research of individuals with high levels of PC and their self-selected coping styles is important and the main aim of the current study.

### **Positive Affect Motivating PACs**

As it has been discussed throughout the length of this review thus far that emotional affect enhancement is theorized to be an integral part in why people may choose PAC. Research has shown that one's positive affective responses during and after physical activity may in turn motivate the individual to continue exercising (Bryan et al., 2007; Annesi, 2002; Netz, 2010; Kwan & Bryan, 2010; Williams et al., 2012). Bryan et al. (2007) speculate that, "...the most well-documented immediate benefit of exercise is psychological; acute exercise increases positive mood and decreases negative mood" (p. 3). An article by Ekkekakis, Lind, and Jones-Matre (2006) reviewed 33 studies related to affect and exercise published between the years of 1999-2009. The authors note that it is of great importance that the exerciser finds more enjoyment (positive affect) from engaging in exercise than from engaging in other sedentary activities. Dishman, Sallis, and Orenstein (1985) note that enjoyment of the activity is ultimately a better determinant of engaging in physical activity above and beyond the person's understanding of the health benefits in doing said activity. Physical activity can therefore be a useful tool in coping with stress in part due to the positive affective responses it produces which likely,

in turn, motivate the individual to continue pursuing physical activity above other methods of coping.

### **Psychosocial Factors Related to Coping Style and PC**

A number of related psychosocial factors are thought to be related to both trait levels of PC and the coping style one chooses. It is for this reason a number of psychological assessments were utilized in this study, as a means of developing a more thorough understanding of whether or not distinctions exist between the types of individuals who use SSAs, specifically, PAC versus PPC. One of the consistently found personality factors related to PC is depression (Deyo et al., 2009; Nolen-Hoeksema, 2000) and thus both depression and a related construct, loneliness, was measured in this study. Depression is so deeply related to PC, that one of the two scales often utilized in formulation of the PC construct, the Rumination Response Scale or RRS, has a subscale specifically aimed at measuring depression as a function of rumination (Nolen-Hoeksema, 2000). As chronic negative affect related to poor, or lack of coping successfully with stress is potentially related to the development of, or correlated to depression (Deyo et al., 2009), it was a useful to investigate this concept in development of a well-rounded profile related to one's SSA. For the purposes of this study, highly valid and reliable measures of depression and loneliness (see method section) will be used.

Of additional interest to the profile of those individuals who choose one coping style over the other (PAC or PPC) is construct of psychological control, often referred to as locus of control or LOC. A study conducted by Brandon and Loftin (1991) found a

significant positive correlation between internal locus of control (LOC) and fitness level in a sample of recreational cyclists. In a separate study, dancers (a form of PAC) were significantly more physically fit and had significantly higher internal LOC than non-dancers (Adame, Radell, Johnson, & Cole, 1991). A study conducted by Brosschot et al. (1998) found that those who perceived themselves to be low in control following the presentation of an acute, situational stressor had an increase in negative mood. Therefore, there is strong evidence for the relationship between the psychological construct of control, mood, and one's ability to cope with stress.

Desire for control over the events that occur in one's life and environment has been found to be related to both high striving mentality and behavior to achieve a goal and self-efficacy. Burger (1985) found that those with a high desire for control had a higher number of personal aspirations, but also persevered longer at challenging tasks, the cardinal trait of John Henryism. John Henryism is a psychosocial construct related to one's persistent drive to achieve their goals, regardless of the obstacles in their path (Merritt, Bennett, Williams, Sollers, & Thayer, 2004; Merritt, McCallum, & Fritsch, 2011).

Finally, and in relation to self-efficacy Bandura, Caprara, Barbranelli, Gerbino, and Pastorelli (2003) found perceived self-efficacy to be related to affect, in that, those who had a high level of self-efficacy to manage their academic goals also had a high level of efficacy to manage their affect. Burger and Cooper (1979) also note that those who are high in desire for control also tend to have high levels of self-efficacy. Lastly, a measure of perceived stress (Cohen, 1988, see Appendix C-9) will be utilized as an attempt to determine if there are group differences between PACs and PPCs, the thought being that

if the groups perceive stress differently, or if one group is particularly more stressed than another, it might affect their SSA. Taken in total, these personality factors may reveal a useful model of enhancing what is currently understood about the moderating factors and psychological profiles related to selecting an effective coping style.

### **Current Study**

The current study was developed out of the need to determine if there are significant and important psychosocial differences between those who self-select PAC versus PPC styles particularly on the PC construct, a known risk-factor for poor affective and CV recovery after stress. The information found in the current study contributes to the breadth of research involving effective coping strategies and reveals further information regarding the relationship between affect in physical activity. However, it is innovative in two considerably important ways: incorporating the use of SSAs, (PACs particularly) as effective strategies of coping when stressed as a means of fighting the chronic health concerns related to poor coping when classic interventions are ineffective, and determining the existence of significant psychosocial differences between those who choose PAC versus those who choose PPC as a means of better understanding one's comprehensive and individualized risk and treatment profile. Ultimately, this study will also provide data that can be used in an applied setting, assisting those who are considered high-risk for, or are currently suffering from, the negative effects of chronic stress and may benefit from utilizing an effective SSA.

### **Aims and Hypotheses**

- Aim 1: To determine if a relationship exists between active and passive coping styles and PC.

Hypothesis 1: Individuals who are considered PACs will score significantly lower on the construct of PC than PPCs.

- Aim 2: Determine if there is a significant difference in depression scores between PACs and PPCs.

Hypothesis 2a: PACs will score significantly lower on total depression score as measured by the CESD than PPCs.

Hypothesis 2b: PACs will be significantly lower on a measure of loneliness as measured by the UCLA Loneliness scale than PPCs.

- Aim 3: Determine if there is a relationship between relevant personality traits related to coping style and PAC/PPC.

Hypothesis 3a: PACs will score significantly higher on a measure of desire for control as measured by the Desire of Control Scale (DOCS) than PPCs.

Hypothesis 3b: PACs will score significantly higher on measures of self-efficacy as measured by the General Self-Efficacy Scale, and high striving as measured by the John Henryism Active Coping (JHAC) scale than PPCs.

- Aim 4: Determine the relationship of momentary mood and two conditions: walking on a treadmill or sitting in a chair.

Hypothesis 4a: Participants who are PACs will have significantly more positive and less negative mood after walking on a treadmill than those PACs who sit quietly in a chair.

Hypothesis 4b: Momentary mood will be moderated by PC level.

- Aim 5: Verify the accuracy of the author's operational definition of PAC

Hypothesis 5: PACs will prefer walking on a treadmill over four other common PPC strategies: listening to music, reading, watching TV, and surfing the internet.

## Method

### Participants

Recruitment for this study occurred both in-class and online and utilized electronic posters that advertised the study activities. Participants were able to view information about this study on the SONA online recruitment system where they also signed up to participate. A sample of 420 men and women (80.1% female, age,  $M = 21$ ,  $SD = 3.2$ ) from a medium-sized Midwestern University responded to those ads and voluntarily completed part one of this study, an online survey. 34 of those surveys were removed from analyses due to failure to complete large parts of the survey, or were filled out inaccurately, which left 386 surveys that were analyzed fully. 107 of those survey takers qualified for part two of this study, a laboratory visit, and were contacted by the study's author to request their voluntary participation. 29 (66% female, age,  $M = 20.8$ ,  $SD = 3$ ) of those e-mailed participants came in for a lab visit. All but one participant completed the lab visit. This participant was unable to think of an event for the anger-recall session of the laboratory visit, which left 28 laboratory sessions for full analysis. Power analyses indicated that 28 participants were needed for a two-way, two-group (treadmill or sitting X high or low PC) ANOVA ( $p = .05$ ,  $\epsilon = .80$ , two-tailed t-test).

The only exclusion criterion for those participating in the survey portion of this study was age, i.e., anyone older than 34 and younger than 18 was excluded. For the laboratory portion, only participants who specified themselves as PACs when very angry or very stressed were recruited. Additionally for the lab portion of this study, a number of safety-based exclusions were made. Those participants who indicated a BMI in the class two obesity range ( $> 34.9$ ) or higher were excluded due to the constraints of laboratory equipment. Additionally, all lab participants must have specified that they had previous experience with a treadmill and be comfortable using a treadmill in the lab space for 10 minutes, walking at a self-selected pace. Lab participants must have been physically healthy, and those who indicated a personal health history or current status of hypertension, obesity, current lower extremity injury, any cardiovascular health concern, breathing disorders (e.g., COPD, asthma, emphysema) on the survey were ineligible for the lab portion of this study. All participants signified on their informed consent that they understood the risks involved in walking on a treadmill and that they do so at their own risk. Participants were granted extra credit in their desired psychology class, if it was offered by that class, and a monetary award of \$5.

### **Materials and Procedure**

*Study Design* (see Figures 1 and 2). This study was conducted in two parts: an online survey and a subsequent laboratory visit. The first portion of the study utilized the online recruitment system SONA which allowed participants to sign up, and also provided the external link to the online survey tool, Qualtrics. Participants read and agreed to the terms of the informed consent and completed a battery of psychosocial, health, and demographic assessments. The experimenter then invited those participants



who qualified in for a 1-hour lab visit on-campus and utilized a private laboratory equipped with computers with internet access, and a multitude of equipment including BP monitors and a treadmill. For the laboratory visit, participants were randomly assigned to one of two conditions: walking on a treadmill or sitting quietly in a chair.

### **Online Survey**

A 1-hour online survey asked about SSAs, psychosocial factors, and the following sociodemographic and health history items: age, gender, ethnicity, SES (socioeconomic status; e.g., parents' education, and personal income and job status), recent pregnancy, and personal/parental medical history.

*Assessment of self-selected activities (SSA).* First, participants were asked report their typical coping style in two situations: when they are very angry or very stressed out and also when they are not very angry/stressed but simply wanting to relax at the end of a long day (see Appendix C-3). Participants were given two options for both scenarios and given examples of those options, i.e., PAC, like walking, jogging, running, going to the gym to work out, dancing, or playing sports, or PPC, like reading a book, watching TV/movie, surfing the internet, or listening to music. Following that, participants were asked to consider four activities (two activities when very angry/stressed and two when not very angry/stressed) that they prefer to do regularly in their life to relax. Participants were able to freely describe those activities in an open-ended reporting format. Participants were then asked to report the usual frequency of engagement in those activities in minutes per engagement and number of instances per day/week. Using a 7-point Likert scale, 0 "not at all" to 6 "an extreme amount" participants also completed subjective ratings of the activity that included 11 questions asking the extent to which the

activity is, for example: absorbing, distracting, relaxing, entertaining, challenging, and difficult to do. This study found this 11 item measure had a reliability of  $\alpha = .74$ .

*National Aeronautics and Space Administration (NASA) Physical Activity Status Scale (PA-R)*. The NASA PA-R was used to rate the participants typical physical activity level for the past month (see Appendix C-4). This scale was used to relate the participants' general level of physical activity to their physical activity when coping with stress. This assessment utilizes an 8-point scale with a rating of 0–1 indicating very low physical activity (i.e., avoid walking or exertion or walk for pleasure), 2–3 representing moderate physical activity (i.e., 10–60) minutes or greater than 1 hour of comparable physical activity, and 4–7 indicating a high physical activity level (i.e., run 1–5 miles, or 5–10 miles, or greater than 10 miles per week, or comparable physical activity). The NASA PA-R has been validated as an indicator of aerobic fitness in previous studies (Monroe, Thomas, Lagally, & Cox, 2010).

### **Perseverative Cognition Construct**

*Ruminative Response Scale (RRS)*. The RRS measures persistent reflection on negative or depressing events and related feelings and is also associated with various cardiovascular risk profiles (Brosschot et al., 2009; Gerin, et al., 2006; Johnson et al., 2012). The 22-item assessment included a response scale that ranged from 1 “almost never” to 4 “almost always” (see Appendix C-6). Among diverse adult and adolescent normal and clinical samples, RRS total scores correlate with depression, hostility, and temperamental anger coping but less so with measures of worry. Higher scores represent more rumination (and by extension, PC). This study showed an inter-item reliability for all 22 RRS items of  $\alpha = .92$ .

*Penn State Worry Questionnaire (PSWQ)*. Molina and Borkovec (1994) refer to worry as a fairly uncontrollable, negatively valenced sequence of thoughts and images that signify an effort to engage in cognitive problem-solving on a subject that has the possibility of adverse results (see Appendix C-7). The PSWQ assesses trait worry in normal adults and is independent of measures of depression and anxiety. The PSWQ was used in the present study for the purposes of creating a construct of PC total. The 16-item scale included responses that range from 1 “not at all typical” to 5 “very typical of me” points. Reliability for the purposes of this study was  $\alpha = .93$ .

In a separate study examining the same population, PSWQ and RRS total scores were weakly correlated, suggesting that the constructs are independent (Molina & Borkovec, 1994). In the current study, PSWQ scores were correlated with higher RRS scores [ $r(387) = 0.47, p < .01$ ]. Thus, for the sake of efficiency and theoretical focus, the RRS and the PSWQ were then summed to form a single index with higher numbers indicating more PC. This construct has been used in many well-established research studies (Verkuil et al., 2009).

### **Psychosocial Assessments Related to PC**

*Center for Epidemiologic Studies (CESD)*. Depression was measured using the CESD scale. The CESD included 20 items scored on a 4-point Likert scale where scores can range from 0 to 3 (see Appendix C-5). Response options are based on experiences over the past week and range from “Rarely or none of the time (less than 1 day)” to “most or all of the time (5-7 days)”. Overall depression scores have shown acceptable reliability, test-retest consistency, and construct validity in previous studies of community

samples (Van Dam & Earleywine, 2011; Geisser, Roth, & Robinson, 1997). Inter-item reliability for the current study was  $\alpha = .90$ .

*Revised UCLA Loneliness Scale.* This scale consists of 20 forward and reverse worded items ranging in possible scores of 1 “never” to 4 “often” and containing items like, “no one really knows me well” and “I feel isolated from others” (see Appendix C-12). According to Russell, Peplua, and Cutrona (1980) loneliness is related to low self-esteem, negative affect, and depression. This scale has a high level of internal consistency  $\alpha = .91$  ( $\alpha = .90$  reliability for the current study) but also good discriminate validity showing that it is related to, but not the same as depression.

*The John Henryism Scale (JHAC).* This scale was designed to measure high striving behavior, characterized by mental and physical vigor, unrelenting commitment to working hard, and hyper-focused determination (Merritt et al., 2011). JHAC has been found to be related to health behaviors and life satisfaction (Merritt et al., 2011) which is one reason it relates well to the current study. This is a 12-item questionnaire with a Likert response scale ranging from 1 “completely true” to 5 “completely false” (see Appendix C-11). The higher the scores on this scale signify higher striving personality. Reliability of JHAC items for this study was  $\alpha = .79$ .

*The General Self-Efficacy Scale.* General self-efficacy can be conceptualized as one’s perception that they can handle life’s stressful hassles successfully (Jerusalem & Schwarzer, 1992). This scale consists of 10 items that range in answer choices from 1 “not at all true” to 4 “exactly true” and entails questions (see Appendix C-10) like “I can usually handle whatever comes my way” and “I can solve most problems if I invest the necessary effort.” This scale has strong reliability, ranging between

$\alpha = .76 - .90$  (Schwarzer, 1994) and  $\alpha = .91$  for the current study. Validity was found with measures of dispositional optimism and favorable emotions (Schwarzer, 1994).

*The Desirability of Control Scale (DOCS)*. This scale was utilized in this study for the purposes of establishing whether or not significant differences exist between PACs and PPCs level of desired control. This 20-item assessment (see Appendix C-8) utilizes a 7-point Likert scale with 1 representing “this statement does not apply to me” and 7 representing “this statement always applies to me”. This assessment contains questions like, “I prefer to be a leader and not a follower” and “I enjoy having control over my own destiny” and reversed-stated items like “Others usually know what’s best for me”. Burger and Cooper (1979) found good internal consistency and test-retest reliability of .8 and .75 respectively and  $\alpha = .79$  internal consistency for the current study.

*Perceived Stress Scale (PSS)*. The PSS is used frequently in stress research and its content is related to assessing an individual’s perception and interpretation of the level of stress in their life. For example, The PSS asks participants to answer questions (see Appendix C-9) about how often they have felt a certain way in the last month utilizing a 5-point, Likert scale ranging from 0 “Never” to 4 “Very often”. For example, “how often have you felt nervous and stressed?” and “how often have you found that you could not cope with all the things you had to do?” The 10-item scale has been found to have a reliability of  $\alpha = .89$  (Roberti, Harrington, & Storch, 2006) and .85 for the current study.

### **Laboratory Visit**

The second portion of this study utilized a private laboratory space located on campus. This space contained all necessary equipment including BP devices, computers

for data collection, and a treadmill. An Omron BP arm cuff was utilized to assess initial, pre-study, casual BP and HR.

*Interview.* Prior to the start of the experimental protocol, the experimenter validated the participant's PAC status by having them elaborate on their SSA during an open-ended interview. The participants were also asked to quantify on a scale of 0 – 10 what number they had to “reach” to consider themselves to be “very stressed, very angry, or very worked up” again, as a means of focusing their responses on times when the participant was at a high level of stress. Participants were given the opportunity to elaborate on their PAC while the experimenter asked a number of open-ended response questions like, “what is it about this activity that you like so much?” and “how do you feel when you cannot engage in this activity?” The experimenter also validated the participants PAC status by asking questions like “In a perfect scenario, how often would this be the activity you choose to cope with stress when you are very angry or very stressed out?”

*PORTApres.* PORTApres is an ambulatory monitor used to collect continuous BP and HR measures. For the purposes of this study, the PORTApres was used to (1) establish causal BP levels at the beginning of the study, (2) verify that the stressor task indeed produced BP reactivity, and (3) monitor any BP changes during and after the experimental manipulation for the safety of the participant, monitor for any abnormal or extremely elevated readings, in which case, the experiment will be immediately stopped. Measures of systolic and diastolic (SBP and DBP) BP and HR were collected continuously throughout the experimental protocol.

*Treadmill.* The treadmill utilized was a Proform 520, model number PFTL68022. According to multiple, online fitness equipment sources, this brand of treadmill is rated very highly for the purposes of walking (treadmilldoctor.com, 2013; treadmill-world.com, 2013). This treadmill had an emergency pull cord, automatic stop function as well as 5 inch wide side boards for easy dismounting; both features increasing the participant's level of safety. It also had an electronic display which has a timer, as well as distance, speed, and calories burned counter. The speed function on this treadmill was measured in miles per hour (MPH). To verify the accuracy of the MPH settings used for this study, i.e., 2, 3, and 4 MPH, the experimenter walked on the treadmill at each speed for fifteen minutes. Then, the total length traveled was multiplied by four, which verified the total length of distance being the respective 2, 3, or 4 miles within 98% accuracy.

*Mood assessment.* During the laboratory visit, a momentary mood scale (MMS) was utilized to assess emotional reactions over the course of the lab visit (see Appendix A-2). At four pre-designated times the participant completed a 15-item momentary mood scale with a 5-point Likert response scale (0 = "not at all" to 4 = "very much"). The MMS asked participants to rate the presence of each of 15 moods (e.g., depressed, content, happy, tense, annoyed, and angry). An average composite score of the positive and negative moods were computed to assess positive and negative affect during the lab visit. Composite affective scores is a commonly utilized method of analysis of affect change in laboratory research (Atienza, 2001; Kwan & Bryan, 2010). A similar measure of positive and negative affect, the PANAS, also utilizes a 5-point Likert type scale in rating of both positive and negative moods similar to the MMS (e.g., strong, excited,

depressed, upset) and has a good internal consistency of items,  $\alpha = .87$  for positive, and  $\alpha = .86$  for negative affect (Watson, Clark, & Tellegen, 1988).

*Manipulation check.* Following the completion of the experimental manipulations (walking on a treadmill or sitting in a chair) the participant was given a 9-item questionnaire (see Appendix A-4) assessing their level of engagement in the activity. Answers were assessed using a 5-point, Likert scale where 0 represented “not at all” and 5 represented “an extreme amount”. Some of the questions on this questionnaire were, “how distracted were you by this activity?”, “how much effort did you put in this activity?” and “do you feel that walking on the treadmill made you feel physically active?”

## **Procedure**

The first part of this study, the online survey, included questions regarding the participants’ demographics, health history, SSAs, and eleven psychological assessments. Participants who met the inclusionary criteria listed above were then invited via email to participate in a 1-hour laboratory session on-campus for extra credit and a \$5 gift card.

An experimenter scheduled 1-hour laboratory visits during mid-afternoon to mid-evening, but not in the morning or late evening. The experimenter instructed the participant to wear clothes and shoes appropriate for walking on a treadmill. The participant signed an IRB-approved informed consent explaining all of the experimental activities and risks. This informed consent included having the participant verify that they were 1) familiar with using a treadmill, 2) physically uninjured and able to walk on a treadmill, and 3) did not have a prior or current medical condition that would preclude them from safely engaging in cardiovascular exercise.



After obtaining informed consent, the experimenter administered the first MMS to the participant to assess pre-manipulation ratings of mood. The informed consent and mood scale assessment also served as an approximate 5-minute lab acclimation period where the participant had the opportunity to become familiar with their surroundings as well as reduce any elevated BP that may have occurred in the process of transporting themselves to the lab space. After the mood assessment, the experimenter measured casual (seated) BP and HR three times with an Omron BP monitor.

After this initial phase was completed, the experimenter moved the participant to a comfortable chair where the experimenter conducted a 10-minute interview where the experimenter asked a series of questions (see Appendix A-3) of the participant asking them to elaborate on their SSA to get a better understanding of the specifics of their coping activity. Following the interview, the experimenter attached the PORTApres device to the participant. The participant completed the remainder of the lab visit with BP cuffs placed on the middle phalanx of the biggest finger of the non-dominant hand. A height correction transducer from the front end unit of a PORTApres monitor was attached to the upper arm of the participant's non-dominant arm at heart level to account for any arm movement the participant had that may affect the PORTApres readings. The experimenter was seated behind a cubicle wall, behind the participant which served as a visual barrier, for all but one of the experimental procedures, i.e., when the participant told the experimenter their anger-recall story.

After the PORTApres was connected and activated, the participant was asked to sit quietly and comfortably in a chair for a 5-minute casual recording period to get oriented to the device and to provide resting BP and HR measures. Following the 5-

minute baseline period, participants were asked to read a short, neutral passage (see appendix B-2) out loud in his/her normal speaking voice for 2 minutes. The objective of this neutral reading task was to obtain a pre-stressor speaking measure of BP and HR.

Following neutral reading, participants completed a 5-minute anger-recall task, in which they were asked to think about (for 2 minutes mentally) and discuss (for 3 minutes with the experimenter) a previous experience in which they were very angry, very stressed out, or very worked up, and they reached the number (i.e., 0-10) they used during the interview to describe themselves as such. Recent studies highlight anger recall stress as very provocative for elevated affective and BP reactivity to as well as reduced BP recovery (Gerin, 2006; Merritt et al., 2004, 2006; Neumann et al., 2004; Key et al., 2008). Consistently, recent research has demonstrated that speech content (affect-related) has a major impact on CV recovery during laboratory-based speech tasks (Merritt et al., 2006). After the participant completed the 3 minute anger-recall talking session, they filled out their second mood scale in order to gauge any change in mood from their initial, pre-study assessment.

After anger-recall, the participant engaged in one of two 10-minute post anger-recall conditions: engage in 10-minutes of self-paced treadmill walking (condition one) or sitting quietly in a chair (condition two). Participants were randomly assigned to post-anger recall conditions prior to the lab visit. Research has shown that exercise-induced positive affect can be measured in as little as 10-minutes of exercise (Bryan et al., 2007).

For those participants' randomly assigned to the treadmill-walking condition, the experimenter attached the automatic stop safety cord to the participant's shirt and instructed the participant to pull the cord if at any time they feel sick, are in pain, light-

headed, or simply want to stop participating. The experimenter explained to the participant that they will begin the 10-minute session walking at a pace of 2 miles per hour (MPH) for 1 minute to ensure their ability to use the treadmill. After 1 minute of acclimating to the treadmill, the experimenter asked the participant if they would like to change the speed of the treadmill. If so, the experimenter changed the speed for the participant according to whatever the participant wished, but no faster than 4 MPH. Any faster of a speed will no longer be considered walking (Williams et al., 2012). Self-selected pace has been shown to enhance the participant's feeling of control and positive affect (Ekkekakis et al., 2006) and thus was an integral part of the current study's manipulation. The participant was also reminded that they will walk for a total of 10 minutes and that their mood would be reassessed half way through the period (5 minutes) and immediately following. In order to account for confounding influences of speed, differences in walking speed within and across individual participants was recorded.

Participants in condition two (i.e., sitting quietly in a chair) were told that the device would continue taking measurements over the next 10 minutes, and like the treadmill condition, mood was assessed half way and immediately after. The mood scale mid-way through the treadmill condition was recorded verbally for the participants' safety, where the experimenter asked the participants to rate their mood utilizing the same MMS scale, and wrote down the participants' responses. Even though the participants' in the control condition could have completed this mood scale themselves while sitting quietly, the experimenter verbally recorded this condition as well to eliminate potentially confounding effects of one condition being recording verbally and the other condition being done quietly by the participant.

To further control for potential confounding variables, the visual display on the treadmill was covered up so the participant could not see the amount of time they had been walking, in case this information had some effect on mood. Also, the experimenter sat behind the visual barrier so they were not in view of the participant. For safety, the experimenter did check on the status of the participant at 1 minute, 5 minutes, and at 10 minutes, the end of the session, at which time the experimenter stopped the treadmill. The participant was given a moment to gain their bearings after the treadmill was stopped and then escorted back to the chair of which they were originally sitting. The participant was immediately given their fourth mood scale and the manipulation check assessment and asked to rest quietly for 5 minutes in order to get BP levels back down close to their casual BP levels to ensure they have recovered from the treadmill walking. Finally, the experimenter unhooked the PORTApres device and debriefed the participant.

## **Results**

### **Survey**

Bivariate correlational analyses revealed the following significant relationships and all relationships were significant at the  $p < .01$  level. There was a positive relationship between the two factors utilized for a composite PC total, i.e., the RRS and PSWQ,  $r(387) = .83$  and  $.88$  respectively. PC total was also positively correlated with the CESD, UCLA loneliness scale, and the PSS,  $r(387) = .61$ ,  $r(372) = .42$ , and  $r(374) = .66$ , respectively. PC total was negatively correlated with the GSE scale and the JHAC scale,  $r(381) = -.31$  and  $r(378) = -.16$ , respectively. The DOCS was positively correlated with the JHAC and GSE scale  $r(378) = .41$  and  $r(381) = .41$ . The DOCS was also negatively correlated with the CESD scale, and the UCLA loneliness scale  $r(387) = -.17$  and  $r(372)$

= -.22, respectively. The GSE was positively correlated with the JHAC,  $r(387) = .51$  and negatively correlated with the PSS,  $r(370) = -.51$ . Finally, the PSS was positively correlated with the CESD and the UCLA loneliness scale,  $r(381) = .74$  and  $r(370) = .49$ , respectively and negatively correlated with the GSE and JHAC,  $r(372) = -.51$  and  $r(372) = -.34$ , respectively.

*Aim 1: To determine if a relationship exists between active and passive coping styles and PC.*

For part one of this study, the online survey, independent samples t-tests were performed to determine if significant differences existed between PACs and PPCs on assessments of a number of relevant psychosocial factors including the PC construct, (see Table 1). Results indicated a significant difference between PACs and PPCs on PC total (see Table 1, Figure 3),  $t(386) = -3.46$ ,  $p = .001$  in that those who are PACs are significantly lower ( $M = 90.1$ ,  $SD = 21$ ) than PPCs ( $M = 97.9$ ,  $SD = 23.3$ ).

*Aim 2: Determine if there are significant differences in depression scores between PACs and PPCs*

PACs were significantly lower than PPCs on two assessments of depression, the CESD (PACs:  $M = 13.2$ ,  $SD = 9.58$  and PPCs:  $M = 16.62$ ,  $SD = 10.48$ ),  $t(382) = -3.34$ ,  $p = .001$ , and the UCLA Loneliness scale (PACs:  $M = 40.83$ ,  $SD = 10.14$ , and PPCs:  $M = 44.15$ ,  $SD = 10.04$ ),  $t(371) = -3.18$ ,  $p = .002$ .

*Aim 3: Determine if there is a relationship between relevant personality traits related to coping style and PAC/PPC.*

PACs were significantly higher (see Figure 4,  $M = 97.19$ ,  $SD = 14$ ) than PPCs ( $M = 90.3$ ,  $SD = 20.5$ ) on the DOCS,  $t(393) = 3.87$ ,  $p = .0001$ . PACs were also significantly higher in both General Self-Efficacy (PAC:  $M = 31.31$ ,  $SD = 5.9$  and PPC:  $M = 29$ ,  $SD =$

8),  $t(393) = 3.24$ ,  $p = .001$  and JHAC (PAC:  $M = 47.32$ ,  $SD = 10.4$ , and PPC:  $M = 44$ ,  $SD = 12.3$ ),  $t(393) = 2.86$ ,  $p = .004$ . There were no significant differences found between PACs and PPCs on the PSS (PAC:  $M = 16.84$ ,  $SD = 6.65$  and PPC:  $M = 17.74$ ,  $SD = 6.89$ ),  $t(372) = -1.29$ ,  $p = .199$ . Finally, results indicated a significant relationship between scores on the NASA PA-R and PAC in that PAC is significantly related to higher levels of general physical activity,  $X^2 = (2, N = 386) = 100.98$ ,  $p < .001$ .

### **Laboratory**

*Aim 4: Determine the relationship of mood and two conditions: walking on a treadmill or sitting in a chair*

For part two of this study, the positive and negative moods on the MMS construct were averaged together to form two composite scores, one score for positive mood (content, happy, and strengthened) and one score for negative mood (depressed, tense, angry, powerless, hopeless, frustrated, ashamed, and disgusted).

Repeated measures ANOVAs were performed with Greenhouse-Geisser omnibus test of significance to determine if there were any significant effects of the laboratory conditions (10 minutes of walking on a treadmill, or sitting in a chair) on participants' mood levels over four mood measurements. Results showed a significant effect of condition (see Figure 5) on positive mood,  $F(3, 78) = 5.193$ ,  $p = .013$ ,  $\epsilon = .752$ . Follow-up t-tests were performed (using an LSD criterion) and determined that there were significant differences in positive mood by condition as measured at time 3 (mid-post anger-recall condition), treadmill:  $M = 2.51$ ,  $SD = 1.14$ , and sitting:  $M = 1.51$ ,  $SD = 1.24$ ,  $t(26) = 2.215$ ,  $p = .036$  and at time 4, (immediately following the end of the condition) treadmill:  $M = 2.69$ ,  $SD = .99$ , and sitting:  $M = 1.67$ ,  $SD = 1.22$ ,  $t(26) = 2.45$ ,

$p = .021$ . There were no significant differences between conditions on negative mood,  $F(3, 78) = 2.05, p = .151$ . Though this was not an original hypothesis of this study, the individual negative mood of “frustration” as listed on the MMS was analyzed post hoc. Results indicate that those in the sitting condition were significantly higher in frustration,  $t(26) = -2.94, p = .007$ , and  $t(26) = -2.46, p = .021$  than those in the treadmill walking condition at times 3 and 4, respectively.

Repeated measures ANOVAs were again performed to determine if there was an interaction of mood by condition across four time periods when the factor of PC extreme score was added into the equation as a moderating variable. PC extreme score was determined by using tertile scores based on the over-all PC total scores of the surveys completed in this study. The extreme high (upper 66%) cut-off score was determined to be 104 and extreme low (lower 33%) score of 82 on the PC construct. This method was utilized to ensure that differences in affect as a function of PC were in fact detectable and has been used in similar studies utilizing rumination measures (Key et al., 2008).

The Greenhouse-Geisser omnibus test determined a significant three-way interaction (see Figure 6, Table 3) of time periods, condition, and PC total on positive mood,  $F(3, 45) = 5.497, p = .018, \epsilon = .716$ , but not for negative mood,  $F(3, 45) = .926, p = .385, \epsilon = .174$ . Post hoc tests were done to determine where main effects were located and found a significant difference between of positive mood at time 3 and 4 for high PCs,  $p = .021$  and  $p = .009$ , respectively, but not with those who rate low in PC,  $p = .861$  and  $p = .962$ , respectively (see Figure 6). Specifically, among high PC persons, the treadmill (vs. sitting) group scored significantly higher on positive affect at times 3 and 4.

*Aim 5: Verify the accuracy of the author’s operational definition of PAC*

Univariate ANOVAs were performed on the questions asked on the post anger-recall survey that was utilized as a manipulation check, asking questions about the participants' absorption, distraction, and effort, for example, put forth into the activity. 89%, (24/27) of lab participants (who were all self-reported PACs) did prefer to walk on a treadmill rather than four other options of coping strategies that can be considered PPC: listening to music, reading, watching TV, and surfing the internet. 46.7% of those in the treadmill condition reported that walking on a treadmill at a self-selected pace made them feel moderately active ( $M = 2$ ,  $SD = .765$ ) on a scale of 0 – 4, 4 representing “very much” and the majority of participants, 53.3% ( $M = 2.2$ ,  $SD = .941$ ) reported that walking on a treadmill was moderately similar to their PAC.

Furthermore, results revealed that those who are high on PC are significantly more distracted by walking on a treadmill than sitting in a chair, ( $M = 2.00$ ,  $SD = .816$ ),  $t(8) = 4.77$ ,  $p = .001$ , but not those who are low PC, ( $M = 1.8$ ,  $SD = .837$ ),  $t(7) = 1.88$ ,  $p = .101$ . There were no other significant differences in ratings of condition, i.e., absorption in activity, effort put forth, relaxing, or how much control they felt they had following their activity, by condition. Finally, all participants utilized the treadmill between 2 and 3 MPH. Of the 28 total participants, only four participants (i.e., two in the treadmill and two in the sitting group) self-selected to increase the treadmill speed from 2 to 3 MPH.

### **Discussion**

The findings of this study strongly support the fact that there are important and discernible differences in psychosocial factors between those who choose a PAC or PPC coping style. One of the most significant findings of this study and in support of hypothesis one, was that PACs were significantly lower on the construct of PC total than



PPCs. This may suggest that something about being a PAC (but not PPC) buffers perseverance, or that the chosen coping style of physical activity moderates their levels of PC. Either way, it is significant that such a distinction exists. Based on the current knowledge of the empirically-supported, deleterious effects of PC on CV health (Verkuil, et al., 2009; Pieper et al., 2010; Gerin et al., 2006) it is potentially vital for PACs to utilize physical activity, rather than a traditional method like meditation, as a means of coping with stress and thus avoiding the chronic health concerns. In addition to PC, and in support of hypotheses 2a and 2b, PACs were also significantly lower than PPCs on assessments of depression and loneliness. This result not only supports the above result of being lower on PC, as we know PC is related to depression, but also suggests simply that PACs do not feel as depressed or lonely as PPCs.

The result above bolsters three other important findings of this study which were in support of hypotheses 3a and 3b, that PACs were significantly higher on measures of self-efficacy, had a higher degree of striving towards achieving a goal, and had a greater desire for control than PPCs. PACs being significantly lower on measures of PC, depression, and loneliness than PPCs, and higher on levels of self-efficacy, striving, and control echo previous study findings of the relationship between these factors and supply a fascinating profile related to two distinct self-selected coping styles. The multivariate analysis findings were echoed by the results of the correlational analyses which revealed a parallel relationship among the variables reported above, in that, more self-efficacy, striving towards a goal, and desire for control were related to lower PC scores and more depression, loneliness, and perceived stress. Potentially, it may be these psychosocial factors of a PAC profile that renders physical activity effective for coping with stress,

where using traditional coping styles, especially those that require the individual to sit still, ineffective. Interestingly, there were no differences between PACs and PPCs on the measure of perceived stress. This may strengthen the findings of this study, in that the differences between groups cannot be attributed to differences the participants had in perception of stressful events in the last month. In other words, both PACs and PPCs perceived their stress to be approximately equal within the past month. Again, this result being potential evidence that the group differences are related to PC scores and coping style, and not perceived stress.

Furthermore, the randomly assigned laboratory conditions of either walking on a treadmill at self-selected pace or sitting quietly for 10 minutes affected the PACs positive and negative mood, which supports hypothesis 4a. PACs had significantly more positive mood during and after walking on a treadmill than those participants just sitting in a chair. This result is particularly relevant, again, relating to traditional methods of coping with stress, like meditating and progressive muscle relaxation, two tactics that can take place typically while sitting quietly in a chair. Perhaps engagement in the PAC activity for those who already enjoy PACs is sufficient to distract them (and results in positive mood) from the adverse affective consequences of anger recall. The fact that positive affect change is significantly higher for those in the treadmill walking condition further highlights the immediate benefits of the treadmill activity as an acceptable method of simulating physical activity in the lab. Though no over-all significant effect was found for condition on negative mood, the results did in fact trend towards significance for negative affect in time 3 and 4, in that walking on a treadmill also reduced negative mood in comparison to sitting in a chair. This result may potentially reveal itself with the

gathering of future data and thus increased power. However the powerful effect of condition on positive affect was strong and supports previous empirical research related to exercise and positive affect (Williams et al., 2008, 2012).

Interestingly and in support of the relative power of PC on coping, PC moderated the relationship between walking on a treadmill and positive affect, in that, those who are high on PC had significantly more positive mood mid-way through, and immediately following 10 minutes of treadmill walking than those who are low on PC, supporting hypothesis 4b of this study. This result suggests that since high PC is a risk factor of negative CV recovery, and related to mood enhancement, it is incredibly important for those who are high PC and PAC to have their opportunity to engage in physical activity to cope with high levels of stress. The fact that the mood of those who were low PC was not affected by their condition potentially reveals that it truly is the component of PC that is essential to PAC being vital for the effective coping of those who are very stressed out. Of interesting note is that though there was not an over-all significant effect of condition and PC total on negative mood, when the single negative mood of “frustration” was analyzed, it was revealed that those PACs who were high PC and sat in a chair after their stressor task were significantly more frustrated than those who got to utilize a physical activity mid-way and immediately following their 10 minutes of sitting. This suggests that perhaps some further investigation in the negative affect construct should be investigated.

The goal of aim five was to better validate and comprehend the self-selected coping style of PAC. For the purposes of part two of this study, the experimental manipulation, the majority of participants felt that walking on a treadmill made them feel

moderately active and the activity was moderately similar to their own self-selected PAC. Being that almost 90% of participants stated that they would, in fact, choose walking on a treadmill over four other types of coping styles that are PPC helps verify that the treadmill may continue to be a useful tool to evaluate PACs in lab. Of additional interest is that that majority of people chose to remain at the initial treadmill speed set by the experimenter of 2 mph. Only 4 of 28 participants choose to increase speed to 3 mph. This result may indicate that basic, moderate-intensity walking may be sufficient to simulate a feeling of physical activity, though more intense physical activity or activity more similar and personal to the participant may strengthen the results related to positive and negative mood changes.

Furthermore, this study found that among all other questions asked on the post-anger recall manipulation check, the two conditions were only significantly different in levels of distraction, in that those participants in the treadmill condition were significantly more distracted from their stress than those who had to sit in a chair. Thus it is likely that one reason for the increase in positive affect following the post anger-recall session is due to the participant being distracted by walking on a treadmill. This is extremely important due to the issue mentioned above regarding the utility of classic styles of coping, e.g., meditation being sufficiently distracting for PACs. Being that meditation in large part takes place in a quiet, non-physical environment, a tactic like this may be effective for PACs, however, the likelihood that they will continue to sit in a chair and meditate to cope with stress is logically quite low. It can be suggested that it is perhaps the aspect of physical movement that allows PACs to be distracted.

Finally, it is interesting to note that PAC was significantly related to general level of physical activity, in that those who cope with physical activity tend to also be generally active people on the whole. This further relates to the need for PACs to utilize physical activity, rather than sedentary, physically passive coping styles to cope with their stress. It is logical to suggest based on previous research that the enjoyable factors about the activity when the person is not stressed carry over effectively to produce a positive environment for coping with stress, both with one's affect and consequently, CV responding.

### **Limitations and Future Directions**

The limitations of this study mostly involved the experimental manipulation which was limited to the ability of simulating physical activity in a laboratory setting. The participants in the walking condition rated the manipulation as moderately similar to that of their own PAC, and moderate in the level that it made them feel like they were being active. This perhaps may have been due to the variety of physically active coping techniques reported by participants. It simply may have been due to the atypical environment of being in a confined lab space or an inadequate length of time the participants had to engage in the activity. A future study may benefit from recording participants' self-selected PAC in real-time, as they experience it in their own natural state.

Another limitation of this study was the lack of questions or manipulations regarding a well-established coping strategy, like meditation during the lab visit. This would be a useful comparison in detecting acute mood changes and comparing them to treadmill walking. It would be useful in the future to utilize a longitudinal approach

observing three conditions, i.e., meditation, self-selected PAC, and a control group to further determine mood change and long-term sustainability of said activities. Also, the use of the SSA questionnaire is still in its infancy, however, it might be interesting in future studies to attempt to establish some kind of divergent validity related to the participants first and second selection of SSA when very angry or very stressed out to try and increase the likelihood of truly validating the construct of PAC versus PPC.

### **Conclusions**

The purpose of this study was to elucidate if important differences that exist in people who utilize self-selected PAC versus PPC. A known risk factor of poor CV recovery after stress is high PC and thus it logically followed to also determine in this study whether or not this was one of the psychosocial differences between PACs and PPCs, and in fact, that seemed to be the case, along with other potentially detrimental factors related to depression, loneliness, and self-efficacy. What is not known however is if a causal connection exists between these traits and one's chosen coping style. This study also provided additional evidence that mood enhancement occurs during and immediately following physical activity. Coping with stress by using physical activity may not be for everyone, just as using meditation is not for everyone. However this study has shown that for a sample of PACs, it is effective in both mood enhancement and distracting the individual, a useful technique in coping with stress.

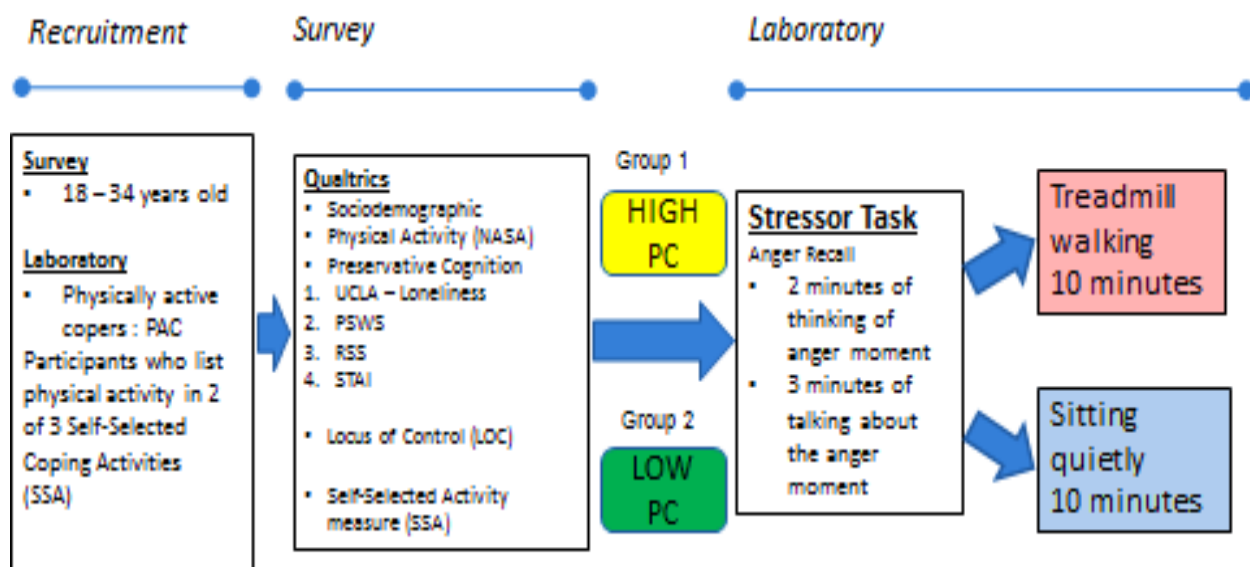


Figure 1. Study Procedural Schematic: Parts 1 and 2.

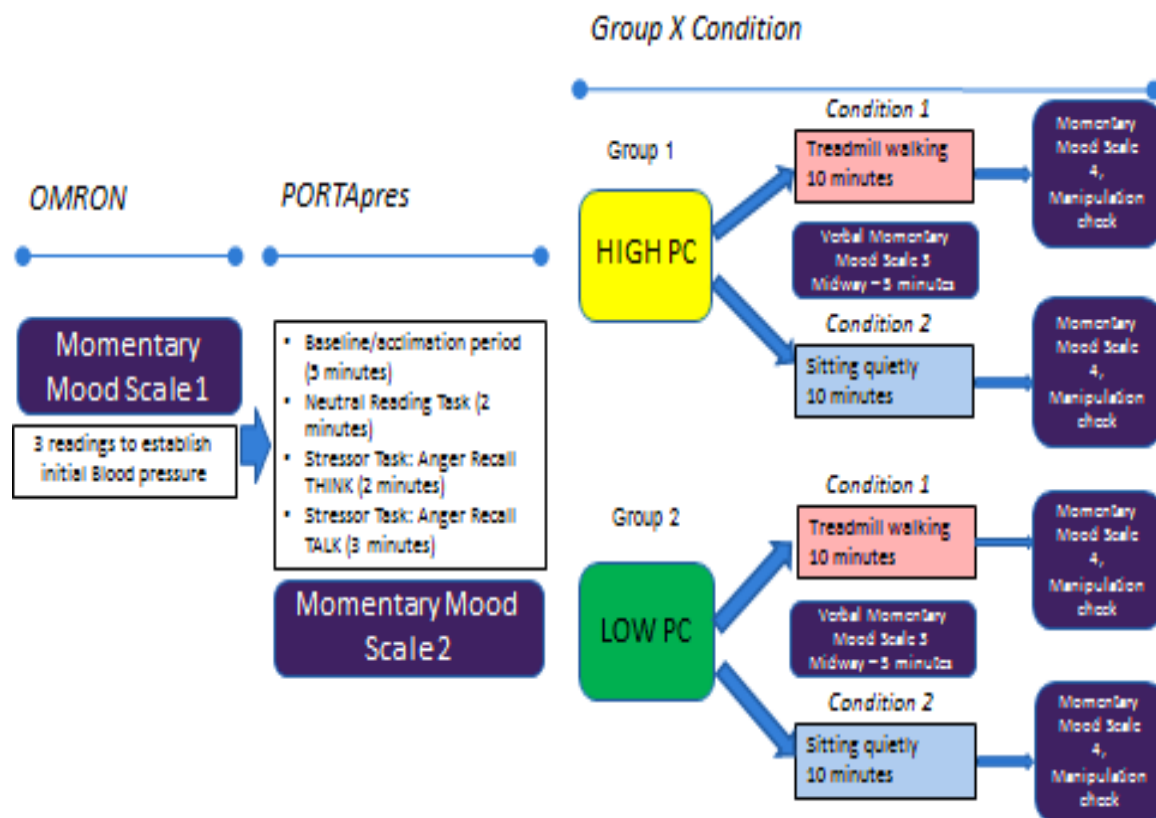
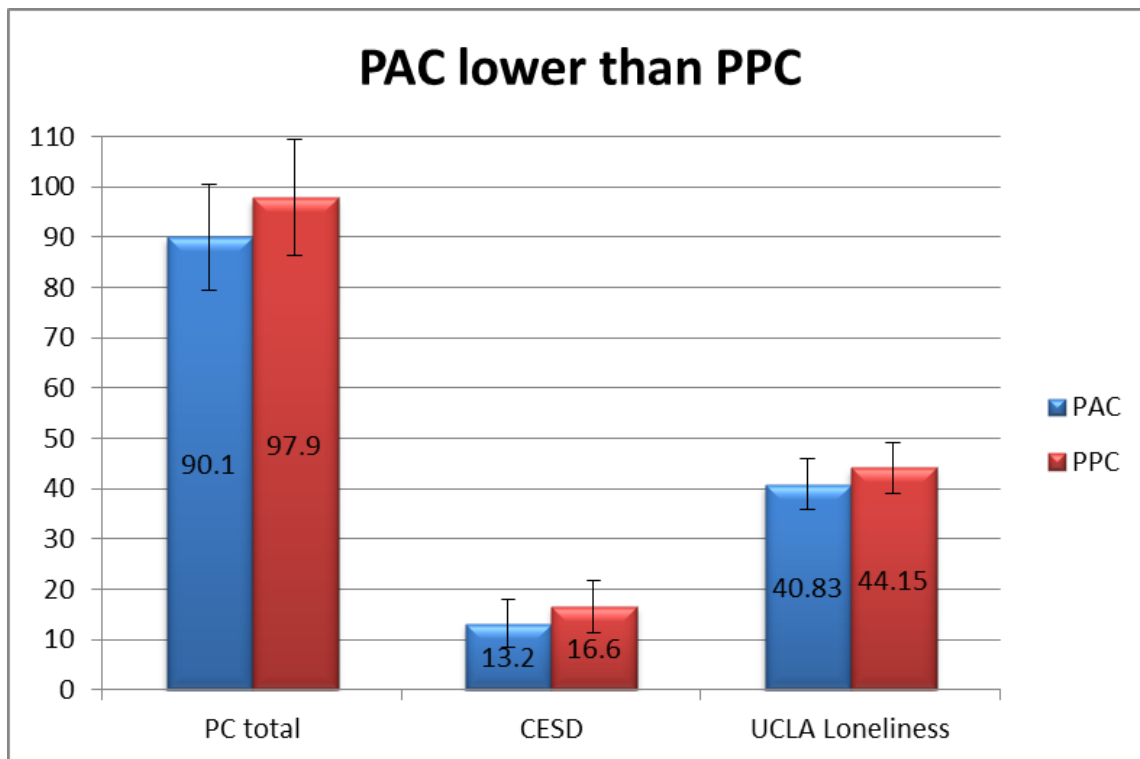
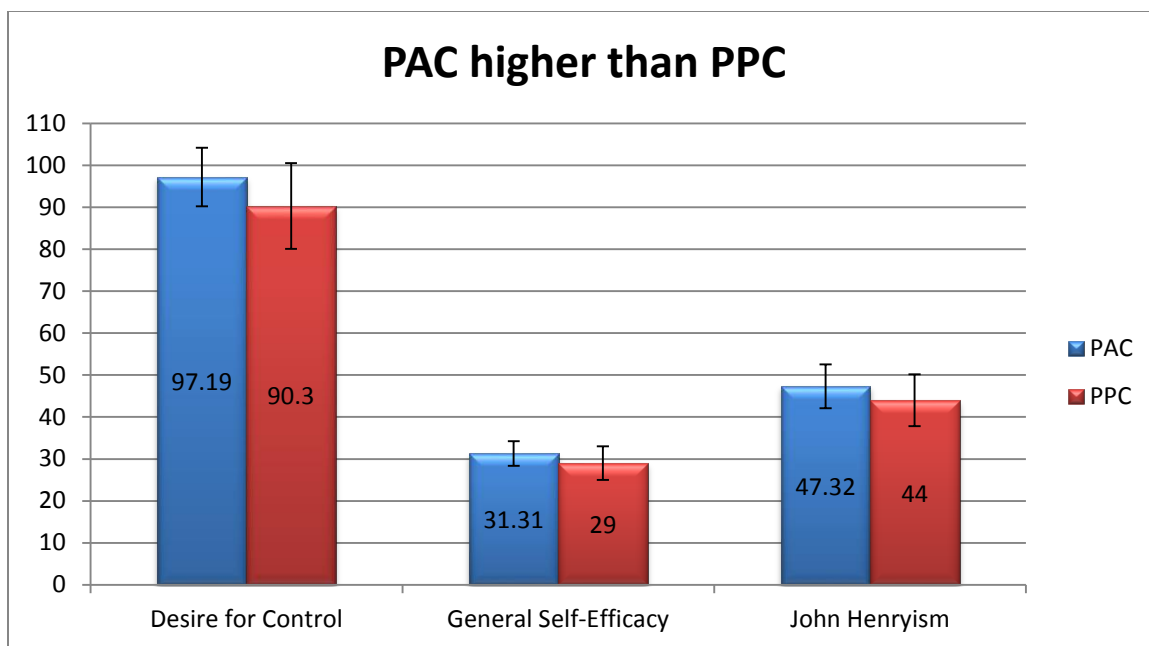


Figure 2. Study Procedural Schematic: Part 2: Laboratory Visit.

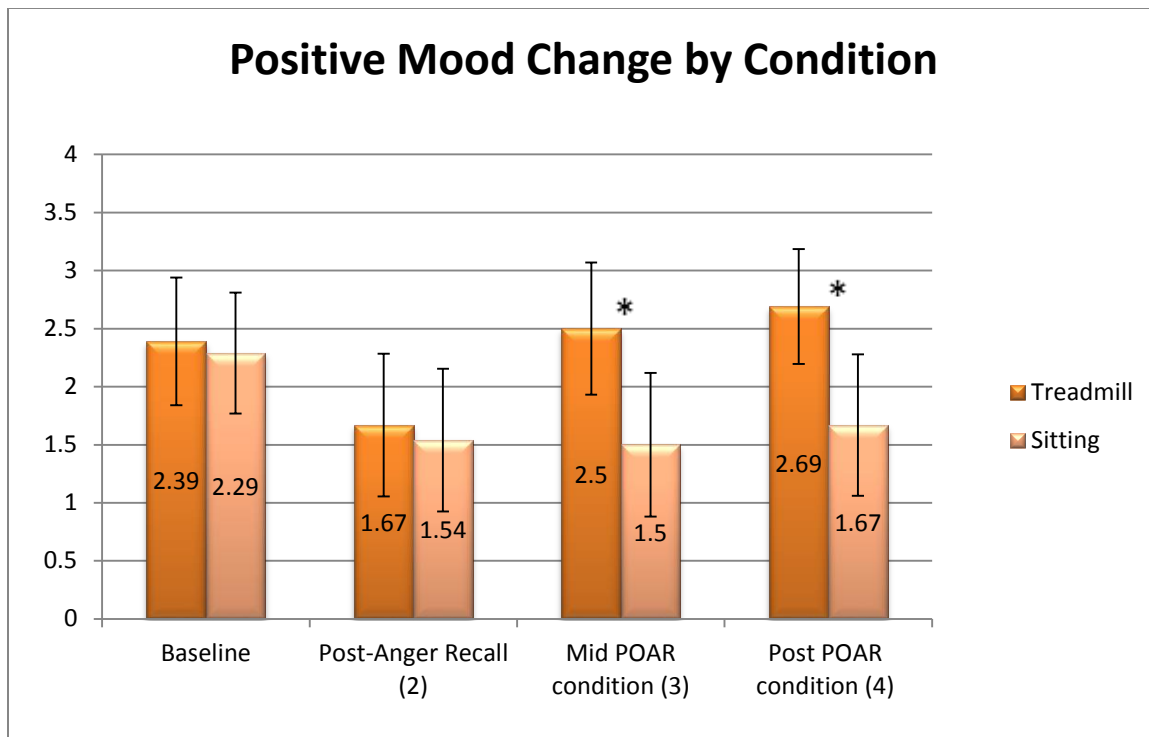




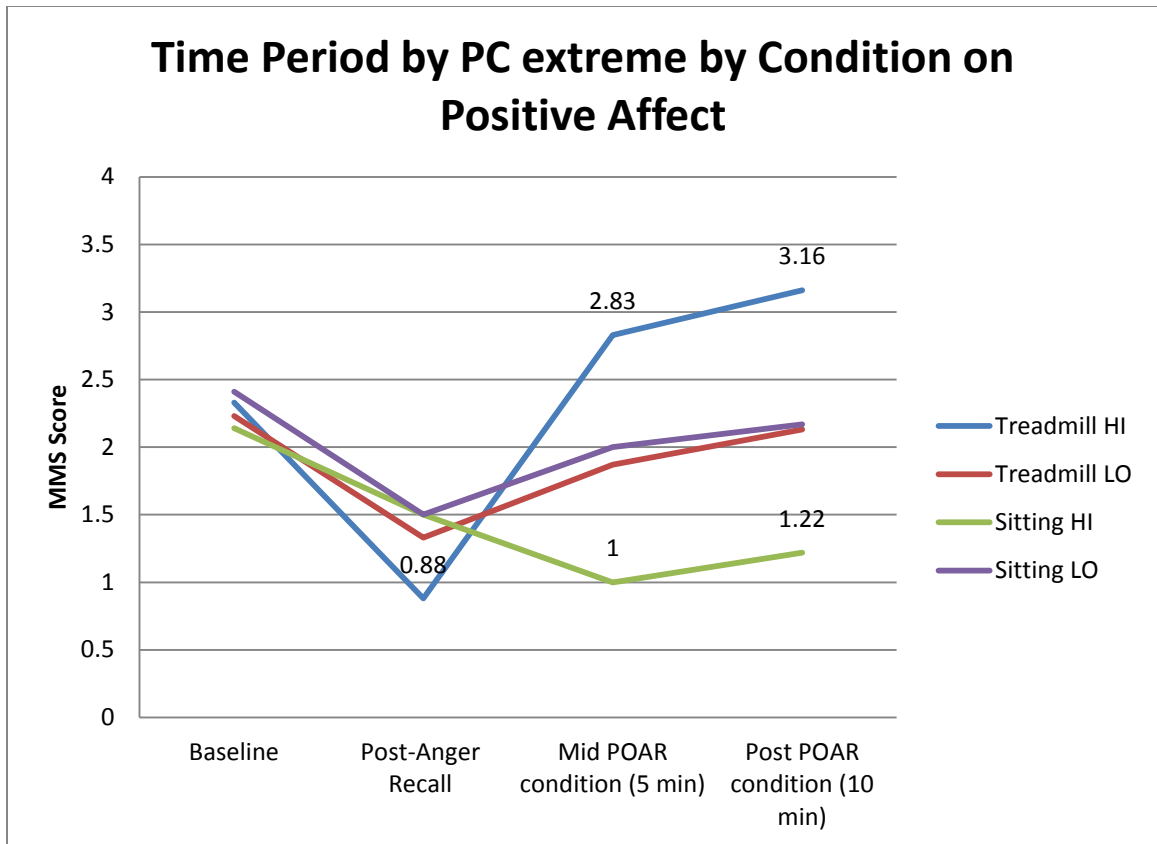
*Figure 3.* Findings of significant differences related to PC total, depression, and loneliness by coping style. Significant at  $p < .001$ ,  $p < .001$ , and  $p < .002$  levels, respectively.



*Figure 4.* Findings of significant differences related to desire for control, self-efficacy, and high striving by coping style at the  $p < .0001$ ,  $p < .001$ , and  $p < .01$  levels, respectively.



*Figure 5.* Significant difference of positive mood by condition at time periods 3 and 4.



*Figure 6.* Significant 3-way interaction of time period, high PC, and condition on positive mood. Significant difference of positive mood at time 3 and time 4 for high PC participants at the  $p = .018$  level.

Stress Level - <b>High</b>	PAC	PPC	
Assessment	mean (SD)	mean (SD)	t
PC total (RSS, PSWQ)	90.1 (21)	97.9 (23.3)	-3.46***
CESD Depression	13.2 (9.6)	16.6 (10.5)	-3.34***
UCLA Loneliness	40.83 (10.1)	44.15 (10)	-3.184**
Desire for Control	97.19 (14)	90.3 (20.5)	3.87****
General Self-Efficacy	31.31 (5.9)	29 (8)	3.240***
John Henryism	47.32 (10.4)	44 (12.3)	2.86**

*Note:* \*\*\*\* $p < .0001$  \*\*\* $p < .001$  \*\* $p < .01$

*Table 1:* Mean scores and standard deviations on study psychosocial scales

n (%)	PAC Hi	PPC Hi	PAC Lo	PPC Lo
<u>Sex</u>				
Male	50 (13)	27 (7)	12 (3.1)	65 (16.8)
Female	141 (36.5)	168 (43.5)	43 (11.1)	266 (68.9)
Total	191 (49.5)	195 (50.5)	55 (14.2)	331 (85.8)
<u>Ethnicity</u>				
Caucasian	152 (39.5)	137 (35.6)	39 (10.1)	289 (64.9)
Af. Am.	11 (2.9)	17 (4.4)	0 (0)	28 (7.3)
Hispanic	9 (2.3)	15 (3.9)	7 (1.8)	17 (4.4)
Asian	10 (2.6)	14 (3.6)	0 (0)	5 (1.3)
Other	5 (1.3)	7 (1.8)	2 (.5)	10 (2.6)

*Table 2: Demographics by coping style and level of stress*

N	Treadmill (15)	Control (13)	Test
<u>Positive Affect</u>			
Overall Model			(F) 5.193*
Baseline (1)	2.39 (1.1)	2.29 (1.04)	
Post-Anger Recall (2)	1.67 (1.23)	1.54 (1.23)	
Mid POAR condition (3)	2.5 (1.14)	1.5 (1.24)	(t) 2.22*
Post POAR condition (4)	2.69 (.99)	1.67 (1.22)	(t) 2.45*
<u>Negative Affect</u>			
Overall Model			(F) 2.05
Baseline (1)	.211 (.27)	.19 (.21)	(t) .203
Post-Anger Recall (2)	.89 (.813)	1.05 (.70)	(t) -5.44
Mid POAR condition (3)	.1563(.19)	.587 (.65)	(t) -2.547*
Post POAR condition (4)	.063 (.11)	.35 (.52)	(t) -2.128*

*NOTE: An asterisk indicates a significant difference by condition at  $p < .05$*

*Table 3: Laboratory Visit: Condition by affect measured four times*

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Appendix A-1  
Laboratory – Recording Forms  
OMRON  
Experimenter Recording Form  
Resting Blood Pressure and Heart Rate Measures

	(1)	(2)	(3)
SBP	_____	_____	_____
DBP	_____	_____	_____
HR	_____	_____	_____

Notes:

Preferred SSA: \_\_\_\_\_

Appendix A-2  
 Laboratory – Recording Forms  
 Momentary Mood Scale

Please rate the way you're feeling right now.

	Not at all	1	2	3	Very much
Depressed	0	1	2	3	4
Content	0	1	2	3	4
Happy	0	1	2	3	4
Tense	0	1	2	3	4
Annoyed	0	1	2	3	4
Angry	0	1	2	3	4
Frustrated	0	1	2	3	4
Sad	0	1	2	3	4
Powerless	0	1	2	3	4
Hopeless	0	1	2	3	4
Ashamed	0	1	2	3	4
Strengthened	0	1	2	3	4
Disgusted	0	1	2	3	4
Surprised	0	1	2	3	4
Neutral (no emotion)	0	1	2	3	4



## Appendix A-3

## Laboratory – Recording Forms

## Instructions for pre-Lab visit Interview

*This protocol is utilized for the purpose of establishing proper participant grouping. It should be done after the informed consent process and before a baseline OMRON reading is taken.*

Group 1: Physically active copers (PAC) who are (a) HIGHLY physically active in their normal, daily functioning as defined by the NASA

Group 2: Physically active copers (PAC) who are (b) LOW to AVERAGE physically active in their normal, daily functioning as defined by the NASA

**Question**

*We all have a wide variety of things that stress us out and to the degree that they stress us out also varies. Sometimes we just feel like doing an activity we enjoy to “unwind” at the end of the day when we aren’t very stressed out at all. Other times, we are so angry or so stressed out that we feel like we could scream. I want to ask you a couple of questions about when you are very angry or very stressed out.*

*First of all, on a scale of 0 – 10, 10 being the max angry/stressed you could ever be, and 0 being completely free of stress, what number would **you** say represents when you consider yourself to be very stressed or very angry? This is different for everyone so there is no right or wrong answer. \_\_\_\_\_*

1. Considering the times in your life that you have hit [say the above number], or in other words, when you are **very angry** or **very stressed out**, would you say you are **more likely** to engage in physically active coping or physically passive coping? (Check one box)

[ ] Physically Active Coper (run, walk, jog, bike, work-out, boxing, dance)

[ ] Physically Passive Coper (read, listen to music, meditate, watch TV, play video games)

(a) What do you do to cope or make yourself feel better?

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(b) Why do you like your coping activity? Be specific.

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(c) Do you think about anything in particular when you do this activity? If you aren't sure, that's ok too.

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(d) After you are very angry or very stressed, how fast are you able to do this activity?

- (1) immediately, within 1 – 4 mins
- (2) within 5 – 10 mins
- (3) between 10 – 15 mins
- (4) 15 minutes – 30 minutes
- (5) longer than 30 minutes: list how long \_\_\_\_\_

(e) How often would you say you choose this activity to cope or make yourself feel better?

- (1) 90 – 100% of the time, basically every single time
- (2) 70 – 89% of the time, mostly every time
- (3)\* 50 – 69% of the time, roughly half of the time
- (4) 20 – 49% of the time, not very often
- (5) 19% - 0% of the time, almost never

\* Any selection 3 and under should specify the next activity they use to cope:

---

(f) During the times that you are very angry or very stressed out and you cannot do this activity, do you still wish you COULD do the activity, i.e., immediately think about the activity?

yes

no

(g) How often would you say you are unable to engage in this activity because you are busy at school, work or some location that doesn't allow you to?

(1) never

(2) sometimes

(3) frequently

(4) always

(h) How do you feel when you cannot engage in this activity when you are very angry or very stressed out?

(i) How often in say, an average week do you get to [say number listed above] or very angry, very stressed out?

(0) 0 – 1 time a week

(1) 2 – 3 times a week

(2) 4 – 5 times a week

(3) more than 5 times a week: \_\_\_\_\_ times

*I want to transition the questions a little bit and ask you about something else. As you know, some people enjoy things like sports, working out, bike riding, doing group exercise, yoga, etc. and do these activities as a part of their average week or month. Other people don't necessarily share those physically active interests; they might enjoy other activities like video games, or watching movies, activities that aren't physically active but are equally as enjoyable.*

2. How often would you say you are physically active (on average) during the week simply because you want to be physically active, and NOT specifically because you are very angry or stressed? *So, forget all of the times you use your physically active coping*

*activity to cope when you are very stressed or very angry, just tell me about the other times you are physically active.*

(1) 0 – 2 times a week

(2) 3 – 5 times a week

(3) 6 – 8 times a week

(4) 9 – 10 times a week

(5) Other: \_\_\_\_\_

(a) Is this activity similar to or exactly the same as what you do to PAC? If not, how else are you physically active during an average week?

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## Appendix A-4

## Laboratory Recording Forms

## RATINGS OF POST-ANGER MANIPULATION

## Treadmill or Sitting

1. In general, how difficult was this activity to understand?  

[0]	Not at all	[1]	Very little difficulty	[2]	moderately difficult
[3]	greatly difficult	[4]	extremely difficult		
  
2. In general, how much effort did you put into this activity?  

[0]	None	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
3. How relaxing did you find this activity?  

[0]	Not at all	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
4. How distracting did you find this activity?  

[0]	Not at all	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
5. How absorbed were you in this activity?  

[0]	Not at all	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
6. How much control do you feel that you have right now?  

[0]	None	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
7. Did walking on the treadmill make you feel like you were being physically active?  

[0]	Not at all	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
8. Roughly speaking, how similar was walking on the treadmill to the coping activity you would typically use when stressed out?  

[0]	Not at all	[1]	Very little	[2]	A moderate amount
[3]	A great deal	[4]	An extreme amount		
  
9. Roughly speaking, if you had the choice, which would you prefer to do when you are very angry or very stressed out?

[0] listen to music, read, watch tv, or surf the internet

[1] walk on a treadmill

## Appendix B-1

### Laboratory – Experimenter Instructions

#### Experimenter Instructions for Neutral Reading task

Next, we need to get a measure of your blood pressure and heart rate while you read out-loud. So please take two minutes to read this passage in your normal speaking voice. If you finish before two minutes are up, just start from the beginning and read again.

## Appendix B-2

### Laboratory – Participant reading task

#### Neutral Reading Passage (for the Reading task)

The steps to washing clothes follow. First, sort clothes by color and type of fabric. For example, separate heavy colors such as dark sweat suits from brightly colored towels and rags since the bright colors may bleed and damage other clothes during washing.

Then measure the proper amount of detergent and pour it in the washing machine. This usually means one full cup of detergent for whites and light colors and two full cups for heavy colors.

Next, set the machine to the correct wash setting. This usually means a hot setting for whites, a cold setting for heavy colors, and a warm setting for light colors. If you are not sure, it is a good idea to read the label on a particular garment or fabric in order to find a correct wash setting. This way you will avoid damaging them during washing.

Then, place the clothes in the machine and close the lid. Next, place the proper amount of coins in machine, if necessary. Remember to place the clothes evenly in the machine so that unbalanced loads will not delay the wash. Then start the rinse cycle remembering to add bleach to the white load of clothes and fabric softener to all loads at the beginning of the wash cycle.

When the machine stops, remove the clothes and prepare to dry them.

## Appendix B-3

## Laboratory – Experimenter Instructions

**Experimenter Instructions for the Anger Recall Task**

Now, I want you to recall a time, sometime in the past, when you felt very angry toward another person or due to a tough situation and you utilized [list participant self-selected PAC per their survey data] to cope with the stress of the situation. This should be a situation or incident that still makes you angry, right now, when you think about it. **(The experimenter pauses about 10 seconds to give subject time to think of the incident)**

OK, do you have an incident in mind? **(If the participant cannot think of an anger scenario in which they utilized PAC, the experimenter says)**

That's ok any situation that made you very angry and still makes you angry now will be fine.

**(The experimenter tells the subject to take some more time and let him/her know when she/he does have the incident in mind. If “yes,” the experimenter proceeds as follows)**

Now I'd like you to take a couple minutes to think about that situation, visualizing it in your mind, recalling as much as you can the details of what happened - where you were, who you were with, what happened, what was said by you and the other person, what happened next, how it turned out - that sort of thing. After that, I'll ask you to start telling me about the incident, taking 3 minutes to tell me about the time you recalled.

Once you start telling me about the incident you thought of, I want you to go through the whole story without me interrupting you - I want it to be your story as you remember it, in your own words. If you run out of things to say before 3 minutes is up, I may ask a question or two to help you recall more details, but the best is if you just keep going until I let you know “Time's up.” Do you have any questions before we start? **(If subject has questions, the experimenter answers them, so that subject is clear about what he/she is to do, as just instructed; If no questions the experimenter proceeds.)**

All right, take a couple minutes to think through what happened. I'll let you know when it's time to start telling me about it. **[experimenter hits event key at the start and end of the thinking period]**



## Appendix B-4

## Laboratory – Experimenter Instructions

## Experimenter Instructions for Anger Recall Talking talk

OK, now start telling me all about the incident you have been thinking about.  
**(Experimenter allows subject to talk on for 3 minutes. [experimenter hits event key at the start and end of the talking period] If subject runs out of story before 3 minutes has passed, the experimenter offers this probe)**

Try to think of anything else you can recall that happened back then and tell me some more about it. **(If subject starts up again, experimenter lets her/him go ahead until 3 minutes have passed; if runs out of talk before 3 minutes, experimenter repeats above probe; experimenter repeats above probe as often as subject does start talking again after the last probe, until the 3 minutes have passed. If subject says “No, I can’t think of anything else,” before 3 minutes pass, experimenter offers the following sequence of probes - adding a new one only after silence for 5 seconds.)**

Tell me about any physical sensations you were aware of when you were the angriest.

What aspect of the situation made you the maddest?

**[The foregoing should get the experimenter past the third minute - if not, do open ended probe (“anything else you can think of”) once more.] (Give mood scale at end.)**

## Appendix B-5

## Laboratory – Experimenter Instructions

## Experimenter Instructions for the Post-Anger recall task

## Walking on Treadmill – Condition 1

*Now that you have talked about your experience for a few minutes – I would like to move over to the treadmill.*

**(Experimenter helps participant over to the treadmill which is approx.. 2 feet away)**

*Please step on the treadmill.*

**(Experimenter reestablishes participants lack of major medical problems/injuries that may prevent them from being physically able to walk. Experimenter also reestablishes that participant has experience using a treadmill. Experimenter hooks red safety cord to the bottom of the shirt of the participant)**

*If you feel faint or are in pain, pull this cord immediately and the treadmill will slow down and stop. Do you understand? (If yes, continue. If no, inquire about questions. DO NOT LET THE PARTICIPANT USE THE TREADMILL IF YOU ARE NOT CONFIDENT THEY WILL BE ABLE TO DO SO. USE CAUTIONARY JUDGEMENT).*

*Please be aware that you will be walking for a total of 10 minutes. For the first minute, I would like you to walk at 2 miles per hour. After one minute is over, I will come back and ask you if you'd like to change your speed up higher anywhere up to 4 miles per hour. Please walk as naturally as you would in any other environment. Do you understand? Ok, I will now start the treadmill at 2 miles per hour. (Experimenter starts treadmill).*

**(Experimenter waits for 10 seconds to establish that the participant is safe and the treadmill is working properly. Then, the experimenter should sit back down where they can see the participant, but the participant cannot see her/him. After one minute...)**

*Would you like to change your speed? (If so, the experimenter changes speed for the participant while the participant continues walking)*

*If at any time you'd like to reduce your speed, please let me know and I will come right back. Again as a reminder, If you feel faint or are in pain, pull this cord immediately and*

*the treadmill will slow down and stop. I will be back in 4 minutes to check in on how you are doing.*

**(At 5 minutes, experimenter verbally assesses MMS 3 and verifies the participant is doing ok. At 10 minutes, the experimenter returns again)**

*It has been 10 minutes and I will now stop the treadmill. (stop treadmill. Allow participant a few seconds to gain their composure once the treadmill stops. Help participant back to original seat. Gives participant MMS 4 and manipulation check).*

*Please fill out the final mood scale for how you are feeling right now, and also this checklist to see how the activity went for you. (after participant is finished)*

*Please take the next 4 minutes to sit quietly and recover from the treadmill walking. (After the 4 minutes is over, establish that the participant's CV is no longer elevated and unhook the participant from the PORTApres.)*

*I would like to ask you one final question about what you were thinking about during the walk. Could you tell me about what thoughts were running through your head if any at all? If you weren't thinking about anything in particular, that's ok too. (Experimenter writes down responses on manipulation check form.)*

## Appendix B-6

## Laboratory – Experimenter Instructions

## Experimenter Instructions for Post-Anger recall task

## Sitting quietly – Condition 2

*Now that you have talked about your experience for a few minutes, I'd like you to sit quietly for the next 10 minutes while we continue to let the machine record some readings.*

**(Experimenter brings participant MMS at 5 minutes)**

*I'd like you to please fill out this mood scale for how you are feeling right now.  
(Participant finishes MMS) Thank you. I'll return when the remaining time is over.*

**(Experimenter brings participant last MMS/POAR form when 10 minutes is up)**

*I'd like you to fill out one last mood scale, and also a questionnaire asking a few last questions.*

*I would like to ask you one final question about what you were thinking about during the walk. Could you tell me about what thoughts were running through your head if any at all? If you weren't thinking about anything in particular, that's ok too. (Experimenter writes down responses on manipulation check form.)*

## Appendix B-7

## Laboratory – Experimenter Instructions

## POAR cognition probe interview

**(Experimenter unhooks PORTApres from participant)**

I'd like to ask you briefly what was on your mind during the last 10 minutes. Please tell me about anything at all that was on your mind.

**(Experimenter writes down participant verbal responses)**

## Appendix B-8

## Laboratory – Experimenter Instructions

## Experimenter Instructions for Debriefing

*The experiment is now over. Do you have any questions? (If no questions.) Thank you for your participation. Before you leave I would like to give you an idea of what this study is about. This is a study examining how cardiovascular responses and mood change in response to a cognitive stressor are influenced by coping behaviors, psychological factors, and health habits. Such an examination is important because people need to be aware of the nature of stressful situations can affect cardiovascular health as well as understand the types of coping strategies available and which ones will be most effective for their personality.*

## Appendix C-1

## Survey Assessments

## Demographic Information

## 1. Gender

(1) male (2) female

## 2. Age (in years)

## 3. Marital Status

(1) single (2) married

(3) divorced (4) cohabitating but not married

## 4. What is your current work status (you may select two)?

(1) Full Time (2) Part Time (3) Homemaker

(4) Student (5) Looking for Work (0) If Disabled

## 5. Do you have biological children?

(1) yes (2) no

## 6. If yes, how many?

7. What religious group do you belong to, if any? (Specify denomination for example Baptist, Methodist etc.)

## 8. College classification: (PLEASE SELECT ONE)

(1) Freshman (2) Sophomore

(3) Junior (4) Senior (5) Other (please specify)

9. What is your racial/ethnic background? (Please select any option below that is relevant for you.)

(1) Caucasian/White

(5) Native Hawaiian/Pacific Islander

- |                             |                                  |
|-----------------------------|----------------------------------|
| (2) African-American/Black  | (6) Asian                        |
| (3) Spanish/Hispanic        | (7) Middle-Eastern               |
| (4) American Indian/Alaskan | (8) Other (please specify below) |

10. What was the highest level of formal education that your mother/stepmother/female guardian completed?:

- |  |                                    |
|--|------------------------------------|
| (1) 8th grade or less                          | (6) Master's degree (MA, MS, etc.) |
| (2) Attended high school, did not graduate     | (7) Post-master's degree           |
| (3) High school graduate (Diploma or GED)      | (8) Doctoral degree or above       |
| (4) Some college or Associate/technical degree | (9) Law degree                     |
| (5) Bachelor's degree (BS, BA, etc.)           |                                    |

11. What was the highest level of formal education that your father/stepfather/male guardian completed?

- |  |                                    |
|--|------------------------------------|
| (1) 8th grade or less                          | (6) Master's degree (MA, MS, etc.) |
| (2) Attended high school, did not graduate     | (7) Post-master's degree           |
| (3) High school graduate (Diploma or GED)      | (8) Doctoral degree or above       |
| (4) Some college or Associate/technical degree | (9) Law degree                     |
| (5) Bachelor's degree (BS, BA, etc.)           |                                    |

12. How would you rate your family's financial well-being while you were growing up?

- (1) Poor      (2) Average      (3) Well Off



## Appendix C-2

## Survey Assessments

## Health History

1. PLEASE CHECK ALL THAT YOU HAVE EXPERIENCED IN YOUR LIFETIME.

0 = No

1 = Yes

Asthma	Diabetes	Kidney Disease	Liver Disorder
Cancer	Alzheimer's	Depression	Headaches
Stroke	High Cholesterol	Hypoglycemia	Ulcers
Heart Disease	Hypertension (or high blood pressure)	Insomnia	Other

2. IF YOU ANSWERED YES TO "OTHER" ABOVE, PLEASE INDICATE THE CONDITIONS YOU HAVE EXPERIENCED IN YOUR LIFE TIME.

3. PLEASE CHECK ANY CONDITION(S) THAT EITHER BIOLOGICAL PARENT HAS EXPERIENCED.(see list above)

4. IF YOU ANSWERED YES TO "OTHER" ABOVE, PLEASE INDICATE THE CONDITIONS YOUR BIOLOGICAL PARENTS HAVE EXPERIENCED IN THEIR LIFE TIME.

5. WHAT IS YOUR CURRENT WEIGHT?

6. WHAT IS YOUR HEIGHT (IN FEET)

7. WHAT IS YOUR HEIGHT (IN INCHES)

8. FOR WOMEN, DO YOU CONSIDER YOUR MENSTRUAL CYCLES TO BE REGULAR?

0 = No

1 = Yes

8 = N/A

9. ARE YOU CURRENTLY SMOKING?

0 = No            1 = Yes

10. IF YOU USED TO SMOKE BUT HAVE NOW STOPPED, WHEN DID YOU QUIT?

0 = N/A

10. IF YOU CURRENTLY, SMOKE, HOW MANY PACKS OF CIGARETTES DID/DO YOU SMOKE PER DAY?

11. WHICH TERM BEST DESCRIBES YOUR CURRENT USE OF ALCOHOL?

0 = Never drank                      1 = Used to but quit

2 = Occasional use                    3 = Regular use

9 = Don't know

12. IF YOU CURRENTLY USE ALCOHOL ON AN OCCASIONAL REGULAR BASIS: HOW MANY GLASSES OF WINE DID YOU DRINK LAST WEEK?

0 = N/A

13. IF YOU CURRENTLY USE ALCOHOL ON AN OCCASIONAL REGULAR BASIS: HOW MANY BOTTLES OR CANS OF BEER DID YOU DRINK LAST WEEK?

14. IF YOU CURRENTLY USE ALCOHOL ON AN OCCASIONAL REGULAR BASIS: HOW MANY SHOTS OF HARD LIQUOR DID YOU DRINK LAST WEEK?

## Appendix C-3

## Survey Assessments

## Self-Selected Activity (SSA) Assessment

## PAC/PPC

a. When you are very angry or very stressed out, would you say you are MORE LIKELY to engage in:

b. When you are not that angry or stressed out, but simply looking to relax or unwind after the day is over, would you say you are MORE LIKELY to engage in:

(1) Physically Active Coping: like running, walking, working out, lifting weights, doing group exercise classes like kickboxing or pilates, or bike riding?

(2) Physically Passive Coping: like playing a video game, watching TV or movies, listening to music, reading a book, or surfing the internet?

1. CONSIDERING WHEN YOU ARE VERY ANGRY OR VERY STRESSED OUT, PLEASE LIST AN ACTIVITY THAT YOU DO TO RELAX YOURSELF AND TAKE YOURSELF MENTALLY AWAY FROM STRESSFUL ASPECT OF YOUR LIFE.

PLEASE DESCRIBE THAT ACTIVITY IN AS MUCH DETAIL AS POSSIBLE.

2. PLEASE DESCRIBE WHAT YOU LIKE MOST ABOUT THE ACTIVITY.

3. HOW OFTEN DO YOU ENGAGE IN THIS ACTIVITY?

1 = Daily                      2 = 2-3 times a Week

3 = Once a Week          4 = 2-3 Times a Month

5 = Once a Month

4. ON AVERAGE, WHEN YOU DO THIS ACTIVITY, HOW MANY MINUTES DO YOU DO IT FOR?

- (1) Less than 15 minutes                      (2) Between 15 minutes and 30 minutes  
(3) Between 30 minutes and 45 minutes      (4) Between 45 minutes and 1 hour  
(5) Between 1 hour and 1.5 hours              (6) Between 1.5 hours and 2 hours  
(7) More than 2 hours

5. PLEASE RATE THE ACTIVITY WHICH YOU ENJOY BY INDICATING HOW SATISFIED YOU FEEL WHEN YOU ARE ENGAGING IN IT.

SSA 1a - How distracting is the activity?

SSA 2a - How relaxing is the activity?

SSA 3a - How entertaining is the activity?

SSA 4a - How rewarding is the activity?

SSA 5a - How challenging is the activity?

SSA 6a - When you do the activity, how much are you focused on only it?

PSS 7a - How difficult is it to do the activity?

SSA 8a - When you do this activity, how much do you find that the hectic parts of life become less relevant?

SSA 9a - When you do this activity, how much do you feel rejuvenated later?

SSA 10a - When you do this activity, how much do you think about the negative events in your life?

SSA 11a - When you do this activity, how much do you become so absorbed that you do not notice anything else going on around you?

0 = Not at all      1 = Hardly at all      2 = A little bit      3 = A fair amount  
 4 = Quite a bit      5 = A great deal      6 = An extreme amount

17. DO YOU FEEL LIKE YOU ENGAGE IN THIS ACTIVITY AS MUCH AS YOU WOULD WANT?

1 = Yes      0 = No

18. IF NO, PLEASE DESCRIBE SOME OF THE BARRIERS THAT LIMIT YOUR ENGAGEMENT IN THIS ACTIVITY.

19. HOW MOTIVATED ARE YOU TO KEEP DOING THIS ACTIVITY IN YOUR LIFE?

0 = Not at all      1 = Hardly at all      2 = A little bit  
 3 = A fair amount      4 = Quite a bit      5 = A great deal  
 6 = An extreme amount

20. HOW MUCH SUPPORT DO YOU RECEIVE FROM SIGNIFICANT OTHERS IN YOUR LIFE TO ENGAGE IN THIS ACTIVITY?

0 = Not at all      1 = Hardly at all      2 = A little bit  
 3 = A fair amount      4 = Quite a bit      5 = A great deal  
 6 = An extreme amount

21. CONSIDERING WHEN YOU ARE VERY ANGRY OR VERY STRESSED OUT, Please list a second activity that you do to relax yourself and take yourself mentally away from stressful aspect of your life. Please describe that activity in as much detail as possible.

(same questions follow).

23. Do you engage in different activities when you are not necessarily very angry or stressed, but simply want to enjoy a relaxing activity or unwind after the day is over?

(1) yes           (2) no

24. Please list the top 2 activities that you do when you are not very angry or stressed, but simply want to enjoy a relaxing activity or unwind after the day is over.

Same questions follow as that for “very angry or stressed out”

## Appendix C-4

## Survey Assessments

## NASA Physical Activity Status Scale - R

1. Use the appropriate number (0 to 7) which best describes your general ACTIVITY LEVEL for the PREVIOUS MONTH. Please choose only one option below.

DO NOT PARTICIPATE REGULARLY IN PROGRAMMED RECREATION SPORT OR HEAVY PHYSICAL ACTIVITY

(0) - Avoid walking or exertion, e. g., always use elevator, drive whenever possible instead of walking.

(1) - Walk for pleasure, routinely use stairs, occasionally exercise sufficiently to cause heavy breathing or perspiration.

PARTICIPATED REGULARLY IN RECREATION OR WORK REQUIRING MODEST PHYSICAL ACTIVITY, SUCH AS GOLF, HORSEBACK RIDING, CALISTENICS, GYMNASTICS, TABLE TENNIS, BOWLING, WEIGHT LIFTING, YARD WORK.

(2) - 10 to 60 minutes per week.

(3) - Over one hour per week.

PARTICIPATE REGULARLY IN HEAVY PHYSICAL EXERCISE SUCH AS RUNNING OR JOGGING, SWIMMING, CYCLING, ROWING, SKIPPING ROPE, RUNNING IN PLACE OR ENGAGING IN VIGOROUS AEROBIC ACTIVITY TYPE EXERCISE SUCH AS TENNIS, BASKETBALL OR HANDBALL.

(4) - Run less than one mile per week, walk 1.5 miles per week, or spend less than 30 minutes per week in comparable physical activity.

(5) - Run one to five miles per week or spend 30 to 60 minutes per week in comparable physical activity.

(6) - Run five to ten miles per week, walk 7-14 miles per week, or spend 1 to 3 hours per week in comparable physical activity.

(7) - Run over ten miles per week, walk over 14 miles per week, or spend over 3 hours per week in comparable physical activity.

## Appendix C-5

## Survey Assessments

## CENTERS FOR EPIDEMIOLOGIC STUDIES OF DEPRESSION SCALE (CES-D)

This questionnaire contains a list of ways you might have felt or behaved. Please answer each question by checking the circle that best describes how often you experienced each feeling or behavior during the past week.

CESD\_1 I was bothered by things that usually don't bother me.

CESD\_2 I did not feel like eating; my appetite was poor.

CESD\_3 I felt that I could not shake off the blues, even with the help from my family and friends.

CESD\_4re I felt that I was just as good as other people.

CESD\_5 I had trouble keeping my mind on what I was doing.

CESD\_6 I felt depressed.

CESD\_7 I felt that everything I did was an effort.

CESD\_8re I felt hopeful about the future.

CESD\_9 I thought my life has been a failure.

CESD\_10 I felt fearful.

CESD\_11 My sleep was restless.

CESD\_12re I was happy.

CESD\_13 I talked less than usual.

CESD\_14 I felt lonely.

CESD\_15 People were unfriendly.

CESD\_16re I enjoyed life.

CESD\_17 I had crying spells.

CESD\_18 I felt sad.

CESD\_19 I felt people disliked me.

CESD\_20 I could not get going.

(0) Rarely or none of the time (less than 1 day)

(1) Some or a little of the time (1-2 days)

(2) Occasionally or moderately (3-4 days)

(3) Most or all of the time (5-7 days)



## Appendix C-6

## Survey Assessments

## Rumination Response Scale (RRS)

PEOPLE THINK AND DO MANY DIFFERENT THINGS WHEN THEY FEEL DEPRESSED. PLEASE READ EACH OF THE ITEMS BELOW AND INDICATE WHETHER YOU ALMOST NEVER, SOMETIMES, OFTEN, OR ALMOST ALWAYS THINK OR DO EACH ONE WHEN YOU FEEL DOWN, SAD, OR DEPRESSED. PLEASE INDICATE WHAT YOU GENERALLY DO, NOT WHAT YOU THINK YOU SHOULD DO.

- Rum1 think about how alone you feel
- Rum2 think "I won't be able to do my job if I don't snap out of this"
- Rum3 think about your feelings of fatigue and achiness
- Rum4 think about how hard it is to concentrate
- Rum5 think "What am I doing to deserve this?"
- Rum6 think about how passive and unmotivated you feel.
- Rum7 analyze recent events to try to understand why you are depressed
- Rum8 think about how you don't seem to feel anything anymore
- Rum9 think "Why can't I get going?"
- Rum10 think "Why do I always react this way?"
- Rum11 go away by yourself and think about why you feel this way
- Rum12 write down what you are thinking about and analyze it
- Rum13 think about a recent situation, wishing it had gone better
- Rum14 think "I won't be able to concentrate if I keep feeling this way."
- Rum15 think "Why do I have problems other people don't have?"
- Rum16 think "Why can't I handle things better?"
- Rum17 think about how sad you feel.
- Rum18 think about all your shortcomings, failings, faults, mistakes
- Rum19 think about how you don't feel up to doing anything
- Rum20 analyze your personality to try to understand why you are depressed
- Rum21 go someplace alone to think about your feelings
- Rum22 think about how angry you are with yourself

1 = almost never

2 = sometimes

3 = often

4 = almost always

## Appendix C-7

## Survey Assessments

## Penn State Worry Questionnaire (PSWQ)

SELECT THE NUMBER THAT BEST DESCRIBES HOW TYPICAL OR CHARACTERISTIC EACH ITEM IS FOR YOU.

- PSWS1r If I don't have enough time to do everything, I don't worry about it.  
PSWS2 My worries overwhelm me.  
PSWS3r I don't tend to worry about things.  
PSWS4 Many situations make me worry.  
PSWS5 I know I shouldn't worry about things, but I just can't help it.  
PSWS6 When I am under pressure I worry a lot.  
PSWS7 I am always worrying about something.  
PSWS8r I find it easy to dismiss worrisome thoughts.  
PSWS9 As soon as I finish one task, I start to worry about everything else I have to do.  
PSWS10r I never worry about anything.  
PSWS11r When there is nothing more I can do about a concern, I don't worry about it anymore.  
PSWS12 I've been a worrier all my life.  
PSWS13 I notice that I have been worrying about things.  
PSWS14 Once I start worrying, I can't stop.  
PSWS15 I worry all the time.  
PSWS16 I worry about projects until they are all done.

1 = Not at all typical

2

3

4

5 = Very typical of me

## Appendix C-8

## Survey Assessments

## Desirability of Control Scale (DOCS)

Below you will find a series of statements. Please read each statement carefully and respond to it by expressing the extent to which you believe the statement applies to you. For all items, a response from 1 to 7 is required. Use the number that best reflects your belief when the scale is defined as follows:

- 1 = The statement does not apply to me at all
- 2 = The statement usually does not apply to me
- 3 = Most often, the statement does not apply
- 4 = I am unsure about whether or not the statement applies to me, or it applies to me about half the time
- 5 = The statement applies more often than not
- 6 = The statement usually applies to me
- 7 = The statement always applies to me.

1. I prefer a job where I have a lot of control over what I do and when I do it.
2. I enjoy political participation because I want to have as much of a say in running government as possible.
3. I try to avoid situations where someone else tells me what to do.
4. I would prefer to be a leader than a follower.
5. I enjoy being able to influence the actions of others.
6. I am careful to check everything on an automobile before I leave for a long trip.
7. Others usually know what is best for me.
8. I enjoy making my own decisions.
9. I enjoy having control over my own destiny.
10. I would rather someone else take over the leadership role when I'm involved in a group project.
11. I consider myself to be generally more capable of handling situations than others are.
12. I'd rather run my own business and make my own mistakes than listen to someone else's orders.
13. I like to get a good idea of what a job is all about before I begin.
14. When I see a problem, I prefer to do something about it rather than sit by and let it continue.
15. When it comes to orders, I would rather give them than receive them.
16. I wish I could push many of life's daily decisions off on someone else.
17. When driving, I try to avoid putting myself in a situation where I could be hurt by another person's mistake.
18. I prefer to avoid situations where someone else has to tell me what it is I should be doing.
19. There are many situations in which I would prefer only one choice rather than having to make a decision.

20. I like to wait and see if someone else is going to solve a problem so that I don't have to be bothered with it.

## Appendix C-9

## Survey Assessments

## Perceived Stress Scale (PSS)

Directions: The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

PSS1 How often have you been upset because of something that happened unexpectedly?

PSS2 How often have you felt that you were unable to control the important things in your life?

PSS3 How often have you felt nervous and "stressed"?

PSS4 How often have you felt confident about your ability to handle your personal problems?

PSS5 How often have you felt that things were going your way?

PSS6 How often have you found that you could not cope with all the things that you had to do?

PSS7 How often have you been able to control irritations in your life?

PSS8 How often have you felt that you were on top of things?

PSS9 How often have you been angered because of things that were outside of your control?

PSS10 How often have you felt difficulties were piling up so high that you could not overcome them?

0 = Never

1 = Almost Never

2 = Sometimes

3 = Fairly Often

4 = Very Often

## Appendix C-10

## Survey Assessments

## General Self-Efficacy Scale

Please indicate the degree to which you believe each of the following statements would apply to you personally by indicating to the left of the item according to the following key:

- SE1 I can always manage to solve difficult problems if I try hard enough.
- SE2 If someone opposes me, I can find the means and ways to get what I want.
- SE3 It is easy for me to stick to my aims and accomplish my goals.
- SE4 I am confident that I could deal efficiently with unexpected events.
- SE5 Thanks to my resourcefulness, I know how to handle unforeseen situations.
- SE6 I can solve most problems if I invest the necessary effort.
- SE7 I can remain calm when facing difficulties because I can rely on my coping abilities.
- SE8 When I am confronted with a problem, I can usually find several solutions.
- SE9 If I am in trouble, I can usually think of a solution.
- SE10 I can usually handle whatever comes my way.

- 1 = Not at all true
- 2 = Hardly true
- 3 = Moderately true
- 4 = Exactly true

## Appendix C-11

## Survey Assessments

## John Henryism Active Coping (JHAC)

The questions below concern how you see yourself, today, as a person living and doing things in the real world. Read each question carefully and then check the response which best describes how you feel on the line next to the question. Each person is different, so there are not “Right” or “Wrong” answers. We would simply like an honest appraisal of how you generally see yourself.

JHAC1 - I’ve always felt that I could make of my life pretty much what I wanted to make of it.

JHAC2 - Once I make up my mind to do something, I stay with it until the job is completely done.

JHAC3 - I like doing things that other people thought could not be done.

JHAC4 - When things don’t go the way I want them to, that just makes me work even harder.

JHAC5 - Sometimes I feel if anything is going to be done right, I have to do it myself.

JHAC6 - It’s not always easy, but I manage to find a way to do the things I really need to get done.

JHAC7 - Very seldom have I been disappointed by the results of my hard work.

JHAC8 - I feel that I am the kind of individual who stands up for what he believes in, regardless of the consequences.

JHAC9 - In the past, even when things got really tough, I never lost sight of my goals.

JHAC10 - It’s important for me to be able to do things the way I want to do them rather than the way other people want me to do them.

JHAC11 - I don’t let my personal feelings get in the way of doing a job.

JHAC12 - Hard work has really helped me to get ahead in life.

1 = Completely False

2 = Somewhat False

3 = Don’t Know

4 = Somewhat True

5 = Completely True

## Appendix C-12

## Survey Assessments

## UCLA-Loneliness Scale

THE FOLLOWING STATEMENTS DESCRIBE HOW PEOPLE SOMETIMES FEEL. FOR EACH STATEMENT, PLEASE INDICATE HOW OFTEN YOU FEEL THE WAY DESCRIBED.

- UCLA1 How often do you feel that you are “in tune” with the people around you?
- UCLA2 How often do you feel that you lack companionship?
- UCLA3 How often do you feel that there is no one you can turn to?
- UCLA4 How often do you feel alone?
- UCLA5 How often do you feel part of a group of friends?
- UCLA6 How often do you feel that you have a lot in common with the people around you?
- UCLA7 How often do you feel that you are no longer close to anyone?
- UCLA8 How often do you feel that your interests and ideas are not shared by those around you?
- UCLA9 How often do you feel outgoing and friendly?
- UCLA10 How often do you feel close to people?
- UCLA11 How often do you feel left out?
- UCLA12 How often do you feel that your relationships with others are not meaningful?
- UCLA13 How often do you feel that no one really knows you well?
- UCLA14 How often do you feel isolated from others?
- UCLA15 How often do you feel you can find companionship when you want it?
- UCLA16 How often do you feel that there are people who really understand you?
- UCLA17 How often do you feel shy?
- UCLA18 How often do you feel that people are around you but not with you?
- UCLA19 How often do you feel that there are people you can talk to?
- UCLA20 How often do you feel that there are people you can turn to?

- 1 = Never
- 2 = Rarely
- 3 = Sometimes
- 4 = Often