

Happy Planet, Happy People?  
The Impact of Pro-Environmental Behaviour on Psychological Well-Being

by

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## Abstract

Changing behaviours responsible for environmental harm may be perceived as an impediment to human well-being, leaving individuals and institutions hesitant to take action. However, large-scale survey data suggest that those who engage in more pro-environmental behaviour are more likely to report greater subjective well-being. The present study was the first (to our knowledge) to experimentally manipulate pro-environmental behaviour in order to assess its causal effects on affect and meaning in life. Participants ( $N = 343$ ) were randomly assigned to either 1) a group who chose and engaged in a pro-environmental behaviour from a provided list of options; or 2) a control group who found and photographed public art from a provided list of options. In order to determine whether pro-environmental behaviour had an effect on meaning in life and affect over and above that of the control group, post-activity measures were compared between groups. The analyses found that there were no significant differences between the pro-environmental group and the control group, and all pre-registered hypotheses were unsupported. Exploratory analyses revealed a within-participants effect, whereby both conditions produced a significant effect on positive and negative affect, as well as meaning in life when compared to participants' average over the last four weeks. Negative affect was most substantially mitigated in both conditions ( $d_s = 0.91 - 1.05$ ). Trait-by-condition interactions were also explored. This study provides insight into the potential emotional effects of pro-environmental behaviour. However, given that all findings were exploratory, the results should be considered speculative and can serve as direction for future research.

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Climate change and environmental degradation are phenomena caused by human behaviour. If continued, the present rate of global emissions and pollution are likely to pose a significant threat to humanity and the world's ecosystems. Given this impending problem, campaigns and interventions to address unsustainable behaviour will likely be necessary. However, asking individuals to change habitual behaviours may be perceived as an impediment to living a happy and satisfying life, leading to hesitancy from both individuals and institutions.

Research suggests, however, that those who engage in more behaviours that protect the natural environment (pro-environmental behaviour) are more likely to experience greater subjective well-being. This line of research is still in its preliminary phase; subjective well-being has not been explored in all its dimensions, and the relationship has only been demonstrated by correlation. No research yet exists that uses experimental methods. If engaging in pro-environmental behaviour is indeed well-being enhancing, it has potential as a positive psychology activity serving a dual purpose: to promote the flourishing of humans and the natural environment.

### **The Environment**

As noted above, there is scientific consensus that the earth's climate is warming due to human behaviour (Cook, 2016). Human-generated greenhouse gas emissions are primarily responsible for record-high average global temperatures. As a result, extreme weather events that are harmful to human populations and global ecosystems (e.g., forest fires, flooding, droughts, and sea-level rise) are projected to increase in both frequency and intensity in the future (Bouwer, 2019). Moreover, environmental degradation is multifarious; chemical spills, pollution, waste-disposal, deforestation, and industrial development are all human behaviours that alter the hospitable balance of the natural environment. As such, current loss of global biodiversity is



estimated to be an order of magnitude 100 to 1000 times greater than the natural rate of extinction ( i.e., without humanity; Ceballos et al., 2015).

The human behaviours that lead to environmental degradation are complex and multifaceted. At the level of the individual, every human engages in a number of consumptive and waste behaviours that have some net-impact on the environment. For example, the most recent national estimates of Canadian driving behaviour suggest that the average vehicle owner drives roughly 300km per week (Government of Canada, 2008) emitting more than 2,000kg of greenhouse gasses per year. Many campaigns have attempted to leverage psychological research in order to mitigate environmental degradation, targeting individuals' environmentally relevant values, attitudes, beliefs, and choices. This approach has also received criticism in popular media (Riley, 2017; Lukacs, 2017), with critics suggesting that the effect of individuals' behaviours are insignificant compared to the effects of industry. It then follows, they argue, that individual behaviour change is obsolete in the process of mitigating environmental harm. If these ideas are endorsed by a significant number of people, they may act as a barrier against actionable behaviour on the issue of environmental protection.

### **The Role of Psychology in Conservation**

While it is both true and non-trivial that industrial activity is responsible for the greatest portion of environmental degradation (Griffin, 2017), it is also the case that it is ultimately governed by the decisions of individuals. Executives, shareholders, and stakeholders may each exert influence on corporate decision-making; individual consumers make purchases that influence markets; individual voters voice their priorities, leading to government regulations that impact the environment. The individual is an essential (albeit not the only) level of analysis in

mapping the constituents of environmental degradation and will likely be relevant to the process of mitigating it.

Some opponents of taking action to protect the environment claim that it is too costly (Lau, 2019), largely citing the short-term economic costs to the actors. However, in discussing the costs and benefits of engaging in pro-environmental behaviour, its psychological effects are rarely mentioned and thus either implicitly assumed or ignored. If pro-environmental behaviours have acute or long-term psychological effects on the individuals engaging in them, this would be a relevant consideration to those making environmental choices. As Brown and Kasser (2005) put it:

*“As long as environmentally responsible behavior is framed in self-sacrificial terms, individuals will be faced with tough choices about how to act, because while the majority of the general public wants a safe and healthy environment, they also want happy lives.”*

Indeed, one of the United Nation’s goals for the second decade of the millennium was to prioritize measuring and promoting global happiness (U.N. General Assembly, 2011). If individuals want to maximize their happiness (and psychological well-being more broadly), it will be useful to have knowledge of the types of behaviours that tend to increase it. An investigation into the relationship between pro-environmental behaviour and well-being may reveal that pro-environmental behaviour confers benefits those who engage in it, and elucidate some of the moderators for these benefits (i.e., traits or contexts that produce more benefits).

### **Well-Being: A Brief Overview**

A pre-requisite to investigating well-being is to define and operationalize it. Philosophers have long debated over what constitutes a “good life”, and some have attempted to list its objective constituents (Hurka, 2014). However, each of these pieces that may or may not

“objectively” contribute to over-all well-being is valued differentially between individuals, based on their values, goals, culture, etc. For example, one person may derive satisfaction or pleasure from the process of creating art, while another might feel similarly when engaging in family activities. From a psychological perspective it may suffice to leave these value attributions up to the individual and instead assess his or her overall subjective experience (Diener et al., 2018).

**Subjective well-being.** This is the logic that gave rise to *subjective well-being* as a psychological construct (Diener, 1984), which is an evaluation of the quality of a person’s life from that person’s own perspective. Subjective well-being is comprised of 1) *life satisfaction*, a person’s cognitive evaluation of their overall satisfaction with their life; 2) *positive affect*, high levels of pleasant and desirable emotions; and 3) *negative affect*, low levels of unpleasant and undesirable emotions.

Researchers differ in the extent to which they prioritize either the cognitive or affective components of subjective well-being. Given that life-satisfaction is a global evaluation of one’s life, it should be based on the sum of many different experiential pieces, and thus relatively resistant to day-to-day changes in behaviour and circumstances. Commensurately, changes in mood, weather, and topic priming have been found to have small and inconsistent effects on life-satisfaction (Diener, 2004; Lucas & Lawless, 2013; Schimmack & Oishi, 2005), suggesting that it is indeed resistant to such short-term fluctuations.

It also appears that life-satisfaction has a strong genetic component and is relatively stable over time. The Minnesota Twin Study conducted a large-sample heritability study, the results of which indicated that there is a substantial genetic component to individual differences in life-satisfaction (Tellegen et al., 1988). Further examining the nature of its stability, Eid and Diener (2004) demonstrated that over a period of four weeks, 74% of the variance in life

satisfaction scores was due to stable individual differences among participants, and only 16% due to occasion-specific changes.

The relative stability of life-satisfaction appears to extend over the course of many years. In a longitudinal study looking at variation in participants' life-satisfaction over the course of seventeen years, average scores over the first five years correlated strongly and positively ( $r = .51$ ) with the average scores from the last five years (Fujita & Diener, 2005). It is worth noting that over the course of this study, a quarter of participants' life satisfaction changed significantly; these participants, however, still represented a minority of the sample. Significant and lasting changes in life satisfaction have been found to accompany substantial changes in life circumstance like losing one's job (Lucas, Clark, Georgellis, & Diener, 2004), the death of a spouse (Lucas, Clark, Georgellis, & Diener, 2003), or the onset of a physical disability (Lucas, 2007). Thus, although research suggests life-satisfaction can be situationally affected by practically and emotionally salient events, it is less likely to respond to acute changes.

While the affective components of an individual's subjective well-being (positive and negative affect) have been shown to be relatively stable when aggregated over time, from moment to moment state affect appears to be more reactive. State affect comprises the emotions and moods that occur in the momentarily (as opposed to tendencies over time), which are more likely to change and fluctuate. Both in-lab manipulations and behavioral interventions have produced larger effects on state-affect (Newman & Sears, 2015; Westermann et al., 1996; ). The fact that these changes have been shorter-lasting than their more cognitive counterpart, however, does not indicate that they are unmeaningful. An individual's life is composed of an aggregate of moments; most would agree that all other things equal, a life filled with miserable moments is a less desirable than a life filled with pleasant ones. Indeed, in a large-scale study by Oishi et al.

(2019) sampling from nine different countries, researchers asked participants to choose whether they would prefer a happy life, a meaningful life, or a psychologically rich life. In every sample the majority (> 50%) picked a happy life over the other options.

Furthermore, when individuals are making cognitive evaluations regarding their satisfaction with life, they are likely (in-part) doing so by attempting to recall their level of positive and negative emotions in the past. This is supported by research demonstrating that when aggregated over time, positive and negative affect are moderately correlated with life-satisfaction in opposite directions, respectively (Suh, Diener, Oishi, & Triandis, 1998). Thus, while individually ephemeral, producing more positive experiences relative to negative ones may also have the power to produce an evaluation of a more satisfying life over time.

**Meaning in life.** As mentioned above, an alternative measure of well-being is the subjective sense that there is meaning to one's life. A life is meaningful, according to King et al. (2006) when it is "felt to have a significance beyond the trivial or momentary, to have purpose, or to have a coherence that transcends chaos". As such, it has been proposed that meaning in life has three central components: purpose, significance, and coherence (Heintzelman & King, 2014; Martela & Steger, 2016; Park & George, 2013). Purpose refers to having goals and direction in life; significance, the degree to which a person believes his or her life has importance, value, and worth; and coherence, the degree to which the person's life appears to makes sense, characterized by some predictability and routine (King, Heintzelman, & Ward, 2016).

In the aforementioned study by Oishi et al. (2019) in which participants prioritized different aspects of well-being, a substantial minority of participants from each sample (14 - 39%) reported preferring a meaningful life to one that is happy or psychologically rich.

Longitudinal research demonstrated that self-reported meaning in life was positively correlated

with subjective well-being (Oishi et al., 2019), and negatively correlated with incidence of depression and other psychological disorders (Taylor et al., 2000; Steger, Oishi, & Kahdan, 2009) as well as physical health outcomes such as risk of heart attack and neuro-degenerative disease (Boyle, Buchman, Barnes, & Bennett, 2010; Kim, Sun, Park, Kubzansky, & Peterson, 2013). Given its value to a substantial proportion of the global population, as well as its physical and psychological correlates, meaning in life appears to be an aspect of well-being worth investigating.

Research suggests that at the state-level, meaning in life may be affected by some manipulations. Participants reading about trees growing in a patterned fashion reported higher meaning in life than those reading about trees growing in a chaotic fashion (i.e., manipulating perceived coherence; Kay, Laurin, Fitzsimons, & Landau, 2014). A similar result was reported when participants looked at images of trees organized by season as opposed to random assortment (Heintzelman, Trent, & King, 2013). Experiments designed to manipulate feelings of belongingness or exclusion have also resulted in significant increases in meaning (Lambert et al., 2013; Stillman et al., 2009; Zadro, Williams, & Richardson, 2004), perhaps because meaning is associated with social connectedness (Lambert et al., 2013; Lambert et al., 2010), or because resulting changes in affect lead to changes in meaning. Indeed, unlike life satisfaction, state-level meaning in life appears to be affected by changes in emotion; multiple studies have found that induced positive affect increased reported meaning in life (King et al., 2006; Hicks & King, 2008; Ward & King, 2016).

### **Pro-Social Behaviour and Well-Being**

At the state-level, it appears that both affect and meaning in life have shown to be affected by manipulations and changes in circumstance. Relevant to the investigation of pro-

environmental behaviour, there is a body of research that has examined the psychological effects of engaging in behaviour that helps others (often at a cost to oneself). Some of these studies have investigated the effect of pro-social behaviour on affect and meaning. In this context, pro-social behaviour shares a common thread with pro-environmental behaviour: an individual engages in (sometimes costly) behaviour to help other humans (and/ or animals), specifically through conserving the natural environment. There is evidence to suggest that this type of behaviour may be psychologically beneficial.

Humans are social primates and co-evolved to help one another in their communities. In this context, positive emotions can be thought of as a reward for behaviour that accrues and maintains social capital. Caring for kin, forming coalitions, and fostering status are evolutionarily adaptive goals that were likely to have been rewarded in the same way as the attainment of other necessary resources such as food and sex (Curry et al., 2018). As such, research has identified ways in which helping behaviour is psychologically rewarded, and a broad literature supports the affect-increasing effect of prosocial activities (Curry et al., 2018).

In their meta-analysis, Curry and colleagues (2018) aggregated 27 studies investigating the causal effect of engagement in prosocial behaviour on happiness. They examined studies that used a broad variety of prosocial activities, including gift giving, spending a windfall on close-ties or strangers, a participant-chosen act of kindness (e.g., giving mother a hug, or vacuuming for a roommate), helping others design a course-schedule, and even anonymous pro-social impact through computer gameplay. The authors calculated an overall effect size estimate of  $\delta = 0.28$ , representing a small-to-medium effect approximately equivalent to an increase of 0.6 units on a 0 – 10 happiness scale. This aggregate effect-size is similar to that reported for other

positive psychology interventions such as mindfulness practice, gratitude, and positive thinking (White et al., 2019).

As an example, Dunn and colleagues (2008) conducted a seminal experiment in which participants were given money and assigned to spend it on either themselves or on someone else. Those who spent the money on others had significantly greater affect-balance (i.e., high positive to negative affect ratio) than those who spent the money on themselves. Subsequently, this finding was replicated in children (Aknin, Hamlin, & Dunn, 2012), and in multiple non-western and developing cultures, leading the authors to suggest that a positive emotional response to pro-social spending may be a human universal (Aknin et al., 2013). Moreover, a large-sample pre-registered replication was recently conducted (Aknin et al., In Press), the findings of which supported the effect that engaging in prosocial spending increased positive affect.<sup>1</sup> These studies are particularly salient given that they have demonstrated the psychological benefits of even objectively costly pro-social behaviour (i.e., giving money away rather than keeping it for oneself).

The extant research examining the relationship between pro-social behaviour and meaning in life is preliminary, but suggestive; Klein (2017) conducted three studies investigating it. The first study demonstrated that individuals who engaged in more volunteering behaviour reported higher meaning in life when controlling for other meaning-associated variables. Study two replicated Dunn and colleagues' (2008) study in which participants spent money on others or on themselves, however investigating meaning as the outcome instead of affect. Spending money on others increased meaning substantially compared to spending on oneself, with an effect size

<sup>1</sup> However, when attempting to replicate studies that asked participants to *recall* a time that they engaged in prosocial spending, results were mixed. The authors cite low participant engagement as a potential cause for null effects. Even when specifically implementing procedures to increase engagement, and recruiting an extremely large sample size ( $N > 5000$ ), effects were marginal.



of  $d = 0.70$ . Study three replicated this finding with a similar effect size,  $d = 0.65$ . These results suggest that at the state-level, meaning in life may be affected by engaging in pro-social behaviour.

If those who engage in pro-social behaviour experience increased affect balance and meaning, there are reasons to believe that pro-environmental behaviour might also induce a similar response. Depending on the actor's knowledge and perspective, pro-environmental behaviour could be perceived as contributing to societal well-being, protecting vulnerable populations, and helping ensure prosperity for future generations. In addition, it could be seen as mitigating the suffering and extinction of various non-human species. Consciously engaging in behaviours that help conserve the natural environment may be perceived as "doing good" in the same way as donating to charity, volunteering, and expressing gratitude, thus providing some of the same psychological rewards as directly pro-social behaviour (Zelenski et al., 2015).

**Counter-arguments.** Some evolutionary thinkers (Curry et al., 2018) have proposed that those who engage in pro-social behaviour should only reap psychological benefits in instances whereby there is a significant possibility for social return on investment. It is suggested that only this type of altruism would be fitness enhancing at the level of the individual throughout evolutionary history, and thus selected for. For example, a prosocial actor might receive an advantage (i.e., survival or reproduction) in situations where they are likely to be reciprocated, or the prosocial act is conspicuous enough to elevate their status as a useful ally among others in their group. If a positive emotional response was contingent on the possibility of direct reciprocation, the response to many types of pro-environmental behaviour could be limited, as returns on investment for engaging in pro-environmental behaviour are typically diffuse and delayed. For example, the primary result of recycling paper might be less harvesting of trees and decreased use of landfill, neither of which is likely to tangibly impact the life of the actor.

Other evolutionary theorists (Henrich, 2016), however, have suggested that cultural evolution likely plays a significant role in which situations lead to pro-social emotions (e.g., through collective integration of pro-social norms). Thus emotional responses may be partially determined by communal selection-pressured rather than the strictly kin-based enhancement that drives genetic evolution. Indeed, there is some evidence that the psychological benefits conferred to a prosocial actor are not contingent on a reciprocal relationship with the receiver. Rowland and Curry (2019) found that acts of kindness resulted in increased feelings of happiness whether they were toward a stranger or someone in the close circle of the actor. This evidence is preliminary but suggestive. It is worth noting, additionally, that as cultural attitudes continue to shift in favor of protecting the natural environment, conspicuously conservational behaviours are likely to act as signals for status-enhancing attributes (e.g., in-group membership, excess time and resources, communal attitudes, etc.).

### **Nature and Well-Being**

Primarily, what distinguishes pro-environmental behaviour from other pro-social behaviour is that it affects more than just human populations. Any human-centered outcomes are downstream from the more proximate target, nature itself. *The Biophilia Hypothesis* suggests that humans have an innate attraction to living things (e.g., plants, animals) and natural elements (e.g., water, landscapes), and that this connection persists in the modern world despite increasing urbanization and separation from nature (Wilson & Kellert, 1993). As in the case made for pro-social behaviour, this attraction likely (partly) developed as a product of natural selection; individuals who spent more time in fertile environments with these natural elements were more likely to survive through greater access to food, water, and shelter. Thus, over millennia, *homo sapiens* and their predecessors developed mechanisms that psychologically rewarded proximity

to those elements. This theory is supported by a wide scientific literature demonstrating the positive effects of nature-exposure on well-being.

Broadly, time spent outdoors engaging with nature has been positively associated with subjective well-being. Research has found that those who engaged in more outdoor activities tended to have higher life-satisfaction (Biedenweg, Scott, & Scott, 2017) controlling for income, leisure, education, and employment (Mert, Zurnaci, & Akgün, 2015). A recent meta-analysis (McMahan & Estes, 2015) found that across thirty-two samples, brief contact with natural environments increased positive affect and decreased negative affect. Being exposed to real nature (i.e., being outdoors) produced a moderate effect on positive affect,  $r = .37$ , while simulated natural elements produced a smaller effect,  $r = .26$ . The effect of nature exposure on negative affect was smaller,  $r = -.12$ , but significant. Moreover, perceived harm to the environment has been found to be negatively associated with life satisfaction (Schmitt et al., 2018), suggesting that humans' psychological well-being is perhaps interconnected with the (perceived) well-being of nature. Given this interrelatedness, it seems possible that humans could experience some intrinsic pleasure or satisfaction in protecting nature. Indeed, Schmitt and colleagues (2018) also found that the negative association between perceived ecological threat and life satisfaction was fully mitigated and even reversed by an increased tendency to engage in pro-environmental behaviour.

Although *The Biophilia Hypothesis* asserts that attraction to nature is a human universal, there are varying degrees to which individuals enjoy, care about, and feel connected to nature. Nature Relatedness is a construct that captures this subjective sense of connection with nature (Nisbet, Zelenski, & Murphy, 2009), defined as individual differences in cognitive, affective, and experiential connections with the natural environment. As a trait, it has been demonstrated to

correlate with subjective well-being and meaning in life (Cervinka, Röderer, & Hefler, 2012). When an induction was used to increase nature relatedness at the state-level, it was accompanied by improved mood (Nisbet & Zelenski, 2011). Thus, there is evidence to suggest that exposure to, and subjective connection with nature promote well-being.

Nature Relatedness also appears to provide benefits beyond the individual experiencing it; it has been found to strongly predict positive attitudes toward environmental protection as well as frequency of self-reported pro-environmental behaviour (Dutcher, Finley, Luloff, & Johnson, 2007), including paper use, waste behaviour, transportation and produce choice, and environmental concern. As a common denominator between well-being and pro-environmental behaviour, nature relatedness may act as a bridge between an individual's propensity to protect the environment and the psychological reward that they receive.

### **Pro-Environmental Behaviour and Well-Being: Past Research**

Researchers have begun examining and unpacking the relationship between pro-environmental behaviour and subjective well-being. In 2002, Kasser and Sheldon found that adults and college students who reported more environmentally responsible Christmas celebrations (e.g., "green" gifts, replanting a tree, etc.) also reported higher life-satisfaction. Subsequently, they found that adolescents' general self-reported pro-environmental behaviours also correlated positively with life-satisfaction (Brown & Kasser, 2005).

Since then, the relationship has been corroborated in larger-scale correlational studies. Welsch and Kuhling (2010) used data from the World Value Surveys in 27 countries ( $N = 24,000$ ) which assessed whether respondents had engaged in three pro-environmental behaviours in the past twelve months, as well as their attitudes toward protecting the environment. Respondents who reported having engaged in more pro-environmental behaviours were more

likely to report higher life-satisfaction. Perhaps most interestingly, the relationship was robust to controlling for environmental attitudes, suggesting that there may have been a unique effect of pro-environmental behaviour over and above participants' attitudes toward the environment. Furthermore, using an economic framework, the authors suggested that individuals systematically over-estimated the psychological utility (i.e., satisfaction enhancement) of material consumption. Given that material consumption is often in direct competition with pro-environmental behaviour, this led them to underestimate the psychological utility of engaging in pro-environmental behaviour. As such the authors suggest that the sample's life-satisfaction would have been optimized by increased engagement in pro-environmental behaviour.

Schmitt and colleagues (2018) also conducted an analysis of a survey ( $N = 1000$ ) drawn from a web-panel, measuring the self-reported frequency of 39 pro-environmental behaviours. Overall there was a positive (and albeit small) association,  $r = .18$ , between reported frequency of pro-environmental behaviour and life-satisfaction. Thirty-seven individual pro-environmental behaviours were positively correlated with life-satisfaction, with coefficients ranging from  $\beta = 0.05 - 0.14$  and none were negatively associated, despite the costs associated with many behaviours. Indeed, the relationship between pro-environmental behaviour and life-satisfaction was *stronger* for behaviours with higher direct costs in terms of money, effort, and time spent. The degree to which a pro-environmental behaviour was social (i.e., an opportunity for interactions with others) and observable (i.e., an opportunity to be seen engaging in the behaviour by others) was predictive of a stronger relationship with life-satisfaction, but to a much lesser extent than direct costs. The results of these analyses were robust to controlling for socio-demographic covariates, including income.

These results have been corroborated cross culturally over multiple studies. Survey research in Spain, Mexico, Sweden, China, and Cyprus, with large sample sizes ( $N > 500$ ) have found positive correlations between a variety of pro-environmental behaviours and well-being (Suarez-Varela et al., 2016; Corral-Verdugo et al., 2011; Kaida & Kaida, 2016; Xiao & Li et al., 2011; Leonidou et al., 2010). Pro-environmental behaviours examined in these studies include recycling, reusing consumer goods, saving water, engaging in environmental activism, and conserving household energy. Indeed, the positive correlation between self-reported pro-environmental behaviour and life-satisfaction is supported in samples of young adults (Corral-Verdugo et al., 2011), adults with an average age of 50 (Kaida & Kaida, 2016), and population age-representative samples (Leonidou et al., 2010). All of these studies use life-satisfaction as a dependent variable (except for Corral-Verdugo and colleagues (2011) who use a “happiness” scale).

However, given that these data are cross-sectional, directionality of the effect remains unclear. Thus, as a preliminary investigation (i.e., a separate study) we conducted a study ( $N = 174$ ) at the Carleton University Happiness Laboratory to investigate participants’ affective forecasts (i.e., predicting how they would feel) after engaging in a novel pro-environmental behaviour. Indeed, participants predicted they would feel better than normal ( $M = + 0.96$ , on a scale with a range from -2 to +2) after engaging in pro-environmental behaviour (van Ginkel & Zelenski, 2020). Although humans are notoriously inaccurate when predicting the affective outcomes of their actions (Verner-Filion et al., 2012), the converging evidence from the robust correlational research and this finding is at least suggestive.

### **Rationale of Study**

The studies outlined above provided a foundation from which to begin investigating the relationship between pro-environmental behaviour and well-being. However, there were limitations to this research. To my knowledge, every direct investigation of pro-environmental behaviour prior to this study was cross-sectional and correlational. Thus, the only scientific evidence that pro-environmental behaviour *causes* increases in affect or meaning in life was the related, but distinct literature investigating the effect of other prosocial behaviours. Furthermore, each previous investigation of pro-environmental behaviour only measured life-satisfaction. However, based on multiple converging sources of evidence, a causal relationship seemed plausible:

1) Pro-environmental behaviour had been positively associated with life-satisfaction, and life satisfaction strongly associated with affect and meaning in life. A possible explanation is that habitual moments of pro-environmental behaviour engagement led to increased affect balance and/or meaning, resulting in increased cognitive evaluations of life-satisfaction. Given that cost to the actor (i.e., time, money, effort) was the strongest identified moderator of the relationship between pro-environmental behaviour and life-satisfaction, perhaps more investment on the part of the actor led to greater acute and long-term psychological returns.

2) Engaging in pro-social behaviour had been shown to increase affect-balance and meaning in life. Put another way, giving to others at a cost to oneself seemed to produce psychological rewards for the giver. It was thus reasoned that pro-environmental behaviour may act on the same, or similar psychological mechanisms, in which the actor feels they are helping other humans or non-human animals (or “nature” as a unified entity).

3) Connection with nature had been positively associated with affect-balance and meaning, as well as pro-environmental behaviour. If the *Biophilia Hypothesis* was true – that humans have an innate attraction and need to connect with nature – it stood to reason that acting to protect the natural environment might partly satisfy that need. This was supported by the finding that, on its own, perceived ecological harm was negatively associated with life-satisfaction, but the increased tendency to engage in pro-environmental behaviour predicted a reversal this relationship.

4) Unpublished research from our laboratory (van Ginkel & Zelenski, 2020) demonstrated that a student sample predicted they would feel better than usual after engaging in a new pro-environmental behaviour of their choice.

At this stage, the question of whether pro-environmental behaviour would lead to improved affect and meaning in life was ripe for exploration. Thus, the present study tested this question in a randomized control experiment.

The experimental condition was assigned the task of engaging in a pro-environmental behaviour of their choice. Pro-environmental behaviour was defined as behaviour that plays an active role in protecting the natural environment or supporting groups/ individuals that do so. A list of examples was provided from the analysis of specific pro-environmental behaviours from Schmitt et al., (2018; e.g., eat vegetarian for a day, walk or cycle instead of drive, etc.). Autonomy in choosing pro-environmental behaviours was encouraged in order to maximize person-activity fit (Sin & Lyubomirsky, 2009), and to determine whether there was support for an overall effect before attempting to investigate heterogeneous variability within the broader category of pro-environmental behaviour.



It has been standard practice for researchers to employ an *active* control group in investigating the effects of positive psychology activities to control for the affective response that sometimes accompanies engaging in a novel task (Lyubomirsky, 2011; Harasymchuk et al., 2016). In this study, the control group was assigned the task of taking photos of statues or sculptures around the city. This activity was as a task that has an element of novelty and action, taking a similar amount of time and effort as engaging in a pro-environmental behaviour (roughly 30 to 60 minutes), but unlikely to provide the same sense of “helping” that is theorized to be central to pro-environmental behaviour’s effect on affect and meaning.

Both the pro-environmental behaviour group and control group completed a follow-up measure of positive affect, negative affect, and meaning in life. Post-activity measures of the pro-environmental behaviour group was compared to those of the control group to determine whether engagement in pro-environmental behaviour resulted in a significant increase in affect and meaning.

### **Moderators**

It seemed plausible that some number of traits might enhance or stifle the effect of pro-environmental behaviour on well-being. For example, perhaps traits that predict engagement or endorsement of pro-environmental behaviour might also make engagement in similar behaviours more value-congruent, rewarding, and pleasant.

As discussed earlier, the degree to which individuals feel connected with nature has been demonstrated to be associated with positive attitudes toward environmental protection and self-reported pro-environmental behaviour (Dutcher, Finley, Luloff, & Johnson, 2007). Individuals higher in nature relatedness may have been more likely frame pro-environmental behaviour as protecting (and thus connecting with) nature. Thus nature relatedness was explored as a potential

moderator enhancing the effect of pro-environmental behaviour on state affect and meaning in life.

Multiple studies have found a link between the extent to which individuals identify as politically liberal and their environmental attitudes and behaviours. Specifically, those who identify as more liberal have been shown to be more likely to support environmental initiatives, policies, and self-report engaging in more pro-environmental behaviours (Currie & Choma, 2018; Wood & Vedlitz, 2007; McCright & Dunlap, 2010). Some research has indicated that this relationship may only be true in developed, capitalist nations that already have relatively strong environmental protection initiatives (Nawrotzki, 2012). Nonetheless, the present sample (i.e., in Canada) falls within those boundaries. It seemed that given this relationship, perhaps liberals would be more likely respond positively to engaging in behaviour that was congruent with their political values, thus enhancing the positive effects of pro-environmental behaviour. Political liberalism was thus assessed as a moderator.

Research linking Big-5 personality traits to environmental behaviour and attitudes has yielded somewhat mixed results. However, some traits have emerged frequently as predictors of self-reported pro-environmental behaviour. In both community and undergraduate samples, openness to experience has been linked to self-reported pro-environmental behaviour (Markowitz et al., 2012). It is unclear whether this is due to inherent values associated with openness (e.g., appreciation for natural aesthetics), or whether it is explained by open individuals' tendency to identify as politically liberal (Klein et al., 2019). It was therefore explored as a potential moderator of the effect of pro-environmental behaviour. Other research has found that along with openness, trait agreeableness also predicted pro-environmental

attitudes and behaviour (Pavalache-Ilie & Cazan, 2018; Pfeiler & Egloff, 2018). It was also chosen as a potential moderator of the effect of pro-environmental behaviour.

## **Hypotheses**

### **Primary Hypotheses**

*Hypothesis 1:* Participants engaging in pro-environmental behaviour would report higher post-activity positive affect than the control group engaging in art photography.

*Hypothesis 2:* Participants engaging in pro-environmental behaviour would report lower post-activity negative affect than the control group engaging in art photography.

*Hypothesis 3:* Participants engaging in pro-environmental behaviour would report higher post-activity meaning in life than the control group engaging in art photography.

### **Secondary Predictions (Exploratory)**

*Prediction 1:* Higher nature-relatedness would enhance the effect of the pro-environmental condition on well-being, a trait by condition interaction.

*Prediction 2:* Self-identified political liberalism would enhance the effect of the pro-environmental condition on well-being, a trait by condition interaction.

*Prediction 3:* Openness to experience and agreeableness would enhance the effect of the pro-environmental condition on well-being, a trait by condition interaction.

Each of these predictions was based on prior research demonstrating that their respective individual difference had been positively related to pro-environmental attitudes. Thus, I reasoned that individual differences that predict likelihood of engagement in pro-environmental behaviour would also predict a stronger effect of engaging in pro-environmental behaviour on increasing well-being, as it had been demonstrated that both personality and person-activity fit have

moderated the effectiveness of positive psychology activities (Senf & Liao, 2013; Sin & Lyubomirsky, 2009).

## Method

### Open Science Disclaimer

I report how I determined my sample size, all data exclusions, all manipulations, and all measures in the present study.

### Participants

I pre-registered (<https://osf.io/ymb7q/>) that I intended to recruit at least 300 participants from a pool of Carleton University Undergraduates. When comparing two groups using a t-test, having 252 (total) participants would allow the detection of an effect size of  $d = 0.25$  with 80% power (calculated using Statistical Decision Tree online power calculator; <https://www.anzmtg.org/stats/PowerCalculator/PowerTtest>). However, I would continue running the study until the end of the semester in which the target was reached.

First- and second-year psychology students were compensated with course-credit for their participation. The study was titled “Trying Something New” so as not to expose the purpose of the study and potentially produce demand effects, but not to deceive participants either. In order to be included in the analysis participants were required to complete both the in-lab and follow-up survey portions of the study.

### Materials

**Positive and negative affect.** These variables were measured using the 12-item Scale of Positive and Negative Experience (SPANE; Diener, Wirtz, & Tov, 2010). In the pre-activity assessment, participants responded by rating how much particular words describe their feelings over the past four weeks, on a scale from 1 (very rarely or never) to 5 (very often or always). A

four week period (as opposed to momentary mood report) was chosen so as to reduce the potential error from having participants report their mood state while sitting in the lab completing questionnaires. A longer recall period was chosen to be more representative of participants' average mood state as a comparison.

This was to assess participant's trait affect scores. The post-activity assessment had participants describe their feelings at the moment they completed the activity, as a state-affect measure. Scores for positive and negative were determined by averaging the responses from their respective categories. Both positive affect ( $\alpha = .81$ ) and negative affect ( $\alpha = .86$ ) demonstrated good internal consistency. Two items measuring awe were embedded in the SPANE.

**Satisfaction with life.** This variable was measured using the 5-item Satisfaction with Life Scale (SWL; Diener, 1984). Participants responded by rating their agreement with statements such as "In most ways my life is close to ideal" on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). The overall score was determined by averaging the responses to all scale-items. Satisfaction with life was not used in the analyses of the present study.

**Meaning in life.** This variable was measured using the Presence of Meaning section (5 items) of the 10-item Meaning in Life Questionnaire (MLQ; Steger, Frazier, Oishi, & Kaler, 2006). Participants responded by rating their agreement with statements such as "I understand my life's meaning" on a scale ranging from 1 (absolutely untrue) to 7 (absolutely true). The scale showed good internal consistency,  $\alpha = .86$ .

**HEXACO.** Big 5 personality dimensions, in addition to the dimension of honesty/humility were measured using the 100-item HEXACO Personality Inventory – Revised (HEXACO-PI-R; Lee, et al., 2016). The researchers that developed the scale recommend using the full version whenever possible to maximize validity of the measure (Lee, et al., 2016). As

such the 100-item scale was used. Participants responded by rating their agreement to statements about themselves such as “I clean my office or home quite frequently), on a scale from 1 (strongly disagree) to 5 (strongly agree). Each scale has a total of 16 items. Both openness ( $\alpha = .78$ ) and agreeableness ( $\alpha = .81$ ) demonstrated good internal consistency.

**Nature relatedness.** This variable was measured by embedding the shortened 6-item Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013) into the HEXACO-PI-R. Participants responded with their agreement with statements such as “I always think about how my actions affect the environment”, on a scale from 1 (strongly disagree) to 5 (strongly agree). Nature relatedness demonstrated good internal consistency in this sample,  $\alpha = .85$

**Political attitudes.** This variable was be measured by asking participants which label best represented their political attitudes from 7 items ranging from “very conservative” to “very liberal”. An additional dimension of measurement was added in which participants responded to the extent they agree with the extent they identified as a libertarian from 1 (strongly disagree) to 5 (strongly agree).

**Authenticity and Effort.** Previous research has demonstrated that person-activity fit contributes to the effectiveness of positive psychology interventions (Sin & Lyubomirsky, 2009). Furthermore, numerous studies have found a link between behaviours identified as ‘representing the true self’, subjective well-being, and meaning in life (Smallenbroek, Zelenski, & Whelan, 2017; Harter, 2008; Heppner et al., 2008 Reich, Kessel, & Bernieri, 2012). Authenticity was thus explored as a factor in the present study. This variable was be measured using the State Authenticity Scale (Smallenbroek et al., 2017). Participants rated their agreement on 6 items, on a scale from 1 (strongly disagree) to 7 (strongly agree) to statements regarding their subjective

sense of authenticity when completing a task, e.g., “I felt authentic in the way I behaved during this activity”. The authenticity scale demonstrated strong internal consistency,  $\alpha = .86$ .

Additionally, research has suggested that individuals who invest more effort into a positive psychology activity (Lyubormirsky & Layous, 2013) or in pro-environmental behaviours (Schmitt et al., 2018) tend to report higher subjective well-being. However, other researchers have suggested that engaging in behaviour that is contrary to one’s personality or values requires great effort and is related to lower positive affect (Smullenbroek et al., 2017; Gallagher et al., 2011). Therefore effort was explored in the present study by measuring the amount of effort the participant felt they engaged as part of the task was measure using two items, e.g., “it took a lot of effort to behave the way I did”.

### **Procedure**

For a chronological diagram of procedures, see Figure 1. Participants were recruited online through SONA, Carleton University’s experiment management system. After reading the title and description of the study, participants chose an in-lab timeslot, in which they came to the Carleton University Happiness Laboratory. When participants arrived, a researcher showed them to an isolated research room with a computer. Participants were randomly assigned to an experimental or control condition. The researcher briefly outlined the procedures and directed the participant to the online consent form for the study. Once participants read and agreed to the consent form, they were be directed to a page with an embedded video. They were be instructed to put the video into “full-screen” mode, and to ensure the volume was at a sufficient level to hear clearly.

**Experimental condition.** The purpose of this condition was to have participants engage in a novel pro-environmental behaviour. After completing the introductory procedures outlined

above, participants were shown a short video (<https://vimeo.com/336835623/58fa1c8bfd>) which in this condition was a short National Geographic presentation on the importance of individual action in mitigating climate-change. The purpose of this video was to provide context for the behaviour (i.e., why engaging in pro-environmental behaviour matters), an element I theorized may amplify the emotional outcome of engagement in pro-environmental behaviour (i.e., actors feeling virtuous or helpful, such as in pro-social behaviour), leading to increased affect and meaning.

The researcher then presented the participant with an Activity Plan (i.e., an exercise in implementation intentions intended to reduce attrition and improve quality of responses). The goal of the Activity Plan (See Appendix H) was for the participant to choose a pro-environmental behaviour that they would engage in outside of the lab before completing a follow-up measure of state affect and meaning.

The researcher explained each of the Activity Plan questions to the participant and had them plan their pro-environmental behaviour activity. Participants were also asked to take a photo during or after their pro-environmental behaviour, demonstrating that they engaged in the activity (i.e., to increase compliance). After the participant completed their activity plan, the researcher had them read their answers out loud, ensuring that their pro-environmental behaviour met the criteria outlined in the Research Protocol (see Appendix J).

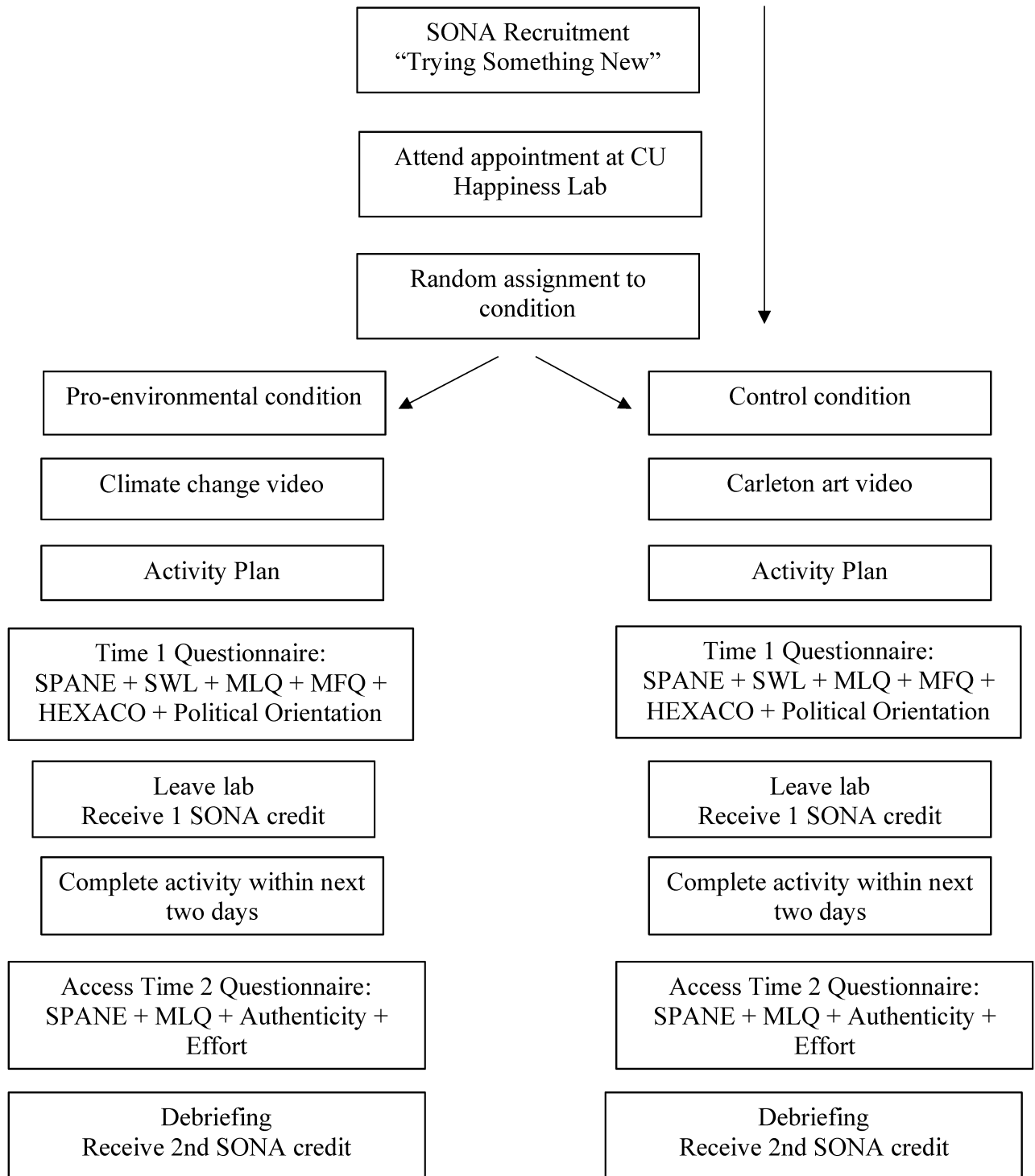
**Control condition.** The purpose of this condition was to have participants engage in a novel, moderately engaging activity. After completing the introductory procedures, participants were shown a video (<https://vimeo.com/336835318/37867979be>) the same length as in the experimental condition, but that demonstrated the origin of a large sculpture on the Carleton



University campus. The purpose of the video was to provide context for the control activity and to match the pro-environmental condition procedure.

**Figure 1**

*Procedure Timeline*



After completing the video, the researcher then brought the participant an Activity Plan (see Appendix I) of the same format as the experimental condition. The goal of the Activity Plan was to choose locations to observe and photograph two separate statues or sculptures around the city. Similarly, the activity plan provided a list of locations where participants could find statues. The list was a similar length as the list of pro-environmental behaviour choices in the experimental condition. Afterward the researcher consulted with the participant and asked them to read their answers out loud, ensuring that the activity they had planned met the criteria outlined in the Research Protocol.

After this portion of the study participants from both conditions were exposed to the same researcher-participant interactions. Once the researcher discussed with the participant about their Activity Plan, they were asked to complete a series of online questionnaires. Participants first completed the SPANE, then the SWLS, then the MLQ, then the MFQ, then the HEXACO-PI-R, and finally the political orientation questionnaire.

Upon completing these questionnaires, the participant entered their e-mail into the survey and the program sent them an e-mail automatically with a link to a follow-up survey. The researcher suggested that the participant check their e-mail inbox for the message while in the lab. Next, the researcher asked the participant to take their Activity Plan with them and to attempt to complete the activity within the following two days, and to access the follow-up survey as soon as possible after the activity. Participants then left the lab and, if following the instructions, completed their activity and accessed the follow-up survey shortly afterward. Participants received the first half of their credit upon leaving the lab.

In the follow-up survey, participants completed the state affect and meaning questionnaires from the first part of the study (i.e., SPANE, MLQ), followed by the authenticity

and effort questionnaire. Participants briefly (in their own words) enter either 1) which pro-environmental activity they chose and why; or 2) which sculptures they took photos of and why. Once these questionnaires were completed, participants received the remaining half of their credit.

## Results

### Participants

A total of 406 undergraduate students from Carleton University were recruited through SONA. Subsequently 378 completed the second survey, with an attrition of 28 participants. During data cleaning, 9 participants were deleted for ID entry error, 8 for incomplete surveys, and 18 for failing at least one of two attention checks. After all criteria were implemented 343 participants were included in the analyses, with a similar sample size in each condition having completed the study ( $Ns = 171$  and  $172$ ). Three outcome outliers were identified close to the range of 3SD. Analyses were run without and then with the outliers, and all results were unchanged between the two analytic procedures.

### Primary Hypotheses

In order to test my primary hypotheses, I conducted a t-test comparing post-activity levels of positive affect, negative affect, and meaning in life between each condition. The hypothesis that positive affect would be greater in the pro-environmental condition ( $M = 3.85$ ,  $SD = 0.60$ ) than the control condition ( $M = 3.83$ ,  $SD = 0.57$ ) was not supported,  $t(341) = -0.38$ ,  $p = .43$ . Similarly the hypothesis that participants in the pro-environmental condition ( $M = 1.68$ ,  $SD = 0.62$ ) would report lower negative affect than the control condition ( $M = 1.66$ ,  $SD = 0.57$ ) was not supported,  $t(341) = -0.30$ ,  $p = .38$ . Finally, meaning in life was not significantly greater in the

pro-environmental condition ( $M = 4.82$ ,  $SD = 1.40$ ) than the control condition ( $M = 4.80$ ,  $SD = 1.27$ ), failing to support this hypothesis,  $t(341) = -0.30$ ,  $p = .38$ .

In order to follow up these results and probe whether both conditions simply had no effect on these three outcomes, or whether a similar effect was observed across both conditions, I conducted a mixed-method repeated measures ANOVA. I tested the difference between each of these variables at the trait-level (i.e., average over the last four weeks, referred to from hereafter as *baseline*) versus post-activity (i.e., state-level), with condition as a between-participants variable.

**Positive affect.** Both the pro-environmental and control conditions reported an increase in positive affect from pre- to post-activity,  $F(1,341) = 19.57$ ,  $p < .001$ , with no significant time by condition interaction,  $F(1,341) = 2.34$ ,  $p = .13$ . Repeated measures  $t$ -tests revealed that the pro-environmental condition resulted in an increase in positive affect from baseline ( $M = 3.62$ ,  $SD = 0.71$ ) to post-activity ( $M = 3.85$ ,  $SD = 0.60$ ),  $t(170) = -3.95$ ,  $p < .001$ ,  $d = 0.25$ . The control condition also resulted in an increase in positive affect from baseline ( $M = 3.71$ ,  $SD = 0.58$ ) to post-activity ( $M = 3.83$ ,  $SD = 0.57$ ),  $t(171) = -2.20$ ,  $p = .02$ ,  $d = 0.15$ .

**Negative affect.** Both the pro-environmental and control conditions reported a decrease in negative affect from pre- to post-activity,  $F(1,341) = 451.58$ ,  $p < .001$ , with no significant time by condition interaction,  $F(1,341) = 0.05$ ,  $p = .83$ . Repeated measures  $t$ -tests revealed that the pro-environmental condition resulted in a decrease in negative affect from baseline ( $M = 2.58$ ,  $SD = 0.77$ ) to post-activity ( $M = 1.68$ ,  $SD = 0.62$ ),  $t(170) = 14.26$ ,  $p < .001$ ,  $d = 0.91$ . The control condition also resulted in a decrease in negative affect from baseline ( $M = 2.54$ ,  $SD = 0.61$ ) to post-activity ( $M = 1.66$ ,  $SD = 0.57$ ),  $t(171) = 15.96$ ,  $p < .001$ ,  $d = 1.05$ .

**Meaning in life.** Participants in both the pro-environmental and control conditions reported an increase in meaning in life from pre- to post-activity,  $F(1,341) = 82.15, p < .001$ , with no significant time by condition interaction,  $F(1,341) = 1.93, p = .17$ . Repeated measures  $t$ -tests revealed that participants in the pro-environmental condition reported an increase in meaning in life from baseline ( $M = 4.24, SD = 0.90$ ) to post-activity ( $M = 4.82, SD = 1.40$ ),  $t(170) = -7.19, p < .001, d = 0.35$ . Participants assigned to the control condition also reported an increase in meaning in life from baseline ( $M = 4.37, SD = 0.84$ ) to post-activity ( $M = 4.80, SD = 1.27$ ),  $t(171) = -5.58, p < .001, d = 0.28$ .

These results suggest that although there was no difference between the two conditions at post-activity measurement, that there was a significant deviation from average in affect and meaning after both activities. A substantial deviation can be seen particularly in negative affect with effect sizes approximating a decrease the size of a standard deviation. These results suggest that participants engaging in both activities felt a substantial reduction in negative emotions from their baseline average.

A summary of intercorrelations of all dependent variables are displayed in in Table 1, and all individual differences in Table 2.

Table 1.

Summary of intercorrelations between dependent measures as a function of condition.

Measure	1	2	3	4	5	<i>M</i>	<i>SD</i>
1. PA	—	-.59*	.30**	.42**	.26	3.85	0.60
2. NA	-.50**	—	-.19*	-.57**	-.51	1.68	0.62
3. MLQ	.06	-.10	—	.26**	.14	4.82	1.40
4. AUTH	.26**	-.19*	.14	—	-.49**	5.54	1.02
5. Effort	.18*	-.28	.15	-.48**	—		
<i>M</i>	3.83	1.66	4.80	5.53	5.75		
<i>SD</i>	0.57	0.57	1.27	1.06	1.05		

Note. Intercorrelations for pro-environmental condition presented above the diagonal, and intercorrelations for the control condition presented below the diagonal. Descriptive statistics for the pro-environmental condition presented to the right of the table, and descriptive statistics for the control condition presented at the bottom of the table. PA = Positive Affect; NA = Negative Affect; MLQ = Meaning in Life; AUTH = Authenticity.

\* Correlation is significant at the 0.05 level.

\*\* Correlation is significant at the 0.01 level.

Table 2.

Summary of intercorrelations between individual difference measures.

Measure	1	2	3	4	5	6	7	8
1. Agreeableness	—	.12*	.06	.07	.11*	-.03	.12*	-.18
2. Openness		—	.46**	.05	-.01	-.14*	.04	.04
3. Nature Relatedness			—	.11*	.14*	.05	.07	.04
4. Care/ Harm Morality				—	.04	.11	.07	.04
5. Trait Meaning in Life					—	-.25**	.38**	-.29**
6. Political Liberalism						—	-.16**	.10
7. Trait Positive Affect							—	-.62
8. Trait Negative Affect								—

\* Correlation is significant at the 0.05 level.

\*\* Correlation is significant at the 0.01 level.

### Secondary Predictions

I proceeded to test trait-by-condition interactions. Despite the no evidence of main effects, it is possible to have a significant trait-by-condition interaction such specific activities produce effects only for those with a high (or low) level of a particular trait. Thus, in order to test them I conducted multiple regressions with each well-being outcome as a separate dependent variable. As predictors I included a dummy-coded condition variable, the centered trait variable, and the cross-product of both.<sup>2</sup> The results from all predicted interactions can be found in Table 3.

The hypothesis that nature relatedness would enhance the effect of the pro-environmental condition for positive affect, negative affect, and meaning in life, was not supported, all  $ps > .15$ . Similarly, the results did not confirm the hypothesis that political liberalism would increase the effect of the pro-environmental condition on positive affect, negative affect, and meaning in life, all  $ps > .15$ . Although agreeableness significantly predicted positive affect,  $t(341) = 2.34$ ,  $p = .02$ ,  $\beta = .18$ , it did not significantly predict negative affect or meaning in life  $ps > .05$ . Agreeableness did not enhance the effect of the pro-environmental condition on positive affect, negative affect, or meaning in life as hypothesized,  $ps > .20$ .

Finally, the hypothesis that openness would enhance the effect of the pro-environmental condition on positive affect, negative affect, and meaning in life was not confirmed, all  $ps > .10$ .

<sup>2</sup> Note that all interaction analyses were also conducted controlling for their respective well-being baseline (e.g., interactions with positive affect as a dependent variable controlled for positive affect over the past four weeks). All results were indistinguishable.



Table 3.

Tests of trait-by-condition interactions with positive affect, negative affect, and meaning in life.

Trait	Positive Affect			Negative Affect			Meaning in Life		
	$\beta$	$t$	$p$	$\beta$	$t$	$p$	$\beta$	$t$	$p$
Nature <sub>M</sub>	0.10	1.32	.19	0.03	0.38	.70	0.11	1.44	.15
Nature <sub>I</sub>	0.01	0.17	.86	-0.07	-0.87	.34	0.11	1.43	.15
Liberal <sub>M</sub>	-0.02	-0.41	.68	-0.05	-0.70	.49	-0.11	-1.44	.15
Liberal <sub>I</sub>	-0.06	-0.76	.45	0.10	1.30	.21	-0.08	-1.06	.29
Agree <sub>M</sub>	<b>0.18</b>	<b>2.34</b>	<b>.02</b>	-0.13	-1.71	.09	0.09	1.13	.26
Agree <sub>I</sub>	-0.10	-1.27	.21	0.09	1.16	.25	-0.01	-0.08	.94
Open <sub>M</sub>	0.08	0.96	.34	-0.08	-0.97	.34	-0.01	-0.14	.89
Open <sub>I</sub>	-0.11	-1.36	.18	0.13	1.55	.12	0.07	0.87	.38

Note. Nature = Nature Relatedness; Lib. = Political Liberalism; Agree = Agreeableness; Open = Openness.

Lines in bold represent significant regression coefficients.

Main effects represented by <sub>M</sub> and trait by condition interactions represented by <sub>I</sub>.

### Exploratory Analyses <sup>3</sup>

**Authenticity.** Given the emphasis on person-activity fit in the positive psychology literature, I sought to test whether participants felt more authentic in either condition, and whether the extent to which participants felt authentic in their activities predicted their post-activity positive affect, negative affect, and meaning in life.

There was no difference in the average authenticity reported between the pro-environmental condition ( $M = 5.56$ ,  $SD = 0.95$ ) and the control ( $M = 5.59$ ,  $SD = 0.95$ ),  $t = 0.11$ ,  $p = .91$ . However, participants who reported feeling more authentic during their activity tended to have greater positive affect,  $r = .34$ ,  $p < .001$ , less negative affect,  $r = -.43$ ,  $p < .001$ , and greater

<sup>3</sup> Note that only exploratory analyses that were significant were reported here.

meaning in life,  $r = .21, p < .001$ . These relationships persisted when controlling for their respective baseline (trait-level) measures ( $p < .001$  for positive and negative affect,  $p = .02$  for meaning in life).

**Effort.** Similarly to authenticity, there was no difference in the average effort reported between the pro-environmental condition ( $M = 5.75, SD = 1.05$ ) and the control condition ( $M = 5.64, SD = 1.16$ ),  $t = -.86, p = .39$ . However, participants who reported greater effort during the activity tended to report less positive affect,  $r = .22, p < .001$ , more negative affect,  $r = -.40, p < .001$ , and less meaning in life,  $r = -.14, p = .01$ . These relationships persisted when controlling for baseline positive and negative affect,  $p < .001$ , but became marginally insignificant controlling for baseline meaning in life,  $p = .06$ .

### Discussion

The purpose of the present study was to examine whether engaging in a novel pro-environmental behaviour would improve states of positive affect, negative affect, and meaning in life. My pre-registered hypotheses were that a group instructed to engage in a pro-environmental activity would report greater post-activity positive affect and meaning, and lower negative affect than a control group instructed to take photos of art. The results did not support any of the pre-registered hypotheses. Specifically, there were no significant differences in the affective or meaning states of participants in the pro-environmental condition versus participants in the control condition. Nor did any of the predicted traits (i.e., nature relatedness, agreeableness, openness, or political orientation) moderate the effect of condition on post-activity outcomes.

However, in comparing post-activity affective and meaning states to their pre-activity baseline (i.e., average over the past four weeks), significant effects emerged. Specifically, negative affect was substantially lower (i.e., roughly one standard deviation) after engaging in

both activities, while positive affect and meaning in life were both higher (i.e., a third of a standard deviation). Such a substantial disparity between baseline and post-activity negative affect (and to a lesser extent positive affect and meaning in life) calls for explanation. It seems plausible that *both* the pro-environmental and control activities may have alleviated pre-existing negative affective states, in addition to enhancing positive and meaningful ones. These effects, however, were not demonstrated in contrast to a control group, nor were they pre-registered, thus the following explanations should be understood as speculative.

Before exploring the possible causal explanations attributable to the specific manipulations, it is important to note the potential ambiguity in the interpretation of the pre- and post-activity measures. As mentioned, baseline affect was measured at the trait-level (i.e., average affect over the last four weeks), which was compared to state-level affect, post-activity. A trait-level baseline measure was selected in order to attain a more broadly representative measure of affect, as opposed to measuring state-affect while participants were in the lab completing questionnaires (i.e., presenting a different set of comparative limitations). However, it is possible that this approach introduced other sources of error. For example, Wirtz and colleagues (2003) found that when recalling their feelings retrospectively, participants tend to be biased toward exaggerating intense mood states compared to more momentary reports.

Recall bias may be partly responsible for some of the pattern of results observed. In the case of negative affect, if baseline measures were inflated due to recall bias, and the activities also reduced negative affect, these effects would be additive (i.e., creating a larger effect size). However, for positive affect, if measures were inflated at baseline but the activities increased positive affect, these two effects would be competing (i.e., creating a smaller effect size). This is consistent with the results observed.

### **The Effect of Pro-Environmental Behaviour**

If participants who engaged in pro-environmental behaviour did indeed experience a significant decrease from their typical negative affective state and an increase from their typical positive state, it may have been due to similar mechanisms as those explored in the literature on pro-social behaviour. Behaviour perceived as virtuous may alter mood states for a number of reasons, including a perceived increase in altruistic status (e.g., competitive altruism or costly signaling), increase in state self-worth, or meeting nature-related participants' desire to connect with nature (Curry et al., 2018; Klein, 2017; Nisbet et al., 2009, respectively).

However, within this purview the disproportionate change in *negative* affect remains unaccounted for, as most of the cited studies focus on increases in *positive* emotions and cognitive evaluations, or commensurate changes in overall affect-balance. An alternative explanation for the observation particular to negative affect is that engagement in pro-environmental behaviour may have provided an enhanced sense of agency in the face of perceived ecological threat. In what has been termed eco-anxiety (Clayton et al., 2012, pp. 29), individuals experience a debilitating sense of powerlessness in the face of human-caused environmental degradation and are at risk of heightened negative affective states<sup>4</sup> (Schmitt et al., 2018; Usher et al., 2019).

Recent polls suggest that the public majority in Canada and the United States are concerned about climate change, and that the proportion of people “worried” is rising (Mildenberger & Lachapelle, 2019; Goldberg et al., 2020). Unfortunately, the present study collected no data on the prevalence or magnitude of ecological threat for its sample. However, in

<sup>4</sup> Note that in the procedure, participants were shown a video on the problem of climate change and the importance of individual action in mitigating it. Although the message in this video was positively valenced, and promoted actionable change, it may still have induced perceptions of ecological threat in participants.

Canada 66% of census respondents believe that climate change has already negatively affected their province, and in the United states 58% of census respondents reported feeling “alarmed” or “concerned” about the near-term effects of climate change. The number of respondents reporting that they were “alarmed” tripled in five years from 2014 to 2019. It is likely reasonable to assume that rates of concern in this sample meet or exceed those in the population data, as undergraduates are disproportionately young and politically liberal (which are both predictors of climate change concern; Dickinson et al., 2016).

The empirical literature on locus of control suggests that individuals who perceive that they are in control of outcomes that affect them are more likely to report greater subjective well-being (i.e., internal locus of control; Rodin, 1986; Deneve et al., 1998). Moreover, individuals who engage in more problem-focused coping (i.e., coping by taking actions over controllable elements of the problem) respond to adversity with less negative affect (Gençöz et al., 2006; Gourounti et al., 2012; Bozo et al., 2018). It may be that engaging in small pro-environmental behaviour acts as a problem-focused coping mechanism for the negative affect associated with perceived ecological threat. Perhaps taking action might alleviate some degree of hopelessness, shifting attention from the larger and more immutable “circle of concern” to the actionable “circle of influence” (Covey, 1988). However, this is a significant leap in speculation given the present data; as gaining a sense of “control” over a global problem the magnitude of climate change may require more than a small pro-environmental action.

Nonetheless, given that eco-anxiety appears to be increasing in prevalence and may continue to do so, methods of mitigating its affective symptoms are likely to be an increasingly important area of research. Perhaps a problem-focused coping strategy entailing engagement in short, manageable pro-environmental behaviours could be a method worth exploring in

mitigating this problem. However, given that the present findings were exploratory, and that perceived ecological threat and eco-anxiety were not measured in the present study, it is important to remind the reader that this is simply the process of idea generation.

### **The Effect of Art Photography**

Participants who took photos of art and sculptures (i.e., the control group) also reported a substantial decrease from their typical negative affect states, and small but significant increases in their typical positive affect and meaning. These results were not significantly different from participants who engaged in the pro-environmental activity. Perhaps this could have been predicted; a number of studies have found that active observation of and participation in art (e.g., attendance of an art museum, appreciation of aesthetics, engaging in photography) produced positive emotional responses. Perhaps expecting the pro-environmental condition to out-perform an activity that has been used as an activity to enhance well-being may have been an unreasonable benchmark. However, the majority of these studies measure positively valenced emotions (e.g., pleasure, and awe; Reber et al., 2004; Packer, 2008; Armstrong & Detweiler-Bedell, 2008). Meanwhile, the evidence that art photography has led to decreased stress and anxiety has been qualitative and has only been recently published (Brewster & Cox, 2019). Thus, the suggestion that photographing art should have such a greater impact on negative affect than on positive affect (i.e., three times greater) seems dubious. If, however, the art photography condition had a small to moderate effect, improving both positive and negative affect, integration with the effect of recall-bias could account for the observed pattern of within-participant effects (and the lack of between-condition effects).

### **Trait-by-condition Interactions**

The results of the present study did not support any of the pre-registered trait-by-condition interactions (i.e., nature relatedness, openness, agreeableness, political liberalism). This may have been due to the choice of control condition, in which the same traits that were hypothesized to enhance the effect of pro-environmental behaviour (e.g., openness, nature relatedness) may have also enhanced the effect of art photography. For example, features of art that bear resemblance to nature have been identified as most those likely to elicit appreciation across a variety of observers (Brady, 1998; Matthews, 2001). Additionally, those with the tendency to enjoy and pursue nature-related experience have been found to also be those likely to appreciate aesthetic experiences in art (Eisenburger et al., 2010). As such, even if nature related participants were more likely to experience a positive affect enhancement from engaging in the pro-environmental activity, the same pattern may have been observed in the art photography condition. Given that the hypothesized traits may have had similar effects for both conditions, a choice of control group that targets distinct personality traits may be useful in determining key trait-moderators.

### **Strengths and Limitations**

This study has several limitations, which can in many cases be viewed as trade-offs. Although it was a randomized control experiment, it only used a single control group. Given that participants in both the pro-environmental and art photography conditions reported similar post-activity affective and meaning states, and that both activities were designed to be new for participants, the effect of novelty cannot be ruled out as a cause of the observed results. Participants in experiments have been found to respond positively to engaging in new activities (Lyubomirsky, 2011; Harasymchuk et al., 2016). As such it is considered good methodological

practice to test positive psychology activities by controlling for this effect with an “active” control group (i.e., to ensure that the response to the activity goes above and beyond the effect of novelty). It seems possible that a short break from the typical demands of student life, whether it is to do something to help protect the environment or take photos of art, could be a welcome respite from stress for undergraduates. However, the effect of novelty has been primarily demonstrated as impacting positive affect rather than negative affect (Coulter & Malouff, 2013), thus more research is needed to provide an understanding of the latter.

This may underscore the need for a general discussion on what constitutes a meaningful change in outcomes in positive psychology acts. In a recent re-analysis of two contradictory meta-analyses of the effectiveness of positive psychology activities, White and colleagues (2019) noted that many of the experimental studies in the extant literature use a wait-list control group as a comparison for the positive activity. While it may be useful to understand that an activity produces more positive outcomes than business-as-usual, it fails to provide a “placebo effect” from which to compare the experimental condition. However, if the standard is to use an active control group, it remains unclear what constitutes a reasonable and meaningful benchmark. This is an ongoing challenge for researchers in the field, and further protocols and standard operations are needed.

The recruitment method and procedure of the present study may have introduced sources of error or impacted the results. For example, participants were recruited using the title “Trying Something New”, intended to be truthful, limiting demand-effects, and encompassing both conditions. However, this title may have created selection pressure for novelty seeking and open participants, thus truncating the personality distribution of the sample. Furthermore, the procedures participants were exposed to may have acted as manipulations in and of themselves –



for example, participants were shown different videos in each condition to help explain the purpose of their respective activities. However, the effects of these videos on mood, attitudes, or other variables are unknown.

This study was also limited in its approach to investigating pro-environmental behaviour as a homogeneous category, which may not have captured many relevant dimensions as they pertain to inducing emotional responses. For example, while giving participants the autonomy to choose their own pro-environmental behaviour may have served to maximize person-activity-fit, it is unlikely to be representative of behaviour that is coerced by economic restrictions (e.g., carbon-tax). Given that perceived autonomy has been demonstrated as a predictor of subjective well-being when engaging in civic duties, it is possible legislated behaviour of this type might undermine affect and meaning (Sheldon et al., 2005). Conversely, requiring participants to engage in pro-environmental behaviour as part of an experiment that provides them with course credit could undermine the intrinsic motivation that would be present in the natural course of voluntary day-to-day pro-environmental behaviours. Additionally, as formerly mentioned, the extent to which a behaviour was costly, observable, and social has been shown to impact the relationship between pro-environmental behaviour and life satisfaction (Schmitt et al., 2018). It may be that this relationship applies only to the cognitive dimension of subjective well-being (i.e., life satisfaction), or it may also extend to affect and meaning. Moreover, any dimensions or moderators may be context or target population dependent.

Ultimately the goal in conducting research on sustainable behaviour is to identify a target population whose behaviour is likely to have a substantial impact on the natural environment. In this regard, a target population that 1) subsumes a greater number of human-beings, and 2) has greater per-capita impact in perpetuating environmental harm would be ideal. As such, research

that is able to make conclusions about North Americans (i.e., large number of individuals with relatively high greenhouse gas emissions) would be more useful than research with a more restricted population such as first- and second-year psychology undergraduates. Because the sample of this study was skewed in many regards (e.g., young, politically liberal, higher socio-economic status, greater IQ, etc.) it may be unlikely to represent the bulk of the North American population who represent the mean or opposing levels of these skewed traits.

Studying the present sample in particular might be useful in a number of ways, however. Given that undergraduates are relatively young sample, as a group they have a greater remaining lifespan, and as a group their life-long choices will have a longer-term impact on environmental sustainability. As a population they will enter the workforce with greater earning potential, giving them power consume environmentally relevant commodities (e.g., emitting more greenhouse gases through air travel, or less with expensive vegan diets). As educated citizens they are more likely to ascend to positions of power whereby environmentally relevant decisions are made (either organizationally or politically). Moreover, because they tend to skew politically liberal, they will be more likely to engage in environmental activism or support political candidates that prioritize environmental protection. Thus, although the present sample may represent a somewhat narrow demographic, it appears there are good reasons to investigate their environmentally relevant behaviour.

Finally, it is likely that the present study failed to include some salient measures. For example, given that specific traits were chosen for interaction hypotheses based on their likelihood of correlating with environmental attitudes, it was an oversight to have not included a direct measure of environmental attitudes. Furthermore, other factors have been suggested to moderate the affective responses to prosocial behaviours, such as psychological need satisfaction

(e.g., competence, relatedness, autonomy) and could have been useful measures to include (Dunn et al., 2014). Of course, it is challenging to anticipate and include all relevant measures in any one study, however considering which absent measures may have been useful provides a point from which to improve future research.

### **Future Directions**

Future studies could seek to address the limitations of the present study and advance some of its theoretical implications. First, conceptual replications with the use of diverse control groups would be informative. For example, a waitlist group could provide a less stringent control so as to understand whether the activity indeed has an effect on affect and meaning in life, in comparison with business-as-usual. An active (yet distinct) control could be employed, such as a group that engages in an act of self-kindness (e.g., making a small purchase for oneself). This method is often used in the literature on the psychological effects of pro-social behaviour (e.g., Aknin et al., 2013). Even if both pro-environmental behaviour and self-oriented activities were found to produce similar positive effects on mood such results could be informative.

While experimental research is important for determining causality, it may fail to capture the nuances of more naturalistic, voluntary pro-environmental behaviour (e.g., most pro-environmental behaviour is not requested by a researcher). Experience sampling methodology may be one way to capture the natural covariation of voluntary pro-environmental behaviour and affective states. For example, participants might partake in a study in which they are contacted through a smartphone multiple times daily for a week, measuring both the occurrence of pro-environmental behaviour and participants' affective states. Although this method does not determine causal distinctions with the precision of experimental methods (e.g., perhaps participants in better moods have a greater desire to engage in pro-environmental behaviour), it

allows for more precision in uncovering the within- and between-person co-variation of behaviour and emotions.

Research that investigates different categories of pro-environmental behaviour may find that some attributes produce greater or lesser mood enhancing effects than others. For example, behaviours that are more or less costly, purchasing versus inhibiting, or that satisfy psychological needs to a greater or lesser degree may be fruitful areas of study. Finally, given the emergent literature on eco-anxiety and the findings of the present study, the use pro-environmental behaviour as a coping mechanism for the negative affect associated with perceived ecological threat may be a useful direction for future studies. Given the lack of specific measurement in the present study, it may be informative to measure eco-anxiety distinctly so as to distinguish it from anxiety or negative affect more generally.

## **Conclusion**

The path to a sustainable and thriving society relies on enacting solutions that concurrently maximize the protection of the environment as well as the psychological well-being of humans. The multi-disciplinary line of research that will lead to these solutions is barely in its infancy, and begs for more minds, institutions, and resources to address the urgent call of climate change and environmental degradation. Whether solutions involve innovations in technology, market forces, legislative activity, and/or social marketing, success will be contingent on compliance and adoption on the part of a collective of individuals. A small but significant piece of this gargantuan project is to further scientific understanding of the psychological effects of diverse sustainable behaviours. Armed with this knowledge and the correct implementation, perhaps a future exists where humans and the environment coexist happily and sustainably.

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**Appendix A:****Scale of Positive and Negative Experience (SPANE)****(Diener et al., 2009)**

**Instructions:** Please think about what you have been doing and experiencing **during the past four weeks**. Then report how much you experienced each of the following feelings, using the scale below.

For each item, select a number from 1 to 5, and indicate that number on your response sheet.

Very Rarely or Never	Infrequently	Sometimes	Often	Very Often or Always
1	2	3	4	5

1. Positive
2. Negative
3. Good
4. Bad
5. Pleasant
6. Unpleasant
7. Happy
8. Sad
9. Afraid
10. Joyful
11. Angry
12. Contented

*[Three items from Stellar et al., 2018 will be added to measure the experience of awe]*

- 13. Awe
- 14. Wonder
- 15. Amazement

**Appendix B:**

**The Satisfaction With Life Scale (SWL)**

**(Diener, Emmons, Larsen, & Griffin, 1985)**

**Instructions:** Below are five statements that you may agree or disagree with. Using the 1 - 7 scale below, indicate your agreement with each item by placing the appropriate number on the line preceding that item. Please be open and honest in your responding.

Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
1	2	3	4	5	6	7

1. In most ways my life is close to my ideal.
2. The conditions of my life are excellent.
3. I am satisfied with my life.
4. So far I have gotten the important things I want in life.
5. If I could live my life over, I would change almost nothing.

**Appendix C:**  
**Meaning in Life Questionnaire (MLQ)**  
**(Stegar, et al., 2006)**

**Instructions:** Please take a moment to think about what makes your life and existence feel important and significant to you. Please respond to the following statements as truthfully and accurately as you can, and also please remember that these are very subjective questions and that there are no right or wrong answers. Please answer according to the scale below:

Absolutely True	Mostly Untrue	Somewhat Untrue	Can't Say True or False	Somewhat True	Mostly True	Absolutely True
1	2	3	4	5	6	7

1. I understand my life's meaning.
2. I am looking for something that makes my life feel meaningful.
3. I am always looking to find my life's purpose.
4. My life has a clear sense of purpose.
5. I have a good sense of what makes my life meaningful.
6. I have discovered a satisfying life purpose.
7. I am always searching for something that makes my life feel significant.
8. I am seeking a purpose or mission for my life.
9. My life has no clear purpose.
10. I am searching for meaning in my life.



**Appendix D:**  
**Moral Foundations Questionnaire (MFQ)**  
**(Graham, Haidt, & Nosek, 2008)**

**Instructions:**

Part 1. When you decide whether something is right or wrong, to what extent are the following considerations relevant to your thinking? Please rate each statement using this scale:

[0] = not at all relevant (This consideration has nothing to do with my judgments of right and wrong)

[1] = not very relevant

[2] = slightly relevant

[3] = somewhat relevant

[4] = very relevant

[5] = extremely relevant (This is one of the most important factors when I judge right and wrong)

\_\_\_\_\_ Whether or not someone suffered emotionally

\_\_\_\_\_ Whether or not some people were treated differently than others

\_\_\_\_\_ Whether or not someone's action showed love for his or her country

\_\_\_\_\_ Whether or not someone showed a lack of respect for authority

\_\_\_\_\_ Whether or not someone violated standards of purity and decency

\_\_\_\_\_ Whether or not someone was good at math

\_\_\_\_\_ Whether or not someone cared for someone weak or vulnerable

\_\_\_\_\_ Whether or not someone acted unfairly

\_\_\_\_\_ Whether or not someone did something to betray his or her group

\_\_\_\_\_ Whether or not someone conformed to the traditions of society

- \_\_\_\_\_ Whether or not someone did something disgusting
- \_\_\_\_\_ Whether or not someone was cruel
- \_\_\_\_\_ Whether or not someone was denied his or her rights
- \_\_\_\_\_ Whether or not someone showed a lack of loyalty
- \_\_\_\_\_ Whether or not an action caused chaos or disorder
- \_\_\_\_\_ Whether or not someone acted in a way that God would approve of

Part 2. Please read the following sentences and indicate your agreement or disagreement:

[0]	[1]	[2]	[3]	[4]	[5]
Strongly disagree	Moderately disagree	Slightly disagree	Slightly agree	Moderately agree	Strongly agree

- \_\_\_\_\_ Compassion for those who are suffering is the most crucial virtue.
- \_\_\_\_\_ When the government makes laws, the number one principle should be ensuring that everyone is treated fairly.
- \_\_\_\_\_ I am proud of my country's history.
- \_\_\_\_\_ Respect for authority is something all children need to learn.
- \_\_\_\_\_ People should not do things that are disgusting, even if no one is harmed.
- \_\_\_\_\_ It is better to do good than to do bad.
- \_\_\_\_\_ One of the worst things a person could do is hurt a defenseless animal.
- \_\_\_\_\_ Justice is the most important requirement for a society.
- \_\_\_\_\_ People should be loyal to their family members, even when they have done something wrong.
- \_\_\_\_\_ Men and women each have different roles to play in society.
- \_\_\_\_\_ I would call some acts wrong on the grounds that they are unnatural.
- \_\_\_\_\_ It can never be right to kill a human being.

\_\_\_\_\_ I think it's morally wrong that rich children inherit a lot of money while poor children inherit nothing.

\_\_\_\_\_ It is more important to be a team player than to express oneself.

\_\_\_\_\_ If I were a soldier and disagreed with my commanding officer's orders, I would obey anyway because that is my duty.

\_\_\_\_\_ Chastity is an important and valuable virtue.

### Appendix E:

#### HEXACO Personality Inventory-Revised

(Lee & Ashton, 2018)

**Instructions:** On the following pages you will find a series of statements about you. Please read each statement and decide how much you agree or disagree with that statement. Then write your response in the space next to the statement using the following scale:

Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1	2	3	4	5

Please answer every statement, even if you are not completely sure of your response.

- 1 \_\_\_\_\_ I would be quite bored by a visit to an art gallery.
- 2 \_\_\_\_\_ I clean my office or home quite frequently.
- 3 \_\_\_\_\_ I rarely hold a grudge, even against people who have badly wronged me.
- 4 \_\_\_\_\_ I feel reasonably satisfied with myself overall.
- 5 \_\_\_\_\_ I would feel afraid if I had to travel in bad weather conditions.
- 6 \_\_\_\_\_ If I want something from a person I dislike, I will act very nicely toward that person in order to get it.
- 7 \_\_\_\_\_ I'm interested in learning about the history and politics of other countries.
- 8 \_\_\_\_\_ When working, I often set ambitious goals for myself.
- 9 \_\_\_\_\_ People sometimes tell me that I am too critical of others.

- 10 \_\_\_\_\_ I rarely express my opinions in group meetings.
- 11 \_\_\_\_\_ I sometimes can't help worrying about little things.
- 12 \_\_\_\_\_ If I knew that I could never get caught, I would be willing to steal a million dollars.
- 13 \_\_\_\_\_ I would like a job that requires following a routine rather than being creative.
- 14 \_\_\_\_\_ I often check my work over repeatedly to find any mistakes.
- 15 \_\_\_\_\_ People sometimes tell me that I'm too stubborn.
- 16 \_\_\_\_\_ I avoid making "small talk" with people.
- 17 \_\_\_\_\_ When I suffer from a painful experience, I need someone to make me feel comfortable.
- 18 \_\_\_\_\_ Having a lot of money is not especially important to me.
- 19 \_\_\_\_\_ I think that paying attention to radical ideas is a waste of time.
- 20 \_\_\_\_\_ I make decisions based on the feeling of the moment rather than on careful thought.
- 21 \_\_\_\_\_ People think of me as someone who has a quick temper.
- 22 \_\_\_\_\_ I am energetic nearly all the time.
- 23 \_\_\_\_\_ I feel like crying when I see other people crying.
- 24 \_\_\_\_\_ I am an ordinary person who is no better than others.
- 25 \_\_\_\_\_ I wouldn't spend my time reading a book of poetry.
- 26 \_\_\_\_\_ I plan ahead and organize things, to avoid scrambling at the last minute.
- 27 \_\_\_\_\_ My attitude toward people who have treated me badly is "forgive and forget".
- 28 \_\_\_\_\_ I think that most people like some aspects of my personality.
- 29 \_\_\_\_\_ I don't mind doing jobs that involve dangerous work.
- 30 \_\_\_\_\_ I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed.
- 31 \_\_\_\_\_ I enjoy looking at maps of different places.
- 32 \_\_\_\_\_ I often push myself very hard when trying to achieve a goal.
- 33 \_\_\_\_\_ I generally accept people's faults without complaining about them.
- 34 \_\_\_\_\_ In social situations, I'm usually the one who makes the first move.
- 35 \_\_\_\_\_ I worry a lot less than most people do.
- 36 \_\_\_\_\_ I would be tempted to buy stolen property if I were financially tight.
- 37 \_\_\_\_\_ I would enjoy creating a work of art, such as a novel, a song, or a painting.
- 38 \_\_\_\_\_ When working on something, I don't pay much attention to small details.
- 39 \_\_\_\_\_ I am usually quite flexible in my opinions when people disagree with me.
- 40 \_\_\_\_\_ I enjoy having lots of people around to talk with.

- 41 \_\_\_\_\_ I can handle difficult situations without needing emotional support from anyone else.
- 42 \_\_\_\_\_ I would like to live in a very expensive, high-class neighborhood.
- 43 \_\_\_\_\_ I like people who have unconventional views.
- 44 \_\_\_\_\_ I make a lot of mistakes because I don't think before I act.
- 45 \_\_\_\_\_ I rarely feel anger, even when people treat me quite badly.
- 46 \_\_\_\_\_ On most days, I feel cheerful and optimistic.
- 47 \_\_\_\_\_ When someone I know well is unhappy, I can almost feel that person's pain myself.
- 48 \_\_\_\_\_ I wouldn't want people to treat me as though I were superior to them.
- 49 \_\_\_\_\_ If I had the opportunity, I would like to attend a classical music concert.
- 50 \_\_\_\_\_ People often joke with me about the messiness of my room or desk.
- 51 \_\_\_\_\_ If someone has cheated me once, I will always feel suspicious of that person.
- 52 \_\_\_\_\_ I feel that I am an unpopular person.
- 53 \_\_\_\_\_ When it comes to physical danger, I am very fearful.
- 54 \_\_\_\_\_ If I want something from someone, I will laugh at that person's worst jokes.
- 55 \_\_\_\_\_ I would be very bored by a book about the history of science and technology.
- 56 \_\_\_\_\_ Often when I set a goal, I end up quitting without having reached it.
- 57 \_\_\_\_\_ I tend to be lenient in judging other people.
- 58 \_\_\_\_\_ When I'm in a group of people, I'm often the one who speaks on behalf of the group.
- 59 \_\_\_\_\_ I rarely, if ever, have trouble sleeping due to stress or anxiety.
- 60 \_\_\_\_\_ I would never accept a bribe, even if it were very large.
- 61 \_\_\_\_\_ People have often told me that I have a good imagination.
- 62 \_\_\_\_\_ I always try to be accurate in my work, even at the expense of time.
- 63 \_\_\_\_\_ When people tell me that I'm wrong, my first reaction is to argue with them.
- 64 \_\_\_\_\_ I prefer jobs that involve active social interaction to those that involve working alone.
- 65 \_\_\_\_\_ Whenever I feel worried about something, I want to share my concern with another person.
- 66 \_\_\_\_\_ I would like to be seen driving around in a very expensive car.
- 67 \_\_\_\_\_ I think of myself as a somewhat eccentric person.
- 68 \_\_\_\_\_ I don't allow my impulses to govern my behavior.
- 69 \_\_\_\_\_ Most people tend to get angry more quickly than I do.
- 70 \_\_\_\_\_ People often tell me that I should try to cheer up.
- 71 \_\_\_\_\_ I feel strong emotions when someone close to me is going away for a long time.

- 72 \_\_\_\_\_ I think that I am entitled to more respect than the average person is.
- 73 \_\_\_\_\_ Sometimes I like to just watch the wind as it blows through the trees.
- 74 \_\_\_\_\_ When working, I sometimes have difficulties due to being disorganized.
- 75 \_\_\_\_\_ I find it hard to fully forgive someone who has done something mean to me.
- 76 \_\_\_\_\_ I sometimes feel that I am a worthless person.
- 77 \_\_\_\_\_ Even in an emergency I wouldn't feel like panicking.
- 78 \_\_\_\_\_ I wouldn't pretend to like someone just to get that person to do favors for me.
- 79 \_\_\_\_\_ I've never really enjoyed looking through an encyclopedia.
- 80 \_\_\_\_\_ I do only the minimum amount of work needed to get by.
- 81 \_\_\_\_\_ Even when people make a lot of mistakes, I rarely say anything negative.
- 82 \_\_\_\_\_ I tend to feel quite self-conscious when speaking in front of a group of people.
- 83 \_\_\_\_\_ I get very anxious when waiting to hear about an important decision.
- 84 \_\_\_\_\_ I'd be tempted to use counterfeit money, if I were sure I could get away with it.
- 85 \_\_\_\_\_ I don't think of myself as the artistic or creative type.
- 86 \_\_\_\_\_ People often call me a perfectionist.
- 87 \_\_\_\_\_ I find it hard to compromise with people when I really think I'm right.
- 88 \_\_\_\_\_ The first thing that I always do in a new place is to make friends.
- 89 \_\_\_\_\_ I rarely discuss my problems with other people.
- 90 \_\_\_\_\_ I would get a lot of pleasure from owning expensive luxury goods.
- 91 \_\_\_\_\_ I find it boring to discuss philosophy.
- 92 \_\_\_\_\_ I prefer to do whatever comes to mind, rather than stick to a plan.
- 93 \_\_\_\_\_ I find it hard to keep my temper when people insult me.
- 94 \_\_\_\_\_ Most people are more upbeat and dynamic than I generally am.
- 95 \_\_\_\_\_ I remain unemotional even in situations where most people get very sentimental.
- 96 \_\_\_\_\_ I want people to know that I am an important person of high status.
- 97 \_\_\_\_\_ I have sympathy for people who are less fortunate than I am.
- 98 \_\_\_\_\_ I try to give generously to those in need.
- 99 \_\_\_\_\_ It wouldn't bother me to harm someone I didn't like.
- 100 \_\_\_\_\_ People see me as a hard-hearted person.

[Two items will be added to assess participant political orientation]

Please select the answer that best represents your political attitudes:

Very Conservative \_\_\_

Conservative \_\_\_

Somewhat Conservative \_\_\_

Moderate \_\_\_

Somewhat Liberal \_\_\_

Liberal \_\_\_

Very Liberal \_\_\_

**Do you identify as a Libertarian?**

*(Libertarians seek to maximize political freedom and autonomy, emphasizing freedom of choice, voluntary association and individual judgment. Sharing a skepticism of authority and state power, often calling for the restriction or dissolution of coercive social institutions, e.g., government)*

Strongly Disagree \_\_\_

Somewhat Disagree \_\_\_

Neutral \_\_\_

Somewhat Agree \_\_\_

Strongly Agree \_\_\_

**Appendix F:**  
**Nature Relatedness Scale**  
**(Nisbet, Zelenski, Murphy, 2009)**

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

Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
1	2	3	4	5

1. I enjoy being outdoors, even in unpleasant weather. \_\_\_\_\_
2. Some species are just meant to die out or become extinct. \_\_\_\_\_
3. Humans have the right to use natural resources any way we want. \_\_\_\_\_
4. My ideal vacation spot would be a remote, wilderness area. \_\_\_\_\_
5. I always think about how my actions affect the environment. \_\_\_\_\_
6. I enjoy digging in the earth and getting dirt on my hands. \_\_\_\_\_
7. My connection to nature and the environment is a part of my spirituality. \_\_\_\_\_
8. I am very aware of environmental issues. \_\_\_\_\_
9. I take notice of wildlife wherever I am. \_\_\_\_\_
10. I don't often go out in nature. \_\_\_\_\_
11. Nothing I do will change problems in other places on the planet. \_\_\_\_\_
12. I am not separate from nature, but a part of nature. \_\_\_\_\_
13. The thought of being deep in the woods, away from civilization, is frightening. \_\_\_\_\_



14. My feelings about nature do not affect how I live my life. \_\_\_\_
15. Animals, birds and plants should have fewer rights than humans. \_\_\_\_
16. Even in the middle of the city, I notice nature around me. \_\_\_\_
17. My relationship to nature is an important part of who I am. \_\_\_\_
18. Conservation is unnecessary because nature is strong enough to recover from any human impact. \_\_\_\_
19. The state of non-human species is an indicator of the future for humans. \_\_\_\_
20. I think a lot about the suffering of animals. \_\_\_\_
21. I feel very connected to all living things and the earth. \_\_\_\_

**Appendix G:****Activity Authenticity and Effort Scale**

Please answer the following questions regarding how you felt over the course of the assigned activity.

Strongly  
Disagree  
1

2

3

4

5

6

Strongly  
Agree  
7

- \_\_\_ 1. It was very easy to behave the way I did during the activity.
- \_\_\_ 2. I felt authentic in the way I behaved during the activity.
- \_\_\_ 3. I felt like I was really being me during the activity.
- \_\_\_ 4. I was my true self during the activity.
- \_\_\_ 5. During the activity, my behaviour represented who I really am.
- \_\_\_ 6. It took a lot of effort to behave the way I did.
- \_\_\_ 7. I felt like I was putting on a “false face” during the activity.
- \_\_\_ 8. If someone was observing me during the activity, they would have an accurate impression of the real me.

## Appendix H:

### Pro-Environmental Condition Activity Plan

For this portion of the study you'll be asked to select an environmentally friendly activity to do for the at-home portion of this study.

Listed below are some examples of environmentally friendly activities. Although you can select from this list, you are not restricted to it if you have a unique idea. **What is important is that it is a something you do not normally do.** For example, if you normally recycle and compost relevant materials after eating, choosing recycling or composting does not meet the requirement.

You will also be asked to take a photo during or after your chosen activity for the second portion of the study. (**Note, you are not required to be in the photograph**).

Potential environmentally friendly activities:

- Donate money to an environmental cause
- Buy food at a farmer's market
- Talk to children about environmental issues
- Buy locally produced foods
- Eat a vegetarian or vegan diet for a day
- Make a product instead of purchasing a new one
- Attend a pro-environmental meeting
- Buy environmentally friendly soaps or cleaners
- Trade or share a product with others rather than buying new
- Buy a product made from recycled materials
- Avoid excess packaging in purchases
- Compost kitchen waste
- Walk or cycle to a destination you'd normally drive
- Replace old lightbulbs with high-efficiency ones
- Use reusable bag when shopping
- Turn off tap while soaping up
- Turn off tap while brushing teeth
- Fix something rather than buy new
- Reuse paper or glass
- Hang clothes to dry rather than use a dryer
- Buy used products instead of new ones
- Turn off lights when not in use
- Use recycling bins for paper, cardboard, glass, cans

- 1) In the box below, write down two or three environmentally friendly actions (either from the list above, or ideas of your own), that you could engage in within the next two days. Ask the researcher if you could use help developing a choice that would be a good fit.

Now select **one** of your choices to develop into a plan.

2) Why have you chosen this action in particular? (One or two sentences is good)

3) Which day, at what time, and where will you complete your chosen action? (**It should be within the next two days**).

4) What are some potential barriers to completing the action as planned above?

5) What is a plan B (action, time, place) in case a problem arises with the first plan?

Once completed, consult the researcher to ensure that the plan you've created is a good fit for the study.

Please keep this plan with you to refer to. An email will be sent to the email address you provided during the initial questionnaires. Once you've completed your action, please access the email, click on the link provided, and fill out a short questionnaire about your experience. Once you have submitted that questionnaire, you've completed the study. **Please note: only complete**

**the follow-up survey once. You will be credited within a week of completing the follow-up survey. There is no need to e-mail the researcher about credit if you haven't received credit within a few days, or to e-mail the researcher with your photographs.**

Thank you for taking time to participate.

## Appendix I:

### Control Condition Activity Plan

For this portion of the study you'll be asked to find two sculptures/ statues that you have never yet paid attention to. There are many placed around campus and the city. **What is important is that you choose two sculptures/ statues that you have never spent time observing before.**

You will be asked to take a photo of each of these statues, and write a couple of sentences about why you chose them.

Suggestions of places to observe sculptures:

- In front of Richcraft Hall
- Inside Richcraft Hall
- 53 Elgin Street
- Wellington St. Downtown
- The Quad
- The Library
- Parliament Hill
- O-Train at Carleton
- 426 Sussex Drive
- Mackenzie Engineering Building
- Corner of Elgin and Albert Street
- Confederation Square
- Robertson Hall
- Jacques Cartier Park
- 90 Wellington Street
- 120 Lisgar Street
- City Hall
- Rideau Falls Park
- National Art Gallery
- Wellington St. West, Hintonburg

- 1) In the box below, write two or three places you intend to look for search for the sculptures. Ask the researcher if you could use help developing some choices.

2) Which day, and at what time, will you complete your search and take photographs?

3) Is there anything that might get in the way of you completing the action at this time?

4) What is a plan B (date, time) in case a problem arises with the first plan?

Once completed, consult the researcher to ensure that the plan you've created is a good fit for the study.

Please keep this plan with you to refer to. An email will be sent to the email address you provided during the initial questionnaires. Once you've completed your action, please access the email, click on the link provided, and fill out a short questionnaire about your experience. Once you have submitted that questionnaire, you've completed the study.

**Please note: only complete the follow-up survey once. You will be credited within a week of completing the follow-up survey. There is no need to e-mail the researcher about credit if you haven't received credit within a few days, or to e-mail the researcher with your photographs.**

Thank you for taking time to participate.

**Appendix J:**  
**Research Protocol**

BEFORE THE DAY OF DATA COLLECTION

1. Based on the availability you have given us, timeslots on SONA will be created with you assigned as the researcher. If your availability changes, please let Sam van Ginkel know as soon as possible. Sam will be the person scheduling the timeslots on SONA for all the research assistants.
2. When a participant signs up for one of the timeslots that you have been assigned to, you will receive an email from SONA titled “Study Sign-Up Notification: Trying Something New”. This email will tell you the date and time of the timeslot they have signed up for. You can also access your time-slots real time through your SONA researcher account.
3. It is important that you have a list of the participants that are signed-up while you are on your shift, so either print out the sign-ups email the night before, or make sure that you have your lap-top with you so that you can access the list of participants to fill out on the Researcher Log.

STUDY PREPARATION ON THE DAY OF DATA COLLECTION

1. Around 30 minutes before your first scheduled timeslot of the day, go to the Carleton University Happiness Laboratory (Human Computer Interaction Building Room 6111).
2. Open the door to the observation room (6111G).
3. In the observation room (6111G), grab the clipboard labelled “Trying Something New” from the top row of the large black shelf. Attached to the clipboard is this Research Protocol and the Researcher Log sheet.
4. On the top row of the large black shelf in the observation room (6111G), there will be two piles of *Activity Plans*, one for each condition of the experiment. Activity Plans for conditions 1 and 2 will have a “1” and “2” in their top right corners, respectively. Each new participant entering into the lab will be assigned the alternate condition from the participant before, i.e., if the last participant in the lab was assigned Activity Plan 1, the next one is assigned condition and Activity Plan 2, and vice versa.
5. Prepare an Activity Plan by writing the Participant ID in the top right corner before the participant arrives. Check the Researcher Log Sheet for the last Participant ID slot, if it begins with a 1 (e.g., 1012), then the next participant will be a 2 - take an Activity Plan with the number “2” in the right hand corner and write the complete Participant ID at the top. Keep this form with you on your clip-board. You will wait to give this to the participant until



it is time for them to do their activity plan.

6. Take the green keys from \_\_\_\_\_. Open up Participant Room 6111A. If you will be running two participants concurrently during your shift, also open up Participant Room 6111C.
7. Before participants arrive, load the survey on the computer by clicking the bookmark that says “SV Survey”. (If the survey begins at some other page than “Please enter your ID”, then you will need to clear the browser history by clicking the History tab > Show Full History > Delete Browsing Data. Then click the survey link again.)

MEETING PARTICIPANTS
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**Notes: If you have two concurrent participants, the procedure is exactly the same. Simply tend to both participants in the way you would if there were only one. Because they are staggered, it’s rare that they both need attention at once, but in the case that you come back to the boardroom and the light is on for the other participant, just help them as soon as possible.**

1. When participants arrive for their scheduled time slot, say “**Hi, are you signed up for the Trying Something New study at [session time here]?**” If they say yes or seem unsure, **ask for their name**. Once they tell you their name, check to ensure that they are signed up for the study at that particular time, on either the sign-ups e-mail or on SONA.
2. If the participant is signed up for that time, say “**Thank you, please come with me.**” and lead them to one of the open lab computers. Then say “**Please wait one moment before beginning anything**”. (If you are not prepared for any reason just ask the participant to sit in the chair outside the observation room until you’re ready).
3. On the Researcher Log write the Participant ID, Last Name, Date, and Start Time.
4. At this time, the survey screen from before with the Participant ID entered should still be open. If it isn’t, re-open it and enter the Participant ID again.
5. Once the participant is seated at the computer and you’ve completed the Researcher Log Sheet, say “**Now you’re going to be given a consent form for the study, it outlines everything in detail, but I’ll give you a brief overview. There is an in-lab and take-home portion of the study; while you’re in the lab you’re going to watch a video, plan an activity, and fill out some questionnaires. Once you go home you’ll complete the activity you’ve planned, and then access a short follow-up survey.**”

**Once you consent, just make sure to put the video in full-screen and that the volume is on. When you’re done, or if you need assistance, please click the “ON” button on this remote and I’ll be right with you.”**

6. Participants will notify you when they need assistance by clicking the “ON” button on the remote. This will cause a light on the window-side of the board room to come on. The light closer to the computer is attached to Room A, while the light farther from the computer is

attached to Room C. When this light goes on, check in with the participant, and click the “OFF” button to reset. If you forget, just go back into the room and press it.

7. Once the participant has finished the video, hand them their Activity Plan and say “**Here is your Activity Plan.**” And explain the process of answering the questions on their particular activity plan. Note that these differ between AP1 and AP2.

For **Activity Plan 1** (complete an environmentally friendly task), say: “**For this activity you will be choosing an environmentally friendly activity to do at home. It’s important that it’s something you don’t normally do. There is a list provided here of potential activities, but if you come up with something on your own that could be okay as well. You’ll also take a photo during the activity, but you can choose whether or not you are in the photo.**” Then go over the content of each question with them and ensure that they understand. Details about what is and is not allowed in the textbox below.

For **Activity Plan 2** (take photos of sculptures around campus), say “**For this activity you will be taking photos of two sculptures/ statues that you haven’t spent time observing before. There is a list of potential places you could look here if you want, but you’re also welcome to find your own.**” Then go over the content of each question with them to ensure they understand. Details in the textbox below.

Then say: “**Let me know if you need any help with the questions, and call me when you’re done answering them**”.

#### **Activity Plan 1 Details:**

The **first box**, participants should identify two or three activities that they could potentially do in the next day or two. A list is provided to them, but creative answers can be allowed as long as they are obviously helpful to the environment, and can be done within the space of a day. For example “going to the gym” is a timely, realistic task, but does not help the environment. Likewise, “volunteering in the amazon rainforest” is environmentally friendly but not timely. In the **second box**, they will be asked to choose one task from the three. In the **third box** they will choose a day and time to complete their task. In the **fourth box** they will list some potential barriers to completing their choice task as planned. This is to get participants thinking about what might get in the way, some examples might be “feeling tired, having to do homework, an appointment coming up, etc.”. In the **fifth box** participants will outline an alternate time they could complete the task in case the first one falls through. Some subjective discretion may be required here in working with participants. For example if a participant makes up their own activity such as “reading environmental news”, you should say that although it’s a good idea, for the purpose of the study we require the activity to be more *action oriented*, and thus something that directly impacts the environment rather than simply learning about it. There are many different things that might come up, so just do your best.

#### **Activity Plan 2 Details:**

In the **first box**, participants should identify two or three places they will look for sculptures. A list is provided to them, for their reference, but they are not limited to it, any other area on campus will work. In the **second box**, they will be asked to pick a day, time, and location they will complete their task, it is important that they choose a time in the next two days. In the **third box** they will list some potential barriers to completing their choice task as planned. In the **fourth box** participants will outline an alternate time they could complete the task in case the first one falls through.

When they are done, go over their choices with them and make sure they match the requirements of the study. If they are good then say: **“Next you’re going to complete some questionnaires. One important thing: at the end you’ll be asked to input your e-mail so that we can send you a link to your follow-up survey. It is important that you enter your e-mail correctly, so that you can complete and be credited for the second part of the study. Just click the “ON” button once you’ve completed the questionnaires, or if you have any questions. Thank you.”**

8. If participants require assistance with the survey questions, offer them help.
9. Once the participant has completed the survey say **“Thank you for completing the first part of the study. Take your Activity Plan with you and complete your activity within the next two days. You will receive an e-mail with a link to a follow-up survey soon. If you have your phone with you, could you check to make sure you’ve received the follow-up e-mail?”**

If they say yes, wait for them to do this.

**“Please try to complete the follow-up survey as soon as possible after completing your activity. You’ll be credited for the second half of the study once you complete the follow-up survey. Also, it can take up to a week to be credited after the follow-up survey, so please only do it once and there’s no need to e-mail the researcher if it’s taking a few days to receive your credit. There’s also no need to e-mail any photos to the researcher. Do you have any questions?”** Answer any questions that they might have. After this, or if not, show them to the door and say, **“Take care”**.

10. If participants do not receive the follow up e-mail:
  - a. Encourage them to check their junk folder.
  - b. Tell them that if they do not receive the e-mail that they can e-mail you with their Participant ID, written at the top of their Activity Plan.
  - c. If a participant e-mails you with their Participant ID, this is the follow-up survey link:  
[carletonu.az1.qualtrics.com/jfe/form/SV\\_ebqvW7KD1TY5JiZ?id=\\$P ID](http://carletonu.az1.qualtrics.com/jfe/form/SV_ebqvW7KD1TY5JiZ?id=$P ID)
  - d. Simply replace the **P ID** with their Participant ID, e.g., 1007

AFTER COMPLETING ALL TIME-SLOTS
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1. Once you do not have another timeslot scheduled, log into your SONA account and assign credit to students who participated. You can do this on a smartphone or on a lab computer

that is not in use in the observation room (6111G) or the conference room (6111C). If you are using a lab computer, log onto the “CUHL Guest” account and enter the password \_\_\_\_\_”. Consult Researcher Log Sheet to determine which individuals should be credited for participating and which individuals should be marked as an excused no-show if they did not participate. Mark an X under T1 once you have credited the participant. Once a researcher log is completely full, place it in the Trying Something New box beside the microwave, and add a fresh sheet to the clipboard.

Participants completing the first part of the study should be granted half of the total credit (1%). The procedure for doing so is:

- i. At the end of your shift when it’s time to grant credit to the participants who showed up and completed the first part of the study, log in to SONA
- ii. Click “View add or edit timeslots” on the left side of the screen
- iii. To the right of “Trying Something New (In-Lab Study + Take-home Activity)”, click “Timeslots”
- iv. To the far right of the participant’s name who has completed the first part of the study, click the red “Modify” button
- v. At the bottom of the page, beside the participant’s name, select the “Participated” button
- vi. Underneath it, change the percentage value to “1”
- vii. Select the green “Update Sign-Ups” button to the bottom left
- viii. Repeat these for all participants that complete the first part of the study

If the participant did not show up, select the “Excused No-Show” bubble under the participant’s name and click the green “Process Changes” button at the bottom of the page. If the participant did show up to participate and signed the research consent form but dropped out afterwards before completing the study, they should be still be given a credit. If you are using a lab computer, log out of SONA and turn the computer off by clicking on the apple icon in the top left corner of the screen and click “Log Out CUHL Guest”. Turn off the screen of the computer by clicking “Sleep”.

2. Place the clipboard on the second row of the large black shelf in the observation room (6111G).
3. Close the door to the observation room (6111G) if you unlocked it and grab any personal belongings from the conference room (6111C).
4. Leave the Carleton University Happiness Laboratory. Make sure that the entrance door to the lab is closed and locked.

CONTACT INFORMATION
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Below is Sam van Ginkel’s contact information in case any issues arise or in case you have questions while you are running the study. If the issue is of a time sensitive nature and you need to get a hold of Sam immediately, you can call him at the number below. For anything else, an email or text message would be preferable – he will do his best to get back to you ASAP.

Sam's email: \_\_\_\_\_

Sam's phone #: \_\_\_\_\_

In the unlikely event of an emergency occurring while you are helping out with this study, you can contact the Department of University Safety for help. They can also open the doors to the Carleton University Happiness Laboratory if you accidentally left your keys at home or inside the lab and no one else is in the lab to open the doors for you. Please save this number in your phone.

University Safety phone #: 613-520-4444