

**EXPLORING THE RELATIONSHIP OF GREEN EXERCISE, WELL-BEING AND
PHYSICAL ACTIVITY MOTIVES**

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ABSTRACT

Previous research has established that contact with nature can support psychological well-being. A number of recent studies have also raised the possibility that exercising in green spaces amplifies the benefits of physical activity and nature. With the challenge of declining physical activity levels and decline in mental health within the U.S adult population, it is important to learn more about how the use of natural outdoor settings impacts physical activity and psychological well being and consider how the natural environment has the potential to not only promote psychological well-being, but also to serve as facilitators of activity. The current study sought to complement previous research by exploring the degree to which outdoor activity was associated with higher levels of psychological functioning and well-being. A second goal was to expand on existing research by investigating how outdoor activity might be correlated with overall physical activity levels and exercise related motivations. Survey results indicated that participants who were more active outdoors were also more physically active overall. While outdoor activity was associated with improved psychological well-being overall, there was some evidence indicating that more frequent outdoor activity and the use of more natural outdoor settings was particularly beneficial for participants engaging in more moderate levels of exercise. In addition, results suggested that outdoor activity and the use of more natural settings was primarily associated with stronger exercise related motivations among participants engaging in higher levels of activity. Overall, these findings lend support to the notion that green exercise can promote psychological health and well-being, while also facilitating healthy behavior changes and active lifestyles.

KEY TERMS: outdoor activity, nature, vitality, attentional functioning, mood, intrinsic motivations

INTRODUCTION

Experiences in nature

“We spent five and a half hours hiking up the valley today – the trail was gorgeous. Most of the path followed alongside a glacial river, running in and out of a thick, jungle-like forest. The river was a bright turquoise color, strikingly beautiful. The trail itself was fun and engaging, with lots of varying terrain with boulders, rocks, and stream crossings...”

“I love being outdoors. I feel so content and peaceful all of the time. I am inspired to take up more recreational outdoor activities and I have never felt so excited about nature, in and of itself.”

These are just a couple excerpts taken from a journal I kept while studying and backpacking around New Zealand. Themes of contentment, satisfaction, and enjoyment of simply being in nature can be found throughout my daily writings. While my thoughts are purely anecdotal, they speak to the experiences many have reported after spending time outdoors, away from usual distractions and stressors. These observations have led some, including myself, to look more closely at the apparent connection between human health, well-being, spirituality, and nature. What happens when we look at natural scenery? Can we break nature down into its components and still see positive impacts on humans? What happens when we are active in natural environments? While answers to some of these questions are beginning to emerge, there are many aspects of human-nature interactions that are still not fully understood.

To further understand the human-nature interaction, this study focused on the relationship between physical activity, outdoor natural environments, and various aspects of mental health. Moreover, this study explores the possibility that natural environments can facilitate physical activity and motivations related to persisting long-term in health behaviors such as exercise. Within our highly inactive and media oriented western culture, physical and mental health problems are on the rise. The results of this study lend support to the idea that turning off the

screen and getting outdoors might be a viable solution for the promotion and improvement of societal well-being.

The rise of sedentary, indoor lifestyles

Sedentary, indoor lifestyles have become increasingly common in today's society. On average, U.S. adults spend nearly 70% of their time indoors and report consuming over 10.5 hours of media per day (Klepiet et al. 2001; Nielsen, 2016). Furthermore, according to the Center for Disease Control (2014), only 21% of adults in the U.S. meet the 2008 Physical Activity Guidelines, which suggest that adults should engage in at least 2.5 hours of moderate intensity exercise per week. These statistics point to the fact that humans are spending more time inside, consuming media than ever before, all the while becoming increasingly inactive. What are the repercussions of these indoor and media-centered lifestyles? While much research has focused on the connection between these behavioral patterns and increasing rates of obesity (Divya, 2013; Duncan et al. 2012; Herman et al., 2014), less attention has been given to the mental health impacts. In 2015, an estimated 16.1 million adults aged 18 or older in the United States had at least one major depressive episode in the past year (NIMH, 2015). Additionally, more than one-third of adults report that their stress has increased since 2014 and 24% of adults report experiencing levels of extreme stress (APA, 2015). Although the factors influencing psychological health are complex, it does seem possible that inactivity and media exposure negatively influence the mental health of individuals and society. As a result, there is need to investigate interventions that not only address both physical and psychological wellness, but also are accessible to a broad range of individuals and facilitate successful behavior change.

Physical activity: Some benefits and barriers

It has long been established that engaging in regular physical activity can help prevent and reduce the risk of chronic illnesses such as obesity, cardiovascular disease, coronary artery disease, and type 2 diabetes (Penedo & Dahn, 2005). More recent research has pointed to the beneficial mental health outcomes of physical activity such as a reduction in symptoms of stress, anxiety, and depression; improved mood; and a buffer to cognitive decline related to aging

(Penedo & Dahn, 2005; Kim et al., 2012). Despite these benefits, the majority of the U.S. population still does not meet the daily-recommended requirements for physical activity, demonstrating that knowledge alone does not necessarily lead to action (CDC, 2014). Therefore, we must promote physical activity and behavior change beyond providing information in order to improve overall health and well-being and successfully motivate individuals to lead more physically active lifestyles.

An important step to increasing activity levels within the general population is to understand the reasons people do and do not exercise. In other words, there is a need to understand motivation. Deci & Ryan (2008) argue that autonomous motivation, or motivation integrated with one's values and sense of self, along with intrinsic goals tend to yield greater psychological health, and long-term persistence in maintaining healthy behavior change. Furthermore, energy for action comes from the fulfillment of basic psychological needs and vitality. Studies have identified specific predictors of physical activity within this theoretical framework; self-regulation, enjoyment, and attitudes about exercise have been positively correlated with physical activity engagement (Ryan & Frederick 1997; Graham et al. 2011). Additionally, a study done with university students reported that prominent barriers to physical activity include disliking exercise, not seeing its benefits, and lack of vitality (Gomez-Lopez et al. 2010). Identifying reasons why a person may or may not meet physical activity recommendations is an essential step, but it is also necessary to investigate practical strategies reducing or eliminating these barriers in order to promote long-term health behavior changes.

Nature as a supporter of health and well-being

A significant body of research has pointed to nature's role in promoting and supporting human health and well-being, such as evoking positive emotions, reducing stress, increasing overall life satisfaction and vitality, and restoring cognitive functioning (Beute & de Kort 2014; Keniger et al. 2013; Maller, et al. 2005; Nisbet et al. 2011). The central theory behind a large portion of this work is the Attention Restoration Theory, originally proposed by Stephen and Rachel Kaplan. The Kaplan's propose that the natural environment holds unique characteristics that are restorative to directed attention or our ability to focus on important but uninteresting tasks while

blocking out distractions (Kaplan, 1995). Problem solving, effective information processing, self-regulation, and behaving in socially appropriate ways are all thought to draw upon this limited and fatigable cognitive resource (Kaplan, 1995; Kaplan & Berman 2010). Mental fatigue occurs when this attentional resource becomes depleted and can lead to impaired functioning including an inability to focus, reductions in self-control, lower capability to recognize mistakes and deal with stressful situations (Kaplan & Kaplan, 1989). The vast amount of time spent indoors and consuming media may very well be displacing time otherwise spent outdoors in natural environments, therefore limiting the restoration of this cognitive capacity. Adequate attentional resources are essential for maintaining health and well-being in a modern world full of distractions, deadlines, and other stressors. This observation could begin to explain the increasing prevalence of poor mental health we see today, spending more time outside in natural and restorative environments may be one part of the solution.

Green exercise: Synergistic effects of nature and physical activity

It has been proposed that activity in natural environments, or “green exercise” for short, may have a synergistic effect on various physiological and psychological outcomes (Pretty et al., 2005; Barton & Pretty, 2010). For example, a study conducted by Ryan et al. (2010), assessed the impacts of green exercise on participants’ subjective vitality. Their results indicated that participants who walked on a natural path for 15 minutes experienced increased subjective vitality, where participants who walked on an indoor path for the same length of time experienced no change in subjective vitality. This suggests that the combination of physical activity and nature has greater benefits than physical activity alone. Further research by Mitchell (2013) compared the mental health and well-being benefits of physical activity over a range of natural and non-natural environments, utilizing data from the 2008 Scottish Health Survey. Results of this study showed that regular use, at least once a week, of natural environments for physical activity was independently associated with a lower risk of poor mental health and each additional use of any natural environment was associated with an additional reduction of nearly 6%. Furthermore a study by Barton et al. (2012) examined exercise, nature, and socially interactive-based health initiatives comparing mood and self-esteem outcomes among participants all experiencing a range of mental health outcomes. Their findings showed that

there was a significant impact on self-esteem and mood in every group when comparing pre and post-session assessments. However, self-esteem increased significantly more in the green exercise group compared to the group engaging in social activities (Barton et al. 2012). Similar positive outcomes can be found in many studies. A systematic review revealed beneficial changes were found in energy, fatigue, anxiety, anger, and sadness after a short run or walk in natural or green environments across 25 different studies (Bowler et al., 2010). These studies and others have made a strong argument that green exercise could be utilized as an effective health intervention and a powerful approach to mental health care.

The natural environment as a facilitator of physical activity

Although evidence on the benefits of green exercise continues to accumulate, getting people to actually use outdoor settings remains a challenge. According to Gladwell et al. (2013), most structured physical activity in the western world has shifted indoors (gyms, sport halls, and within the home); meanwhile there is a decreased accessibility to nature, mostly due to rapid urbanization. Gladwell's observation offers valuable insight as to why the majority of adults might still fail to meet recommended physical activity requirements. Frequently indoor physical activity, particularly in the context of fitness centers or gyms, is not free and could be intimidating or unenjoyable to some. Gladwell and her colleagues (2013) go on to suggest that natural environments, in particular, have the potential to facilitate positive physical activity behaviors by increasing motivation, enjoyment of exercise, and reducing perception of exertion. Furthermore, natural areas tend to be more widely available to a larger number of individuals, often at no cost.

Other research that demonstrates nature's potential to facilitate physical activity participation include a European study, where individuals living in greener environments were reported to be 3 times more likely to be physically active and had 40% lower chance of being overweight or obese (Ellaway et al. 2005). Another study done by Flowers et al. (2016) found that individuals were four times more likely to meet the recommended amount of physical activity if they visited a green space at least one time per week compared to never going. Based on the preceding evidence, providing access and encouraging use of natural environments as a way to promote

physical activity, drive behavior change, and facilitate psychological well-being appears to fit the need for an effective solution to successfully address the range health issues of modern day society from a holistic and multi-faceted standpoint.

The present study: Outdoor physical activity, well-being, and motivations

Based on the previous research addressing physical activity, nature, and green exercise, this study attempts to synthesize the evidence across disciplines, deepening the understanding of the relationship between nature and well-being. Furthermore, while it has been suggested that motivations are especially influential in regards to physical activity habits and long-term persistence in healthy behaviors, little research within the green exercise field has explored the interaction between outdoor activity in natural environments and physical activity motives. Incorporating a behavioral and motivational perspective along with psychological well-being outcomes may bring us towards a broader understanding of how outdoor physical activity can be used to successfully improve physical, and psychological well-being through environments that hold the restorative qualities of nature and facilitate active lifestyles.

METHODS

Participants

Three hundred and seventy seven adults completed an electronic survey that was developed and delivered through the Qualtrics online survey platform (qualtrics.com). Invitations to the online survey were sent to a convenience sample of residents of Benzie County, Michigan and University of Michigan students and faculty on the Ann Arbor, Michigan campus via social media and email. While Benzie County is a largely rural area characterized by small towns and villages located in the northwest corner of the lower peninsula, Ann Arbor is located in the southeast corner of the lower peninsula and tends to be more densely populated and urban. A snowball sampling approach was used where respondents were encouraged to share the survey link with other interested individuals. Data was collected between August and October 2016. Eligible participants were required to be at least 18 years of age. The study was reviewed by the

University of Michigan Institutional Review Board and deemed exempt from IRB oversight, case number HUM00115136.

Participants with self-reported physical activity levels that far exceeded that of typical survey respondents were removed from data analysis. These outliers were determined based on the self-reported average number of physical activity sessions in a typical week and the average duration of each session. Respondents were excluded from the data set if they reported engaging in any of the following, 20 or more physical activity sessions per week, an average duration of 480 minutes or more for each physical activity session, or 1,080 minutes or more of total physical activity in a typical week. After these criteria were applied, 9 participants were excluded, resulting a final total sample size of three hundred and sixty eight (N=368).

Survey participants had a median age of 27, were primarily female (71.5%), and well educated (80.9% had a bachelor's degree or higher). Most respondents indicated they were employed full-time (57.9%) and about one quarter of participants indicated they were students (24.7%). Survey participants reported engaging in a relatively high amount of physical activity, with mean levels exceeded 3.5 hours per week. In addition, respondents indicated that a substantial amount of this activity took place outdoors over the last several months (see Table 1).

Survey Measures

In order to explore the impact of outdoor physical activity participation on psychological health, well-being, and physical activity motives a two page survey was developed. The survey instrument included questions designed to assess participants' normal level of physical activity, frequency of outdoor exercise, as well as the environmental features typically present in the outdoor physical activity setting. Additional questions on the survey assessed participants' psychological well-being, exercise-related motivations, and demographic characteristics. More detail is provided on each of these measures in the section below and the full survey is included in Appendix 1.

Physical activity

Physical activity levels were measured by asking participants to report the number of physical activity sessions in a typical week over the last several months and the average duration of each session in minutes. These responses were then used to calculate the average total minutes of physical activity per week. Survey respondents were also asked to report how frequently they engaged in physical activity outdoors over the last few months on a 5-point Likert scale (*never to very often*).

Psychological well-being

A number of established and validated survey-based measures were used to investigate numerous aspects related to psychological well-being, including subjective vitality, attentional functioning, mood state, and self-esteem. Subjective vitality was measured using the 7-item version of the Subjective Vitality Scale (Ryan & Frederick, 1997). This scale asks participants to rate feelings of vitality and energy on a 5-point Likert scale (*not at all to completely*). A modified version of the Attentional Functioning Index (Cimprich et al., 2011) was used to evaluate participants' perceived effectiveness at completing a variety of daily tasks that require self-regulation and mental effort. Participants were asked to rate how well they had been functioning in 9 of these tasks on a 5-point Likert scale over the last few months (*not at all to extremely*). In order to measure mood states, a short 10-item version of the Positive and Negative Affect Schedule (PANAS) was included that asked participants to rate the degree to which they experienced five positive and five negative emotions (*not at all to very often*) over the last few months (Thompson, 2007). Finally, the 9-item Rosenberg Self Esteem Scale (Rosenberg, 1965) was incorporated since previous research indicates that engagement in green exercise is associated with higher levels of self-esteem (Barton & Pretty, 2010; Pretty et al., 2005). When responding to these items participants were asked to assess satisfaction with themselves and feelings of self-worth on a 5-point Likert scale (*strongly disagree to strongly agree*).

Table 1. Characteristics of participants

Gender (%)	
Female	71.5
Male	25.8
Age (%)	
18-22	
23-29	25.8
30-49	30.9
50-59	33.3
60 and over	5.6
	4.4
Education (%)	
High school	
Some college	
Two-year degree	1.1
Four-year degree	14.9
Post-graduate degree	1.1
	45.4
	35.5
Employment (%)	
Full-time	
Part-time	
Retired	57.9
Unemployed	9.8
Student	1.9
	3.3
	24.7
Average amount of physical activity in a typical week (hours)	
	3.54
Frequency of outdoor exercise over the last several months (%)	
Never or rarely	15.5
Sometimes	24.7
Often	28.3
Very often	29.1

Physical activity motives

Physical activity motivations were assessed using a modified version of the Exercise Motivations Inventory (EMI-2, Markland & Ingledew, 1997). Survey respondents were asked to rate the degree to which they personally endorsed 20 different physical activity related motivations on a 5-point Likert scale (*not at all* to *extremely*). This measure addressed a broad set of motivations and included items related to physical and mental health benefits, improvements in appearance, feelings of enjoyment and personal satisfaction, as well as social pressure.

Outdoor activity setting characteristics

Characteristics of outdoor physical activity settings was assessed by asking participants to rate how frequently they encountered 14 different landscape features during a typical activity session on a 5-point Likert scale (*never to very often*). The landscape features included items that represented natural elements, such as trees and nature trails, as well as elements that were more characteristic of residential or urban settings, such as sidewalks, busy streets, and businesses.

Demographics

The survey instrument also included a number of demographic questions. These included questions assessing participant age, employment status, education, gender, and residential zip code.

Statistical analysis

In order to assess construct validity and identify a set of common underlying themes, separate factor analyses using a principle component factor structure and Varimax rotation were conducted on measures related to vitality, attentional functioning, mood states, self esteem, physical activity motives, and outdoor activity setting characteristics. All factor structures were based on item loadings of at least .45, Eigenvalues greater than 1.0, and alpha coefficients of at least .50. Items loading on more than one factor at 0.45 or above were excluded.

An independent samples t-test was used to determine whether the use of outdoor activity settings was associated with greater levels of overall physical activity. To conduct this analysis participants were separated into two groups of Frequent and Infrequent Outdoor Activity (OA) based on the mean frequency of self-reported outdoor activity ($M = 3.69$). The t-test was used to investigate whether individuals who engaged in Frequent or Infrequent OA differed statistically significantly in terms of their self-reported average minutes of physical activity per week (with the significance level set at $p \leq .05$).

A series of one-way analysis of variance (ANOVA) tests and Tukey post hoc pairwise comparisons were used to explore the influence of different levels of outdoor activity on each of the psychological well-being variables. Acceptable significance values for all analyses were those with $p = .05$. This same approach was used to investigate the influence of outdoor activity on physical activity motives. In order to conduct this analysis a composite categorical variable was created using a combination of participants' self-reported overall physical activity and ratings about the frequency of outdoor activity. Low and high categories for physical activity

were determined based on the median level of self-reported overall activity per week ($m = 3$ hours). Participants in the Low Physical Activity (PA) category reported engaging in less than 3 hours of activity per week, while those in the High PA group reported exercising for 3 or more hours per week. It should be noted that due to the generally high levels of self-reported activity among survey respondents, the activity level of some participants classified as “Low Physical Activity” actually met or exceeded minimum recommended physical activity levels (Department of Health and Human Services, 2008). As a result, it is most appropriate to interpret the activity level categories with respect to one another rather than to an external standard. In addition, participants were split into two groups of Frequent and Infrequent Outdoor Activity (OA) based on the mean frequency of self-reported outdoor physical activity ($M = 3.69$). This resulted in four distinct categories of outdoor physical activity participation in which participants were categorized as Low PA and Infrequent OA; Low PA and Frequent OA; High PA and Infrequent OA; or High PA and Frequent OA. Comparing participants in these four categories to one another with respect to psychological well-being and physical activity motives allows a better understanding of the relative impact of engaging in outdoor activity under differing levels of overall physical activity.

Finally, a series of independent samples t-tests were used to explore the effects of outdoor physical activity setting characteristics amongst individuals who reported Frequent OA on psychological well-being and motives to exercise. This was analyzed based on overall physical activity levels using the parameters discussed above. Two separate analyses were conducted for individuals who reported Low PA and those who reported High PA. These t-tests were used to determine whether the use of settings with more natural characteristics were associated with different levels of psychological well-being and physical activity motives.

RESULTS

Development of measures

Psychological well-being

Factor analysis of the subjective vitality items resulted in a single factor, *Vitality*, related to feelings of aliveness, energy, and positive outlook. This factor structure was consistent with the Subjective Vitality Scale as constructed by Ryan & Frederick (1997). A two-factor solution emerged from the items related to attentional functioning. The first category, *Initiating & Planning*, was composed of items associated with starting and following through on plans and intentions and the second category, *Self-Regulation*, included items concerning the ability to

focus and respond thoughtfully to others. This structure differed slightly from the Attentional Functioning Index (AFI) proposed by Cimprich et al. (2011), which identified 3 factors- *Effective Action*, *Attentional Lapses*, and *Interpersonal Effectiveness*. The category *Initiating & Planning*, from the present study shared most items found under *Effective Action*. The second category, *Self-Regulation*, included items mostly found under *Interpersonal Effectiveness* but also included items from the *Attentional Lapses* category. Analysis of the mood state items also resulted in two distinct factors. The first category, *Positive Affect*, included items associated with positive feelings and emotions, and the second category, *Negative Affect*, consisted of items with a negative emotional tone. This factor structure is consistent with previous research using the PANAS items (Thompson, 2007). Finally, factor analysis of the items related to self-esteem produced a two-factor solution. The first factor, *Internal Self-Esteem*, included items about feelings of self-worth and self-regard. The second category, *External Self-Esteem*, was composed of items related to how one compares themselves to others. This factor structure differs from the unidimensional structure initially proposed by Rosenberg (1965). However, recent attempts to reevaluate the Rosenberg Self-Esteem Scale have suggested that a multidimensional structure, similar to the one presented here, may be warranted (Huang & Dong, 2011). Reliability analysis of all well-being variables indicated all categories were highly coherent with alpha values at .70 or higher. Factor structures, item loadings, means, and alpha values can be found for each of the psychological well-being categories in Table 2.

Physical activity motives

Factor analysis of the items related to physical activity motives resulted in four distinct factors (see Table 3). The first category, *Mental Health*, consisted of stress management and reflection as motivations to exercise. The second category, *Physical Health*, related to desires to improve appearance, be physically and cardiovascularly fit, and feel good about one's self. The third factor, *Intrinsic Satisfaction*, included items associated with enjoyment, challenge, and spending time with others. Finally, the fourth category, *Social Pressures*, consisted of motivations related to the external influence of friends, family, or a health care professional. This factor structure was representative of the Exercise Motivations Inventory-II's 14 subscales constructed by Markland & Ingledew (1997), which can be condensed down into larger categories of physical health and appearance, social motivations, mental health motivations, and intrinsic motivations. Reliability analysis indicated all motive categories to be highly coherent except for *Social Pressures* and therefore was dropped from subsequent analysis.

Table 2. Psychological Well-Being Categories

Category name and items included		Mean	S.D.	Alpha
VITALITY		3.13	.78	.89
<i>Items</i>	<i>Loadings</i>			
I feel energized	.87			
I feel energy and spirit	.80			
I feel alive and vital	.78			
I look forward to each new day	.77			
I nearly always feel alert and awake	.75			
I don't feel very energetic (rev)	.73			
Sometimes I feel so alive I want to burst	.68			
INITIATING & PLANNING		3.31	.70	.83
<i>Items</i>	<i>Loadings</i>			
Following through on your plans or goals	.86			
Doing things that take time and effort	.80			
Getting started on activities (tasks, jobs) you intend to do	.80			
Making your mind up about things	.66			
Remembering to do all the things you started out to do	.56			
SELF-REGULATION		3.44	.64	.70
<i>Items</i>	<i>Loadings</i>			
Keeping your mind on what others are saying	.79			
Being patient with others	.77			
Concentrating on details	.62			
Keeping yourself from saying/doing things you did not want to say/do	.57			
POSITIVE AFFECT		3.75	.58	.80
<i>Items</i>	<i>Loadings</i>			
Determined	.80			
Attentive	.76			
Alert	.74			
Active	.70			
Inspired	.69			
NEGATIVE AFFECT		2.44	.57	.74
<i>Items</i>	<i>Loadings</i>			
Afraid	.75			
Nervous	.75			
Ashamed	.69			
Upset	.67			
Hostile	.63			
INTERNAL SELF-ESTEEM		3.80	.96	.82
<i>Items</i>	<i>Loadings</i>			
At times I think I am no good at all (rev)	.79			
I certainly feel useless at times (rev)	.77			
I wish I could have more respect for myself (rev)	.62			
All in all, I am inclined to feel that I am a failure (rev)				
EXTERNAL SELF-ESTEEM		4.41	.58	.76
<i>Items</i>	<i>Loadings</i>			
I am able to do things as well as most other people	.79			
I feel that I have a good number of qualities	.77			
I feel that I am a person of worth, at least on an equal plane with others	.62			

Table 3. Physical Activity Motives Categories

Category name and items included	Mean	S.D.	Alpha
MENTAL HEALTH	3.79	.83	.89
<i>Items</i>	<i>Loadings</i>		
Improve mood	.82		
Be more clear headed	.81		
To reduce stress	.79		
It gives me space to think	.79		
Time to reflect	.70		
PHYSICAL HEALTH	3.97	.67	.81
<i>Items</i>	<i>Loadings</i>		
Be physically fit	.78		
Improve appearance	.74		
Manage weight	.67		
To feel good about myself	.65		
Improve cardiovascular fitness	.64		
Maintain physical strength	.61		
INTRINSIC SATISFACTION	3.27	.88	.84
<i>Items</i>	<i>Loadings</i>		
It's fun	.85		
It's enjoyable	.80		
It's interesting	.77		
It's challenging	.74		
Spend time with others	.57		
SOCIAL PRESSURES	1.84	.93	.48
<i>Items</i>	<i>Loadings</i>		
My friends/family want me to	.79		
My doctor advised me to	.73		

Outdoor activity setting characteristics

Factor analysis of the items related to environmental features most frequently encountered during outdoor activity sessions identified two distinct categories (see Table 4). The first, *Built Settings*, represented those outdoor activity settings composed of features more common to developed areas with urban or residential characteristics. The second category, *Natural Settings*, represented settings with a greater abundance of natural elements. Reliability analysis indicated both categories were highly coherent. One item, community parks, failed to load in either factor and was dropped from subsequent analysis.

Table 4. Outdoor Activity Setting Categories

Category name and items included	Mean	S.D.	Alpha
BUILT SETTINGS	3.57	.98	.89
<i>Items</i>	<i>Loadings</i>		
Sidewalks	.84		
Businesses	.83		
Busy streets	.82		
Other people	.79		
Large buildings	.75		
Residential areas	.72		
NATURAL SETTINGS	3.37	.88	.86
<i>Items</i>	<i>Loadings</i>		
Natural areas	.85		
Wooded areas	.84		
Nature trails	.81		
Water	.71		
Trees	.71		
Wide open spaces	.61		
Flowers and gardens	.59		

Impact of outdoor activity (OA) on physical activity (PA) levels

Before examining the impact of outdoor activity on well-being and physical activity motives, it is useful to first investigate a more basic question, namely whether more outdoor activity is associated with higher rates of physical activity participation. As shown in Table 5, results of an independent samples t-test indicated that participants who were frequently active outdoors, had significantly higher physical activity levels overall, $t(334) = 4.44, p \leq .001$. Those who reported Frequent OA were physically active, on average, 242 minutes per week, whereas those who reported Infrequent OA were only physically active, on average, 169 minutes per week. These findings suggest that outdoor activity may promote exercise overall and be an important component of more physically active lifestyles.

Table 5. Independent samples t-test comparing frequency of outdoor activity to average minutes of physical activity per week

	n	Mean minutes of physical activity per week	S.D.
Infrequent OA	136	169.30*	131.75
Frequent OA	200	241.77*	156.12

Note: * indicates mean minutes of physical activity per week are significantly different at $p < .001$.

Impact of outdoor activity (OA) on psychological well-being

A series of one-way ANOVAs were used to determine how different levels of overall physical activity (PA) and outdoor activity (OA) influence psychological well-being. As outlined previously, these analyses focused on exploring whether Infrequent or Frequent self-reported OA influenced psychological well-being among participants who reported engaging in Low and High levels of PA (see Table 6). This approach, of grouping participants into categories based on OA and PA, permitted overall PA levels to be controlled and more accurate conclusions to be drawn about the relative impact of OA on psychological well-being.

ANOVA results indicated significant variation among participants based on their level of OA with respect to *Vitality*, $F(3,330) = 19.28, p = .000$, *Positive Affect*, $F(3,325) = 17.78, p = .000$, and the *Initiating & Planning* dimension of attentional functioning, $F(3,328) = 7.17, p = .000$. Post hoc Tukey tests among individuals with Low PA revealed significant differences between participants reporting Infrequent and Frequent OA in terms of *Vitality* ($p = .000$) and *Positive Affect* ($p = .000$). These tests also showed a trend indicating more Frequent OA was associated with improved *Initiating & Planning* scores ($p = .073$) for this group. Among those who reported High PA, post hoc Tukey tests indicated participant engaged in more Frequent OA reported significantly higher levels of *Vitality* ($p = .019$). In total, these results may suggest a pattern of diminishing benefits from outdoor activity as overall levels of PA increase. While High PA individuals do appear to receive some well-being related benefits, a wider variety of improvements were reported by those participants engaged more moderate levels of physical activity.

Although the ANOVA results provide a general sense for how OA influences psychological well-being, it would also be useful to know whether the use of specific types of outdoor settings are associated with more positive outcomes (see Table 7). Prior research on green exercise suggests that the use of natural settings, in particular, results in enhanced well-being (Barton & Pretty, 2010; Pretty et al. 2005; Shanahan et al. 2016). In order to explore this issue, a series of independent samples t-test were conducted to assess whether the use of *Natural Settings* for OA were associated with increases in psychological well-being. This analysis only included participants who were previously classified as engaging in Frequent OA. Once again, the subsample was divided into participants with Low and High levels of PA and these subgroups were analyzed separately. As a result, the t-test comparisons were generated by splitting the mean frequency with which Low PA ($M = 3.46$) and High PA ($M = 3.69$) participants encountered Natural Settings during their typical OA sessions.

Results of this analysis indicated that among Low PA participants the use of more *Natural Settings* was associated with significant improvements in *Vitality*, $t(73) = 2.43, p = .018$, *Initiating & Planning*, $t(72) = 2.11, p = .038$, and *Self-Regulation*, $t(72) = 2.30, p = .025$. With respect to High PA participants, the use of more *Natural Settings* was associated with a significant improvement in *Vitality*, $t(121) = 2.74, p = .007$. No other significant differences were detected among respondents engaged in High PA levels.

Overall, these results suggest that both outdoor activity, broadly, and the use of more natural settings, in particular, have a stronger effect on well-being among individuals engaging in lower to moderate levels of overall physical activity compared to those who are highly physically active. Frequent OA for participants with Low PA was significantly associated with higher levels of *Vitality* and *Positive Affect*, and results suggest a positive trend in the *Initiating & Planning* component of attentional functioning. Frequent OA among participants who reported High PA was only associated with increased *Vitality* and no differences were found in regards to either *Positive Affect* or attentional functioning. A somewhat similar pattern was found when examining the influence of the outdoor activity setting among individuals reporting Frequent OA. Low PA was associated with significantly higher levels of *Vitality* and multiple aspects of attentional functioning (i.e., *Initiating & Planning* and *Self-Regulation*) if these individuals tended to use more *Natural Settings*. However, Frequent OA with High PA in more *Natural Settings* was only associated with significantly higher levels of *Vitality*.

Table 6. Impact of outdoor activity (OA) on psychological well-being among participants engaging in different levels of physical activity (PA)

	Low PA			High PA		
	n	Mean	S.D.	n	Mean	S.D.
VITALITY						
Infrequent OA	78	2.68*	0.68	57	3.13*	0.74
Frequent OA	75	3.17*	0.74	124	3.46*	0.71
INITIATING & PLANNING						
Infrequent OA	77	3.06 [†]	0.72	57	3.32	0.68
Frequent OA	74	3.33 [†]	0.57	124	3.51	0.68
SELF-REGULATION						
Infrequent OA	77	3.39	0.67	57	3.57	0.61
Frequent OA	74	3.53	0.62	124	3.47	0.64
POSITIVE AFFECT						
Infrequent OA	75	3.41*	0.54	56	3.81	0.46
Frequent OA	74	3.76*	0.54	124	3.98	0.57
NEGATIVE AFFECT						
Infrequent OA	75	2.50	0.52	56	2.35	0.60
Frequent OA	74	2.49	0.60	124	2.39	0.56
INTERNAL SELF-ESTEEM						
Infrequent OA	75	3.66	0.93	57	3.89	0.88
Frequent OA	74	3.89	0.99	124	3.84	1.02
EXTERNAL SELF-ESTEEM						
Infrequent OA	75	4.40	0.56	57	4.47	0.51
Frequent OA	74	4.45	0.49	124	4.43	0.64

Notes: * indicates mean scores are significantly different for Infrequent and Frequent OA at $p \leq .02$

[†] indicates mean scores are different for Infrequent and Frequent OA at $p = .073$

Table 7. Impact of natural settings on psychological well-being among participants reporting frequent outdoor activity under different levels of overall physical activity (PA)

	Low PA			High PA		
	n	Mean	S.D.	n	Mean	S.D.
VITALITY						
Low Natural Settings	41	2.99*	.69	54	3.27*	.60
High Natural Settings	34	3.40*	.75	71	3.60*	.75
INITIATING & PLANNING						
Low Natural Settings	41	3.20*	.56	53	3.42	.70
High Natural Settings	34	3.48*	.56	71	3.58	.67
SELF-REGULATION						
Low Natural Settings	41	3.38*	.57	53	3.43	.66
High Natural Settings	34	3.71*	.64	71	3.50	.64
POSITIVE AFFECT						
Low Natural Settings	40	3.68	.57	54	3.92	.59
High Natural Settings	34	3.87	.49	71	4.03	.56
NEGATIVE AFFECT						
Low Natural Settings	40	2.58	.67	54	2.47	.54
High Natural Settings	34	2.39	.50	71	2.33	.57
INTERNAL SELF-ESTEEM						
Low Natural Settings	40	3.95	.98	54	3.69	1.09
High Natural Settings	34	3.82	1.01	71	3.95	.96
EXTERNAL SELF-ESTEEM						
Low Natural Settings	40	4.44	.51	54	4.36	.74
High Natural Settings	34	4.46	.48	71	4.48	.56

Note: * indicates mean scores are significantly different for Low and High Nature physical activity settings at $p \leq .05$.

Impact of outdoor activity (OA) & activity setting on physical activity motivations

Analysis of the impact of outdoor activity (OA) and the specific type of outdoor activity setting on exercise motivations followed the same approach described in the previous section on psychological well-being. A series of one-way ANOVAs were conducted, assessing how Infrequent and Frequent OA impacted motivations to exercise among individuals engaging in Low and High levels of self-reported PA (see Table 8). Again, grouping participants into categories based on OA and PA enabled overall activity levels to be controlled and more accurate conclusions to be drawn about the relative impact of OA on exercise motivations.

ANOVA results indicated significant variation in physical activity motives among participants based on their level of OA with respect to *Mental Health*, $F(3,325) = 7.15, p = .000$, *Physical Health*, $F(3,325) = 3.09, p = .027$, and *Intrinsic Satisfaction*, $F(3,325) = 18.16, p = .000$. Post hoc Tukey tests among individuals reporting Low PA, while not significant, suggest a difference between participants engaging in Infrequent and Frequent OA in regards to *Mental Health* motivations ($p = .116$). These tests also revealed Frequent OA was associated with significantly stronger *Intrinsic Satisfaction* motivations ($p = .003$) for this group. Among those who reported High PA, post hoc Tukey tests indicated participants who engaged in more Frequent OA reported significantly stronger *Mental Health* ($p = .000$) and *Intrinsic Satisfaction* motivations ($p = .003$). While more OA among Low PA individuals appeared to be associated with stronger mental health and intrinsic satisfaction as motives to exercise, there was some evidence that the influence of more OA on these motivations was slightly more pronounced among participants engaged higher levels of physical activity.

Once again, these ANOVA results provide a broad sense of how OA is related to exercise motivations, but it is also valuable to explore whether the use of specific types of outdoor activity settings were associated with different motivations. As previously outlined with respect to psychological well-being, a series of independent samples t-test were conducted to assess how the use of *Natural Settings* for OA was associated with exercise motives (see Table 9). Only participants who were previously classified as engaging in Frequent OA were included and the subsample was divided into participants with Low and High levels of PA to be analyzed separately.

Results of this analysis indicated that among participants reporting Low PA, the use of more *Natural Settings* was not associated with any difference in motivations. However, among participants reporting High PA significant differences emerged with respect to *Mental Health*, $t(122) = 2.21, p = .030$, *Physical Health*, $t(122) = 3.13, p = .003$, and *Intrinsic Satisfaction* motives, $t(122) = 2.07, p = .044$, if they were active in more *Natural Settings*.

Overall, these results suggests that both general OA and the use of *Natural Settings* specifically are associated with significantly stronger exercise related motivations among High PA individuals compared to Low PA individuals. Frequent OA was associated with significantly greater *Intrinsic Satisfaction* motivations in both Low and High PA participants, however significantly greater *Mental Health* motivations were only apparent among High PA individuals. A similar pattern was observed in regards to the outdoor activity setting. The use of more *Natural Settings* among Frequent OA participants reporting low PA was not associated with

stronger exercise related motivations. On the contrary, a significant difference was observed in *Mental Health*, *Physical Health*, and *Intrinsic Satisfaction* motivations in Frequent OA participants with High PA who utilized more *Natural Settings*.

Table 8. Impact of outdoor activity (OA) on physical activity motives among participants engaging in different levels of physical activity (PA)

	Low PA			High PA		
	n	Mean	S.D.	n	Mean	S.D.
MENTAL HEALTH						
Infrequent OA	75	3.63	0.77	57	3.49*	0.96
Frequent OA	73	3.93	0.80	124	4.02*	0.82
PHYSICAL HEALTH						
Infrequent OA	75	3.91	0.64	57	4.23	0.57
Frequent OA	73	3.93	0.72	124	4.01	0.64
INTRINSIC SATISFACTION						
Infrequent OA	75	2.78*	0.86	57	3.20*	0.91
Frequent OA	73	3.25*	0.82	124	3.66*	0.74

Notes: * indicates mean scores are significantly different for Infrequent and Frequent OA at $p \leq .05$.

Table 9. Impact of natural settings on psychological well-being among participants reporting frequent outdoor activity under different levels of overall physical activity (PA)

	Low PA			High PA		
	n	Mean	S.D.	n	Mean	S.D.
MENTAL HEALTH						
Low Natural Settings	40	3.88	0.81	53	3.83*	0.82
High Natural Settings	33	4.00	0.78	71	4.15*	0.79
PHYSICAL HEALTH						
Low Natural Settings	40	3.86	0.73	53	3.81*	0.64
High Natural Settings	33	4.02	0.70	71	4.16*	0.59
INTRINSIC SATISFACTION						
Low Natural Settings	40	3.23	0.82	53	3.50*	0.78
High Natural Settings	33	3.29	0.84	71	3.78*	0.70

Note: * indicates mean scores are significantly different for Low and High Nature physical activity settings at $p \leq .05$.

DISCUSSION

Research examining the benefits associated with outdoor physical activity, or green exercise, has grown in recent years. Findings from this work suggest that green exercise is associated with improvements in multiple aspects of health (Pretty et al., 2005; Barton & Pretty, 2010; Ryan et al., 2010; Mitchell, 2013; Barton et al., 2012; Bowler et al., 2010). The current study sought to complement previous research by exploring the degree to which outdoor activity was associated with higher levels of psychological functioning and well-being. Another important goal was to expand on existing research by investigating how outdoor activity might influence overall physical activity levels and exercise related motivations. Survey results indicated that participants who were more active outdoors were also more physically active overall. The difference between respondents who infrequently engaged in outdoor activity and those who more regularly participated in green exercise was substantial, with frequent outdoor exercisers reporting over 70 minutes of additional activity. This supports previous research that has shown that nature and physical activity can be inextricably linked, as individuals who spend more time outdoors in natural environments tend to be significantly more active (Flowers et al., 2016; Shanahan et al., 2016). These findings also lend support to the claim that the outdoors acts as a facilitator of physical activity. An alternative explanation consistent with these findings is that physically active individuals seek out natural environments as opposed to the outdoors promoting higher levels of physical activity. For example, those who are already highly active may find indoor settings boring after awhile. Therefore, they may choose other activity settings or ways to keep exercise interesting; this could include the addition of listening to music, going to another indoor location, or they may go outdoors. Any of these strategies could work, however natural environments hold unique advantages over other alternatives such as having a greater variation in interesting stimuli, which may keep a person's interest for longer period of time, while also leading to positive changes in psychological well-being as discussed previously.

Analysis of the survey data also revealed that individuals who were less physically active tended to experience greater benefits to psychological well-being when frequently active outdoors. Among participants engaging in lower levels of PA, frequent OA was associated with a significant increase in vitality and positive affect. There was also some evidence suggesting this group experienced higher levels of attentional functioning. Furthermore, among frequent outdoor exercisers, the use of more natural outdoor activity settings had a significant positive impact on both vitality and attentional functioning for participants reporting lower levels of PA. These results support previous research done by Ryan et al. (2010) and Wolsko & Lindberg (2014) whose works demonstrated that outdoor activity can lead to a significant increase in

subjective vitality and positive emotions. While only a marginal effect of frequent OA on attentional functioning for individuals with low PA was observed, improvements in this aspect of psychological well-being were more strongly associated with the use of natural outdoor settings. This finding aligns with previous research linking nature contact with increases in attentional functioning, where numerous studies have shown that not only active, but also passive nature contact can have positive effects (Beute & de Kort 2014; Keniger et al. 2013; Maller, et al. 2005; Nisbet et al. 2011; Kaplan, 1995; Kaplan & Berman 2010; Kaplan & Kaplan, 1989; Rogerson & Barton, 2015). A less substantial impact from OA and the use of more natural outdoor settings on psychological well-being was observed among individuals who reported high levels of PA. Between infrequent and frequent outdoor exercisers, there was only a significant increase in vitality and differences were found in regards to positive affect or attentional functioning.

The results of this study in relation to psychological well-being suggest that individuals with lower or moderate physical activity levels may actually benefit more from outdoor activity in natural environments than individuals who are highly physically active. This hints that there may be a kind of ceiling effect associated with outdoor activity where the relative benefits of outdoor activity become less pronounced as individuals engage in progressively greater amounts of exercise. This particular issue has not been the focus in previous research. Instead, studies have explored how quickly individuals gain benefits from green exercise (Barton & Pretty, 210), rather than examine how the benefits change as one engages in greater amounts of physical activity.

The possibility that individuals who engage in low to moderate levels of physical activity receive measurable benefits from outdoor exercise and exposure to natural environments could have significant implications for designing effective strategies to encourage physical activity. For example, barriers to exercise have been found to include lack of vitality and disliking physical activity (Gomez-Lopez et al. 2010). Through facilitating positive attitudes and increased vitality, green exercise may reduce barriers that have typically interfered with a person's capability of leading a more active lifestyle. However, because only correlational relationships can be established, a counter to this explanation could be that if an individual lacks vitality or a positive attitude towards exercise, then it is likely they will not engage in regular outdoor activity, despite the fact that green exercise itself could result in greater vitality and a more positive attitude. From this perspective, an individual must use other means to initiate this behavior, after which these barriers may fade. Yet, outdoor activity would more likely address these barriers than indoor activity and therefore could be more effective in helping an individual sustain regular physical activity.

In terms of exercise related motivations, findings indicated that significantly higher intrinsic satisfaction motives were associated with more frequent OA, regardless of overall physical activity levels. Strong mental health motivations to exercise were correlated with frequent OA within the high PA group. Results also suggested that the use of more natural outdoor activity settings was associated with differences in exercise related motivations. Although no significant impact was found among individuals with low PA, those engaging in higher levels of PA reported significantly stronger mental health, physical health, and intrinsic satisfaction motives if they utilized physical activity settings with more natural features. These findings are in line with recent work by Gladwell et al. (2013), which argues that natural environments might facilitate positive physical activity behaviors by increasing motivation and enjoyment of exercise by serving as a distraction from physiological discomfort. Again, because a causal direction cannot be assumed, the argument can be made that an individual with greater concern for their mental or physical health might seek out more natural settings and/or pursue more frequent PA and OA. However, outdoor activity may lead a person to more noticeably experience the benefits of exercise and also make physical activity more enjoyable. This could result in the individual developing stronger exercise motivations related to mental and physical health, as well as intrinsic motivations.

While the methodological design of the current study makes it difficult to discern the direction of the relationship between outdoor activity, outdoor setting, and motivations to exercise (i.e., whether outdoor activity influences motivations or motivations influence outdoor activity) it is still meaningful to note that motivations associated with healthy lifestyle behaviors and greater psychological well-being are also associated with outdoor activity and the use of natural outdoor settings. Intrinsic motivations are of particular interest because greater intrinsic motivation not only predicts willingness to engage in health related activities but also adherence to these behaviors (Gaitan-Sierra & Dempster, 2016).

In this study, it appears that motivations to exercise are more strongly associated with frequent OA and the use of natural outdoor settings among individuals engaging in higher levels of PA. This pattern is opposite to what was observed with respect to psychological well-being, where greater impacts were found among those participating in lower levels of activity. Taking these patterns into account, it is reasonable to suggest that the effect of outdoor activity and natural environments changes as an individual becomes more active. If improvements to psychological well-being are more apparent at lower levels of activity, this could help an individual realize and experience the tangible benefits of exercise. Nature exposure and outdoor activity could potentially facilitate an increase in physical activity. While an initial increase in activity is the

first step, many fail to persist in physical activity engagement long-term. Therefore, it is important that an individual develops enjoyment of physical activity and positive attitudes towards exercise - aspects of intrinsic motivation (Ryan & Frederick 1997; Graham et al. 2011). Moreover, mental health and intrinsic motivations, in particular, have been shown to be strong predictors of long-term persistence in healthy behavior change such as engaging in regular physical activity (Deci & Ryan, 2008).

Caution should be used when generalizing these results to the larger population, as the sample included in this study were a highly educated and a highly active group of participants, therefore not necessarily representative of the average population. Furthermore, assessing characteristics of the outdoor physical activity setting is difficult in a self-report survey as individuals can move through many different environments during one outdoor activity session. In order to account for this, participants were asked to assess how frequently they encountered different environmental features while active outside. As a result, the use of natural outdoor activity settings was based on how often natural features were present, however, this may not be reflective of the actual environment participants were active in, as built or urban environments can also contain natural features (i.e. flowers, grass, trees, water, etc.).

Questions not addressed in this study point to potential future directions for research. For example, participants only reported frequency and duration of physical activity. Intensity of physical activity, however, was not accounted for and may have a significant influence on the well-being and motivational outcomes associated with green exercise. Furthermore, this study only inquired about participant's general outdoor activity, yet the type of outdoor activity may also be an important piece to the puzzle. Some research has suggested that certain outdoor activities such as hiking or canoeing may yield more positive psychological outcomes compared to consumptive and motorized outdoor recreational activities (Wosklo & Lindberg, 2013). Finally, another factor not accounted for in this study that may play an important role is an individual's level of awareness and engagement with the environment while active outdoors. A study done by Duvall (2010) showed that increased awareness of one's surroundings during an outdoor walking routine was significantly associated with greater satisfaction with the environment and improvements in psychological functioning. Studies addressing these issues would further deepen our understanding of green exercise and the interaction of humans with nature

The implications of this study call to us consider the way physical activity is approached and encouraged. The following bullets are a few suggestions of how these findings can be applied to efforts that promote outdoor activity and green exercise:

- Due to the associated psychological well-being benefits, health care professionals and physical activity interventions should place greater emphasis on the use of outdoor, natural settings. This is particularly relevant in today's society considering the majority of time is spent indoors and consuming media, as well as work and family demands of a modern lifestyle.
- The greatest benefits to well-being from green exercise were associated with individuals who reported low to moderate levels of physical activity. Therefore, we should prioritize encouraging outdoor activity as well as raising awareness of its benefits in populations with lower levels of physical activity and among those who are less interested in or motivated to exercise. Green exercise may help these individuals realize and experience tangible benefits of exercise, which in turn may facilitate an increase in overall physical activity levels.
- The common approach to encouraging physical activity often focuses on the physical health benefits and may not even consider the importance of the physical activity setting. It could be useful to reframe physical activity in a more positive way, especially for those who find it to be a chore. Engaging with the outdoor, natural environment may increase one's enjoyment of exercise and subsequently facilitate an increase in overall physical activity levels. Green exercise may also help individuals to sustain regular physical activity routines long-term.

CONCLUSION

Previous work has shown that green exercise may result in a synergistic positive effect on a variety of physiological and psychological outcomes (Pretty et al., 2005; Barton & Pretty, 2010). The natural environment has also been suggested as a facilitator of physical activity (Gladwell et al., 2013; Flowers et al. 2016). This study found that participants who were more active outdoors were more active overall, lending support to the idea that the outdoors can serve as a facilitator of physical activity. Data analysis confirmed previous findings that green exercise is related to improved psychological functioning. However, most intriguingly, results of this study suggest that the benefits associated with green exercise may shift as one engages in greater

amounts of physical activity. Individuals who engaged in low to moderate levels of physical activity appeared to experience the greatest psychological benefit from outdoor activity, particularly in natural settings. On the other hand, individuals reporting high levels of physical activity, frequent outdoor activity in natural settings seemed to have a less substantial impact on psychological well-being but had a stronger association with positive exercise related motivations. When addressing the decline in physical activity and mental health in today's society, we should consider the power of nature and the outdoors as a viable and effective intervention to encourage more healthy and active lifestyles.

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APPENDIX 1

Thank you for agreeing to participate in this study. The purpose of this research is to help understand well-being outcomes and attitudes related to physical activity.

1. Gender: Male Female

2. Age: _____

3. Employment: Full-time Employed Part-time Employed Student

Unemployed Retired

4. Education: High School Two-year degree Post-graduate degree

Some College Four-year degree

5. Residential Zip-code: _____

6. Please rate the amount of nature in your nearby neighborhood

- Little to no nature
- Some nature, but mostly built features
- About equal amounts of natural and built features
- A good deal of nature
- Lots of nature

7. Over the last few months, how often have you engaged in physical activity in a typical week?

_____ / week _____ (*minimum*) – _____ (*max*)

8. Over the last few months, how much time is your typical physical activity session?

_____ *minutes* _____ (*minimum*) – _____ (*max*)

9. Over the last few months, how often have you exercised outdoors?

- Never → If never, skip to Question 11
- Rarely
- Sometimes
- Often
- Very often

10. During a typical outdoor physical activity session, how often do you encounter the following features?

1 = never	2 = rarely	3 = sometimes	4 = often	5 = very often
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<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%;">1</td><td style="width: 5%;">2</td><td style="width: 5%;">3</td><td style="width: 5%;">4</td><td style="width: 5%;">5</td><td style="width: 70%;">Residential areas</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Busy streets</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Businesses</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Large buildings</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Sidewalks</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Water (stream, pond, river, lake)</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Community parks</td></tr> </table>	1	2	3	4	5	Residential areas	1	2	3	4	5	Busy streets	1	2	3	4	5	Businesses	1	2	3	4	5	Large buildings	1	2	3	4	5	Sidewalks	1	2	3	4	5	Water (stream, pond, river, lake)	1	2	3	4	5	Community parks	<table style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 5%;">1</td><td style="width: 5%;">2</td><td style="width: 5%;">3</td><td style="width: 5%;">4</td><td style="width: 5%;">5</td><td style="width: 70%;">Flowers & gardens</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Other people</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Natural areas</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Wooded areas</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Trees</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Nature trails</td></tr> <tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>Wide Open Spaces</td></tr> </table>	1	2	3	4	5	Flowers & gardens	1	2	3	4	5	Other people	1	2	3	4	5	Natural areas	1	2	3	4	5	Wooded areas	1	2	3	4	5	Trees	1	2	3	4	5	Nature trails	1	2	3	4	5	Wide Open Spaces
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11. In the last few months, to what degree are the following statements true?

1 = not at all true	2 = slightly true	3 = moderately true	4 = very true	5 = completely true
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1	2	3	4	5	I feel alive and vital
1	2	3	4	5	I don't feel very energetic
1	2	3	4	5	Sometimes I feel so alive I want to burst
1	2	3	4	5	I feel energy and spirit
1	2	3	4	5	I look forward to each new day
1	2	3	4	5	I nearly always feel alert and awake
1	2	3	4	5	I feel energized

12. Over the last few months, how well have you been doing in each of the following areas?

1 = not at all well	2 = slightly well	3 = moderately well	4 = very well	5 = extremely well
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1	2	3	4	5	Getting started on activities (tasks, jobs) you intend to do.
1	2	3	4	5	Following through on your plans or goals.
1	2	3	4	5	Doing things that take time and effort.
1	2	3	4	5	Making your mind up about things.
1	2	3	4	5	Remembering to do all the things you started out to do.
1	2	3	4	5	Keeping your mind on what others are saying.
1	2	3	4	4	Concentrating on details
1	2	3	4	5	Keeping yourself from saying or doing things you did not want to say or do.
1	2	3	4	5	Being patient with others

13. Please indicate how frequently you've felt the following ways over the past few months.

1 = never	2 = rarely	3 = sometimes	4 = often	5 = very often
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1 2 3 4 5 Upset	1 2 3 4 5 Nervous
1 2 3 4 5 Hostile	1 2 3 4 5 Determined
1 2 3 4 5 Alert	1 2 3 4 5 Attentive
1 2 3 4 5 Ashamed	1 2 3 4 5 Afraid
1 2 3 4 5 Inspired	1 2 3 4 5 Active

14. Below is a list of statements dealing with your general feelings about yourself.

Please indicate how strongly you agree or disagree with each statement.

1 = strongly disagree	2 = disagree	3 = neutral	4 = somewhat agree	5 = strongly agree
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1 2 3 4 5 On the whole, I am satisfied with myself	
1 2 3 4 5 At times I think I am no good at all	
1 2 3 4 5 I feel that I have a number of good qualities	
1 2 3 4 5 I am able to do things as well as most other people	
1 2 3 4 5 I feel I do not have much to be proud of	
1 2 3 4 5 I certainly feel useless at times	
1 2 3 4 5 I feel that I am a person of worth, at least on an equal plane with others	
1 2 3 4 5 I wish I could have more respect for myself	
1 2 3 4 5 All in all, I am inclined to feel that I am a failure	
1 2 3 4 5 I take a positive attitude towards myself	

15. Below is a list of reasons to engage in a physical activity routine.

Please indicate how much each one applies to you.

1 = not at all	2 = a little	3 = somewhat	4 = very much	5 = extremely
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1 2 3 4 5 Be physically fit	1 2 3 4 5 Improve cardiovascular fitness
1 2 3 4 5 It's fun	1 2 3 4 5 Improve appearance
1 2 3 4 5 It's challenging	1 2 3 4 5 It's interesting
1 2 3 4 5 Manage weight	1 2 3 4 5 Maintain physical strength
1 2 3 4 5 Have more energy	1 2 3 4 5 My friends/family want me to
1 2 3 4 5 Be more clear headed	1 2 3 4 5 Spend time with others
1 2 3 4 5 Improve mood	1 2 3 4 5 Time to reflect
1 2 3 4 5 It gives me space to think	1 2 3 4 5 To reduce stress
1 2 3 4 5 My doctor advised me to	1 2 3 4 5 To feel more healthy
1 2 3 4 5 It's enjoyable	1 2 3 4 5 To feel good about myself