AFFECTIVE FORECASTING: PREDICTING THE INFLUENCE OF NATURE ON WELL-BEING

by

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Abstract

Although spending time in nature has demonstrated mental and physical health benefits, many individuals engage very little with their natural surroundings. Estimates suggest individuals in developed nations spend up to 90% of their time inside buildings. If individuals underestimate the positive emotions they will experience when exposed to natural environments, they may choose to not spend time in natural settings. This dissertation reports on three studies that explored whether individual's inaccurate affective forecasts are a barrier to spending time in natural environments. The studies compared participants' affective forecasting accuracy for outdoor natural and urban spaces. As well, the studies evaluated whether using different cognitive processing systems influenced participants' affective forecasting error. Some researchers speculate that forecasting error occurs because individuals use one processing system to forecast (System 1) and a different system for a real-time assessment (System 2). Study 1 compared affective forecasting error for virtual natural and urban settings. Participants used System 1 for their forecast and System 2 for their real-time assessment. Study 2 used retrospective assessments of time spent in natural and urban outdoor settings. Participants used System 2 for both assessments because their assessments were retrospective. Study 3 assessed affective forecasting error for outdoor walks in natural and urban settings. This study used a cognitive load manipulation on half the participants to overload their System 2 processing system. This meant that half the participants used System 1 and System 2, and half the participants used only System 1. Results from the three studies did not conclusively demonstrate that individuals underestimate the positive emotional effects of nature exposure and overestimate the positive emotional effects of urban exposure. Overall, the findings indicate that exposure to natural spaces increases positive affect, reduces negative affect, and induces a calm response from participants.

Lay Summary

The overarching goal of this work was to understand why individuals choose to not spend time in outdoor natural settings when there are known benefits to doing so. The three studies investigated if an underestimation of how happy you might feel after spending time outdoors is a contributing reason. If individuals underestimate how happy they will feel, they may not perceive spending time in nature as beneficial. The studies used videos of outdoor nature and urban settings, a past experience, and a real walk to see if a consistent underestimation of happiness existed. The results did not indicate that individuals underestimate how happy they will be from spending time in nature any more than spending time in an urban setting. But the results did indicate that spending time in nature improves an individual's happiness and sense of relaxation more than spending time in urban settings.

Preface

Study 1 (outlined in chapter 2) was conducted at the European Centre for Environment and Human Health in Truro, Cornwall. The University of British Columbia's Okanagan Behavioural Research Ethics Board granted ethical approval for this research on January 23rd, 2015 (H14-02878). I was responsible for the research design, analyzing the data, and interpreting the data. Data collection was shared between Nicola Yeo, Elizabeth Larbalestier, and myself.

Study 2 (outlined in chapter 3) uses open source data from the Government of the United Kingdom. Natural England collects data as part of the Monitor of Engagement with the Natural Environment. I was responsible for the analyzing and interpreting the data.

Study 3 (outlined in chapter 4) was conducted in Kelowna, B.C. The University of British Columbia's Okanagan Behavioural Research Ethics Board granted ethical approval for this research on September 27th, 2016 (H14-02646). I was responsible for the research design, data collection, analyzing the data, and interpreting the data.

As of the date of this submission, the data included in this dissertation have not been published.

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Dedication

This dissertation is dedicated to the two gentle and hard-working men I hold in my heart. One who has been beside me from the beginning and one who has been beside me half my life. You support me, believe in my choices, and challenge me. I am so fortunate.

Chapter 1: Introduction

1.1 Nature and Well-Being

The positive relation between exposure to nature and emotional well-being is well documented (Alcock, White, Wheeler, Fleming, & Depledge, 2013; Berman, et al., 2012; Hartig, Evans, Jamner, Davis, & Gärling, 2003) and a recent meta-analysis concluded that contact with nature has a moderately sized effect on positive emotion ($r = 0.31$) and a small effect on negative emotion ($r = -0.12$; McMahan & Estes, 2015). The positive emotional connection individuals feel towards nature can be defined as external, such as an appreciation of forests, or as internal, such as a spiritual connection (Kranz, 2008).

Although exposure to nature has been shown to improve emotional well-being, many individuals engage very little with their natural surroundings (David Suzuki Foundation, 2015; Soga & Gaston, 2016; Winters & Benoit, 2013). Research suggests that people in developed nations spend approximately 90% of our lives inside buildings (Evans & McCoy, 1998), and the U.S. National Recreation and Park Association states that 28% of Americans do not spend time outside on a daily basis (2014).

The low levels of outdoor time may be the result of increased levels of urbanization and the type of lifestyle associated with living in large urban centres (Soga & Gaston, 2016). The United Nations World Urbanization Prospects 2014 report states that 54% of the world's population now live in urban areas. In North America it is 82%. Compounding this, Canadians spend 90% of their time indoors (Vancouver Coastal Health, 2014), and 5% of their time in vehicles (Leech, Nelson, Burnett, Aaron, & Raizenne, 2002). So not only are individuals living in more urbanized areas, they are also spending almost all of their time in confined spaces.

Spending time away from natural areas has been shown to reduce the emotional connection that individuals feel towards nature (Hinds & Sparks, 2008) as well as their

attachment to it (Zhang, van Dijk, Tang, & van den Berg, 2015). Halpenny (2010) demonstrated that as place attachment increases, so does pro-environmental behaviour towards that location. Unfortunately, as individuals spend less time in natural spaces, they may feel less connected to nature and less inclined to take care of local green spaces.

1.2 Affective Forecasting

This dissertation examined affective forecasting error as a potential reason why individuals do not spend more time in nature even when they acknowledge that spending time in nature feels good. Affective forecasting error is the discrepancy between forecasted and actual emotional reactions to an event. It can be separated into four components: valence, emotion, intensity, and duration (Wilson & Gilbert, 2003). In general, individuals frequently make accurate predictions about the valence and specific emotion they anticipate feeling but are less accurate at predicting the intensity and duration of the experienced emotion (Wilson & Gilbert, 2003). Most individuals display an impact bias; they overestimate the emotional intensity and the duration of the emotion they believe will arise from events in their lives (Kushlev & Dunn, 2012; Wilson & Gilbert, 2003). For instance, a student may believe that getting a poor grade on a final exam will make them feel terrible for months, but in reality, the student may only feel upset for a few days.

Research on affective forecasting and individuals' emotional response to nature is limited to one study. Nisbet and Zelenski (2011) asked participants to forecast how they would feel after walking in either an outdoor or indoor environment. The results suggest that individuals underestimate the emotional benefits of exposure to the outdoors and overestimate the emotional benefits of exposure to an indoor environment. Their findings are important because exposure to nature generally increases positive affect and lowers negative affect (Berman et al., 2012; Hartig, Evans, Jamner, Davis, & Gärling, 2003; Hartig, Mang, & Evans, 1991; Nisbet & Zelenski, 2011;

van den Berg, Koole, & van der Wulp, 2003). The Nisbet and Zelenski study suggests that individuals were not aware of, or at least underestimated, the positive emotional benefits nature could offer them and therefore underestimated their positive emotional response.

A similar pattern of forecasting error of underestimated benefit has been shown for exercise; individuals reported they enjoyed an exercise session much more than they anticipated (Loehr & Baldwin, 2014; Ruby, Dunn, Perrino, Gillis, & Viel, 2011). Loehr and Baldwin found that the pattern of underestimated benefit was more prominent for inactive individuals than for active individuals and suggested this could be due to inactive individuals' susceptibility to variability when recalling previous exercise. When asked about exercise, individuals who do not regularly exercise think about the last time they exercised (i.e., a singular event), whereas individuals who regularly exercise think about exercise more holistically (i.e., multiple events). Inactive individuals who have not formed an exercise habit focus on a single exercise episode which may have been unpleasant. As a result, inactive individuals may be less likely to exercise because they are anticipating an unpleasant experience.

When individuals single out a particular event, such as an unpleasant exercise experience, and fail to consider the influence of other events on their future well-being it is called focalism (Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000), or the focusing illusion (Schkade & Kahneman, 1998). When succumbing to focalism individuals think about their emotional reaction to a specific event and don't think about how the event connects to other things happening at the same time. By solely focusing on one thing the forecasted emotional reaction is inaccurate to what the individual will actually experience. The concept can be summarized simply as "Nothing in life is as important as you think it is when you are thinking about it" (Kahnemen, 2011 p. 402).

If individuals make similar forecasting errors regarding time spent in natural environments as they do regarding exercise, it may shed light on why individuals underestimate the benefits of natural environments. Specifically, individuals who spend more time in nature should more accurately predict the emotional benefits, while those who spend less time in nature will underestimate the emotional benefits.

1.3 Dual Cognitive Processing

Another theory for the underestimation of the benefits of natural environments is that we use one system to forecast and a different system to evaluate current activities. Some researchers suggest that we use a rational system when forecasting and an emotional system for the actual experience (Dunn, Forrin, & Ashton-James, 2009; Loewenstein & Schkade, 1999; Wilson & Gilbert, 2003). Specifically, individuals are in a different emotional state when predicting how they will feel than when they experience an event and are asked to report their actual feelings.

The belief that individuals utilize dual cognitive systems is not new (Epstein, 1985; Evans & Over, 1996; Kahneman, 2011; Stanovich, 1999), but there are different understandings about how the dual systems work. Stanovich (1999) coined the terms System 1 and System 2, but this nomenclature often led others to mistakenly conceptualize these systems as the old and new mind (Evans & Stanovich, 2013). The old mind was described as similar to other animals and the new mind as distinctly human (Evans & Stanovich, 2013). This simplistic categorization has evolved over time and more recent discussions suggest the two systems should be considered as dual processes (i.e., separate processes using some of the same neural connections), rather than distinct systems (i.e., independent operating systems using distinct brain regions; Evans & Stanovich, 2013).

1.3.1 System 1 Processing

System 1 is conceptualized as autonomous, rapid, and instinctive (Evans, 2008). The properties include heuristic processing that is implicit, intuitive, associative, and automatic (Järvilehto, 2015; Lapsley & Hill, 2008). When a triggering stimulus is encountered, System 1 automatically activates a response (Evers et al., 2014). A defining feature of System 1 is that this response does not require a heavy demand of cognitive resources (Stanovich et al., 2014). The individual's System 1 is perceived as having the ability to make rapid decisions based on exposure and personal experience and is designed to jump to a conclusion based on slight evidence (Lapsley & Hill, 2008).

1.3.2 System 2 Processing

In contrast, System 2 processing is slower and requires energy and contemplation while relying on working memory (Stanovich, West, & Toplak, 2014). Being rule-based, System 2 processes are rational, conscious and explicit (Lapsley & Hill, 2008). System 2 requires cognitive effort and can vary across individuals due to differences in cognitive capacity (Evans, 2008). In addition, System 2 also uses cognitive decoupling which allows for hypothetical thinking (Evans & Stanovich, 2013). Cognitive decoupling is the ability to shift from the actual situation to a hypothetical one in order to predict what may happen in the future.

1.3.3 Incompatibilities Between the Two Processing Systems

Due to the differences in the way System 1 and System 2 operate and assess information, individuals can have two different experiences from the same theoretical event. For example, our emotional response is different when we imagine eating an ice cream cone (System 2) versus when we actually eat an ice cream cone (System 1; Gilbert & Wilson, 2009). This is because the imagined eating of ice cream is based on information that is fabricated (System 2) rather than actually happening in the moment (System 1). The discrepancy between the imagined emotional

response and the real emotional response can be explained by the various ways the two systems process information (Dunn, Forrin, Ashton-James, 2009; Gilbert & Wilson, 2009).

One reason for the incompatibility between the two systems could be that System 1 assesses content holistically while System 2 assesses content analytically (Stanovich & West, 2000). The discrepancy between how the two systems process information has been suggested as one of the reasons for affective forecasting error (Dunn, Forrin, Ashton-James, 2009). Because System 2 functions in an analytic fashion, it may succumb to focalism and ignore much of the information present and only target specific information, rather than seeing the event holistically. Focalism can produce an over- or under-estimation of emotional reaction (Lench, Safer, & Levine, 2011).

Various manipulations have been shown to reduce the discrepancy between the two processing systems. Wilson, Wheatley, Meyers, Gilbert, & Axsom (2000) asked participants to record information about other events that would occur at the same time as the focal point of the forecast. The manipulation encouraged participants to process information from a holistic perspective and therefore reduced their focalism and affective forecast error. Researchers have shown that interference from multiple methods (i.e, diaries, anagrams) reduces forecasting error for future and past events (Sevdalis & Harvey, 2009).

Another reason for the discrepancy between a forecast and a real-time response may be related to the cold-to-hot empathy gap (Loewenstein, 2005). System 2 is considered a rational, or cold system, and is used when making an affective forecast. System 1 is considered an emotional or hot system and is used when making a real-time assessment (Loewenstein & Schkade, 1999). The issue is that individuals in an emotionally cold state have a difficult time predicting how they will feel once they are in an emotionally hot state and this leads to affective forecasting error. The empathy gap between the two systems can be minimized when participants are

manipulated into a hot state prior to making their affective forecast (Van Boven, Loewenstein, Welch, & Dunning, 2012). Van Boven et al. emotionally primed participants into a similar emotional state they were to experience later on and found that it reduced their empathy gap.

1.4 Dissertation Overview

This dissertation examined the use of different processing systems when participants forecasted about time spent in natural and urban spaces to assess whether altering the processing system or location affected the size of the forecast error. Using three independent studies, I explored whether utilizing different processing systems and different environments contributed to the size of forecast error.

In the first study participants used System 1 and System 2 in a traditional forecasting manner: System 2 for their forecast and System 1 for their real-time assessment. In the second study participants only used System 2 because both the forecast and the real-time assessment were provided retrospectively. For the third study, half the participants used traditional forecasting of System 2 and System 1, and half used only System 1. This was done by manipulating half the participants prior to their forecast to suppress System 2 by overloading the participants' working memory. The manipulation has been used previously in forecasting research to ensure that the participants use System 1 for their forecast and real-time assessment (Hoerger, Quirk, Lucas, & Carr, 2010; Sevdalis & Harvey, 2009).

The three studies allowed a comparison between affective forecasting error using both System 1 and 2, only System 2, and only System 1. Appraising whether the magnitude and direction of the forecasting error was influenced by the type of processing used sheds light on our understanding of the relation between System 1 and 2 and affective forecasting error.

The three studies also expanded our understanding of how individuals predict and respond emotionally to outdoor natural and urban settings. In Study 1 participants watched

videos of an outdoor green space and an outdoor urban space. In Study 2 participants reflected on an outing of their choice from the previous week to an urban, coastal, or rural green space. In Study 3 participants were assigned to a walk in either an urban green space or an urban downtown. The three studies compared how individuals predict and respond emotionally to different types of outdoor natural and urban spaces.

1.4.1 Individual Differences

In addition to improving our understanding of System 1 and 2 processing, the dissertation expanded our understanding of how individual differences influence participants' affective forecasting accuracy for experiences in natural and urban spaces. Specifically, emotional intelligence (Hoerger, Chapman, Epstein, & Duberstein, 2012), and previous experience (Nielsen & Knutson, & Carstensen, 2009; Zhao & Meyer, 2007) were investigated.

Emotional intelligence (EI) is conceptualized as a cognitive process that involves the perception, understanding, use, and management of emotions (Mayer, Caruso, & Salovey, 1999; Mayer, Salovey, Caruso, & Sitarenios, 2001). EI has been linked to affective forecasting both directly (Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007), and indirectly (Emanuel, Updegraff, Kalmbach, & Ciesla, 2010; Gilbert, Killingsworth, Eyre, & Wilson, 2009; Markey & Vander Wal, 2007; Rash & Prkachin, 2013). Specifically, high levels of EI improve affective forecasting accuracy when individuals consolidate memories of previous emotional reactions to similar experiences (Hoerger, Chapmen, Epstein, & Duberstein, 2012).

Some researchers suggest that experience is related to emotional intelligence and the memory of past emotion. Individuals often use past experience when making an affective forecast (Meyvis, Levav, & Ratner, 2010), and in some instances, increased experience reduces affective forecasting error (Hoerger, Chapmen, Epstein, & Duberstein, 2012; Nielsen, Knutson, & Carstensen, 2008). Individuals seem to learn from negative experiences but not from positive

experiences because for positive experiences they tend to remember feeling more positive than they actually were (Wilson, Meyers, & Gilbert, 2001). This is called a retrospective durability bias and the reason for this is that individuals are not taking the time to think deeply about their emotional reaction but are just making a quick assessment (Wilson, Meyers, & Gilbert, 2003).

Study 1 and Study 2 recruited community members while Study 3 recruited university students. Recruiting from the community for two of the studies allowed a more representative sample of demographic variables such as age and gender. The way individuals respond to natural environments changes with age and gender. Astell-Burt, Mitchell, and Hartig (2014) found that as individuals age the benefits of a natural environment on their well-being changes. Men appeared to benefit earlier in life while women benefitted later in life. As well, women and men appear to have different access to green space, and to use it differently (Richardson & Mitchell, 2010). Men spend more time using competitive areas in parks than women, but general-purpose areas are used equally (Cohen, McKenzie, Sehgal, Williamson, Golinelli, & Lurie, 2007). Gender may also influence individuals' perceived stress and their relationship to greenery because men appear to use green spaces to release work stress (Lottrup, Grahn, & Stigsdotter, 2013).

1.4.2 Site Characteristics

All three studies examined how the type of environment participants experienced influenced their emotional response and the amount of time they spend in that type of environment. The type of environment visited influences an individual's experience, as specific environments are perceived to have particular properties that may, or may not be, conducive to the experience the individual seeks. Triguero-Mas et al. (2015) found that green space within 300 metres was related to improved health, but that access to blue space (water) did not demonstrate the same trends. These findings contradict research showing that individuals seek out blue space

for their own well-being (Bell, Phoenix, Lovell, & Wheeler, 2015), and research showing higher levels of positive affect in response to images of blue space rather than green space (White et al., 2010).

Being in close proximity to green space increases the likelihood that individuals will engage with the green space (Rhodes, Brown, & McIntyre, 2006). Specifically, individuals living within 300 meters of green space use the green space more (Reklaitiene et al., 2014; Toftager et al., 2011). The proximity to green space also impacts well-being and reduces stress levels for individuals who live closer (van den Berg, Maas, Verheij, & Groenewegen, 2010), but more recent evidence suggests the relationship is more nuanced and differs for each gender (Astell-Burt, Mitchell, & Hartig, 2014).

1.5 Research Questions

The dissertation had two primary overarching questions as well as specific hypotheses for each study. The overarching questions were:

1) Investigate how System 1 and System 2 influence the accuracy of affective forecasting for natural and urban outdoor environments.
2) Compare participants' affective forecasting error when they are exposed to natural versus urban outdoor environments.

Chapter 2 – Study 1

2.1 Overview

Historically, affective forecasting research used several designs to minimize potential demand characteristics and to ensure that forecasts did not influence real-time assessments. For example, researchers either used different participants to provide the forecast and the real-time assessment, or they would aggregate the data so a comparison between an individual's forecast and real-time assessment was impossible (Mathieu & Gosling, 2012). More recent affective forecasting studies use within-subject designs and have shown that collecting forecasts and real-time assessments close in time has no detrimental impact and allows for a more powerful design (Ruby, Dunn, Perrino, Gillis, & Viel, 2011).

Study 1 was based on research by Nisbet and Zelenski (2011) who conducted two separate studies asking participants to forecast their emotional response to walking inside and outside on a university campus and then provide a real-time assessment. One of their studies used an original forecasting model where the forecasters were different than the real-time experiencers, and the other study used a within-subject design. They found that participants underestimated their positive emotional response when walking outdoors and overestimated their positive emotional response when walking indoors. They also found that participants who walked outside reported a higher connection to nature after their walk than participants who walked indoors.

Study 1 expanded on Nisbet and Zelenski's (2011) work by comparing natural and urban outdoor settings rather than comparing indoor and outdoor settings. This adaptation was used to assess whether forecasting error would be the same for outdoor natural and outdoor urban spaces, or if forecast error would be larger for outdoor natural settings.

Similar to Nisbet and Zelenski's work, Study 1 assessed participants' positive and negative emotional responses to both environments, and measured participants' connection to nature. State inventories were used pre- and post-intervention to see if emotional response or connection to nature was influenced by the intervention.

Unique to this study, previous nature experience was used to predict the size of the forecasting error. Individuals often use past experience when making an affective forecast (Meyvis, Levav, & Ratner, 2010), and in some instances increased experience reduces affective forecasting error (Hoerger, Chapmen, Epstein, & Duberstein, 2012; Nielsen, Knutson, & Carstensen, 2008). This study is the first to assess whether the amount of previous experience in a natural environment reduces forecasting errors.

Study 1 used videos of local natural and urban settings as the manipulation and recruited community volunteers via posters and social media (see Appendix A).

2.1.1 Hypotheses for Study 1

Hypothesis 1 (H1): Participants will report a larger forecasting error for the nature video than for the urban video.

Hypothesis 2 (H2): Participants will report higher positive affect after the nature video than for the urban video.

Hypothesis 3 (H3): Participants will report higher negative affect after the urban video than for the nature video.

Hypothesis 4 (H4): Participants will report higher energy levels after the urban video than for the nature video.

Hypothesis 5 (H5): Participants will report higher connection to nature scores after the nature video than for the urban video.

Hypothesis 6 (H6): More previous experience with natural environments will reduce participant forecasting error for the nature video.

2.2 Method

2.2.1 Participants

After receiving ethical approval from UBC and approval from the University of Exeter Medical School (see Appendix B), participants (N= 39, 32 females, 7 males, M_{age} = 39, age range 17-61) were recruited from the community. To be eligible, participants had to be fluent in English.

As a thank you for their time, participants received a snack, a book on hiking in Cornwall, and were reimbursed for their parking fee.

2.2.2 Procedure

Study 1 was composed of two parts. Part 1 was completed online after participants opened the SmartSurvey link on their home computer. Part 1 consisted of online questionnaires (demographic questions and baseline trait assessments) and prompted participants at the end of the survey to schedule an in-person appointment at the European Centre for Environment and Human Health. Part 2 consisted of online questionnaires, watching two 10-minute movies, and selecting a snack to take home at the end of the appointment.

2.2.2.1 Part 1 Method.

Part 1 took approximately 25 minutes and occurred at the participants' homes. To begin participants completed the Informed Consent (see Appendix C) and created a Personal Identification Number (PIN) that was used by the researcher to identify them. To ensure they remembered their PIN, they were asked to use the first letter of the school they attended, the first letter of the street of their current address, and a 2-digit number.

After creating a PIN, participants completed demographic questions and were shown an example of a Circumplex Model. The description with the model explained that the x- and y-axis represented different variables (emotion and energy; see Appendix D). Participants then completed a demonstration Circumplex Model using the example of losing their house keys. They were asked to estimate their emotion and energy ratings at 2.5, 5, 7.5, 10 minutes, and 3 minutes after they found their keys (see Appendix E). This example was selected to demonstrate to the participants that their ratings of emotion and energy would change location on the model as time passed and their keys were still lost, and then when they found their keys.

Once participants completed the example questions they were asked to forecast their emotion and energy for both urban and nature settings for several time intervals. In both models, participants were asked to imagine sitting on a park bench. For the nature model they were told they would be viewing a country scene, and for the urban model they were told they would be watching traffic drive past. Participants also completed several online trait inventories, were asked about their previous outdoor behaviour, and were thanked for their participation. They were then automatically redirected to a SignUpGenius webpage where they entered their PIN and created a face-to-face appointment at the lab. The researcher was notified through SmartSurvey when participants completed Part 1.

2.2.2.1.1 Part 1 Measures.

Demographics. Participants reported their age, gender, and education (see Appendix F).

Affective Forecast – Positive and Negative Affect Schedule Short-Form (PANAS). The Short PANAS (Kercher, 1992; see Appendix G) has 10 items that consist of 5 positive adjectives and 5 negative adjectives. The Short PANAS demonstrates a two-factor structure, reliability, and stability for various ages (Mackinnon et al., 1999). The PANAS has been used in affective forecasting research (Nisbet & Zelenski, 2011; Quoidbach & Dunn, 2010; Zelenski et

al., 2013). In Study 1, participants forecasted their emotions for both the nature and urban videos using a five-point Likert-type scale with a response range from 1 “very slightly or not at all”, to 5 “extremely” for the 5 positive and 5 negative adjectives. The short-form PANAS was used as an affective forecast and a real time assessment. PANAS subscales of positive and negative affect were summed.

Affective Forecast Circumplex Model. Participants used a Circumplex Model (Russell, 1980; see Appendix H) to forecast their emotion and energy for both the nature and urban video. Participants were instructed to imagine what it was like to sit still and look at the countryside, and then instructed to imagine what it was like to sit still and watch traffic go by. For both scenarios, they were asked to forecast their energy and emotion at 2.5, 5, 7.5, and 10 minutes, and then 3 minutes after they stopped the activity. The question for both energy and emotion used a 21-point (-10 to 10) scale. The Circumplex Model was selected to assess whether valence or energy would change over time so that these could be compared to scores from the PANAS.

Nature Relatedness Scale - Trait. The Nature Relatedness Scale (Nisbet, Zelenski, & Murphy, 2008; see Appendix I) assesses participants’ trait connection to nature. The 21-item inventory has three subfactors: self, perspective, and experience. Participants responded using a five-point Likert-type scale that ranges from 1 “strongly disagree” to 5 “strongly agree”.

Past Behavior. Participants were asked three questions to assess their outdoor activity over the last week (see Appendix J). Participants were asked how many times they were out of doors, where they spent their time, and approximately how much time in total they spent outside. The questions were based on the Natural England Monitor of Engagement with the Natural Environment (MENE; 2016) project that has been collecting data since 2009.

2.2.2.2 Part 2 Method.

Part 2 took place in the lab at the ECEHH and took approximately 40 minutes. Participants were met in the lobby of the Knowledge Spa at the Royal Cornwall Hospital by the researcher/assistant and accompanied to the third-floor lab. The windowless lab was set up with a table, laptop, headphones, a projector and a large screen (see Appendix K). Prior to meeting the participant in the foyer, the researcher/assistant would open the link for Part 2 on the laptop, open both videos and minimize them to the bottom of the screen, check the volume on the headphones, and review the checklist (see Appendix L).

Participants were guided into the lab space, instructed where they could hang their coat and place their belongings, asked to turn their cell phone off, and seated in a chair beside the table. The researcher/assistant also sat at the table, gave a brief description of the experiment, and asked if the participants had any questions. Participants were then asked to draw a slip of paper from a bowl containing 10 slips of paper with 5 even and 5 odd numbers. The number drawn represented whether they would watch the nature (even number) or urban (odd number) video first and counterbalanced the treatments.

Participants were asked to begin Part 2 on the laptop in front of them and the researcher/assistant moved to a chair at the back of the room to allow the participant privacy. The researcher/assistant stayed in the lab for the duration of the study. The first page was a settling exercise intended to calm the participants (see Appendix M). Participants were then asked to record their PIN, to complete a state connection to nature question, and shown a Circumplex Model example to remind them of Part 1 of the study. Once the participants had viewed the Circumplex Model, they were told to turn to the researcher and ask them to start the first video. Prior to starting the video, an immersion script was read by the researcher/assistant (see Appendix N). The immersion script was to encourage the participants to fully engage with

the video and to imagine themselves in the actual environment presented to them. Once the immersion script was complete, participants were asked to put on the headphones and adjust them to be comfortable. Next, the lights were turned off and the first video was projected onto the large screen. The video automatically paused at 2.5, 5, and 7.5 minutes to allow participants to rate their current emotion and energy levels using the Circumplex Model. When the video paused, a message was projected onto the large screen: "The video will now pause for 45 seconds. Please turn your attention back to the computer for a moment to answer two questions. Then resume viewing." When the video concluded, a second message appeared: "This concludes the video portion of the study. Please turn your attention back to the computer and continue with the questions." Participants then rated their emotion and energy using the Circumplex Model (the 10-minute assessment), completed an item about their state connection to nature, completed an inventory about their current emotional state, and answered several items about their anticipated future behaviour. Participants then completed a final assessment of their current emotion and energy using the Circumplex Model (13-minute assessment).

At this point, the researcher/assistant asked the participant to stand up because they needed to set up the next video on the laptop. Participants were asked to step out of the lab and take a short break while the researcher/assistant set up the second video. While the participant was outside the lab, the researcher/assistant closed the window for the video that was just watched and projected the second video onto the large screen.

When the participant re-entered the room they were instructed to sit in the same chair and told that it was time to watch the second video. The researcher/assistant read the same immersion script before the video started, and the participant was instructed to put on the headphones. The same inventories, in the same order, were presented to the participants during and after the

second video that were presented during and after the first video. The final online page thanked the participants for their time and told them that Part 2 of the study was now complete.

At this point, the researcher/assistant turned the lights back on and sat back at the table with the participant. Participants were asked if they had any questions about the study and were provided with a debriefing (see Appendix O). Participants were reimbursed for their parking, given a book on nature walks, and given the snack of their choice in a take-away container. The researcher/assistant then walked the participant back down to the lobby of the Knowledge Spa.

2.2.2.2.1 Part 2 Measures.

Connection to Nature – State. The Inclusion of Nature in Self scale (INS; Schultz, 2002. See Appendix P) was used to assess participants' state connection to nature. The INS is a series of Venn diagrams showing increasingly overlapping circles. One circle is labeled as "nature" and one circle is labeled as "me". The assessment is short and demonstrates good face validity and good convergent validity (Schultz, 2002). It is highly correlated with other inventories that assess an individual's degree of nature connection (Nisbet & Zelenski, 2013; Schultz, 2001). Participants were asked to "Circle the number that best describes how you feel about nature right now."

Circumplex Model - State. Participants used a Circumplex Model to record their real-time emotion and energy for both the nature and urban video. Participants watched a video of countryside and of traffic. For both videos, they were asked to record their energy and emotion at 2.5, 5, 7.5, and 10 minutes, and then 3 minutes after they stopped watching the video. The question for both energy and emotion used a 21-point (-10 to 10) item.

Positive and Negative Affect Schedule Short-Form (PANAS) - State. Participants recorded their real-time emotions for both the nature and urban videos using a five-point Likert-type scale with a response range of 1 "very slightly or not at all" to 5 "extremely" for the 5

positive and 5 negative adjectives. Participants were asked "…to what extent you feel like this right now, IN THIS MOMENT". PANAS subscales of positive and negative affect were summed.

Future Behaviour. Participants were asked three questions about their anticipated behaviour over the upcoming week. They were asked the extent to which they intended to go into the type of environment they just watched (nature or urban), how does the amount of time selected compare to their previous behaviour, and what type of environment will they spend most of their time in (see Appendix R). The questions were used to assess whether an exposure to either video (nature or urban) influenced the anticipated future behaviour of the participant.

2.2.3 Research Design

Study 1 examined affective forecasting accuracy in a repeated measures within-participant design where each participant experienced two counterbalanced treatments. Participants watched two videos (nature and urban) and completed pre- and post-video inventories (Circumplex Model and PANAS). For the Circumplex Model, participants predicted their energy and emotion for 5 time points and then completed a real-time assessment for Energy and Emotion. Trait and state inventories of nature connection and previous experience in natural environments were measured.

2.3 Results

Factorial repeated measures ANOVAs, linear regression, and paired t-tests (both traditional and robust) were used for the primary data analyses. Before running the analyses, variables were assessed for normality with histograms, probability plots, and values of skew and kurtosis using SPSS version 24. When the assumptions of normality were questionable, robust methods in R were conducted.

To evaluate forecasting accuracy, difference scores subtracting forecast from real-time assessment (Hoerger et al., 2010; Zelenski et al., 2013) were calculated for the PANAS and the Circumplex Model. For the Circumplex Model, difference scores for Emotion and Energy at five time points (2.5 minutes, 5 minutes, 7.5 minutes, 10 minutes, 13 minutes) were calculated. A negative difference score indicates an overestimation while a positive difference score indicates an underestimation. Cribbie and Jamieson (2000) suggest difference scores are appropriate when the research question examines how scores vary over time.

The Circumplex Model Energy and Emotion difference scores were used as dependent variables for the factorial repeated measures analyses. The PANAS difference scores were used as the dependent variable for the ANOVA and linear regression analyses.

2.3.1 Descriptive Statistics

Descriptive statistics and differences score correlations can be found in Table 2.1 and Table 2.2.

2.3.2 Video Watched and Size of Forecasting Error

A paired t-test was calculated for the PANAS, and factorial repeated measures were calculated for the Circumplex Model. These calculations were used to assess Hypothesis 1 (H1): Participants will report a larger forecasting error for the nature video than for the urban video.

2.3.2.1 PANAS.

Paired t-tests were used to assess whether individuals reported larger forecasting errors for urban versus nature video with regards to either the PANAS positive or negative subscales. For positive affect, t-tests revealed that participants had a smaller forecasting error for the nature video (M = 0.54, SE = 0.75) than the urban video (M = 1.02, SE = 0.60). The difference of 0.48, 95% CI [-2.21, 1.24] was not significant $t(38) = -.57$, $p = .57$, and represented a small effect size, $r = .09$. The positive difference score mean for both the nature and urban video indicates that

participants underestimated their positive affect. For negative affect, t-tests revealed that participants again had a smaller forecasting error for the nature video (M = 0.15, SE = 0.22) than the urban video (M = -0.27, SE = 0.41). The difference of 0.41, 95% CI [-0.47, 1.29] was not significant $t(38) = .95$, $p = .35$, and represented a small effect size $r = .15$. Participants underestimated their negative affect for the nature video but overestimated their negative affect for the urban video as reflected in the negative difference score mean.

2.3.2.2 Circumplex Model.

Two factorial repeated-measures ANOVAs (Circumplex Model emotion and energy) were calculated to assess whether participants had larger forecasting errors for the nature video than the urban video over five time points. Although the five time points were evaluated, the hypotheses were specific to the overall effect of the video shown on forecasting error, rather than differences across time points. Simple contrasts were used to compare the video watched, and repeated contrasts were used for the five timepoints.

2.3.2.2.1 Emotion (valence).

For the model assessing emotional valence, Mauchly's Test of Sphericity was significant for time $\chi^2(9) = 23.22$, $p = .006$, and the interaction of time and video watched $\chi^2(9) = 31.219$, $p = .000$, which indicates the assumption of sphericity was violated. The degrees of freedom were adjusted using Greenhouse-Geisser for time ($\varepsilon = .75$) and for the interaction of time and video watched ($\varepsilon = .74$).

There was no significant effect of video watched on forecasting error for emotional valence $F(1, 38) = 0.16$, $p = .69$, partial $\eta^2 = .004$, with the estimated marginal means of the nature video, M = -0.51, SE = 0.57, and the urban video, M = -0.22, SE = 0.47. Note that negative numbers mean that the forecast was larger than the real time assessment for emotional valence. There was also no significant main effect for time point on emotional valence F(3,

113.93) = 1.91, p = .13, partial η^2 = .05, with the estimated marginal means of the five time points Time 1, M = -0.95, SE = 0.47; Time 2, M = -0.65, SE = 0.44; Time 3, M = -0.23, SE = 0.48; Time 4, M = -0.12, SE = 0.50; and Time 5, M = 0.12, SE = 0.41. The results indicate that participants' forecasting error for emotional valence did not vary between the nature and urban videos, or across time points.

There was a significant interaction effect for the video watched and time F(2.96, 112.34) = 4.51, p = .005, partial η^2 = .11, on emotional valence forecasting error. To evaluate this interaction, repeated contrasts were performed comparing each time point to the previous time point. The only contrast that was significant was from time point 4 to time point 5, F(1, 38) = 12.15, p = .001, partial η^2 = .24. The estimated marginal means plot (see Figure 2.1) shows that emotion forecasting error for time point 5 is different than the other four time points. Time point 5 was taken 3 minutes after the nature and urban videos finished. The plot shows that emotion forecasting error for the nature video was much higher than the other four time points and that for the urban video forecasting error was slightly lower than the other four time points. Although time point difference was not included as a hypothesis, the results demonstrate a change in the participants' emotional valence.

2.3.2.2.2 Energy.

For the model assessing energy, Mauchly's Test of Sphericity was significant for time $\chi^2(9) = 62.162$, p = .000, and the interaction of time and video watched $\chi^2(9) = 57.428$, p = .000, which indicates the assumption of sphericity was violated. The degrees of freedom were adjusted using Greenhouse-Geisser for time (ε = .181) and for the interaction of time and video watched (ε = .207).

There was no significant effect of video watched on forecasting error for energy F(1, 38) = 0.02, p = .88, partial η^2 = .001, with the estimated marginal means of the nature video M = -

0.22, *SE* = 0.75, and the urban video *M* = -0.05, *SE* = 0.78. Again, the negative numbers indicate that participants' forecast was larger than their real time assessment for energy. There was also no significant effect of time point on energy forecasting error $F(2.38, 90.59) = 0.87$, $p = .44$, partial $\eta^2 = .02$, with the estimated marginal means of the five time points Time 1, *M* = 0.13, *SE* = 0.53; Time 2, *M* = 0.13, *SE* = 0.48; Time 3, *M* = -0.31, *SE* = 0.60; Time 4, *M* = -0.59, *SE* = 0.75; and Time 5, *M* = -0.03, *SE* = 0.60. The results indicate that participants' forecasting error for energy did not vary between the nature and urban videos, or across the time points.

There was no significant interaction effect for the video watched and time $F(2.43, 92.45) = 1.40$, $p = .25$, partial $\eta^2 = .04$ on energy forecasting error. Therefore, the size of the forecasting error for the energy variable did not differ between the nature and urban videos across the five time points. While no predictions were made about forecasting errors differing across time points, a non-significant main effect and interaction confirmed this.

2.3.3 Video Watched and Positive Affect

A paired t-test was used to assess if individuals reported having higher positive affect scores on the PANAS after watching the nature video compared to the after the urban video (H2). On average, participants had higher positive affect after watching the nature video (*M* = 14.15, *SE* = 0.81) than after watching the urban video (*M* = 8.74, *SE* = 0.45). The difference of 5.41, CI [3.64, 7.18], was significant $t(38) = 6.18$, $p = .000$, and represented a large effect size, $r = .70$.

2.3.4 Video Watched and Negative Affect

A paired t-test was used to assess if individuals reported having higher negative affect scores on the PANAS after watching the urban video compared to the after the nature video (H3). On average, participants had higher negative affect after watching the urban video (M = 7.41, SE = 0.52) than after watching the nature video (M = 5.33, SE = 0.18). The difference of -

2.08, CI [-3.20, -0.96], was significant $t(38) = -3.75$, $p = .001$, and represented a medium effect size, $r = .52$.

As well, a robust paired t-test using the yuend () function in R (Wilcox, 2012) was used because both urban and nature PANAS negative variables demonstrated issues with skew and kurtosis. The analysis used a mean trim of 20%, with 2000 bootstrap samples. The results were significant $t(24) = -2.80$, $p = .01$, CI [-2.64, -0.40], and represented a large effect size, $r = .78$. The robust findings are congruent with the traditional t-test results and indicate that participants' negative affect was higher after watching the urban video than then nature video.

2.3.5 Video Watched and Energy Levels

A paired t-test was used to assess if individuals had higher energy levels after watching the urban video compared to after the nature video (H4). Time point 4 was used for the t-test because that is when the videos concluded. On average, participants had higher energy levels after watching the urban video (M = 10.97, SE = 0.73) than after watching the nature video (M = 9.69, SE = 0.93). The difference of -1.28, CI [-3.56, 1.00], was not significant $t(38) = 6.18$, $p = .26$, and represented a small effect size, $r = .18$.

2.3.6 Video Watched and Connection to Nature

A paired t-test was used to assess whether individuals had higher connection to nature scores after watching the nature video than the urban video (H5). On average, participants had a higher connection to nature score after watching the nature video (M = 5.05, SE = 0.22) than after watching the urban video (M = 3.21, SE = 0.25). The difference of 1.85, CI [1.37, 2.32], was significant $t(38) = 7.80$, $p = .000$, and represented a large effect size, $r = .78$.

2.3.7 Previous Experience and Forecasting Error for Nature Video

A linear regression was used to assess whether higher amounts of previous experience in a natural setting would predict lower forecasting error scores for the nature video (H6). The

variable Total Time Outside was considered to be indicative of previous experience spent in natural settings. A difference score was calculated for PANAS negative and PANAS positive (real time assessment minus forecast) to assess forecasting error and a linear regression was run for each variable.

The results of the regression for PANAS positive were not significant $F(1, 38) = 0.05$, $p = .83$, $f^2 = .001$. The $R^2 = .001$ so only 0.1% of the variation in forecasting error in positive emotion can be explained by the amount of time spent in nature. The model's constant was not significant [0.727, CI (-1.637, 3.092), $p = .54$], nor was the slope coefficient for previous amount of time spent in nature [-0.017, CI (-0.182, 0.147), $\beta = -.035$, $p = .83$].

The results of the regression for PANAS negative were also not significant $F(1, 38) = 1.55$, $p = .22$, $f^2 = .04$. The $R^2 = .04$ so 4% of the variation in forecasting error in negative emotion can be explained by the amount of time spent in nature. The model's constant was not significant [0.464, CI (-0.202, 1.129), $p = .54$], nor was the slope coefficient for previous amount of time spent in nature [-0.028, CI (-0.075, 0.018), $\beta = -.200$, $p = .22$].

2.4 Summary

Hypothesis one stated that participants would report a larger forecasting error for the nature video than the urban video. This prediction was based on work by Nisbet and Zelenski (2011) who demonstrated through two studies that participants underestimated how happy they would be after a walk outside. The current study failed to replicate these results as there were no significant differences in forecasting error between the nature and urban conditions for the PANAS or Circumplex Model. In addition, the direction of the affective forecasting errors varied from underestimation with the PANAS to overestimation with the Circumplex Model.

A reason for this discrepancy may be that the current study used videos of natural and urban environments, but the Nisbet and Zelenski study used real exposure. The participants in

their study walked in real indoor and outdoor settings and this may have increased their real time positive emotion more than watching videos of natural and urban settings. Participants in Study 1 demonstrated a general underestimation of negative and positive affect for the PANAS but a general overestimation of emotion and energy for the Circumplex Model (see Table 2.1). Given the discrepancy in the results between two inventories measuring emotion, it is plausible that the videos did not elicit a strong emotional response.

The second and third hypotheses addressed how positive and negative affect are influenced when participants are exposed to natural and urban settings. Hypothesis two predicted that participant positive affect would be higher after the nature video than after the urban video and this was supported by the data. Participants reported significantly higher positive affect after watching the nature video than after watching the urban video (r = .52). These findings are congruent with earlier research suggesting that when individuals are exposed to simulations of nature they experience an increase in positive affect (McMahan & Estes, 2015). The third hypothesis predicting that negative affect scores would be higher after the urban video than after the nature video was also supported. Both a classic and robust analysis revealed that participants reported significantly higher negative affect following the urban video than the nature video. These findings are consistent with earlier research suggesting that exposure to nature reduces negative affect compared to other experimental conditions (McMahan & Estes, 2015).

The fourth prediction was that energy levels would be higher after the urban video than the nature video. Participant energy ratings at the conclusion of the videos (time point 4) were compared. The urban video had a higher mean score than the nature video but it was not a significant difference (p = .26). This hypothesis was based on research indicating that walking on a busy street was rated the lowest for restoration and relaxation when compared to other locations (Staats, Jahncke, Herzog, & Hartig, 2016). Other research suggests that being in nature

can increases an individual's vitality (Tyrväinen, et al., 2014) and energy (Bowler, Buyung-Ali, Knight, & Pullin, 2010) so the reason for the lack of findings may be that participants experienced an energy increase from watching the nature video as well as an increase in energy from the urban video.

The fifth prediction that connection to nature scores would be higher after the nature video than the urban video was supported by the data. Participants had a significantly higher connection to nature after watching the nature video. The results are congruent with previous research demonstrating that connection to nature can be increased through nature videos (Mayer, McPherson Frantz, Bruehlman-Senecal, & Dolliver; Soliman, Peetz, and Davydenko, 2017). The findings suggest that participants related to the videos, and that the video manipulations were effective.

The final hypothesis predicting that participants with higher amounts of nature experience would have lower forecasting error for the nature video was not supported. Participants did not show a reduction in forecasting error for positive or negative emotion for the nature video. The lack of findings could be due to the manipulation being a video rather than real exposure to a natural setting. It is possible that participants had difficulty predicting how they would feel watching a video of nature if they have not watched nature videos in the past.

2.4.1 Limitations

One limitation of Study 1 is the use of videos instead of real exposure to natural and urban settings. Although research indicates the effectiveness of videos for connectedness to nature and positive affect, real exposure is generally considered to be more effective (Kahn, Friedman, Gill, Hagman, Severson, Freir, Feldman, Carrére, & Stolyar, 2008; Kahn, Severson, & Ruckert, 2009; Mayer et al., 2009). No difference in forecasting error was found between the

nature and urban videos and it may be that the manipulation was not strong enough to precipitate a difference.

A second consideration regarding the videos is that participants were not given the opportunity to view the videos prior to making their affective forecast. This can be problematic as participants are forecasting their emotional response to a stimulus that they do not have any experience with.

Another limitation is the sample size of the study (N = 39). Recruiting from the community proved to be more challenging than anticipated and the participant sample was not as large as hoped. Given the small sample size, it is possible that there may have been an effect that was not detectable.

The demographics of the sample are also problematic as there were only seven male volunteers that participated in the study.

Although there are advantages to a within-subjects design regarding reduced variability of individual differences and improved statistical power, there are also limitations. It is possible that the participants were more aware of the hypotheses because they were exposed to both the nature and urban conditions. This could have led to a response bias when completing the inventories.

Due to the repetitive nature of the questions that the participants were asked using the Circumplex Model, it is possible that participants became fatigued or bored, or that practice effects influenced their responses.

2.4.2 Review

Study 1 demonstrated that exposure to a nature and urban video influenced participants' affective response and connection to nature. Participants felt more positive affect after the nature

video and more negative affect after the urban video. Participants also had higher connection to nature scores after the nature video.

Chapter 3 – Study 2

3.1 Overview

Study 2 used data from the Monitor of Engagement with the Natural Environment Survey (MENE; Natural England, 2018), which conducts interviews across England asking individuals about their visits to natural environments. Participants are asked to reflect on their visit and so all reported variables are retrospective.

The MENE data were of interest because the survey asks participants to identify in hindsight the purpose of their visit to an outdoor space and to evaluate their outcome from the visit. This is different from Study 1 and 3 where participants were asked to forecast before the event, and then asked for a real-time assessment. Examining affective intentions and outcomes (Study 2) provides a complementary perspective to the forecasting research regarding how individuals make affective forecasting errors when they think about going into nature (Study 1 and 3).

Retrospective assessments are not as common in research on affective forecasting as predictive assessments, but they are used to assess cognitive errors when assessing emotional responses to personal events (Fredrickson & Kahneman, 1993; Loewenstein & Frederick, 1997; Loewenstein & Schkade, 1999; Wilson & Gilbert, 2003). Individuals consistently demonstrate a retrospective bias when assessing their emotional response to a past event and do not appear to succumb to a commitment bias (Van Boven & Ashworth, 2007; Wilson & Gilbert, 2003). Duration of the event does not seem to influence the retrospective evaluation (Fredrickson & Kahneman, 1993), but participants report higher emotional intensity for future events than past events (Van Boven & Ashworth, 2007). Given the research demonstrating that a retrospective error exists, Study 2 used participants' recalled purpose and recalled outcome from their outdoor visit.

Study 2 participants used System 2 processing for the retrospective assessments they gave for the purpose and outcome of their outing. This is in contrast to Studies 1 and 3 where participants used System 2 processing for the forecast, and System 1 processing for the real-time assessment.

Study 2 assessed the discrepancy between an individual's recalled emotional purpose (relaxation) for spending time outdoors and their recalled emotional outcome of the experience. The discrepancy between the purpose and the outcome was used as a measure of error regarding the participants' emotional state. The findings shed light on retrospective errors individuals make regarding their emotional intentions and outcomes when going into outdoor settings.

Study 2 also examined the individual differences of age and gender to see if they influenced the size of the affective forecasting error for outdoor settings. Individual differences such as age and gender have been shown to influence the way individuals' respond to natural spaces (Elliott, White, Taylor, & Herbert, 2015; White, Pahl, Ashbullby, Herbert, & Depledge, 2013; Wyles et al., 2017).

While Studies 1 and 3 used outdoor urban and rural categories, Study 2 used an additional outdoor category. Participants were asked to identify the type of outdoor environment they visited with the categories of urban, rural and seaside.

3.1.1 Hypotheses for Study 2

Hypothesis 1 (H1): The percentage of individuals who stated they felt calm and relaxed after their nature visit (real-time assessment) is higher than the percentage of individuals who went on their nature visit to purposefully become relaxed and unwind (forecast).

Hypothesis 2 (H2): Nature visits to blue space (i.e., spaces that include water) will receive higher relaxation scores as compared to green space.

Hypothesis 3 (H3): Younger individuals will report feeling less relaxed by visits to nature than older adults.

Hypothesis 4 (H4): Women will report feeling more relaxed by visits to nature than men.

3.2 Method

3.2.1 Participants

Based on quota sampling, data are collected year-round from participants, aged 16 or older, from across the country and the data are considered to be Official Statistics by the U.K. Statistics Authority. The MENE is structured to survey participants equally across geographical regions and socioeconomic groups.

For the purposes of this analysis, only data from years 8 and 9 were included (n = 43,606). This decision was made because the survey length and data collection methodology changed in February 2016. Including data exclusively from the last two years (March 2016-February 2018) ensured consistency in the data collection methodology.

MENE participants were asked to agree or disagree with various statements regarding the outcome of their visit. For the purposes of this study, only participants who responded to the question "it made me feel calm and relaxed" were selected (n = 3,374).

3.2.2 Procedures

The MENE survey is funded by Natural England and is part of a larger national omnibus survey that has been administered over the past nine years. Approximately 800 in-home interviews are conducted each week with participants asked about the time they have spent outside over the preceding week. "Outside" includes areas such as in and around towns, the countryside, and on the coast, but does not include time spent in their own garden. Many of the survey questions are included each week, but other questions are asked once per month, or once per quarter.

3.2.2.1 Measures.

For the purpose of Study 2, specific questions from the MENE database were selected. The variables of interest included demographic variables (i.e., age and sex; see Appendix S), environment visited (see Appendix T), recalled purpose of the visit (see Appendix U) and recalled outcome of the visit (see Appendix V).

Demographic information. The MENE survey categorizes age into six groups and gender is listed as male or female (see Appendix S). The highest percentage of participants were in the 65+ category and just over half were female.

Environment visited. Each MENE respondent identifies the type of environment they visited. The visit is coded as one of four options: "in a town or city"; "in a seaside resort or town"; "other seaside coastline"; and "in the countryside" (see Appendix T).

Purpose of Visit. The main predictor variable for Study 2 was the purpose of the visit to a natural setting. Participants have 14 categories to choose from (see Appendix U) and can choose as many categories as they want. This study included individuals who answered either "yes", or "no" to the question of did they go "to relax and unwind". The retrospective assessment of the visit's purpose is considered the participants' forecast.

Outcome of Visit. The dependent variable is the outcome of the visit. Participants are asked to think about their visit to a natural space and rate on a scale (1 = *strongly agree* to 5 = *strongly disagree*), to the item "it made me feel calm and relaxed" (see Appendix V). This question is asked once per quarter and so the sample size for this study is smaller than for questions asked weekly. The retrospective assessment of the outcome is considered the participants' real-time assessment.

3.2.3 Analytical Method

Multiple regression using SPSS 24 was used to analyze the relation between the purpose for the visit and the outcome of the visit, which was considered the dependent variable. Using hierarchical entry, purpose of the visit "to relax and unwind" (no = 0, yes = 1) was entered into the model in Step 1.

In Step 2, dummy coded variables of environment type were entered. Due to the smaller number of responses in the two seaside categories, they were collapsed into one category (White et al., 2013; Wyles et al., 2017). The three environments used for the analyses were "urban green", "rural green", and "coastal". Rural green was used as the reference category for the analysis.

In Step 3, demographic variables including age and gender were added. Similar to previous studies, Female (0) was used as the reference category for gender, and 35-44 years (0), as the reference category for age. The dependent variable was the outcome of the visit "it made me feel calm and relaxed".

3.3 Results

The model did not demonstrate collinearity as the average variance inflation factor (VIF) was 1.326, and the casewise diagnostics did not show evidence of bias.

A regression model was used to evaluate whether participants underestimated the degree to which time spent in nature would be relaxing, by comparing their recalled purpose and their recalled outcome (H1). Step 1 of the regression revealed that participants who purposefully went to relax (coded as 1), felt more relaxed than individuals who did not walk to relax (coded as 0; Table 4.2). The regression coefficient $\beta = -.14$, $p < .001$, $f^2 = .02$ indicated that lower scores (i.e., 1 = strongly agree) on the outcome of the visit, were associated with greater eventual relaxation after their nature visit. Thus, expectations of relaxation were related to the experience of

relaxation. To directly address the hypothesis that a higher percentage of participants experienced relaxation than purposefully went out to become relaxed (H1), participants' self-reported purpose and outcome statements were compared. The accuracy of participants' purpose was evaluated by examining whether the percentage who experienced relaxation was greater than the percentage who initially stated relaxation as the purpose for their nature visit. The results confirm that while only 33.3% of the participants went outside to relax, a robust 87.9% agreed, or strongly agreed, that they felt relaxed after their nature visit. The participants' feelings of relaxation from time in nature is congruent with other research, and can be considered an underestimation, or forecasting error.

To evaluate the prediction that environment location would influence the participants' reported relaxation (H2), Step 2 of the regression compared urban green space to rural green space, as well as coastal areas to rural green space. The results indicate that individuals who visited rural green areas reported feeling more relaxed ($\beta = .07$, $p < .001$, $f^2 = .026$) after their walk than individuals who visited urban green spaces. There were no significant differences between rural green and coastal areas.

Comparing pre- and post-relaxation scores for each of the three environments, 37% of participants went to a rural green space to relax and 90% felt relaxed after their outing. 30% of participants went into an urban green space to relax and 86% reported feeling relaxed after their outing. Finally, 35% of participants went to a coastal area to relax and 92% felt relaxed after their outing.

Step 3 of the regression addressed the predictions that older adults, and women (H3 and H4), would feel more relaxed after their nature visit. The results indicate no significant differences for age categories (range of $\beta = -.00$ to .04), or gender ($\beta = .03$). The effects of walk

purpose and environment type remained significant when controlling for age and gender in Step 3.

3.4 Summary

The primary purpose of Study 2 was to assess whether there was a discrepancy between an individual's recalled purpose for visiting a natural space, and their recalled emotional outcome of the experience. As both assessments were retrospective, participants used their System 2 cognitive processing as they reflected on their experience. Study 2 was designed to further investigate whether individuals underestimate the positive emotions they feel when exposed to a natural environment.

The first prediction (H1) was that more individuals would feel relaxed after their outing than purposefully went to feel relaxed. The prediction was supported as 33.3% of participants reported purposefully going into nature to relax and unwind, and 87.9% of participants reported they agreed or strongly agreed their nature experience made them feel calm and relaxed. The high percentage of agreement suggests that although not intending to, participants felt more relaxed after spending time in a natural space. These findings are congruent with reports of individuals feeling more relaxed in natural green spaces (Korpela, Ylén, Tyrväinen, & Silvennoinen, 2008; Korpela, Ylén, Tyrväinen, & Silvennoinen, 2010). The discrepancy between the reason for going and the outcome of the visit may indicate that participants were not aware of the relaxing benefits of spending time in nature.

There may also be an added effect of intention as participants who purposefully went to relax reported feeling more relaxed after the outing than participants who were not going to relax. Although not directly asked in the survey, it may be that those who purposefully went into nature to relax were more mindful of their surroundings. Research indicates that individuals who

are more mindful when spending time in nature have higher ratings of positive affect after the experience (Wolsko & Lindberg, 2013).

The second step in the model addressed the prediction that participants would report feeling more relaxed after visiting a coastal area, as compared to urban green and rural green spaces (H2). Participants reported feeling more relaxed when visiting a rural green space when compared to an urban green space, but there were no significant differences between rural green spaces and coastal areas. This suggests that participants felt similar levels of relaxation after spending time near the coast and in rural green spaces but did not feel as relaxed after spending time in urban green spaces.

The participants' higher relaxation ratings in rural green space as compared to urban green space are similar to earlier MENE research (White, Pahl, Ashbullby, Herbert, & Depledge, 2013), and consistent with the literature (Korpela, Ylén, Tyrväinen, & Silvennoinen, 2010). Individuals are more relaxed when visiting green areas in the countryside, than when visiting green areas within cities or towns.

The lack of differentiation between rural green areas and coastal areas was surprising. Earlier MENE studies have found that participants rate a coastal visit as more restorative than a rural green visit (White, Pahl, Ashbullby, Herbert, & Depledge, 2013). The White et al. study used a different criterion variable called recalled restoration; a combination of "calm and relaxed" and "refreshed and revitalized". This may have influenced the results as if participants experienced coastal areas as revitalizing more than relaxing.

The third step in the model included demographic variables and addressed two different predictions. Prediction one was whether younger participants would report feeling less relaxed than older participants after they visited a natural space (H3). Prediction two was whether men would report feeling less relaxed than women after visiting a natural space (H4). Neither age nor

gender influenced participant retrospective relaxation ratings. These findings are congruent with other studies (Korpela, Ylén, Tyrväinen, & Silvennoinen, 2010), but previous MENE studies have found that young people and men are less restored by natural spaces (White, Pahl, Ashbullby, Herbert, & Depledge, 2013; Wyles, White, Hattam, Pahl, King, & Austen, 2017). For the MENE studies the criterion variable was a combination of relaxation and revitalization and it may be that the younger participants and men are more revitalized by natural spaces than older adults and females, and that these differences account for the results.

3.4.1 Limitations

Multiple limitations are linked to the format of the MENE and the set questions participants are asked. The MENE question "what was the purpose of your visit?" was selected as the participants' forecast but this is not the same as asking individuals "what was your anticipated emotional response?" In addition, the framing of this question regarding the visit purpose requires participants to answer "yes", or "no". This binary response limits the analysis and is not typical of forecasting research where a pre and post, response mean is compared. The use of the predetermined question has limitations but is still useful when assessing participants' retrospective affective forecast for their outing.

The MENE is structured as a retrospective assessment of a nature visit from the previous week. The time frame between the nature visit and the MENE questions varies depending on which visit the participant chooses to report on. This arrangement could lend itself to unintentional retrospective bias by the participants.

The criterion variable to "relax and unwind" is unique in the nature and well-being literature. In most studies, relaxation is considered part of a larger construct of emotional well-being, or physiological arousal. The lack of continuity makes the comparison of the findings difficult and suggests that more research be conducted.

3.4.2 Review

Study 2 demonstrated that using System 2 processing, participants underestimated their feelings of relaxation after a nature visit. Although it is not typical to use retrospective assessments, these findings still suggest that participants were not aware that going into nature would induce a state of relaxation. Their primary purpose for the visit may have been different, but they received unexpected positive benefits from the outing. The findings also show that the environment you spend time in matters to your overall well-being. Participants who spent time in natural green spaces or coastal areas felt more relaxed than those who spent time in urban green areas.

Chapter 4 – Study 3

4.1 Overview

Study 3 involved a real walk in an outdoor natural or outdoor urban environment. The study focused on individual differences, walking location, and cognitive load in regard to forecasting accuracy. Not all individuals share the same affective forecasting biases, and individual differences such as previous experience (Nielsen & Knutson, & Carstensen, 2008; Zhao & Meyer, 2007) and emotional intelligence (Hoerger, Chapman, Epstein, & Duberstein, 2012) influence affective forecasting accuracy. The individual difference of connection to nature was also assessed. In addition to testing individual differences, Study 3 used cognitive load manipulation for half the participants as it has been shown to interfere with affective forecasting accuracy (Evans & Stanovich, 2013; Sevdalis & Harvey, 2009).

Some researchers suggest that emotional intelligence is related to experience and the memory of past emotion. Emotional intelligence (EI) is conceptualized as a cognitive process that involves the perception, understanding, use, and management of emotions (Mayer, Caruso, & Salovey, 1999; Mayer, Salovey, Caruso, & Sitarenios, 2001). EI has been linked to affective forecasting both directly (Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007), and indirectly (Emanuel, Updegraff, Kalmbach, & Ciesla, 2010; Gilbert, Killingsworth, Eyre, & Wilson, 2009; Markey & Vander Wal, 2007; Rash & Prkachin, 2013). Specifically, high levels of EI improve affective forecasting accuracy when individuals consolidate memories of previous emotional reactions to similar experiences (Hoerger, Chapmen, Epstein, & Duberstein, 2012).

Related to the amount of previous experience and emotional connection to a particular environment is an individual's connection to nature. Spending time away from natural areas has been shown to reduce the emotional connection that individuals feel towards nature (Hinds & Sparks, 2008) and their attachment to it (Zhang, van Dijk, Tang, & van den Berg, 2015). This

study investigated a moderated relation between connection to nature, environment visited, and affective forecasting error.

Study 3 used cognitive load manipulations for half the participants in an attempt to overload their working memory (System 2). The manipulation was designed to overload System 2 so that participants would use System 1 processing to make their forecast. System 1 is considered to be automatic and instinctive and is thought to be the processing system used when making a real-time assessment. This manipulation forced participants to use System 1 for their forecast and real-time assessment. Cognitive load manipulations similar to this have been shown to improve the accuracy of affective forecasting by reducing the impact bias (Hoerger, Quirk, Lucas, & Carr, 2010; Sevdalis & Harvey, 2009). The study employed a daily diary and rating task that has been used previously in affective forecasting research (Hoerger et al., 2010). Hoerger et al. used the same manipulation one to eight weeks in advance of participants' real-time assessment.

4.1.2 Hypothesis for Study 3

Hypothesis 1 (H1): Participants in the nature condition will report higher levels of happiness post-walk than participants in the urban condition.

Hypothesis 2 (H2): More previous experience with a particular environment (urban/nature) will reduce forecasting error for the same environment.

Hypothesis 3 (H3): Participants with high levels of emotional intelligence will report smaller forecasting error.

Hypothesis 4 (H4): Participants in the nature condition will report a larger forecasting error than participants in the urban condition.

Hypothesis 5 (H5): Participants who experience priming will report a smaller forecasting error.

Hypothesis 6 (H6): Participants in the nature condition with high connection to nature scores will have smaller forecasting errors than participants with low connection to nature scores.

4.2 Method

4.2.1 Participants

After receiving ethical approval, participants were recruited through the University of British Columbia Psychology Department's SONA participant pool (see Appendix W). To be eligible, participants had to be enrolled at UBC Okanagan, fluent in English, and have signed the Informed Consent (see Appendix X).

205 participants (151 females, 54 males, age range 17-61) completed Part 1 of the study and 161 participants (121 females, 40 males, age range 17-52) completed all three parts of the study. Most of the participants (155) were in the age range of 17-25. Participants who completed Part 1 at home but who did not complete the walk (Part 2) were excluded from the analysis.

4.2.2 Sample Size Determination

Previous research has identified an effect size of $r = 0.31$ for positive emotion when participants are exposed to natural environments (McMahan & Estes, 2015). Based on this value, a study would require 84 participants to achieve .80 power to replicate those effects. Given the addition of other predictors, a sample of 205 participants was collected.

4.2.3 Research Design

Study 3 examined the accuracy of affective forecasts and behavioural intention and happiness when participants were subjected to different treatments. The study had two between group independent variables. The first variable was cognitive load (manipulation or no manipulation) and the second variable was walking location (urban or nature). Study 3 included multiple individual difference variables such as connection to nature, happiness, emotional intelligence, previous experience, and future behaviour.

4.2.4 Procedure

Study 3 was composed of three parts. Part 1 was completed online when participants initially signed up for the study on the SONA website. Part 1 consisted of online questionnaires and requested that participants download a free mobile application. Part 2 consisted of several short online questionnaires and a 20-minute walk. Participants were tracked on the walk using a GPS application. The use of GPS tracking has been used successfully in other studies to ensure participants can have an independent experience while still ensuring compliance to the assigned walk (MacKerron & Mourato, 2013; Wolf & Jacobs, 2010). Part 2 was completed between 24 hours and 20 days after Part 1. Part 3 consisted of several open-ended questions and was completed between several minutes and 5 days after completing Part 2.

4.2.4.1 Part 1.

When participants signed up for the study on the SONA website, the researcher was notified by FluidSurveys via email. Participants selected a date and time to complete Part 1 and Part 2. One day prior to their Part 1 scheduled appointment participants received an email containing the UBC FluidSurveys link for Part 1 (see Appendix Y).

Within the FluidSurveys application a random number generator assigned participants to one of four conditions: urban manipulated, urban non-manipulated, nature manipulated, and nature non-manipulated. Participants were blind to the other three conditions.

In Part 1, participants completed several inventories online (see Part 1 Measures) and created a personal identification number (PIN) that was used by the researcher to identify them. To ensure they remembered their PIN, they were asked to use the first two letters of the street they currently live on and their birth date (see Appendix Z).

Once the initial inventories were complete and a PIN was created, participants were asked to download the free Family Locator-GPS Tracker Life 360 mobile application to their

phone (see Appendix AA). At this point, participants from two of the conditions (urban manipulated and nature manipulated) experienced a cognitive distraction task (see Appendix BB) that was used as one of two interventions. The next portion of Part 1 showed participants a description of their upcoming walk (nature or urban) as well as a map of the route (see Appendix CC and DD). All participants were asked to forecast their happiness after a 20-minute walk in their assigned environment. Once the forecast was complete, participants were thanked for their time and told that the researcher would send them further instructions 24 hours before Part 2 (the walk) was to take place.

4.2.4.1.1 Part 1 Measures.

Demographics. Participants completed two demographic questions including age and gender (see Appendix EE).

Manipulation. In each condition, (nature and urban), approximately half the participants were randomly assigned to a manipulation right before their affective forecast. The manipulation was designed to overload System 2, or rational processing, because overloading System 2 in an unrelated task can improve forecasting accuracy (Hoerger, Quirk, Lucas, & Carr, 2010; Sevdalis & Harvey, 2009; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000). The cognitive load manipulation was not part of the participants' forecast but designed to exhaust System 2. By overloading System 2, participants would be forced to use System 1 for their affective forecast.

Participants were told to write down as many daily activities as they could for three minutes and to make the list as long as possible (see Appendix BB). They were then told they had two minutes to rate each of the listed activities in terms of how much they enjoy the activity (see Appendix X). Both tasks were written in a style to make the participants work quickly. Diary manipulation has been used extensively in affective forecasting research (Hoerger, Quirk,

Lucas, & Carr, 2010; Sevdalis & Harvey, 2009; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000).

Happiness - Trait. Participants' general happiness was assessed with the question "How happy would you say you are these days?" (see Appendix FF) on a nine-point Likert-type item with a response range of 1 "not at all happy" to 9 "extremely happy". The question correlates strongly with the Satisfaction With Life Scale, the Affectometer 2 scale (Gilbert, Pinel, Wilson, Blumber, & Wheatley, 1998), the Positive and Negative Affect Schedule (Quoidbach & Dunn, 2010), and has been used as a baseline measure in other affective forecasting research (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson, Wheatley, Meyers, Gilbert, & Axsom, 2000).

Inclusion of Nature in Self (INS) – Trait. The INS (Schultz, 2002. See Appendix GG) was used to assess participants' overall connection to nature. The INS is a series of Venn diagrams showing increasingly overlapping circles. One circle is labeled as "nature" and one circle is labeled as "me". The assessment is short and demonstrates good face validity and good convergent validity (Schultz, 2002), and is highly correlated with other inventories that assess an individual's degree of nature connection (Nisbet & Zelenski, 2013; Schultz, 2001). Participants were asked "How interconnected are you with nature in general?" and then asked to select one of the seven circles in the Venn diagram.

Emotional Intelligence (EI) – Trait. The EI is the short-form of the Trait Emotional Intelligence Questionnaire (TEIQ-SF; Petrides & Furnham, 2006; see Appendix HH). The 30-item inventory has four broad subfactors: emotionality, well-being, sociability, and self-control. The inventory has a seven-point Likert-type item that ranges from 1 "completely disagree" to 7 "completely agree". The inventory has been used to highlight improved affective forecasting accuracy, and in particular, the well-being and emotionality subfactors (Hoerger, Chapman,

Epstein, & Duberstein, 2012). The inventory demonstrates good psychometric properties and multidimensionality (Cooper & Petrides, 2010; Perera, 2015).

Past Behaviour Questions. Participants were asked how much time they normally spend in natural or urban environments (see Appendix II). The questions regarding environmental exposure replicate questions asked during Study 1 and indicate whether spending time in either environment is considered a regular habit.

Forecast of Walk. Participants were shown a written description and a map of either the urban or nature walk. They were asked to forecast their future emotional happiness with the question, "How happy do you think you will be after this walk?" on a nine-point Likert-type item with a response range from 1 "not at all happy", to 9 "extremely happy" (Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007; see Appendix JJ). The participants' response was considered their emotional forecast.

4.2.4.2 Part 2.

After participants completed Part 1, the researcher sent an email asking them to book a walk (see Appendix KK). Once the walk was booked, participants were emailed instructions approximately 24 hours prior to their walk. The email contained instructions on how to drive or take public transit to either the nature (see Appendix LL) or urban walk location (see Appendix MM), instructions on how to proceed once they arrived on site, a UBC FluidSurveys link, and an activation code for the Family Locator-GPS Tracker Life 360 mobile application. Once the participants were on-site, they were instructed to open the UBC FluidSurveys link. The survey instructed participants to enter the Family Locator-GPS Tracker Life 360 mobile application code that was emailed to them, thus linking the participant and researcher's phones.

Participants were instructed to shut off all mobile applications other than the GPS tracker and the FluidSurveys link prior to beginning the survey (see Appendix NN) and were asked to

enter their PIN for identification. After entering their PIN, participants were asked a question about their current happiness (see Appendix OO) and about their current connection to nature (see Appendix PP). After the questions, they were reminded to focus on their walking environment which included not using their phone and paying close attention to the sights, sounds, and smells around them (see Appendix QQ).

If participants did not have a data plan associated with their mobile phone, the researcher called the participant once they arrived on site, read the instructions, and ask the pre- and post-walk questions by cell phone. There were three participants who did not have a data plan and were given instructions and asked pre- and post-walk questions by cell phone.

Once the pre-walk questions were completed, participants were told how long their walk would take, shown a description of their walk, and shown a map with an arrowed path indicating the direction of the walk (see Appendix CC and DD). A time delay was entered into the FluidSurveys link so that participants could not move forward in the questionnaire and answer the post-walk questions, before a minimum of 10 minutes had elapsed.

Both the urban and nature walks consisted of a rectangular pathway to minimize the risk that a participant would get lost or disoriented during the walk. Both walks were designed to take approximately 20 minutes, and the urban walk was 200 meters longer than the nature walk. To ensure compliance, the researcher tracked each participant using the GPS tracking application during their walk. All the participants followed the instructions and completed their assigned walks. In some instances when the participants were unsure of the route, they would text the researcher prior to starting their walk. In 20 instances, the link to FluidSurveys was lost before completing the post-walk questions and so the researcher called the participants to ask them the post-walk questions. This could have been due to a poor cell phone connection or because the

participant inadvertently closed the FluidSurveys link. This occurred for twelve of the urban participants and eight of the nature participants.

After the walk was complete, participants were asked if they were back at the starting point. When the participants clicked "yes", the survey moved to the post-walk questions and asked for their current happiness and current connection to nature (see Appendix OO and PP). The participants then answered two questions about their future behaviour (see Appendix RR).

4.2.4.2.1 Part 2 Measures.

Happiness - State. Participants answered a pre- and post-walk question measuring state happiness with the question "How happy are you right now?" (See Appendix OO) on a nine-point Likert-type item with a response range from 1 "not at all happy", to 9 "extremely happy". The happiness assessment has been used successfully in other affective forecasting studies (Dunn, Wilson, Gilbert, 2003; Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson, Wheatley, & Meyers, 2000).

Connection to Nature – State. The Inclusion of Nature in Self (INS; Schultz, 2002) was used as a pre- and post-walk assessment of the participants' current connection to nature (See Appendix PP). The INS asked participants "How interconnected are you with nature in this moment?"

Future Behaviour. Two questions were used to assess the participants' predictions about their future behaviour. One question asked about the participants' intentions to spend time during the following week in the same type of environment as their walk (see Appendix RR). A second question asked how their answer compares to the normal amount of time they spend in this type of environment (see Appendix RR). The questions were used to assess participants' behavioural intentions.

4.2.4.3 Part 3.

After each participant completed their walk, the researcher sent an email containing the FluidSurveys link for Part 3 (SS). Participants completed Part 3 on their home computer or on their mobile phone. Once the participants entered their PIN, they were asked three open-ended questions regarding their experience as a participant in the study (see Appendix TT). Participants were told they could write as much, or as little, as they wanted for each question. After completing the questions, participants were told that the study was complete and they were thanked for their time.

When the researcher received notification from FluidSurveys that Part 3 was completed, SONA credits were awarded to the participant. Participants were also sent an email that contained a thank you and a debriefing statement (see Appendix UU and VV). They were asked to not share the debriefing statement.

4.2.4.3.1 Part 3 Measures.

Personal Insights. Participants were asked what they learned about themselves and what they learned in general from doing the study (see Appendix TT). The open-ended questions were included to offer participants a chance to reflect on the study and offer their own insights.

Purpose of Study. Participants were asked what they thought the study was about. This question was used to assess whether participants knew there were two walking conditions. The question was used so the researcher could identify participants who may have succumbed to demand characteristics.

4.3 Results

Linear regression, analysis of variance, and moderated regression were used for the primary data analyses. Dummy variables were created for the categorical variables of Location (0 = Nature, 1 = Urban), and Manipulation (0 = Not Primed, 1 = Primed).

To evaluate forecasting accuracy, a difference score was calculated using the variables Forecast of emotional happiness and Post-Walk Happiness. Participant forecast was subtracted from their post-walk rating (Hoerger et al., 2010; Zelenski et al., 2013).

The happiness difference score was used as the dependent variable for the ANOVAs, linear regressions, and moderated regression.

Prior to running the analyses, variables were assessed for normality with histograms, probability plots, and values of skew and kurtosis using SPSS version 24. Analysis was conducted using SPSS and R. When assumptions of normality were questionable, robust methods in R were also implemented (Field & Wilcox, 2017; Mair & Wilcox, 2017).

4.3.1 Descriptive Statistics

Descriptive data such as variable means, standard deviations, and cell sizes are provided in Table 4.1. In addition, Spearman correlations and bootstrapped confidence intervals of the variables are provided in Table 4.2.

4.3.2 Walking Location on Happiness

A one-way ANOVA was used to examine the prediction of whether participants in the nature group reported a greater change in happiness from pre- to post-walk than participants in the urban group (H1). The variable of happiness change was calculated by subtracting pre walk happiness from post walk happiness. The difference score was used as the dependent variable for the model. Prior to the main analysis, a one-way ANOVA was used to test for pre-walk differences of happiness between the urban and nature group. No significant pre-walk differences were found [$F(1, 159) = 0.13$, $p = .72$]. Results are presented for both traditional and robust ANOVAs.

A traditional one-way ANOVA revealed a significant main effect for group [$F(1, 159)$ 11.88, $p = .001$, $r = .26$]. Individuals in the nature group ($M = 1.29$, $SD = 1.54$) reported

significantly higher happiness change than individuals in the urban group (M = 0.43, SD = 1.64). Participants in both the nature and urban group underestimated how happy they would feel after the walk as shown by the positive means.

Due to concerns regarding normality, a robust one-way ANOVA using the t1way() function with 2000 bootstrap samples (Mair & Wilcox, 2017), was also used to examine if walking location influenced participant happiness change from pre- to post-walk. The robust ANOVA model was significant, [Y_t = 10.47, CI (0.32, 1.33), variance explained = .201, p = .002, ES = .45]. Figure 4.1 illustrates the happiness change difference score was higher for the nature walking group than the urban walking group. Participants in the nature group reported a significantly larger change in happiness from their walk than participants in the urban group. The results from both the robust analysis and traditional ANOVA indicate that participants' happiness increased significantly for the nature walk as compared to the urban walk.

4.3.3 Amount of Previous Experience in an Environment on Forecasting Error

Two linear regressions were used to assess whether higher amounts of previous experience in either an urban or natural setting would predict lower forecasting error scores in the same type of environment (H2). Scatterplots detailing the relation between time spent in natural and urban environments and forecasting error are shown in Figure 4.2 and 4.3. Due to the leverage of outliers in both scatterplots, the analysis was conducted using both traditional and robust regression.

The first classic linear regression with bootstrapped confidence intervals was used to test if a higher amount of time spent in natural environments predicts a smaller forecasting error regarding a future visit to a natural setting (H2 – A). The results of the regression were not significant $F(1, 159) = 2.90$, $p = .09$, $f^2 = .0183$. The $R^2 = .018$ so only 1.8% of the variation in forecasting error can be explained by the amount of time spent in nature. The model's constant

was significant [0.331, CI (0.014, 0.648), p = .04], but the slope coefficient for time spent in nature was not [-0.011, CI (-0.023, 0.002), β = -.134, p = .09].

Due to normality concerns, a robust regression using the lmrob() function in R (Field & Wilcox, 2017) was also used to test the same hypothesis (H2 - A). The model's constant (0.52) was significant (p < .05), but the slope (-0.043) was not significant. The Pearson correlation was .14, R^2 value was .02, and so 2% of the variation in forecasting error can be explained by the amount of time spent in nature. Both the classic and robust models suggest that spending larger amounts of time in nature does not help reduce an individual's forecasting error when predicting how happy they will be in a future natural environment.

For the second part of the hypothesis examining whether a higher amount of time spent in urban environments predicts smaller forecasting error regarding a future visit to an urban environment (H2 – B), a classic linear regression with bootstrapped confidence intervals was used. The results of the regression were significant [F(1, 159) = 7.45, p = .007, f^2 = .0471]. The R^2 = .045 so 4.5% of the variation in forecasting error can be explained by the amount of time spent in urban areas. The model's constant [0.486, CI (0.142, 0.831)] was significant (p = .006), and so was the slope coefficient for time spent in urban areas [-0.012, CI (-0.021, -0.003), β = -.212, p = .007].

Due to normality concerns, a robust linear regression model was also used to assess the same hypothesis (H2 - B). The model's constant (0.40) was significant (p < .05), but the slope (-0.004) was not significant. The Pearson correlation was .06, the R^2 value was .004, and so very little variation in forecasting error can be explained by the amount of time spent in an urban environment.

There is discrepancy between the classic linear regression and the robust model as to whether the amount of time spent in an urban environment can predict forecasting error in a

future urban environment. Given the lack of normality in the time variables, it is believed that the robust model is more accurate. The findings suggest that spending larger amounts of time in an urban environment does not help reduce an individual's forecasting error when predicting how happy they will be in a future urban environment.

4.3.4 Emotional Intelligence on Forecasting Error

Simple linear regression was used to assess the prediction of whether individuals with high levels of emotional intelligence report smaller forecasting errors (H3). A scatterplot of the relation between the variables is shown in Figure 4.4, and due to the leverage of several outliers the analysis was conducted using both classic and robust regression.

The classic model examining whether emotional intelligence predicts forecasting error was not significant [$F(1, 159) = 0.06$, $p = .82$]. Neither the slope coefficient for emotional intelligence [-0.05, CI (-0.47, 0.37) $\beta = -.02$, $p = .82$], or the constant [0.47, CI (-1.60, 2.52), $p = .67$] were significant. The R^2 value was 0.0, which indicates emotional intelligence is not accounting for any variance in forecasting error.

Robust regression based on an M-estimator and the lmrob() function (Field & Wilcox, 2017) was also not significant. The R^2 value was .005, so only 0.5% of the variation in forecasting error can be explained by emotional intelligence. The slope coefficient was -0.167, the constant was 1.14, and the Pearson's correlation coefficient was .07. Both the classic and robust models suggest that having higher emotional intelligence does not predict a smaller forecast error.

4.3.5 Walking Location and Priming on Forecasting Error

To assess whether walking location influenced the size of the affective forecasting error a one-way ANOVA and a two-way ANOVA were conducted. A one-way ANOVA revealed no significant difference in the size of the participants' forecasting error between the urban and

nature locations [$F(1, 159)$, 0.13, $p = .72$, $r = .03$], but individuals in the nature group had slightly larger forecasting error ($M = 0.28$, $SD = 1.89$) than individuals in the urban group ($M = 0.17$, $SD = 1.88$).

A two-way independent ANOVA was also implemented to assess whether participants in the nature group reported a larger forecasting error than participants who were in the urban group (H4), and to assess whether participants who received cognitive priming reported a smaller forecasting error (H5). Both a classic, and robust 2 (Nature; Urban) x 2 (Primed; Not Primed) ANOVA were conducted because of concerns regarding variable normality.

Initially, a classic ANOVA model was used to test the effects of location and priming on forecast error. The main effect of location was not significant [$F(1, 157) = 0.24$, $p = .62$, $n_p^2 = .002$], nor was priming significant [$F(1, 157) = 0.02$, $p = .90$, $n_p^2 = .000$] on the size of forecasting error. The interaction of location and priming on forecasting error was also not significant [$F(1, 157) = 1.05$, $p = .31$, $n_p^2 = .007$].

Next, a robust model using the t2way () function was conducted. The results were similar to the classic model in that no significant main effects (location $p = .73$; priming $p = 0.89$) or interaction ($p = .86$) were present. A visual representation of the data is shown in Figure 4.5.

Both the classic and robust models suggest that exposure to a natural environment and using cognitive priming do not reduce an individual's forecasting error when predicting how happy they will be in a future natural environment.

4.3.6 Trait Connection to Nature and Walking Location on Forecasting Error

Moderated regression was used to assess whether individuals in the nature group with high trait connection to nature scores had smaller forecasting errors than individuals with low trait connection to nature (H6). The moderated model used overall connection to nature-trait as

the independent variable, group as the moderator, and forecasting error as the dependent variable. The analysis was completed using the PROCESS macro in SPSS 24. The variable overall connection to nature-trait was grand mean centered (Aiken & West, 1991; Field, 2013). Centering was not completed on the categorical moderator (group), or on the dependent variable (forecasting error; Aiken & West, 1991).

The model was significant, [b = 0.595, 95% CI (0.182, 1.009), t = 2.84, p = .005, R^2 = .06] suggesting that the relationship between trait connection to nature and forecasting error is moderated by walking location. Table 4.3 identifies the betas and their confidence intervals, the standard errors, the t-values, and the significance values.

To interpret the model, simple slopes were calculated with group as the moderator. A plot of the values of low, moderate, and high trait connection to nature is shown for the nature and urban walk (see Figure 3.6). For the nature walk, there is a significant negative relationship between trait connection to nature and forecasting error [b = -0.432, 95% CI (-0.723, -0.142), t = -2.94, p = .004]. For the urban walk, there is a non-significant positive relationship between trait connection to nature and forecasting error [b = 0.163, 95% CI (-0.131, 0.457), t = 1.09, p = .27].

4.4 Summary

The primary purpose of Study 3 was to assess the effects of individual differences, walking location, and cognitive load manipulation on forecasting accuracy. Individual differences examined were previous experience, emotional intelligence, and connection to nature. The between groups differences were walking location (urban/nature), and cognitive load manipulation (daily task manipulation/no daily task manipulation). Some hypotheses were supported by the data, while others were not.

Higher levels of previous experience in either urban or natural settings did not reduce forecasting error when participants estimated how happy they would be in a particular

environment. For instance, participants who reported large amounts of time in an urban setting and then predicted how happy they would feel in a future urban environment, did not have significantly different forecasting error to individuals with less experience in an urban setting.

A higher level of emotional intelligence was also not a significant predictor of forecast accuracy. Participants who reported having high emotional intelligence did not record a smaller forecasting error as compared to participants who recorded lower levels of emotional intelligence. The relation between emotional intelligence and affective forecasting error is generally consistent, but recent work has also found no relation between the two variables (Frank, Iordan, Ballouz, Mikels & Reuter-Lorenz, 2020).

The final individual difference examined was connection to nature. The results indicate that walking location moderates the relation between connection to nature and forecasting error. Higher levels of connection to nature resulted in smaller forecasting errors for nature-walking individuals, but not for urban-walking individuals. Individuals who completed the nature walk had low forecasting error if they had a high connection to nature, and high forecasting error if they had a low connection to nature. Individuals who completed the urban walk did not demonstrate a significant difference with low and high connection to nature and forecasting error.

Results indicate that walking location did have an effect on the happiness of participants. No pre-existing group differences were found for happiness prior to the walk. But individuals who walked in nature had a significant increase in happiness change from their walk when compared to individuals who walked in the urban setting. This finding suggests that participants who completed the nature walk enjoyed their walk more than those who walked in the urban environment.

The final analysis assessed whether walking location or priming influenced the size of forecasting error. Neither walking location nor cognitive priming predicted forecasting error. Forecasting error was not significantly different for individuals who walked outdoors in natural or urban settings, or for individuals who were cognitively primed or not primed.

4.4.1 Limitations

A limitation for Study 3 was the cognitive load manipulation used for priming half the participants. The manipulation was used in previous studies (Hoerger, Quirk, Lucas, & Carr, 2010; Sevdalis & Harvey, 2009), but a pilot study was not conducted to ensure the manipulation would have the desired effects for this study. It is possible that the manipulation did not exhaust the participants System 2 processing and therefore the participants' forecasts were not made using System 1.

Another limitation of the study was having the participants complete Part 1 of the study wherever they wanted instead of in a lab. This means that participants were potentially exposed to a variety of distractions while completing the inventories and may have had a broad time range between starting and finishing Part 1. These issues could have influenced their responses and the results of the study.

Having the participants take their walk without the experimenter was to encourage a more relaxing and real experience. The participants were tracked using GPS and asked to close any additional applications on their phones, but it is possible that they didn't follow the instructions and used other functions while walking. It is also possible that they were worried about getting lost and paid too much attention to their map. If participants didn't allow themselves to relax and pay attention to their surroundings, it's possible that their responses to Part 2 of the study were not as accurate as they could have been.

4.4.2 Review

Findings from Study 3 indicate that the only individual difference that altered the size of forecasting error was connection to nature. Individuals with a higher connection to nature that walked in nature had a smaller forecasting error than individuals with a lower connection to nature that walked in nature. The nature walks also elicited higher levels of happiness from the participants than the urban walks. But walking location did not affect the size of forecasting error or future behavioural intention for participants. Manipulating half the participants to use System 1 processing for their forecast did not have an effect on the size of forecasting error or future behavioural intention.

Chapter 5 General Discussion

5.1 Research Questions

There were two primary overarching questions for the dissertation. The first was to investigate how System 1 (automatic and rapid), and System 2 (conscious and rational), influence the accuracy of affective forecasting. The second was to compare participants' affective forecast error when they are exposed to natural versus urban outdoor environments.

5.1.1 Processing Systems

The three studies were designed so that participants would use different processing systems when making their forecast and real time assessment in each study. Study 1 participants used both systems, Study 2 participants used System 2, and in Study 3 half the participants used both systems and the other half only used System 1.

Some researchers suggest that forecasting error may be due to the fact that individuals use System 2 for their forecast, and System 1 for their real-time assessment (Dunn, Forrin, Ashton-James, 2009). Given the design differences across the three studies, the expectation was a smaller forecasting error for Study 2 participants and for half of the participants in Study 3 because they would be using the same system for their forecast and their real-time assessment and therefore eliminate or reduce the error.

In Study 1 participants used a traditional approach of System 2 processing for their forecast, and System 1 for their real-time assessment, but there were no significant differences in their forecasting errors. For both the PANAS and the Circumplex Model subscales, participants were quite accurate when forecasting how they would feel during and after watching both videos leading to very little error.

The prediction for Study 2 was that forecasting error should not exist because both the forecast and the actual assessment were both using System 2. The results indicate that the

percentage of individuals who went to relax was considerably smaller than the percentage of individuals who reported feeling relaxed. The discrepancy between the purpose of the visit and the outcome of the visit suggests a forecasting error.

In Study 3 half the participants used both systems, and the other half were cognitively manipulated to initiate their System 1 processing system prior to their forecast. Participants completed a diary manipulation and rating task that was designed to overload System 2. Individuals who received the cognitive load manipulation did not have significantly different forecasting errors from the participants who did not receive the manipulation. Unfortunately, both groups of participants demonstrated forecasting error when only one group should have demonstrated error.

The findings across the three studies did not support the concept that forecasting error is caused by individuals using two different systems. Participants in Study 1 used two different systems had very little forecasting error. Participants in Study 2 used one system and demonstrated a forecasting error. Participants in Study 3 showed no difference in forecasting error between participants who were cognitively overloaded and using one system, and those who were not manipulated and therefore using two systems.

5.1.2 Environment and Forecasting Error

The second overarching question for the dissertation was to assess whether there was a significant difference in forecasting error when participants were exposed to natural and urban outdoor settings across three studies. In Study 1 participants watched two videos; one of the countryside and one of a busy street with traffic. In Study 2 participants compared natural spaces they had visited over the last week that were classified as either in the countryside, along the seaside, or in a town or city. In Study 3 participants went for walks in either a green space or a downtown area. The purpose of the three studies was to extend Nisbet and Zelenki's 2011

findings that individuals underestimate how good they will feel after walking outside, and overestimate how good they would feel walking indoors. Results from the three studies vary when comparing forecasting error for natural and urban environments.

Study 1 participants did not report a significant difference in the size of their forecasting error between the nature and urban videos for the PANAS subscales, or for the Circumplex Model subscales. In addition, results from the negative and positive PANAS subscales indicate the mean forecasting error for the urban video was larger than the forecasting error for the nature video. For both videos, participants thought they would experience more negative emotions than they actually felt, and they experienced more positive emotions than they anticipated.

Although not a significant difference, the mean forecasting error for the Circumplex subscale of emotion indicates that participants did have a larger forecasting error for the nature video but that they overestimated rather than underestimated how good they would feel at four of the five time points. For the Circumplex subscale of energy, there was no consistent pattern of forecasting error for the nature and urban videos. The forecasting error was quite small and the participants overestimated their energy for two time points for both the nature and urban videos and underestimated at three time points for both the nature and urban videos.

In Study 2 participants reflected on an outing to a natural space (rural, urban, coastal) from the previous week and reported their intention for the outing, and the outcome from the outing. For each of the three environmental types, participants underestimated how relaxed they would feel. All three locations had similar discrepancies, but the coastal area had the largest at 57%, followed by urban green at 56%, and finally rural green at 53%.

Study 3 involved participants taking a 20-minute walk in either a downtown urban area or a pathway along a creek and separated participants into four groups (nature primed; nature unprimed; urban primed; urban unprimed). To address the overarching question of whether there

was a difference in the size of the forecasting error between the nature group and the urban group, the primed and unprimed participants were combined. A one-way ANOVA revealed no significant difference in the size of the participants' forecasting error between the urban and nature locations

Two of the three studies (Study 1; Study 3) were designed to empirically test whether the size of the forecasting error would significantly change when participants were exposed to different outdoor environments. The results indicate that participants do not over- or under-estimate their future emotional well-being for natural or urban outdoor areas. In Study 2 participants self-selected whether they went into a rural green area, an urban green area, or a coastal area and provided a retrospective assessment of why they went to that location and how they felt after their outing.

5.2 Overall Limitations and Future Directions

An overarching goal was to assess whether the processing system used influenced the accuracy of the affective forecast. Although there is empirical work to suggest we process differently when thinking quickly versus thinking slowly, it was not possible to test which processing system participants were using at different time points in the studies. The assumptions about which processing system participants were using may have been incorrect.

All three studies had varying timeframes between participants' completing Part 1 and Part 2, and so time may have influenced the results. In Study 1 and Study 3, participants were allowed to pick the day they wanted to complete Part 2 to fit with their schedule. Timeframes ranged from 24 hours to 2 weeks. For Study 2 the participants are called and asked to respond to an outing that took place from one to seven days previous. The variability in time for the second assessment may have influenced their responses and affected the results. For example, participants who had a much shorter time turn around between Part 1 and Part 2 may have

remembered their forecasts and succumbed to commitment bias for their real-time assessments. Commitment bias is when participants attempt to match previously given answers to maintain consistency.

Some recommend that affective forecasting research is best executed as a hybrid design with half the participants in a within-participant design and the other half split between forecasters and experiencers (Loewenstein & Schkade, 1999). A hybrid design can illuminate issues with commitment bias. In each of the three studies, participants forecasted how they would feel and then provided a real-time assessment. None of the studies employed a design where "forecasters" were separate from the "experiencers". Using a hybrid design may have provided more discrepancy, or forecast error, in the three studies that could have been compared to the current results.

This dissertation was the first to specifically explore how individuals' affective forecasting error differed from outdoor natural areas to outdoor urban areas. The findings were not congruent with Nisbet and Zelenski's (2011) research demonstrating that participants underestimated positive affect for outdoor areas and showed an impact bias for indoor spaces. Further research should explore if the discrepancy is due to indoor and outdoor spaces rather than outdoor natural and urban spaces. It is possible that individuals perceive outdoor spaces similarly and do not discriminate strongly between how positive they will feel in an outdoor natural space when compared to an outdoor urban space. Perhaps individuals perceive indoor and outdoor spaces as more distinct and therefore an affective forecasting error between the two environments is present.

It is also possible that affective forecasting error varies according to an individual's connection to nature. Study 3 demonstrated that participants with a higher trait connection to nature had reduced forecasting error in nature while individuals with a lower connection to

nature had larger forecasting error. Future research could further explore how much forecasting error is dependent on location and trait connection to nature.

Another avenue is to continue to explore how different cognitive processing systems alter individuals' estimations of positive well-being when in outdoor natural and urban spaces. Research indicates that working memory capacity can alter the accuracy of affective forecasting (Hoerger, Quirk, Lucas, & Carr, 2010). But a recent study suggests it is a more specific subsystem of affective working memory that allows for more accurate affective forecasting (Frank, Iordan, Ballouz, Mikels & Reuter-Lorenz, 2020). Future studies should include individual differences such as working memory capacity and affective working memory.

The final suggestion for future research regarding outdoor environments is to ask participants to identify the valence and intensity of a previous experience that is influencing their affective forecast. It matters whether the previous outdoor experience was positive or negative because individuals may use that experience to predict how they will feel in a similar environment. Some research indicates that individuals seem to learn from negative, not positive experiences (Wilson, Meyers, & Gilbert, 2001), while others suggest it depends on whether the positive moments were at the beginning or end of the experience (Kahneman, 2011; Ruby, Dunn, Perrino, Gillis, & Viel, 2011). As well, many affective forecasting studies select scenarios with strong affective reactions, but it is plausible to assume that most individuals do not have strong affective responses to going outside. Documenting the valence and intensity of participants' previous outdoor experience could offer insights into their affective forecasting.

5.3 General Review

Although the three studies do not conclusively indicate how exposure to natural and urban outdoor environments influence affective forecasting error or demonstrate how System 1 and System 2 alter forecasting error in outdoor environments, the studies do provide insight

regarding how individuals should spend their time. All three studies clearly show that exposure to nature improves positive well-being. Study 1 demonstrated that positive affect and connection to nature both increase even when the nature exposure is a video. Study 2 highlighted that being in natural green spaces and coastal areas increases a sense of relaxation even when not anticipated or sought. Study 3 showed that spending time in natural spaces significantly increases an individual's happiness when compared to spending time in urban environments. The consistent findings of improved positive well-being is an important reminder to seek natural spaces when enjoying time outside.

Table 2.1

Study 1 Descriptive Statistics

	N (39)	Mean	Standard Deviation
Age			
17-25	3	7.7	
26-34	12	30.8	
35-43	5	12.8	
44-52	9	23.1	
53-61	10	25.6	
Gender			
Female	32	82.1	
Male	7	17.9	
Amount of Time Spent Outdoors (hrs)		10.9	9.51
PANAS Positive Post Nature Video		14.15	5.07
PANAS Negative Post Nature Video		5.33	1.11
PANAS Positive Post Urban Video		8.74	2.79
PANAS Negative Post Urban Video		7.41	3.23
INS Post Nature Video		5.05	1.39
INS Post Urban Video		3.21	1.54
Diff Score Emotion Nature 2.5 minutes		-1.12	4.28
Diff Score Emotion Nature 5 minutes		-1.33	4.12
Diff Score Emotion Nature 7.5 minutes		-0.67	3.77
Diff Score Emotion Nature 10 minutes		-0.64	4.79
Diff Score Emotion Nature 13 minutes		1.21	4.47
Diff Score Energy Nature 2.5 minutes		-0.05	5.62
Diff Score Energy Nature 5 minutes		0.10	5.15
Diff Score Energy Nature 7.5 minutes		0.18	4.87
Diff Score Energy Nature 10 minutes		-0.95	5.81
Diff Score Energy Nature 13 minutes		-0.38	4.61
Diff Score Emotion Urban 2.5 minutes		-0.77	3.90
Diff Score Emotion Urban 5 minutes		0.03	3.52
Diff Score Emotion Urban 7.5 minutes		0.21	4.55

Table 2.1

Study 1 Descriptive Statistics

	Mean	Standard Deviation
Diff Score Emotion Urban 10 minutes	0.41	4.06
Diff Score Emotion Urban 13 minutes	-0.97	3.55
Diff Score Energy Urban 2.5 minutes	0.31	5.29
Diff Score Energy Urban 5 minutes	0.15	5.08
Diff Score Energy Urban 7.5 minutes	-0.79	6.21
Diff Score Energy Urban 10 minutes	-0.23	6.56
Diff Score Energy Urban 13 minutes	0.33	4.34
Diff Score PANAS Positive Nature	0.54	4.70
Diff Score PANAS Negative Nature	0.15	1.35
Diff Score PANAS Positive Urban	1.03	3.72
Diff Score PANAS Negative Urban	-0.26	2.55

Note. Amount of Time Spent Outdoors is for the last week; Difference Scores calculated from real time assessment minus forecast.

Table 2.2
Study 1 Correlations for Difference Scores

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1. nEmot2.5																							
2. nEmot5	.84**																						
3. nEmot7.5	.52**	.68**																					
4. nEmot10	.33*	.55**	.77**																				
5. nEmot13	.42*	.55**	.63**	.72**																			
6. nEner2.5	-.20	-.27	-.14	-.27	-.42**																		
7. nEner5	-.07	-.20	-.14	-.29	-.42**	.92**																	
8. nEner7.5	-.17	-.27	-.24	-.45**	-.53**	.85**	.92**																
9. nEner10	.02	-.14	-.18	-.42**	-.45**	.76**	.84**	.91**															
10. nEner13	.15	-.07	-.01	-.22	-.28	.51**	.59**	.62**	.67**														
11. uEmot2.5	.05	.02	-.05	-.10	-.18	-.04	.02	.04	.15	.01													
12. uEmot5	.10	.04	-.15	-.09	-.05	-.18	-.02	.03	.12	-.05	.45**												
13. uEmot7.5	.19	.18	.01	.08	.11	-.16	-.09	-.09	-.09	-.08	.11	.63**											
14. uEmot10	.16	.12	.-.12	-.01	.08	-.24	-.09	-.08	-.02	.05	.37*	.65**	.77**										
15. uEmot13	.13	.04	-.01	-.18	-.20	.25	.31	.19	.24	.10	.24	.41**	.30	.40*									
16. uEner2.5	.25	.20	.33*	.20	.36*	-.26	-.27	-.25	-.17	.31	-.08	-.23	-.16	-.03	-.25								
17. uEner5	.14	.10	.16	.10	.41**	-.37*	-.32*	-.27	-.16	.21	-.08	-.16	-.12	.07	-.42**	.82**							
18. uEner7.5	.12	.08	.14	.03	.32*	-.27	-.20	-.10	.02	.28	.02	-.08	-.17	.05	-.47**	.65**	.90**						
19. uEner10	.11	.06	.11	-.02	.22	-.16	-.09	.40	.16	.30	.01	-.01	-.12	-.02	-.46**	.50**	.76**	.91**					
20. uEner13	.23	.16	.26	.23	.23	-.19	-.14	-.07	.07	.39*	.04	-.16	-.18	-.08	-.58**	.54**	.71**	.73**	.71**				
21. nPANAS+	.01	.06	.09	.35*	.27	-.31	-.34*	-.42**	-.50**	-.21	-.22	-.08	.07	.01	-.27	.29	.23	.11	.07	.16			
22. nPANAS-	-.47**	-.43**	-.55**	-.40*	-.37*	.04	.05	.15	.09	-.22	.27	.19	-.09	.02	-.09	-.26	-.08	.11	.14	-.18	.09		
23. uPANAS+	-.05	-.03	.02	.19	.30	-.16	-.15	-.30	-.26	-.16	.30	.32*	.29	.46**	.17	-.06	.03	-.01	-.14	-.16	.22	.83	
24. uPANAS-	-.11	.11	.14	.13	.03	-.02	-.03	.03	.01	-.19	-.06	-.06	-.15	-.24	-.17	-.02	-.12	-.08	-.15	-.01	.05	.15	-.16

Note. * = $p < .05$; ** = $p < .001$; n = nature video; u= urban video; Emot = Emotion; Ener = Energy; PANAS = Positive and Negative Affect Schedule; + = PANAS Positive; - = PANAS Negative

Table 3.1

Study 2 Frequencies (and Percentages) of Visitor Demographics, Environment Visited, and Purpose and Outcome of Visit

	n	%
Age		
16-24	429	12.7
25-34	624	18.5
35-44	545	16.2
45-54	495	14.7
55-64	453	13.4
65+	828	24.5
Gender		
Female	1773	52.5
Male	1601	47.5
Environment Visited		
Urban Green	1731	51.3
Coastal	422	12.5
Rural Green	1221	36.2
Purpose: Relax & Unwind		
No	2251	66.7
Yes	1123	33.3
Outcome: Calm & Relaxed		
Strongly Agree	931	27.6
Agree	2,035	60.3
Neither Agree/Disagree	259	7.7
Disagree	118	3.5
Strongly Disagree	31	0.9

Note. Purpose = Reason for going into nature; Outcome = How participants recalled feeling.

Table 3.2

Study 2 Regression Analyses Predicting Level of Relaxation from Motivation to Relax, Environment, and Visitor Demographics

	Purpose of visit to relax			Purpose + environment visited			Purpose + environment + demographics		
	B	*SE*	*β*	B	*SE*	*β*	B	*SE*	*β*
Relax and unwind	-0.23	0.03	-.14***	-0.22	0.03	-.14***	-0.22	0.03	-.14***
	[-0.28, -0.18]			[-0.27, -0.17]			[-0.28, -0.17]		
Environment visited									
Urban green	/	/	/	0.11	0.03	.07***	0.12	0.03	.08***
				[0.06, 0.16]			[0.06, 0.17]		
Rural green (ref)	/	/	/	-	-	-	-	-	-
Coastal	/	/	/	0.01	0.04	.01	0.02	0.04	.01
				[-0.10, 0.10]			[-0.07, 0.10]		
Demographics									
Female (ref)	/	/	/	/	/	/	0.04	0.03	.03
							[-0.01, 0.09]		
16-24 years	/	/	/	/	/	/	0.01	0.05	.01
							[-0.08, 0.11]		
25-34 years	/	/	/	/	/	/	0.01	0.04	.01
							[-0.07, 0.10]		
35-44 years (ref)	/	/	/	-	-	-	-	-	-
45-54 years	/	/	/	/	/	/	-0.01	0.05	-.00
							[-0.10, 0.08]		
55-64 years	/	/	/	/	/	/	0.02	0.05	.01
							[-0.08, 0.11]		
65 years plus	/	/	/	/	/	/	0.06	0.04	.04
							[-0.02, 0.15]		
Constant			1.97			1.91			1.87
R^2			.02***			.03***			.03
Adjusted R^2			.02***			.03***			.03

Note: ***p <.001 CI in brackets

Table 4.1

Study 3 Group Frequencies, Means, and Standard Deviations

	Nature	Nature Primed	Urban	Urban Primed
Frequency	44	35	47	35
Forecast	6.80 (1.29)	6.57 (1.54)	5.55 (1.47)	6.23 (1.29)
Emotional Intelligence	4.88 (0.71)	4.58 (0.66)	4.97 (0.76)	4.98 (0.60)
Happiness Trait	5.95 (1.87)	5.77 (1.94)	6.30 (1.57)	6.40 (1.50)
Happiness Pre-Walk	5.60 (2.02)	5.77 (1.43)	5.45 (1.71)	5.77 (1.50)
Happiness Post-Walk	6.95 (1.71)	7.00 (1.46)	5.87 (2.00)	6.20 (1.88)
INS Trait	4.02 (1.28)	4.06 (1.58)	3.98 (1.45)	4.20 (1.27)
INS Pre-Walk	3.70 (1.48)	4.06 (1.78)	2.51 (1.06)	2.89 (1.38)
INS Post-Walk	5.14 (1.60)	4.94 (1.43)	3.02 (1.60)	3.74 (1.73)
Forecasting Error	0.16 (1.96)	0.43 (1.82)	0.32 (1.78)	-0.03 (2.02)
Spend More Time	5.84 (2.48)	5.40 (1.97)	4.98 (2.24)	4.97 (2.72)
Time in Nature	12.00 (27.10)	11.01 (24.18)	10.36 (23.68)	6.17 (16.32)
Time in Urban	25.60 (39.50)	25.96 (41.76)	19.19 (26.37)	13.49 (9.10)

Note. INS = Inclusion of Nature Scale; Time in Nature/Urban = Spend more time in the future; standard deviations are in brackets; the scale ranges are 1-to-7 for Emotional Intelligence, INS, and Spend More Time; and 1–to- 9 for Forecast and Happiness.

Table 4.2

Study 3 Spearman Correlations and Confidence Intervals

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age														
2. Gender	.04 [-.14, .15]													
3. Forecast	.01 [-.16, .18]	.00 [-16, .14]												
4. EI	.23** [.13, .30]	.15 [-.18, .17]	.27** [.12, .40]											
5. Happy Trait	.14 [.01, .24]	.04 [-.11, .22]	.12 [-.04, .27]	.53** [.40, .64]										
6. Happy Pre	-.01 [-.15, .14]	-.20* [-.34, -.06]	.19* [.03, .36]	.21** [.06, .34]	.28** [.12, .42]									
7. Happy Post	-.06 [-.20, .10]	-.16* [-.31, -.02]	.34** [.18, .50]	.12 [-.04, .26]	.12 [-.03, .28]	.62** [.52, .71]								
8. INS Trait	.03 [-.09, .16]	.25 [-.07, .24]	.25** [.09, .41]	.22** [.07, .37]	.21** [.06, .35]	.16** [.02, .31]	.07 [-.10, .22]							
9. INS Pre	-.03 [-.17, .12]	-.16* [-.31, -.07]	.28** [.12, .44]	.01 [-.15, .16]	.05 [-.10, .19]	.37** [.22, .49]	.31** [.17, .44]	.42** [.26, .55]						
10. INS Post	.02 [-.12, .15]	-.18* [-.32, -.02]	.34** [.19, .49]	-.03 [-.18, .12]	.03 [-.12, .18]	.32** [.17, .46]	.53** [.41, .65]	.23** [.06, .38]	.67** [.56, .77]					
11. FE	-.06 [-.19, .06]	-.14 [-.29, .03]	-.41** [-.54, -.28]	-.06 [-.21, .10]	.03 [-.13, .20]	.43** [.28, .56]	.67** [.57, .75]	-.10 [-.27, .06]	.06 [-.09, .20]	.25** [.10, .40]				
12. RB	.13 [-.04, .25]	-.15 [-.29, .02]	.32** [.16, .45]	.14 [-.01, .28]	.10 [-.07, .24]	.30** [.15, .43]	.42** [.27, .55]	.23** [.07, .38]	.24** [.08, .39]	.46** [.31, .58]	.19* [.04, .33]			
13. PB	.05 [-.11, .19]	.10 [-.06, .25]	-.24** [-.38, -.08]	.06 [-.09, 23]	.10 [-.07, .26]	-.13 [-.28, .02]	-.38** [-.51, -.26]	.09 [-.06, .23]	-.23** [-.37, -.10]	-.39** [-.52, -.26]	-.20* [-.34, -.06]	-.37** [-.52, -.22]		
14. Time N	.02 [-.07, .11]	.02 [-.15, .20]	.18* [.03, .34]	.18* [.03, .33]	.23** [.07, .39]	.04 [-.12, .19]	-.02 [-.20, .15]	.40** [.26, .52]	.16* [.00, .31]	.05 [-.11, .20]	-.17* [-.31, -.01]	.06 [-.11, .24]	.05 [.00, .29]	
15. Time U	.07 [-.02, .17]	.09 [-.08, .23]	.06 [-.09, .22]	.03 [-.12, .21	.04 [-.12, .21]	-.01 [-.17, .16]	-.08 [-.24, .09]	.23** [.09, .38]	.04 [-.12, .19]	.02 [-.15, .18]	-.07 [-.22, .09]	.11 [-.05, .26]	.04 [-.12, .21]	.24** [.10, .38]

Note. * = $p < .05$; ** = $p < .001$; EI = Emotional Intelligence; INS = Inclusion of Nature Scale; FE = Forecast Error; RB = Repeat Behaviour; PB = Previous Behaviour; Time N= Time in Nature; Time U = Time in Urban; Bootstrap 95% CIs reported in brackets.

Table 4.3

Study 3 Moderated Regression of Trait Connection to Nature and Walk Location on Forecasting Error

	b	*SE B*	*t*	*p*
Constant	0.271 [-0.139, 0.681]	0.208	1.30	.194
Walk Location	-0.103 [-0.677, 0.472]	0.291	-0.354	.724
INS Trait (centered)	-0.432 [-0.723, -0.142]	0.147	-2.936	.004
INS Trait x Walk Location	0.595 [0.183, 1.009]	0.209	2.842	.005

Note: R^2=.06. INS = Inclusion in Nature; Bootstrapped 95% CIs reported in brackets.

Figure 2.1 - Study 1

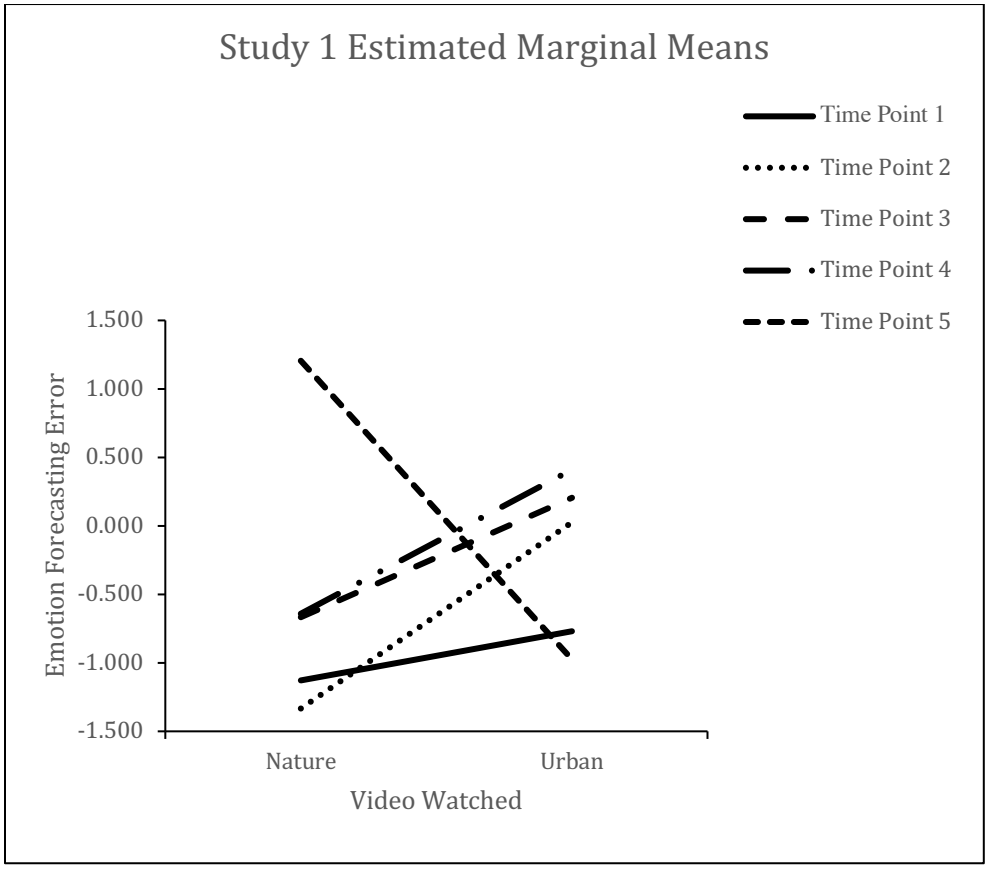


Figure 4.1 – Study 4

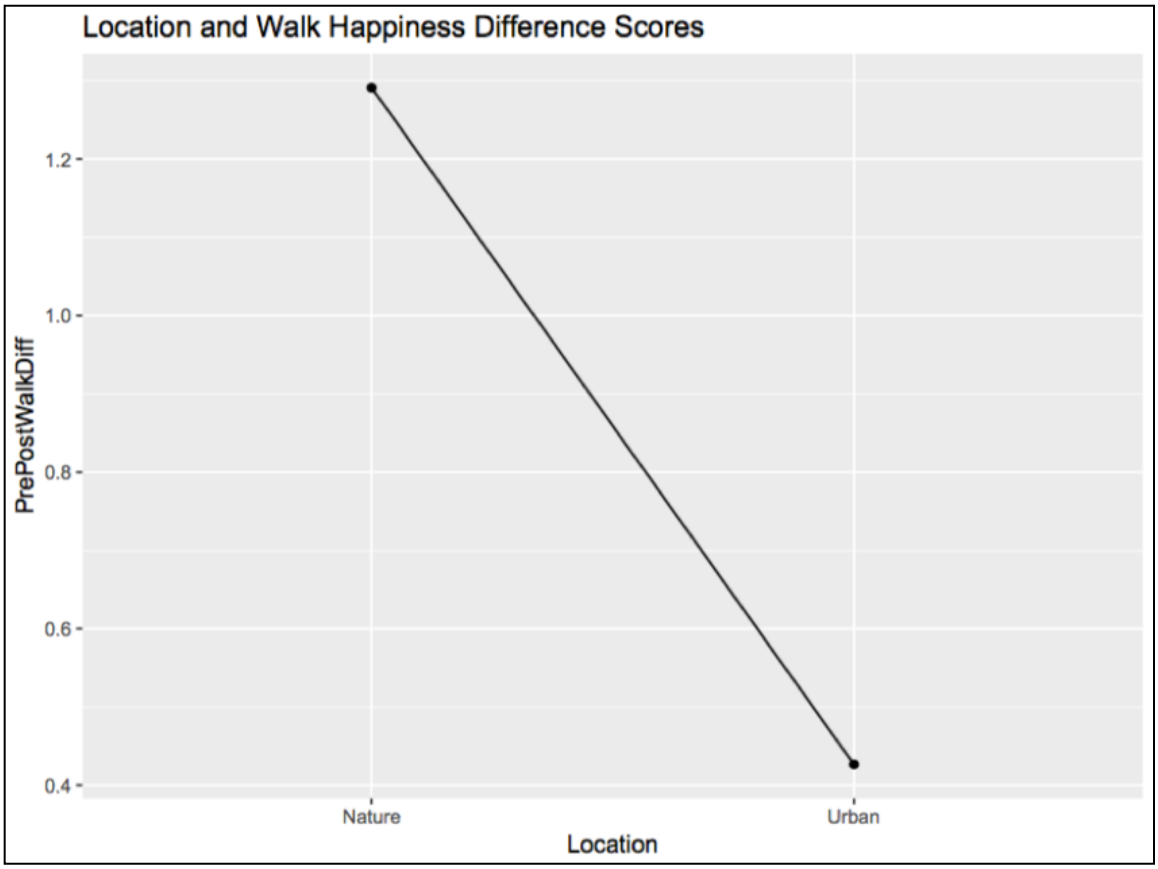


Figure 4.2 – Study 4

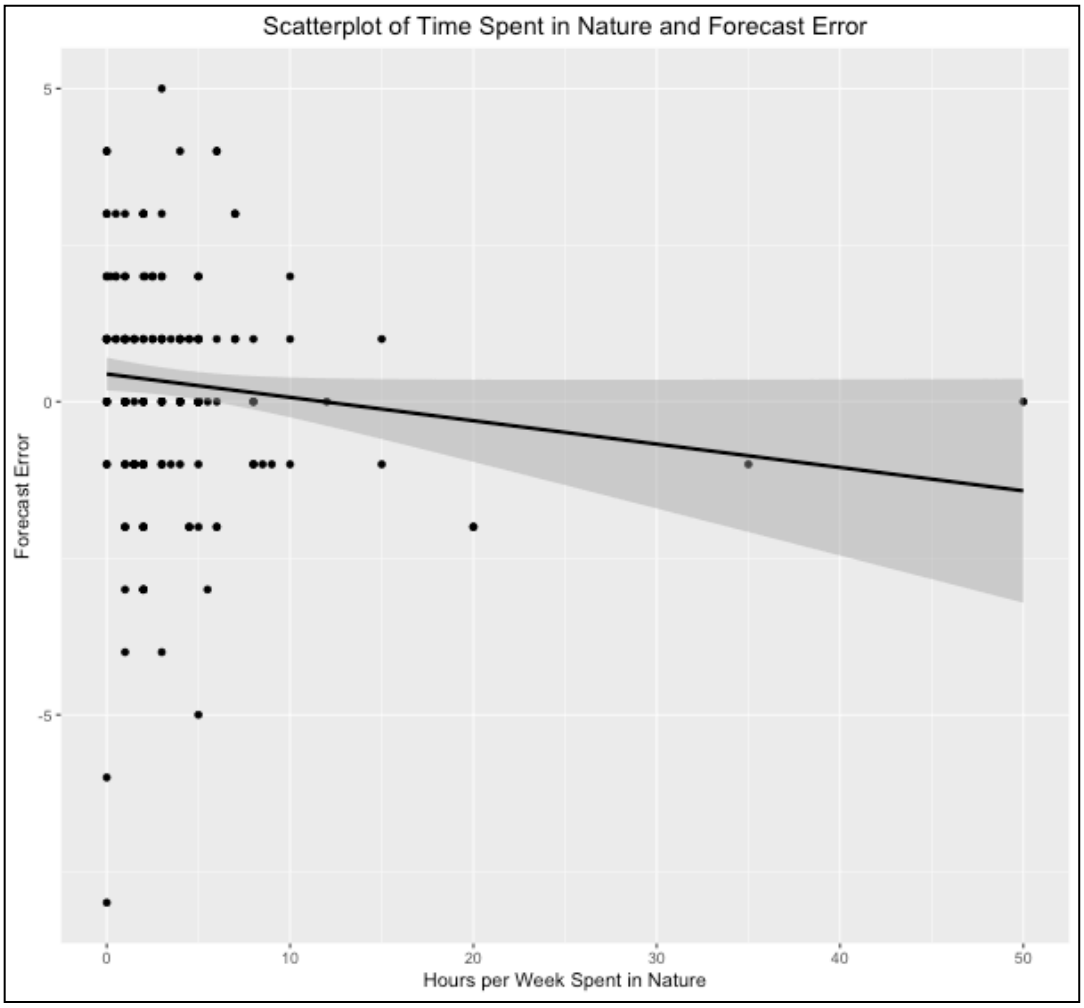


Figure 4.3 – Study 4

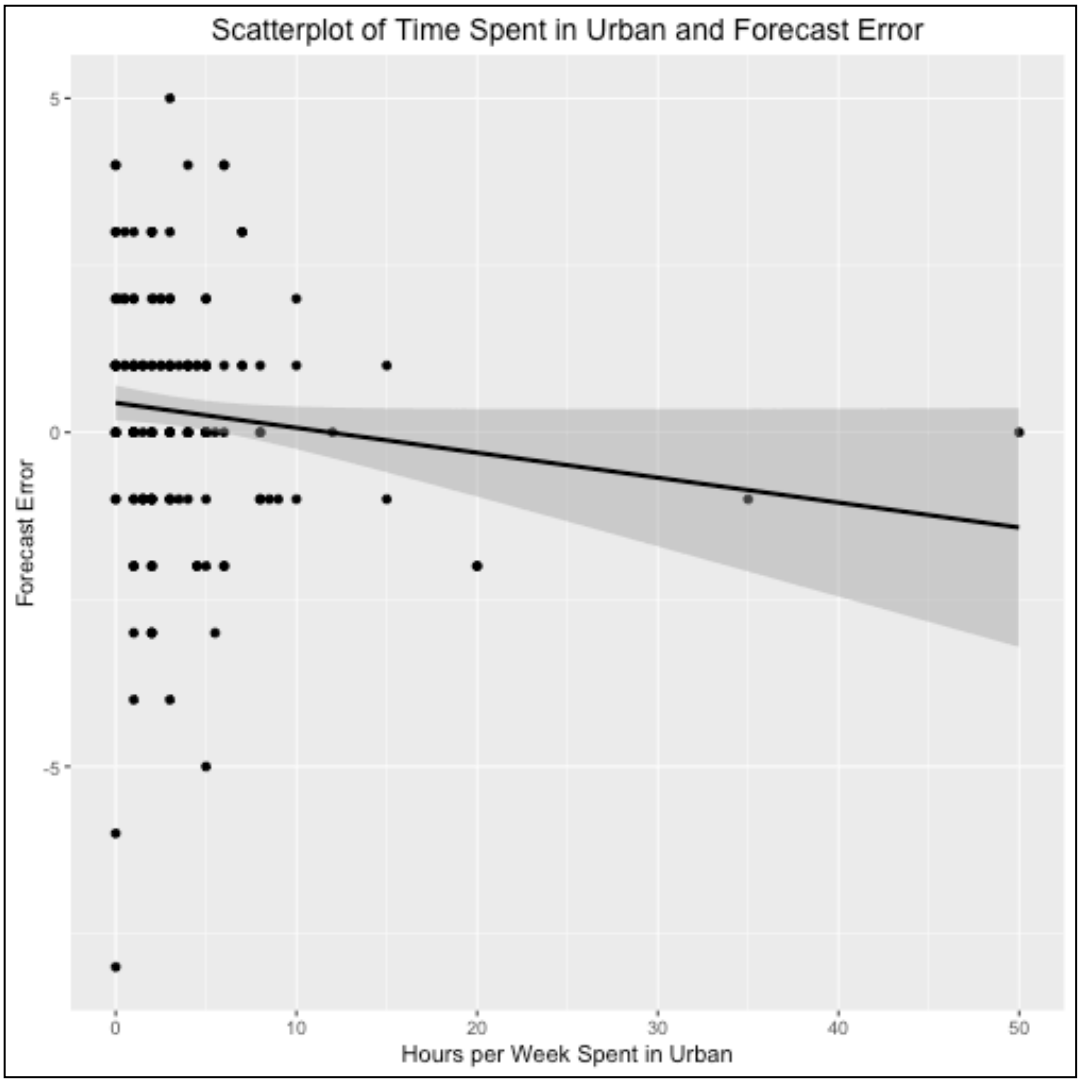


Figure 4.4 – Study 4

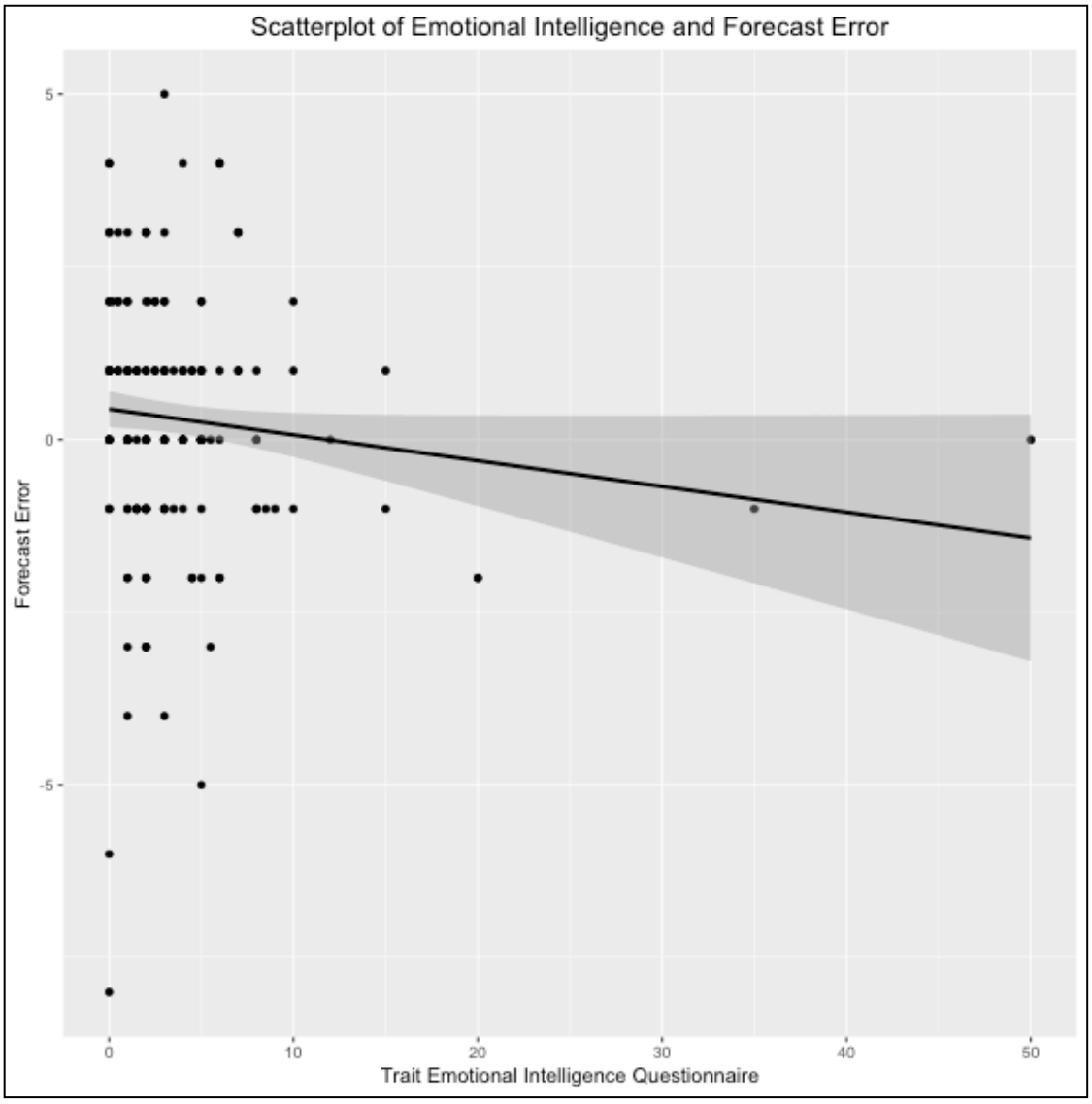


Figure 4.5 – Study 4

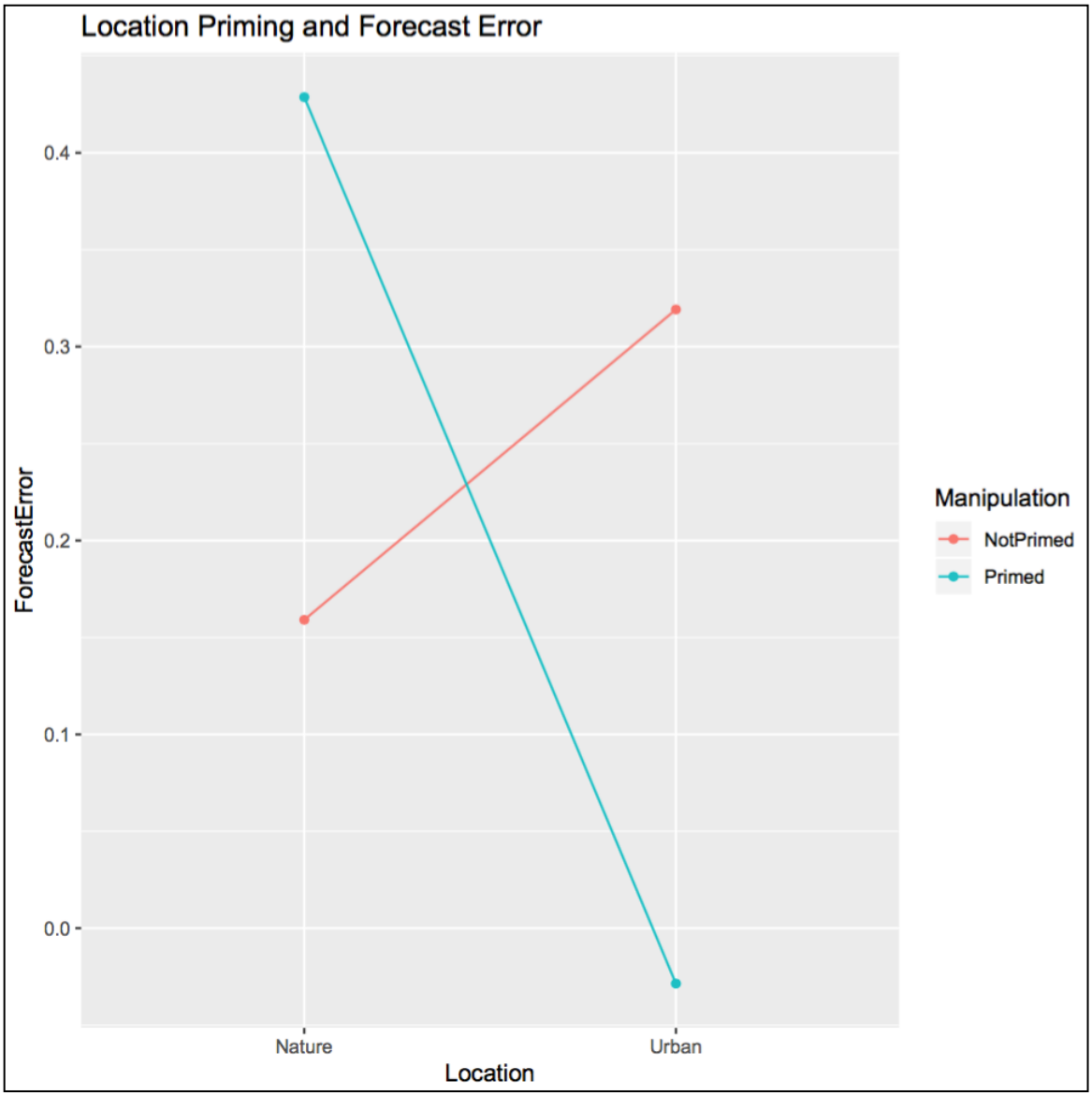
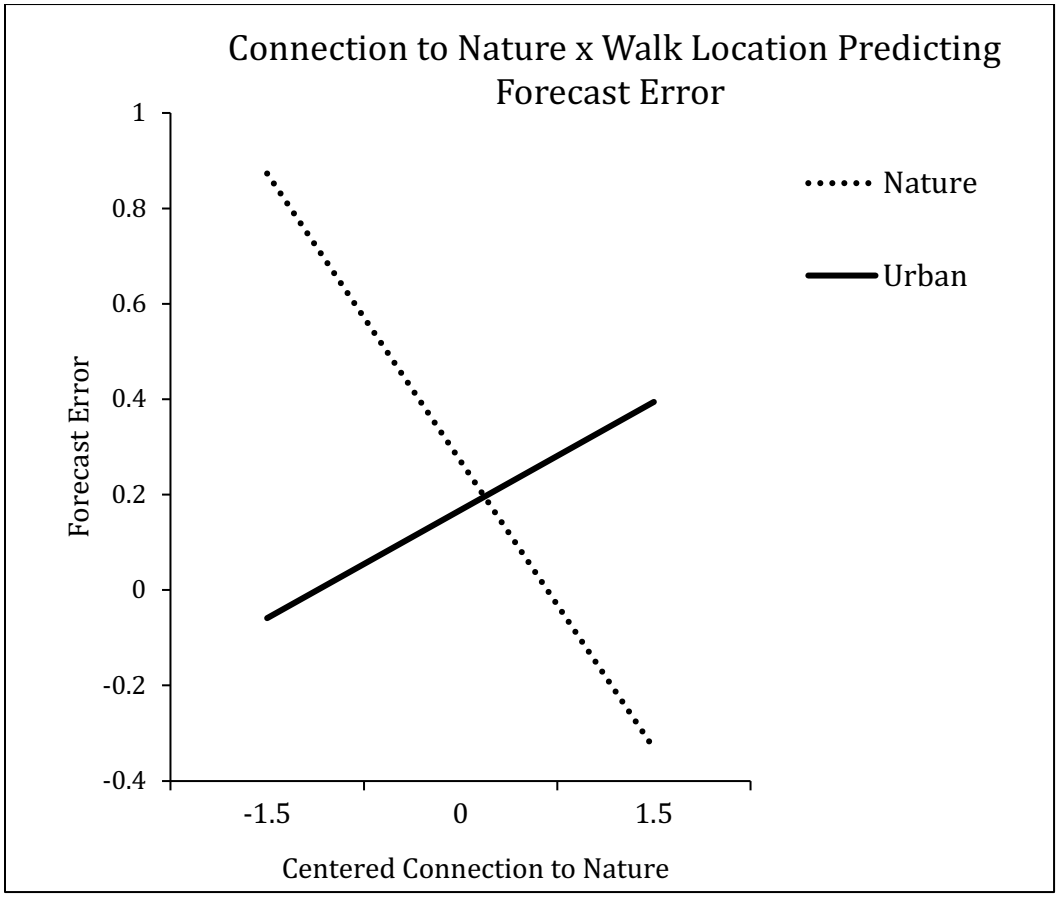


Figure 4.6 – Study 4



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Appendices

Appendix A: Study 1 Recruitment Poster

Appendix B: Study 1 Ethical Approval University of Exeter

European Centre for Environment & Human Health

UNIVERSITY OF EXETER | MEDICAL SCHOOL

November 14, 2014

Office of Research Services
University of British Columbia
Kelowna, BC Canada
V1V 1V7

RE: Letter of External Approval

To whom it may concern,

The European Centre for Environment and Human Health in conjunction with the University of Exeter, have given approval for Maxine Crawford from the University of British Columbia to conduct research at the Centre providing she receive ethical approval from the University of British Columbia.

Please contact me if you have any questions.

Kind regards,

[redacted]

European Centre for Environment and Human Health
University of Exeter Medical School
Knowledge Spa, RCHT, Truro, TR1 3HD

EUROPEAN UNION
Investing in Your Future
European Regional Development Fund 2007-13

European Union
European Social Fund
Investing in jobs and skills

convergence
for economic transformation

Appendix C: Study 1 Informed Consent

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The University of British Columbia
Okanagan Campus
Irving K. Barber School of Arts and Sciences
Psychology
ASC286 – 3187 University Way
Kelowna, BC Canada V1V 1V7

Information Letter and Consent Form

Title of Study: Assessing Emotions and Personality

Principal Investigator: Dr. Mark Holder (University of British Columbia, Psychology)

Co-Investigators: Maxine Crawford (University of British Columbia, Ph.D. student), and Mathew White (Lecturer and Researcher University of Exeter). The results may be submitted for publication in an academic journal and or used for oral academic presentations.

Study Procedure: If you agree to participate, the study will be done in two components. The first component includes answering questions online and will take approximately 25 minutes. The questions will be about your particular demographics, as well as about your personality, your behaviour, and your relationship to your environment. The second component includes going to a lab for 35 minutes where you will watch two videos and answer more questions about your feelings, your relationship to your environment, and your behaviour. You are free to withdraw from the study at any time while the study is happening and you are not required to provide a reason for your withdrawal. Once your participation has concluded, we cannot remove your information from the data file as your information will be associated with a code and you will no longer be identifiable.

Potential Risk: There are very few potential risks associated with participation in this study. You will evaluate your emotional states, both good and bad, as well as your personality. This, however, is no more serious than normal day-to-day evaluations.

Potential Benefits: Results from this study may help improve our understanding of the links between personality, emotions, and behaviour, as well as how people relate to their environment.

Remuneration/Compensation: You will be reimbursed for your travel costs to the lab (up to £10), you will be offered a complimentary snack after the study, and you will also receive a complimentary guide to nature walks in the area.

Confidentiality: Responses of all participants are strictly confidential (individual responses will only be seen by the principal and co-researchers). Each questionnaire will be coded in order to link the answers from each participant and only the researchers will know this code. After the data are collected, the codes will be destroyed so individuals cannot be identified. All of the questionnaires will be administered online and no identifying information will be attached to the

questionnaires. The United Kingdom (UK) website (www.smartsurvey.co.uk) is encrypted, and only the principal investigator and the co-investigators will have access to the original data. All data will be kept in electronic format on password protected computer drives for 5 years after publication. We plan to submit the findings for publication but no participant names will be used in any reports of the study. The results will only be reported for groups with no possibility of individual participants being identified.

SmartSurvey is online survey company located in the UK. If you participate in this study, your responses to the questionnaires will be stored and accessed in the UK. The complete security and privacy policy for SmartSurvey can be found at https://www.smartsurvey.co.uk/privacy-policy.

Follow-up: Public presentations of our results will be made on campus and these will be advertised in advance.

Contact for information about the study: If you have any questions about this study, contact Dr. Mark Holder in Canada (250-807-8728) or Maxine Crawford in the UK (07931031496)

Contact for concern about the rights of research participants: If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Services at 1-877-822-8598 or the UBC Okanagan Research Services Office at 250-807-8832. It is also possible to contact the Research Participant Complaint Line by email (RSIL@ors.ubc.ca).

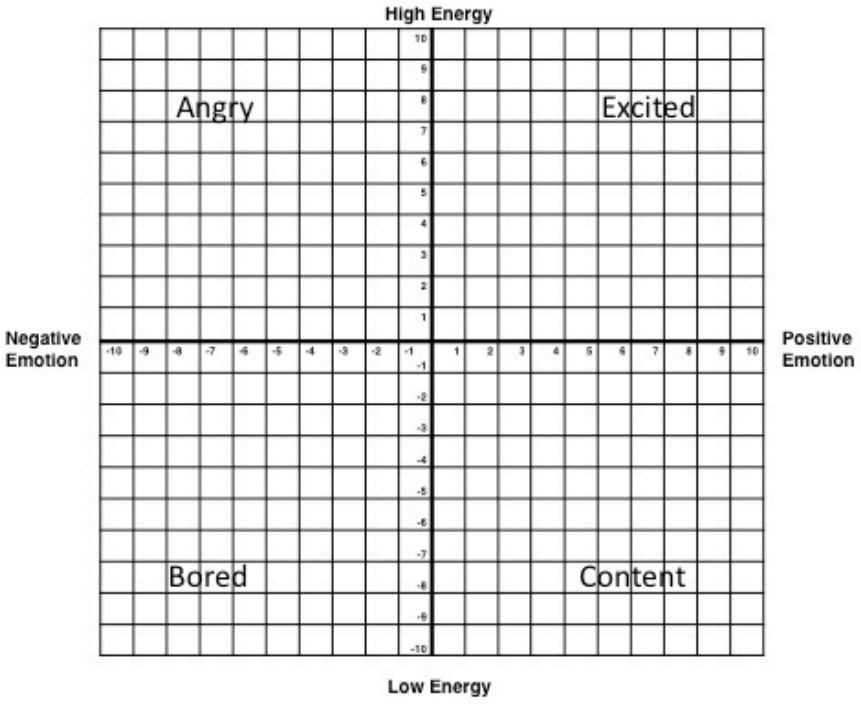
Consent: Your participation in our study is completely voluntary and you may refuse to participate or withdraw from the study at any time without penalty while the study is happening.

Do you agree to participate in this study? Please select one of the following boxes.

- ☐ Yes
- ☐ No

Appendix D: Study 1 Circumplex Model Description

The graph below uses rows from LEFT to RIGHT to indicate how positive or negative your EMOTIONS are, with the left being negative emotions and the right being positive emotions. The columns from TOP to BOTTOM indicate the level ENERGY you feel, with the top being very energized and bottom being not very energized. The example graph has four emotions in each quadrant to give you an idea of what you would feel like in each of the quadrants. Please take the time to familiarize yourself well with this graph as you will be using it for multiple questions today, as well as multiple questions when you come to the Knowledge Spa.



Appendix E: Study 1 Practice Graph – Losing Your Keys

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Irving K. Barber School of Arts and Sciences
Psychology Department

The graph below uses rows from LEFT to RIGHT to indicate how positive or negative your EMOTIONS are, with the left being negative emotions and the right being positive emotions. The columns from TOP to BOTTOM indicate the level ENERGY you feel, with the top being very energized and bottom being not very energized. Please estimate your emotions and energy at 2 ½ minutes, 5 minutes, 7 ½ minutes, 10 minutes imagining **what it is like to lose the keys to your house**. How would you feel at each of these time frames and then imagine how you would feel 5 minutes after you found them.

High Energy

									10										
									9										
									8										
									7										
									6										
									5										
									4										
									3										
									2										
									1										
Negative Emotion																			Positive Emotion
-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10
									-1										
									-2										
									-3										
									-4										
									-5										
									-6										
									-7										
									-8										
									-9										
									-10										

Low Energy

Appendix F: Study 1 Demographics and Creation of Personal Identification Number

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Psychology Department

Demographic Questions

Gender:
Please select one of the following:

- ☐ Male
- ☐ Female
- ☐ Transgender
- ☐ I would rather not say

Age:
Please select one of the following:

- ☐ 17 - 25
- ☐ 26 – 34
- ☐ 35 – 43
- ☐ 44 – 52
- ☐ 53 - 61
- ☐ 62 – 70
- ☐ 71 and older

Creation of Personal Identification Number:
Please enter the first letter of the first school you attended. (If you were home-schooled, please enter the letter "h").

Please enter the first letter of the street you currently live on.

Please enter a 2-digit PIN number that you will remember. You will have to enter this PIN number again at the end of the survey and you will be asked for this PIN number when you come into the Knowledge Spa. If you think you may forget this number, please write it down and bring it with you when you come to the Knowledge Spa.

Education Level completed:
Please select the highest level of education you have received.

- ☐ 1-4 O levels/CSEs/GCEs (any grades), Entry Level, Foundation Diploma
- ☐ NVQ Level 1, Foundation GNVQ, Basic Skills
- ☐ 5+ O levels (passes)/CSEs (grade 1)/GCSEs (grades A-C), School Certificate, 1 A level/2-3 AS levels/VCEs, Higher Diploma

- ☐ NVQ Level 2, Intermediate GNVQ, City and Guilds Craft, BTEC First/General Diploma, RSA Diploma
- ☐ Apprenticeship
- ☐ 2 + A levels/VCEs, 4 + AS levels, Higher School Certificate, Progression/Advanced Diploma
- ☐ NVQ Level 3, Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, BTEC National RSA Advanced Diploma
- ☐ Degree (for example BA, BSc)
- ☐ Higher Degree (MA, PhD, PGCE)
- ☐ NVQ Level 4-5, HNC, HND, RSA Higher Diploma, BTEC Higher Level
- ☐ Professional qualifications (for example teaching, nursing, accountancy)
- ☐ Other vocational/work-related qualifications
- ☐ Foreign qualifications
- ☐ No qualifications

Appendix G: Study 1 Positive and Negative Affect Schedule Short-Form

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Psychology Department

The Positive and Negative Affect Schedule (Short-Form)

This scale consists of a number of words that describe different feelings and emotions. Read each word and then write the appropriate number in the space next to that word. Indicate to what extent you feel like this right now, in this moment.

Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____Inspired	_____Nervous
_____Afraid	_____Enthusiastic
_____Alert	_____Scared
_____Upset	_____Determined
_____Excited	_____Distressed

Appendix H: Study 1 Affective Forecast Circumplex Model (Forecast - Nature Video)

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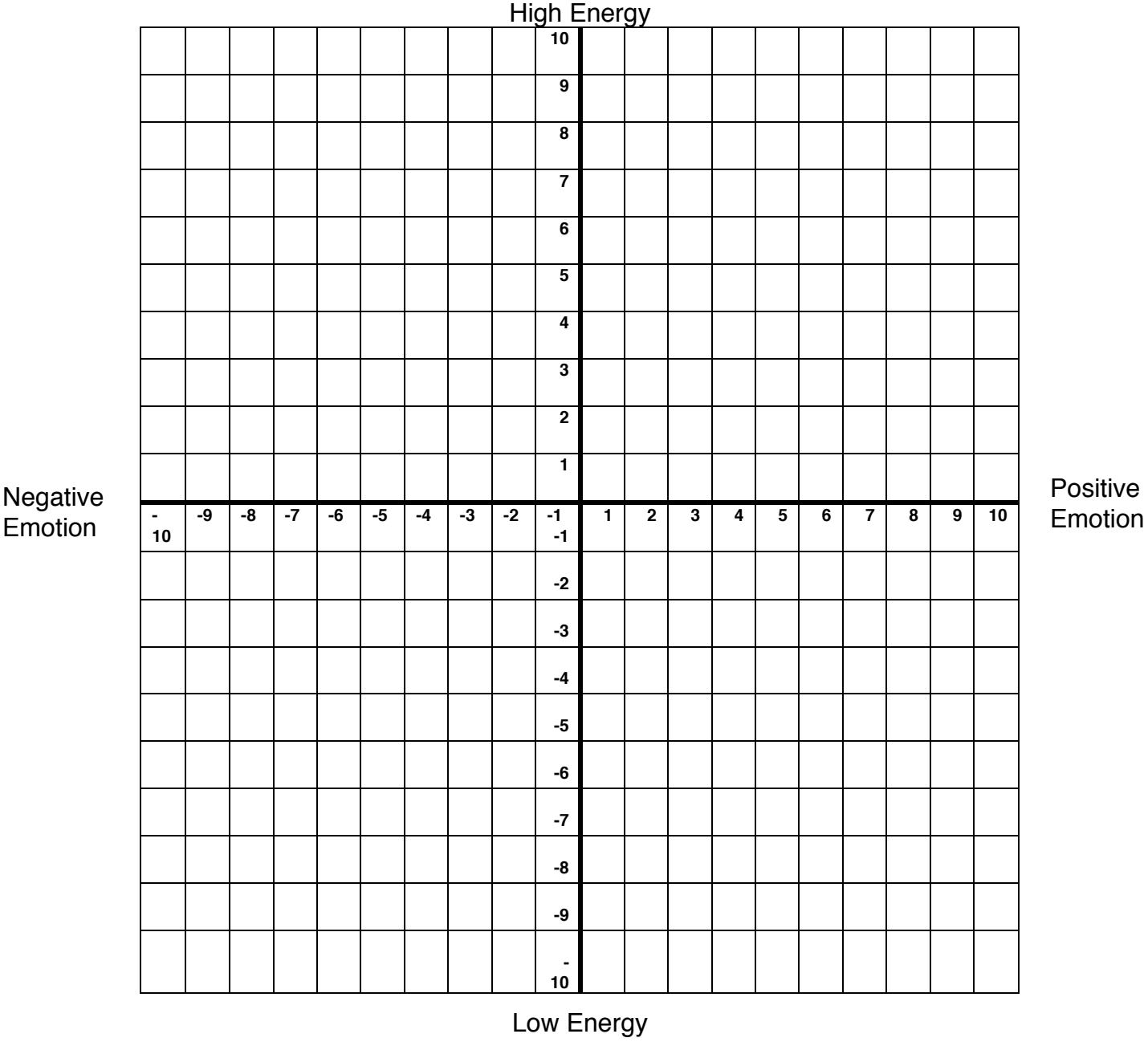
Using the graph below, please estimate your emotions and energy 2 ½, 5, 7 ½, 10 minutes imagining **what it is like to stand still and look at the countryside**. How would you feel at each of these time frames and then how would you feel 3 minutes after you stopped doing it.



Appendix I: Study 1 Nature Relatedness Scale – Trait

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Psychology Department

The Nature Relatedness Inventory

For each of the following, please rate the extent to which you agree with each statement using the scale from 1 to 5. Please respond as you really feel, rather than how you think "most people" feel.

1. I enjoy being outdoors, even in unpleasant weather.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

2. Some species are just meant to die out or become extinct.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

3. Humans have the right to use natural resources any way we want.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

4. My ideal vacation spot would be a remote, wilderness area.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

5. I always think about how my actions affect the environment.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

6. I enjoy digging in the earth and getting dirt on my hands.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

7. My connection to nature and the environment is a part of my spirituality.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

8. I am very aware of environmental issues.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

9. I take notice of wildlife wherever I am.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

10. I don’t often go out in nature.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

11. Nothing I do will change problems in other places on the planet.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

12. I am not separate from nature, but a part of nature.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

13. The thought of being deep in the woods, away from civilization, is frightening.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

14. My feelings about nature do not affect how I live my life.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

15. Animals, birds and plants should have fewer rights than humans.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

16. Even in the middle of the city, I notice nature around me.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

17. My relationship to nature is an important part of who I am.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

18. Conservation is unnecessary because nature is strong enough to recover from any human impact.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

19. The state of non-human species is an indicator of the future for humans.

1	2	3	4	5
Disagree	Disagree a		Agree	Agree

strongly	little	Neither agree or disagree		strongly

20. I think a lot about the suffering of animals.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

21. I feel very connected to all living things and the earth.

1	2	3	4	5
Disagree strongly	Disagree a little	Neither agree or disagree	Agree	Agree strongly

Appendix J: Study 1 Past Behaviour

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Irving K. Barber School of Arts and Sciences
Psychology Department

Past Behaviour Questions

Please answer the following questions about occasions in the last two weeks when you spent your time out of doors. By out of doors we mean open spaces in and around towns and cities, including parks, canals and nature areas; the coast and beaches; and the countryside including farmland, woodland, hills and rivers. This could be anything from a few minutes to all day. It may include time spent close to your home or workplace, further a field or while on holiday in England. However this does not include: routine shopping trips or time spent in your own garden.

1. How many times over the last week did you spend time out of doors?
- ☐ 0
- ☐ 1-3
- ☐ 4-6
- ☐ 5-7
- ☐ 8-10
- ☐ 11-13
- ☐ 14-16
- ☐ 17-19
- ☐ 20-22
- ☐ 23-25
- ☐ 26-28
- ☐ 28 or more

2. Which of the following best describes where you spent most of your time outdoors?
- ☐ In a town or city
- ☐ In a seaside resort or town
- ☐ Other seaside coastline (including beaches and cliffs)
- ☐ In the countryside (including areas around towns and cities)

3. Overall, how much time would you say you spent outside over the last week?
Record your time in hours and minutes.
Hours _____ Minutes _____

Appendix K: Study 1 Room Configuration for Experiment

Appendix L: Study 1 Checklist for Participants

Cornish & Canadian Procedure:

- ***Initial meeting of participants:***
    - Meet participants 10 minutes before their scheduled appointment downstairs by the main lobby desk (make sure you know the name of the participant you are meeting).
    - Introduce yourself to them and ask them if they would like to take the stairs or the elevator up to the lab.
    - On the way up, thank them for participating in the study and engage in some small talk (weather, journey in). Let them do the majority of the talking.
    - Tell them you will walk them downstairs after the study so they don't start worrying about trying to remember how to get back down to the lobby.
- ***Once in the lab*:**
    - Once in lab, indicate to participant where they will sit and where they can put their belongings.
    - Ask them if they have a mobile phone. If so, get them to turn it off and put it away (out of sight and reach).
    - Tell them that the room gets very warm so that they know to take their coat off. Tell them you have a fan on and you can turn it off if it bothers them.
    - Overview of what will happen during their time at the Centre "Thank you for coming today and taking the time to help us with our study. Today you'll be answering some questionnaires on the laptop you see here and also watching 2, 10-minute videos that will be projected onto the wall. One of the videos is of the countryside and the other video is of a busy street. When you watch the videos I'll ask you to put on the headphones as there is sound associated with them. You shouldn't be here for more than about 35 minutes and I'll be staying in the room with you and so if you have any problems or questions, I'll be here to help you. When I start the videos I'll turn off the lights so that you can see the videos better; I'll remind you of this before I do it."
    - Ask if they have any questions before you begin.
- ***Before start of video 1:***
    - Read immersion script.
    - Please put on the headset (tell them it's adjustable)
    - Lights off
    - Click the "continue" button so that the first graph is showing
    - Start the video
- ***After video 1:***
    - Tell them you need to set up the next video and you would like them to go just outside of the room and move around a little before the next video.
- ***Before start of video 2:***

- Read immersion script.
- Please put on the headset
- Click the “continue” button so that the first graph is showing
- Start the video

- ***After final video:***
  - Ask if they have any questions about the study
  - Let them know you are very happy to have them refer someone to the study, but ask them to not discuss any details of the study. This is because it will change the way someone answers the questions and their data will not be as authentic as it should be.
  - Ask them if they would like a copy of the “Nature Walks in Cornwall” book
  - Ask and if they have a receipt for their travel or parking expenses. If so, use the “participant travel expense sheet”. You will need to collect their name, the date, the reimbursement amount, the receipt, and have them sign for it.

Appendix M: Study 1 Settling Exercise

Please sit QUIETLY in the chair... Make sure both feet on the ground and your hands on your lap. GENTLY slow your mind, freeing yourself from any hassles of the day. Thoughts will drift in and out and that is OK, simply allow them to pass. Soften your face allowing your throat, neck and shoulders to broaden and relax. Begin to draw your attention inwards moving your awareness to your breath. EFFORTLESSLY observe where the breath travels, simply allowing the body to do what it naturally does. Allow your body to RELAX.

Appendix O: Study 1 Immersion Script

"Imagine yourself in this place. Look around, noticing all aspects of your environment. Pay attention to the colours. Notice the textures. Imagine yourself breathing in the air; notice any smells that may be present. Let yourself take in all the aspects of the environment in front of you."

Appendix O: Study 1 Debrief

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THE UNIVERSITY OF BRITISH COLUMBIA

Irving K. Barber School of Arts and Sciences
Psychology Department

Debrief

Thank you very much for participating in our research. You have made a valuable contribution to the advancement of psychological research and the study of affective forecasting and the environment.

This study has several purposes:
1) To see if people are more or less accurate when forecasting their positive and negative emotions for different environments.
2). To see if your more experience with a particular environment makes you forecast more accurately

If you have any questions or concerns about the research, or any suggestions about how to make this research better, please contact the researcher at [redacted] You do have the right to withdraw from the study at any time and if you wish to do so please contact the researcher.

We would like to ask that you not share this information with your friends or family as they may participate in the study in the future. As we mentioned, knowing all the details of the study ahead of time can change the way people respond and so we need to keep particular details of the study a secret until the end. Thank you for your help in achieving this.

Thank you again for your participation, as we could not do this without you.

Appendix P: Study 1 Inclusion of Nature in Self Scale – State

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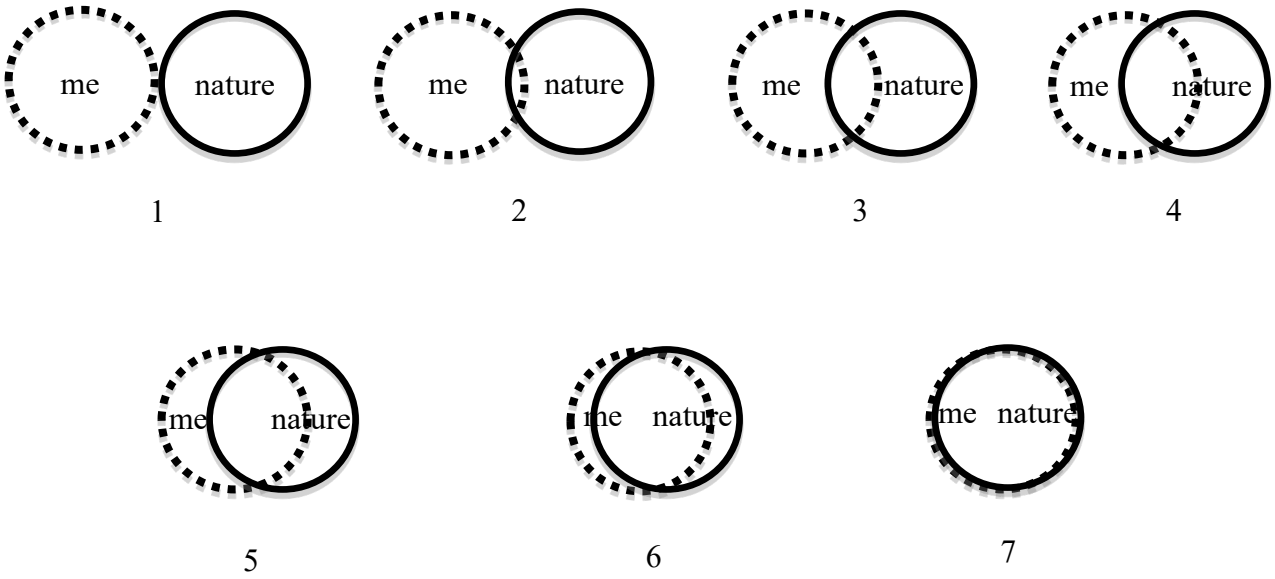
THE UNIVERSITY OF BRITISH COLUMBIA

Irving K. Barber School of Arts and Sciences
Psychology Department

Inclusion of Nature in Self Scale

Please look at the following circles. Circle the number that best describes how you feel about nature right now.



Appendix Q: Study 1 Circumplex Model State – Emotion Rating

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Irving K. Barber School of Arts and Sciences
Psychology Department

Using the graph, estimate your EMOTIONS right now.

High Energy

Negative Emotion

Positive Emotion

									10										
									9										
									8										
									7										
									6										
									5										
									4										
									3										
									2										
									1										
-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9	10
									-1										
									-2										
									-3										
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									-6										
									-7										
									-8										
									-9										
									-10										

Low Energy

Appendix R: Study 1 Future Behaviour

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Irving K. Barber School of Arts and Sciences
Psychology Department

Future Behaviour

These questions are designed to find out more about your future behaviour.

1. To what extent over the next week do you intend to go out into the type of environment you watched on the video? Please circle the number that best indicates your response.

1	2	3	4	5	6	7
Definitely not/not likely at all			Moderately likely			Definitely will/very likely

2. Which of the following best describes where you will spend most of your time outdoors?
   - ☐ In a town or city
   - ☐ In a seaside resort or town
   - ☐ Other seaside coastline (including beaches and cliffs)
   - ☐ In the countryside (including areas around towns and cities)

3. How does the amount of time you are committing to being in this environment compare to your previous behaviour?
   - ☐ More time
   - ☐ Less time
   - ☐ The same amount of time

Appendix S: Study 2 Demographics

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Irving K. Barber School of Arts and Sciences
Psychology Department

MENE Variables: Demographics

Gender:

- ☐ Male
- ☐ Female

Age:

Please select one of the following:

- ☐ 16 - 24
- ☐ 25 - 34
- ☐ 35 - 44
- ☐ 45 - 54
- ☐ 55 - 64
- ☐ 65+

Appendix T: Study 2 Location of Visit

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Psychology Department

MENE Variable: Location of Visit

Which of the following best describes where you spent most of your time on this visit?

- Options:
  - In a town or city
  - In a seaside resort or town
  - Other seaside coastline (including beaches and cliffs)
  - In the countryside (including areas around towns and cities)

Appendix U: Study 2 Purpose of Visit

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Irving K. Barber School of Arts and Sciences
Psychology Department

MENE Variable: Purpose of Visit

Participant can select all that apply.

- 0 = No, and 1 = Yes
- Options:
    - To spend time with family
    - To spend time with friends
    - To learn something about the outdoors
    - For fresh air or to enjoy pleasant weather
    - For health or exercise
    - For peace and quiet
    - To relax and unwind
    - To exercise your dog
    - To enjoy scenery
    - To enjoy wildlife
    - To entertain children
    - To challenge yourself or achieve something
    - To be somewhere you like
    - For other reasons
    - Don’t know

Appendix V: Study 2 Outcome of Visit

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Psychology Department

MENE Variable: Outcome of Visit

One response for each of the statements.

- Likert scale from 1 *strongly agree,* 2 *agree*, 3 *neither agree nor disagree*, 4 *disagree*, 5 *strongly disagree*, to 6 *don't know*.
- Questions:
    1. I enjoyed it
    2. It made me feel calm and relaxed
    3. It made me feel refreshed and revitalized
    4. I took time to appreciate my surroundings
    5. I learned something new about the natural world
    6. I felt close to nature

Appendix W: Study 3 SONA Recruitment

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The University of British Columbia
Okanagan Campus
Irving K. Barber School of Arts and Sciences
Psychology
ASC286 – 3187 University Way
Kelowna, BC Canada V1V 1V7

SONA Advertisement

Title of Study: Assessing Emotions and Personality

Overview: We are conducting this study to see how accurately people can predict their own emotions in the future and whether their personality influences their accuracy.

Description: The study takes place in 3 parts. In Part 1 you will complete multiple online questionnaires and download two free mobile applications to your phone or tablet. In Part 2 you will go for a walk and complete several questions before and after your walk. In Part 3 you will be asked about what you thought of the study. The questionnaires measure personality, emotions, and your relationship to your surroundings.

Duration: The entire study should take approximately 2 hours, with approximately one hour of this time allotted for you to complete online questionnaires and complete a walk, and one hour allotted for you to get to and from your walking destination.

Credit: You will receive 4 SONA credits and your name will be put in a draw for an iPod.

Eligibility: You are eligible to participate if you are in a UBC Okanagan psychology course that offers SONA credits. You are not eligible if you have already participated in the study, if you do not have access to a mobile phone or tablet, or if you are unable to complete online inventories in English.

Appendix X: Study 3 Informed Consent

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The University of British Columbia
Okanagan Campus
Irving K. Barber School of Arts and Sciences
Psychology
ASC286 – 3187 University Way
Kelowna, BC Canada V1V 1V7

Information Letter and Consent Form

Title of Study: Assessing Emotions and Personality

Principal Investigator: Dr. Mark Holder (Associate Professor, Psychology)

Co-Investigator: Maxine Crawford (Ph.D. Candidate).

Purpose: We are conducting this study to see how accurately people can predict their own emotions in the future and whether personality influences their accuracy.

Study Procedure: If you agree to participate, the study will be done in three parts. Part 1 will take approximately 20 minutes and includes answering questions online and downloading a free app on your phone. Part 1 would be done right now and Parts 2 and 3 would be done in the next week. The online questions will be about your particular demographics, as well as about your personality, your behaviour, and your relationship to your environment.

Part 2 will be done within the next week and will take approximately 30 minutes. Part 2 includes a walk and answering questions on your mobile device.

Part 3 will take approximately 10 minutes and involves three more online questions asking what you thought of the study.

Overall, you will have about one hour to complete all 3 parts of the study and one hour to get to and from your walking destination. You are free to withdraw from the study at any time while the study is happening and you are not required to provide a reason for your withdrawal. Once your participation has concluded, we cannot remove your information from the data file as your information will be associated with a code and you will no longer be identifiable.

Potential Risk: There are very few potential risks associated with participation in this study. You will evaluate your emotional states, both good and bad, as well as your personality. This, however, is no more serious than normal day-to-day evaluations.

Potential Benefits: Results from this study may help improve our understanding of the links between personality, emotions, and behaviour, as well as how people relate to their environment.

Remuneration/Compensation: You will receive 4 SONA credits toward a psychology course offering SONA credits, as well as your name will be entered into a draw for an iPod.

Confidentiality: Responses of all participants are strictly confidential (individual responses will only be seen by the principal and co-researcher). You will create a PIN so that your data from Parts 1-3 can be collated and so that your name is not associated with your responses. The PIN you create will be coded to you but only the researchers will know this code. While the study is ongoing, the PIN and codes will not be kept in the same location as participant data. After the data are collected, the PIN numbers and codes will be destroyed so individuals cannot be identified. All of the questionnaires will be administered online and no identifying information will be attached to the questionnaires. The electronic data will be collected on a database called FluidSurveys which is encrypted, and only the principal investigator and the co-investigator will have access to the original data. The GPS information gathered through the mobile application will not be stored and will be deleted once the researcher sees that you completed your assigned walk. The rest of the data will be kept in electronic format on password protected computer drives for 5 years after publication. We plan to submit the findings for publication but no participant names will be used in any reports of the study. The results will only be reported for groups with no possibility of individual participants being identified.

FluidSurveys is online survey company located in Canada. If you participate in this study, your responses to the questionnaires will be stored and accessed in Canada. The complete security and privacy policy for FluidSurveys can be found at .http://fluidsurveys.com/about/privacy

Follow-up: The study will be included as part of the Co-Investigator's dissertation, and as such, public presentations of the results will be made on campus. You are welcome to attend and the presentations will be advertised in advance. Dissertation documents are also available online through cIRcle. The results may be submitted for publication in an academic journal and or used for oral academic presentations off campus.

Contact for information about the study: If you have any questions about this study, contact [redacted]

Contact for concern about the rights of research participants: If you have any concerns or complaints about your rights as a research participant and/or your experiences while participating in this study, contact the Research Participant Complaint Line in the UBC Office of Research Services at 1-877-822-8598 or the UBC Okanagan Research Services Office at 250-807-8832. It is also possible to contact the Research Participant Complaint Line by email (RSIL@ors.ubc.ca).

Consent: Your participation in our study is completely voluntary and you may refuse to participate or withdraw from the study at any time without penalty while the study is happening.

Do you agree to participate in this study? Please select one of the following boxes.

- ☐ Yes
- ☐ No

Appendix Y: Study 3 Part 1 SONA Study: Assessing Emotions and Personality

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Kelowna, BC Canada V1V 1V7

Hello,

Thank you for signing up for the SONA study "Assessing Emotions and Personality". Part 1 of the study is online questionnaires that you can do at home on your computer. Please complete Part 1 as per your sign-up time slot.

Here is the link for Part 1.
https://survey.ubc.ca/surveys/37-ee02e5585aa0276a32a19d33950/affectfore/

I will send you another email the day before your Part 2 time slot you signed up for. Part 2 includes a walk at a pre-assigned location.

Thank you very much for your participation. If you have any questions you can email or text me at [redacted]

Maxine

PS Don't forget that when you complete all 3 parts of the study your name is put into a draw and all 4 SONA credits are awarded.

Appendix Z: Study 3 Creating of Personal Identification Number

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Psychology
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Kelowna, BC Canada V1V 1V7

PIN Information

Personal Identification Number (hint: first 2 letters of the street you live on and the day of the month of your birthday). For example, if I live on Ellis Street and my birthday is on the 7th of January, my PIN would be EL07. What is your PIN?_____

Appendix AA: Study 3 Mobile Application Download Instructions

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Psychology
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Kelowna, BC Canada V1V 1V7

Download Two Mobile Applications

The reason you need to download 2 apps onto your electronic device is that you need to track your walk and answer questions while you are at the walking location. One of the apps is the same program that you are currently using to answer these questions (Fluid Surveys) and the other will allow you to track your walk and send me the route (Route Tracker)

1) Tap the Apps icon on your home screen.
2) Tap on the magnifying glass or "search" on your screen.
3) Type in "fluid surveys".
4) Tap the "Download" or "Get" button.
5) Tap the "Install" button".
6) Enter your password to make changes to your electronic device when asked.
7) Wait for the Fluid Surveys app to download onto your device.
8) Now you need to install the second app.
9) Tap on the magnifying glass or "search" on your screen.
10) Type in XXXXXX
11) Tap the Download button again.

Appendix BB: Study 3 Daily Task Manipulation

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Psychology Department

Daily Tasks: Part 1

This part of the study is timed and is designed to see how many items you can come up with during a three-minute time frame.

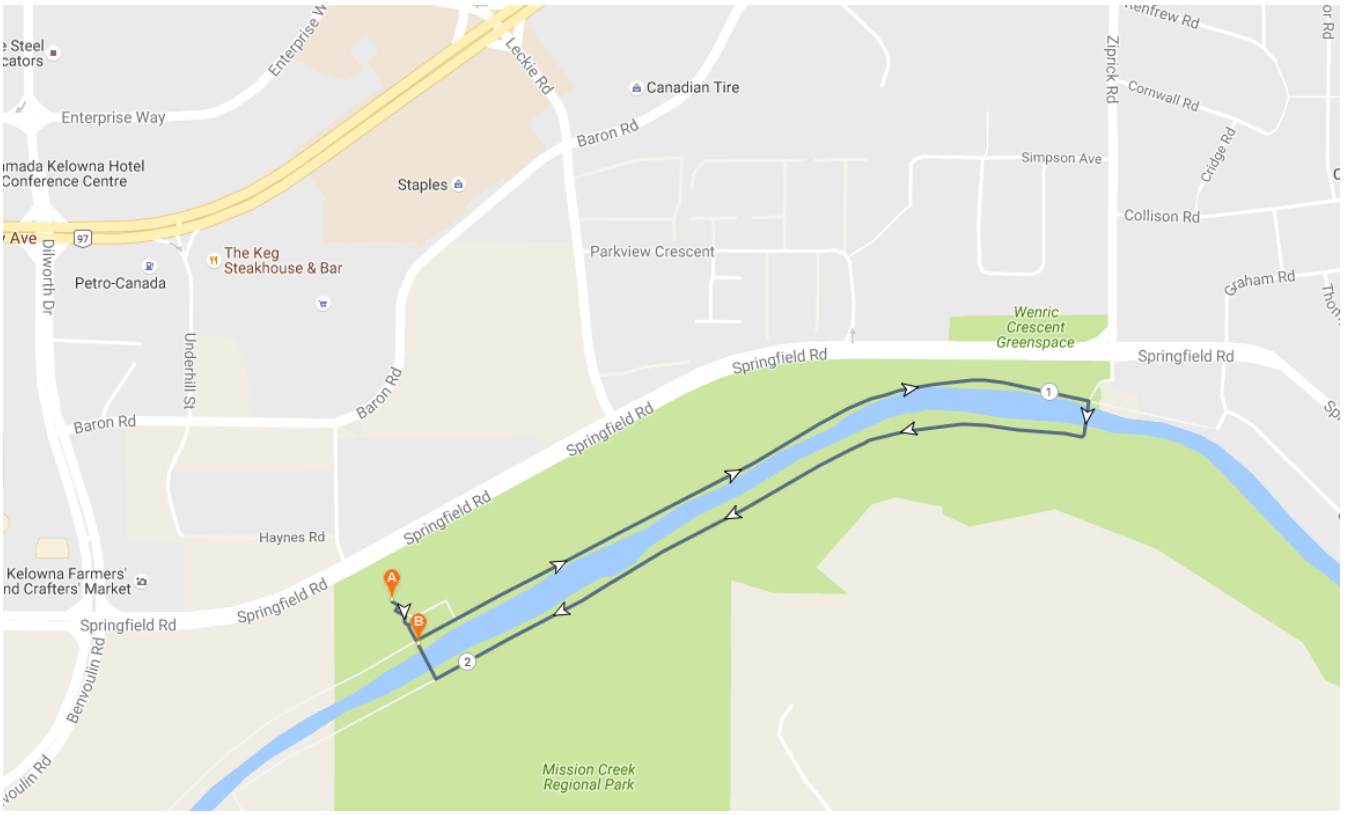
When you click on the start button you will have three minutes to type out as many **daily activities** as you can think of. (For example, brushing your teeth). Try to go as fast as you can and to write down as many as you can. If you run out of activities that you do every day, think about ones that you do every couple of days. The goal is to write down as many activities as you can. You only have 3 minutes once the clock starts.

Daily Tasks: Part 2

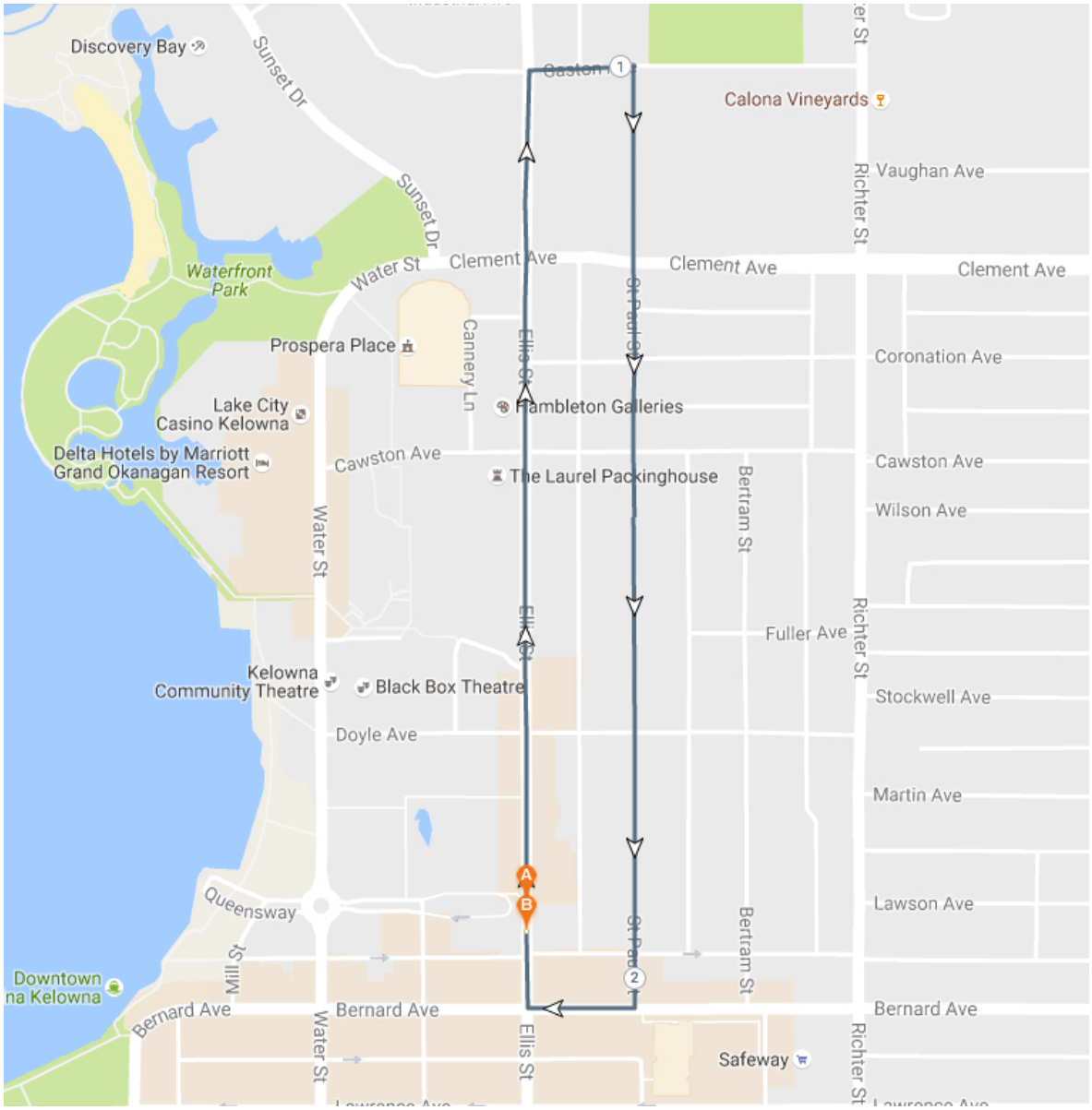
The second part of this activity is to have you rate how much you enjoy doing each of these activities. Beside each activity, rate on a scale of 1 (I don't like at all) to 9 (I love doing this) how much you like doing each activity. You will only have 2 minutes to rate your enjoyment for all of the activities you have listed.

1	2	3	4	5	6	7	8	9
I hate doing this				Neither hate or love doing it				I love doing this

Appendix CC: Study 3 Nature Walk



Appendix DD: Study 3 Urban Walk



Appendix EE: Study 3 Demographic Inventory

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Demographic Questions

Gender:
Please select one of the following:

- ☐ Male
- ☐ Female
- ☐ Transgender

Age:
Please select one of the following:

- ☐ 17 - 25
- ☐ 26 – 34
- ☐ 35 – 43
- ☐ 44 – 52
- ☐ 53 - 61
- ☐ 62 – 70
- ☐ 71 – 79

Appendix FF: Study 3 Trait Happiness Inventory

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Happiness General

Please select the appropriate response to the question, "How happy would you say you are these days?"

1	2	3	4	5	6	7	8	9
Not at all happy				Neither Happy nor Unhappy				Extremely Happy

Appendix GG: Study 3 Trait Connection to Nature Inventory

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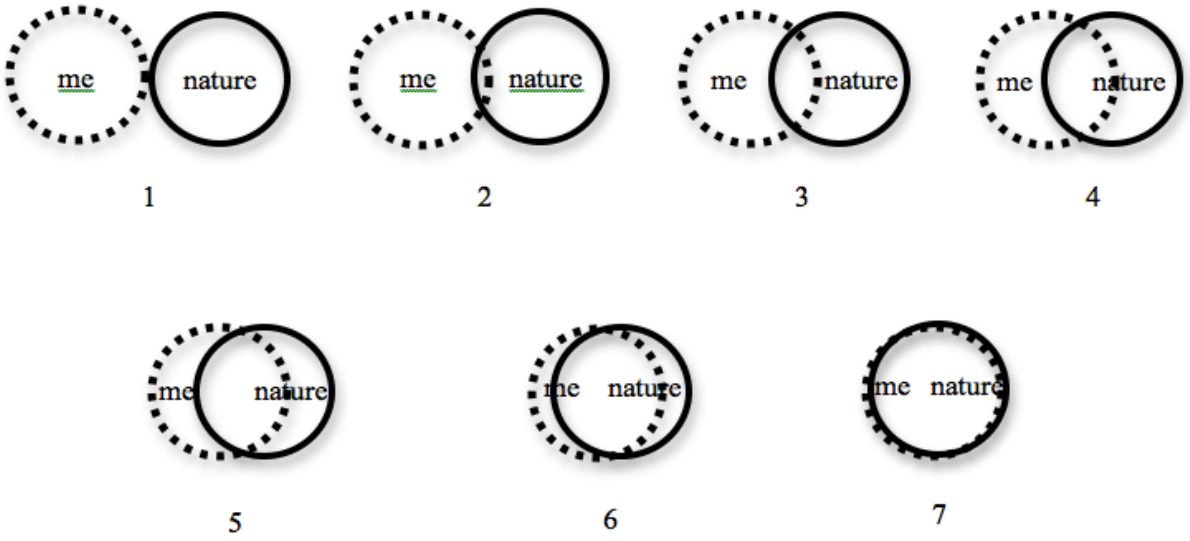
Irving K. Barber School of Arts and Sciences
Psychology Department

Inclusion of Nature in Self Scale

Please look at the following circles. Select the number that best describes your relationship with the natural environment. How interconnected are you with nature in general?



Appendix HH: Study 3 Trait Emotional Intelligence Inventory

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Psychology Department

EIQ

Please answer each statement below by selecting the number that best reflects your degree of agreement or disagreement with that statement. Do not think too long about the exact meaning of the statements. Work quickly and try to answer as accurately as possible. There are no right or wrong answers.

1	2	3	4	5	6	7
Completely Disagree						Completely Agree

____1. Expressing my emotions with words is not a problem for me.
____2. I often find it difficult to see things from another person's viewpoint.
____3. On the whole, I am a highly motivated person.
____4. I usually find it difficult to regulate my emotions.
____5. I generally don't find life enjoyable.
____6. I can deal effectively with people
____7. I tend to change my mind frequently.
____8. Many times, I can't figure out what emotion I'm feeling.
____9. I feel that I have a number of good qualities.
____10. I often find it difficult to stand up for my rights.
____11. I'm usually able to influence the way other people feel.
____12. On the whole, I have a gloomy perspective on most things.
____13. Those close to me often complain that I don't treat them right.
____14. I often find it difficult to adjust my life according to the circumstances.
____15. On the whole, I'm able to deal with stress.
____16. I often find it difficult to show my affection to those close to me.
____17. I'm normally able to "get into someone's shoes" and experience their emotions.
____18. I normally find it difficult to keep myself motivated.
____19. I'm usually able to find ways to control my emotions when I want to.
____20. On the whole, I'm pleased with my life.
____21. I would describe myself as a good negotiator.
____22. I tend to get involved in things I later wish I could get out of.
____23. I often pause and think about my feelings.
____24. I believe I'm full of personal strengths.
____25. I tend to "back down" even if I know I'm right.
____26. I don't seem to have any power at all over other people's feelings.
____27. I generally believe that things will work out fine in my life.
____28. I find it difficult to bond well even with those close to me.
____29. Generally, I'm able to adapt to new environments.
____30. Others admire me for being relaxed.

Appendix II: Study 3 Past Behaviour Inventory

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Psychology Department

Past Behavioural Questions

Please answer the following questions about how much time you spend in each of these two environments.

1. Overall, how much time would you say you spend per week in natural areas? This includes time spent in parks, wooded areas, and by water. This does not include time spent in your own garden.

Hour(s) _____

2. Overall, how much time would you say you spend per week in urban areas? This includes time spent around buildings and traffic. This does not include the time you spend in your own home.

Hour(s) _____

Appendix JJ: Study 3 Forecast of Walk Question

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Psychology Department

Forecast

Please look at the description and the map of your walking route. Please **predict (forecast) what you think your level of happiness will be after walking in this environment for 20 minutes.**

1	2	3	4	5	6	7	8	9
Not at all happy				Neither Happy nor Unhappy				Extremely Happy

Appendix KK: Study 3 Book a Walk Email

Subject line: SONA study Booking a Walk

Hi XXX,

Now that you've completed Part 1 of the study, it's time to move onto Part 2...the walk!

Before you go for the walk I need you to book a day and a time so that I can send you some important information prior to your walk. So have a look at your calendar and email me the day and time that you plan to go for your 20-minute walk before Friday December 2nd. Please choose a time that is during daylight hours (no later than a 3:30pm start time). I'll mark it down in my calendar and the day before your walk I'll send you an important email that you'll need for your walk.

If you have any questions or concerns you can email or text me [redacted]

I look forward to hearing from you and thanks so much for your participation!

Sincerely,
Maxine

Appendix LL: Study 3 Nature Walk Instructions Email

Subject Line: It's walk day tomorrow!

Hi,

You have your scheduled walk tomorrow at XXX at the Mission Creek entrance to the greenway (close to the Orchard Park mall).

The entrance is off of Springfield Road between Dilworth Drive and Leckie Road if you go by car. If you take public transit the #11 Eastbound stops on Springfield just outside the greenway entrance. The best bus stop is by Durnin Road.

Your walk will begin when you are standing by the Education Centre and Kiosk that are beside the parking lot. Once you are at that location, use the code (see below) to open up FluidSurveys. **The rest of the instructions are in FluidSurveys.**

You will need to make sure of a couple things before going for your walk.
1). Your phone needs to be charged up.
2). You need this code to open FluidSurveys**. https://survey.ubc.ca/s/greenway/**
3). You need this access code for Family Locator GPS Life360 so that you can link your phone to the researchers prior to the walk. **XXXXX** (all letters, no numbers)
4). Make sure you have access to the link and the GPS Life 360 access code on your phone. It will link your phone to my phone so that we can see each others movements.
5). Make sure that your Location Services is on your phone by following these steps:
iPhone: Go to iPhone's Settings > Location Services > turn ON Life360
Android: Go to Settings > Location Services > make sure the checkboxes are on for all location options
6). Please be aware that you will be asked to provide a screen shot of your full walk so please don't shorten or deviate from the assigned walk. (The GPS Life 360 app keeps a record of your walk history).

If you have any questions or concerns you can email or text me [redacted]

Have a great walk and thanks so much for your participation!

Max

PS Don't forget that when you complete all 3 parts of the study your name is put into a draw and all 4SONA credits are awarded.

Appendix MM: Study 3 Urban Walk Instructions Email

Subject Line: It's walk day tomorrow!

Hi,

You have your scheduled walk tomorrow at XXX in downtown Kelowna starting from the Queensway Bus Terminal.

If you go by car there is parking on Ellis Street and surrounding area. If you go by bus, the #97 goes downtown to the terminal.

Your walk will begin when you are standing at the end of the Queensway Bus Terminal by Ellis Street. Once you are at that location, use the code (see below) to open up FluidSurveys. **The rest of the instructions are in FluidSurveys.**

You will need to make sure of a couple things before going for your walk.
1). Your phone needs to be charged up.
2). You need this code to open FluidSurveys.
https://survey.ubc.ca/surveys/37-ee02e5585aa0276a32a19d33950/part-2-affective-forecasting/
3). You need this access code for Family Locator GPS Life360 so that you can link your phone to the researchers prior to the walk. **XXXXX** (all letters, no numbers)
4). Make sure you have access to the link and the GPS Life 360 access code on your phone. It will link your phone to my phone so that we can see each others movements.
5). Make sure that your Location Services is on your phone by following these steps:
iPhone: Go to iPhone's Settings > Location Services > turn ON Life360
Android: Go to Settings > Location Services > make sure the checkboxes are on for all location options
6). Please be aware that you will be asked to provide a screen shot of your full walk so please don't shorten or deviate from the assigned walk. (The GPS Life 360 app keeps a record of your walk history).

If you have any questions or concerns you can email or text me [redacted]

Have a great walk and thanks so much for your participation!

Max

PS Don't forget that when you complete all 3 parts of the study your name is put into a draw and all 4 SONA credits are awarded.

Appendix NN: Study 3 On Site Walk Instructions

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Psychology Department

Participant Instructions for Walk

1) Using the map provided in the instructions emailed to you, go to the beginning point of your walk.
2) Please close all of your applications on your mobile phone.
3) Please turn your mobile phone to 'silent mode'.
4) Open the FluidSurveys application on your mobile phone
5) Login to FluidSurveys
6) Answer the 3 Pre-Walk Questions on FluidSurveys
7) Open the Family Locator mobile app.
8) Following the map, walk at your normal pace and complete the full walk. You will send your recorded walk to the researcher and they will be able to see if you did not complete the full walk.
9) Do not talk on your phone, answer texts, send emails, or use social media while walking. It is very important that you are fully committed mentally to your walk.
10) During your walk, please pay close attention to your surroundings. This means noticing the all the sights, sounds, and smells around you.
11) Once you have completed the walk go back to FluidSurveys and complete the three Post-Walk Questions.
12) Send the map of your Family Locator walk to [redacted]

Appendix OO: Study 3 State Happiness Inventory

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THE UNIVERSITY OF BRITISH COLUMBIA

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Psychology Department

Happiness State

Please select the appropriate response for how happy you feel right now.

1	2	3	4	5	6	7	8	9
Not at all happy				Neither Happy nor Unhappy				Extremely Happy

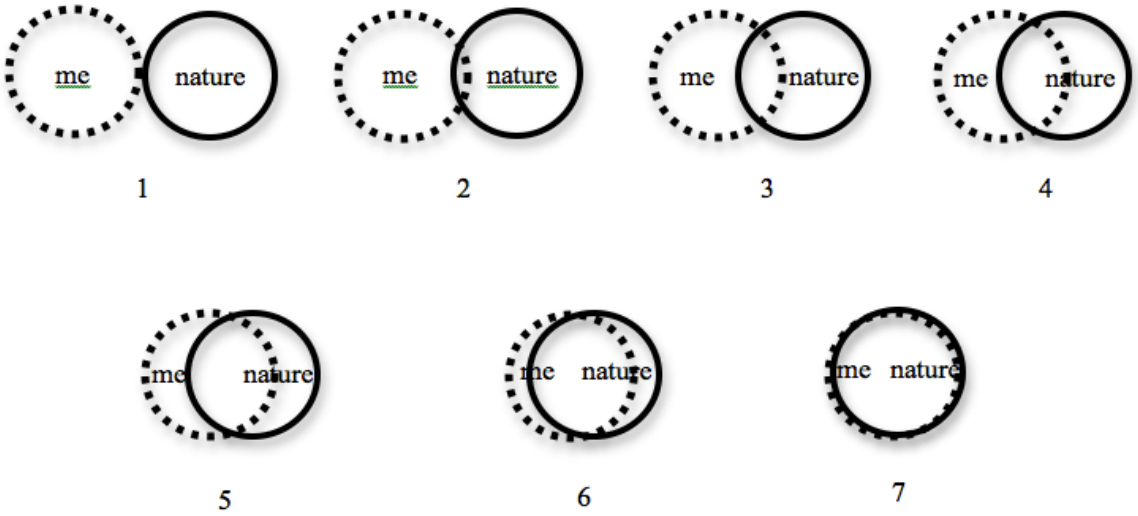
Appendix PP: Study 3 State Connection to Nature Inventory

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

Irving K. Barber School of Arts and Sciences
Psychology Department

Inclusion of Nature in Self Scale

Please look at the following circles and select the number that best describes how you feel about nature right now.



Appendix RR: Study 3 Future Behaviour Inventory

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Psychology Department

Future Behaviour

These questions are designed to find out more about your future behaviour.

1. To what extent over the next week do you intend to go out into the type of environment you just walked in? Please select the most appropriate response.

1	2	3	4	5	6	7
Definitely not/not likely at all			Moderately likely			Definitely will/very likely

2. How does your answer compare with the amount of time you normally spend in this environment? Please select one of the following answers.

- ☐ I will spend more time.
- ☐ I will spend less time.
- ☐ I will spend the same amount of time.

Appendix SS: Study 3 Part 3 Email

Subject Line: Thank you for completing the walk!

Hi,

Thank you for completing the walk and Part 2 of the study. If you haven't already done so, please email me a screen shot of your walk to [redacted] u can see your history by clicking on the icon on the bottom right of the screen (black box with a curvy white line). Once you have sent your screen shot you are free to delete the GPS Life 360 app from your phone if you wish. I will delete the connection we have between our 2 phones on the app once I receive your screen shot.

Here is the link for Part 3. It is the final portion of the study, should take less than 5 minutes, and can be done on your computer at home. https://survey.ubc.ca/s/observations/

Thank you very much for your participation.

Take care,
Maxine

PS Don't forget that when you complete all 3 parts of the study your name is put into a draw and all 4 SONA credits are assigned.

Appendix TT: Study 3 Observations Inventory

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Observations from the Study

1. What did you learn about yourself during this study?

2. Are there any observations you would like to share regarding what you learned from doing this study?

3. What do you think this study was about?

Appendix UU: Study 3 Thank you email

Subject line - Thank you!

Hi,

Thank you again for your participation in our research.

I have awarded your 4 SONA credits, your name is entered into the draw, and I have attached a document to let you know a little more about our study (please do not share this with anyone).

Good luck with the rest of your semester!

Sincerely,
Maxine

Appendix VV: Study 3 Debrief

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THE UNIVERSITY OF BRITISH COLUMBIA

Irving K. Barber School of Arts and Sciences
Psychology Department

Debrief

Thank you very much for participating in our research. You have made a valuable contribution to the advancement of psychological research and the study of affective forecasting and the environment.

This study has several purposes:
1) To see if people are more or less accurate when forecasting their positive emotions for different environments.
2). To see if your more experience with a particular environment makes you forecast more accurately.
3). To see how altering the way your brain is working influences forecasting accuracy.

There were two different walks that you may have been assigned to: a natural setting or an urban setting. We didn't tell you that there were two different walks because we thought it might have changed the way you forecasted and also changed what you thought the study was about. As well, half of the participants had a diary task that they had to do in Part 1; you may or may not have had to do this task. This task is used a lot in studies to make you think differently. We used it in the study immediately before you made your forecast so that we could get your brain working in a different way than normal before you were asked to forecast. We did this to see if changing the way your brain was working made your forecast more accurate.

If you have any questions or concerns about the research, or any suggestions about how to make this research better, please contact the researcher at [redacted]. You do have the right to withdraw from the study at any time and if you wish to do so please contact the researcher.

We would like to ask that you not share this information with your friends or classmates as they may participate in the study in the future. As we mentioned, knowing all the details of the study ahead of time can change the way people respond and so we need to keep particular details of the study a secret until the end. Thank you for your help in achieving this.

Thank you again for your participation, as we could not do this without you.