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DEFENSE AGAINST DEFENSIVENESS: HOW IMPORTANT PERSONAL VALUES CAN PROMOTE MORE ADAPTIVE RESPONSES TO SEVERE ENVIRONMENTAL THREAT

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DEFENSE AGAINST DEFENSIVENESS: HOW IMPORTANT PERSONAL VALUES CAN

PROMOTE MORE ADAPTIVE RESPONSES TO SEVERE ENVIRONMENTAL THREAT

by

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Abstract

People respond defensively to threatening risk information about the future. For example, people may respond with denial to threatening information about environmental consequences, resulting in inaction which ironically increases the risk. The current thesis was designed to examine individuals' responses to future climate change risk when under different types and levels of threat. We predicted defensive response under threat, but also sought to investigate a factor that might mitigate defensiveness: reflecting on personally important values. In Study 1 we sought to examine individuals' responses to a climate risk message after they were induced to feel low or high personal control (which we reasoned might be one way to induce higher or lower levels of threat). We also examined individual differences in environmental importance. Participants who valued environmental issues were able to mobilize and engage in pro-environmental responses when they felt they had low control, whereas those who did not value environmental issues showed somewhat more defensive responding. These differences did not emerge when participants felt high personal control. We speculated that those who were high in environmental importance drew on that value to affirm themselves in the face of more severe threat. Study 2 directly manipulated self-affirmation (using a values reflection task) and climate change threat severity. Non-affirmed participants responded more defensively to severe than mild threat, whereas affirmation eliminated defensiveness and fostered proactive responses under severe threat. Self-affirmation may allow individuals to more accurately evaluate threatening consequences and take action.

KEYWORDS: self-affirmation, environmental identity, climate change, environmental threat

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Climate change is one of the most pressing social problems of our time. We have

overwhelming scientific evidence that sea levels are increasing, food and fresh water supply are

decreasing, and temperatures and dramatic weather events are on the rise (Environment Canada,

2014). We know this, yet there is still hesitation and skepticism when it comes to accepting and

acting to prevent or mitigate these threats (Whitmarsh, 2011). Indeed, although it might seem

that the increasingly conclusive evidence of the severity of our current climate trajectory should

serve to increase public acceptance and action, a substantial proportion of North Americans – not

to mention the U.S. Senate – are skeptical either of climate change or its human cause

(Goldenberg, 2015; Saad, 2015). This suggests that providing information about the risks of

climate change is not enough: when threatening messages are presented to people with the intent

of increasing pro-environmental behaviour, messages can sometimes have the opposite effect

and actually increase their skepticism and defensiveness toward the issue (Bashir, Lockwood,

Chasteen, Nadolny, & Noyes, 2013; Feinberg & Willer, 2011). This results in a tension between

the motives of the typical communicators of climate change risk (environmental activists,

scientists, etc.) and the motives of a lay audience: communicators will be driven to emphasize

the threat, in order to underscore the severity and need for immediate action. On the other hand,

because people are very good at protecting the self against threat using a variety of defenses

(Pyszczynski, Greenberg, Solomon, Arndt, & Schimel, 2004; Sherman & Cohen, 2006), one

might expect that the more severe the threat, the more people will be motivated to protect against

it. This could lead communication tactics to backfire. How might an individual who feels

threatened by a distressing climate change message best deflect the threat caused by climate

changes messages? Because warnings and predictions are typically estimations or scientific best guesses (probability predictions regarding future risk), one way an individual could deflect the threat they experience may be to increase their subjective uncertainty that climate change will occur or have any personal impact. One can increase subjective uncertainty (or, in other words, decrease perceived likelihood) of personal impact in a number of ways: first, people can emphasize the distance of the threat both physically (Spence & Pidgeon, 2010) and temporally (Bashir, Alisat, Wilson, Lockwood, & Chasteen, 2012; Peetz, Wilson, & Strahan, 2009), or they can decrease the perceived severity of the threat (Feinberg & Willer, 2011; Whitmarsh, 2011). Individuals may express skepticism about scientific claims or about the degree to which the cause is anthropogenic; they may stop short of denying that climate change exists at all, but there are a variety of ways they can write it off as being exaggerated by the scientific community.

Uncertainty and Action

If people defensively downgrade the threat of climate change, one likely result is inaction. When future events are perceived to be temporally distant individuals are less likely to act due to people interpreting that distance in a way that decreases the certainty of the outcomes (Bashir, Wilson, Lockwood, Chasteen, & Alisat, 2014; Chandran & Menon, 2004; Perunovic & Wilson, 2008). When future outcomes are presented as being certain to happen, individuals are more likely to take action in order to prevent those negative outcomes (Brewer, Weinstein, Cuite, & Herrington, 2004; Klein & Cerully, 2007). The problem with challenging climate change is that people are being asked to act in order to stop uncertain future outcomes. Scientists know the outcomes are coming, they cannot say for certain how severe, or when these outcomes will occur which makes people less likely to act to stop them (Whitmarsh, 2011). We know that people are more likely to incur costs now when a future benefit is more certain, rather than uncertain (Green

& Myerson, 2004; Klein & Cerully, 2007), and that this asymmetry in certainty may exacerbate people's tendency to discount the value of distant outcomes over immediate ones: in line with temporal discounting theory, people value immediate outcomes over distant future ones, but in addition may judge the immediate outcome as certain and the distant outcome as less certain to occur (Rick & Loewenstein, 2008). However, the certainty an individual affords to a future outcome is not typically set in stone but rather the outcome of subjective predictions. The inherent subjectivity in these judgments of future certainty means that they may be quite prone to motivated adjustments. Specifically, when people are under greater threat, they may be more inclined to amplify the subjective uncertainty of the threatening future event – which in turn may foster inaction, ironically contributing to the very problem that was such a threat.

Types of Threat

So far we have argued that threatening messages will elicit defensiveness. But what kinds of messages are most threatening? One way to increase threat is to highlight the severity or hopelessness of the problem (Feinberg and Willer, 2011; Spence & Pidgeon, 2010). Varying personal proximity to the risk can also affect how threatening the information seems: Spence and Pidgeon (2010) found that when climate change was depicted as geographically close individuals responded more defensively by discounting the severity of climate change while showing no differences in their attitudes toward climate change mitigation from their geographically distant counterparts which is consistent with the argument that threat can result in defensive responses, uncertainty and inaction. With each of these types of threat, messages about climate change themselves are varied in some manner to make them seem more or less distressing. Another approach to investigating threat in the context of climate change is to induce threat separately from the climate message itself by putting people in a state where they are more likely to find the

climate information threatening. For example, one common way to induce a general feeling of threat is to focus people on thoughts of death and make people aware of their own mortality (Pyszczynski et al., 2004). Another factor that may increase people's experience of threat is inducing a perceived lack of control. When people experience low personal control they feel threatened; this lack of control can result in believing external systems are acting on your behalf which can relate to defensive responses including believing that technology, or a higher power, will assist in the rectification of the threatening issue (Landau, Kay, & Whitson, 2015). Researchers interested in personal control have found that those who believe outcomes are out of their control are more likely to experience internal behaviours of passivity and withdrawal in addition to compliance and conformity more than those who believe their outcomes are in their control (Lefcourt, 1979). In general, people are motivated to perceive themselves as being in control of our environments. Challenging an individual's feelings of personal control should act as a threat to their worldview (Kay & Eibach, 2013), perhaps especially when facing an ambiguous situation. Feeling low control in the face of an uncertain future (and/or a distressing future, in the case of climate change) may make the target future outcome seem more threatening.

Do All People Respond Defensively to Threat?

The previously described studies reporting participant reactions to climate change highlight defensive responding. This may suggest that communicating severe risk to prompt action may be a lost cause. However, not all individuals respond in this defensive manner. Who might be more or less likely to respond defensively, versus perhaps a more proactive response style? One factor that may influence people's responding to climate change threat is an individual's personal values: individual beliefs regarding the importance of our environment and

our responsibility to protect it (Fritsche & Häfner, 2012; Vess & Arndt, 2008). This may occur in part because people are inclined to cling to their worldviews when threatened. For example, when participants were threatened by making them aware of their own mortality, those who espoused environmental values became more concerned while those without this initial worldview tended to dismiss environmental concerns to a greater extent (Vess & Arndt, 2008). The finding that environmental identity moderates the effects of mortality salience supports the idea of environmental identity affirming individuals' worldviews (Fritsche et al., 2010; Fritsche & Häfner, 2012; Vess & Arndt, 2008). Further, we speculate that when people focus on values that are important to them these values may act as an affirmation (Sherman, 2013). It is possible that for individuals who hold environmental values to be important, this value affirmation underlies the reduction in defensive or increase in proactive responses under threat. Across two studies, it is our goal to examine the relationship between threat, defensiveness and inaction, and we also hope to identify ways to mitigate these responses and transform them into pro-environmental efforts. In Study 1, we will manipulate threat by altering people's feelings of personal control. Additionally, we will explore the idea of environmental identity acting as a moderator when individuals are presented with threatening climate change information. Because we are interested in both defensive and proactive responding (and how they may be connected),we will examine measures of both in response to a threat.

Study 1

Our first study was intended to examine how people respond to a climate change risk message when they are experiencing either high or low personal control. We exposed everyone to the same climate risk prediction, then induced feelings of either high or low personal control. We expected that feelings of low control in the face of climate risk would represent a greater

threat. By manipulating personal control we aimed to subtly alter the level of threat that participants experienced, while holding the climate change message constant. We assessed individuals' defensive responses by measuring participants' feelings of skepticism (Whitmarsh, 2011) and their perceived severity of climate change risk (Feinberg and Willer, 2011) because those responses were shown to be important in previous research. As for proactive responses, we examined participants' intentions to participate in pro-environmental behaviours in the future, as well as the effectiveness they believed those actions had. We also asked participants to indicate the extent to which they believed that they could personally make a difference. These variables were relevant indicators because as seen in previous research, perceived efficacy and motivation can influence how individuals respond to environmental risk information (Bashir et al., 2014; Sparks et al., 2010).

Our primary hypothesis was that participants who experience the low personal control condition will respond more defensively to the climate change risk information, whereas those induced to feel high personal control may be prompted to be more proactive.   However, due to the literature suggesting that environmental identity may play a role we also assessed the extent to which environmental issues were important to each participant prior to any risk information or manipulation. Note that we asked participants about how important environmental issues were to them, rather than directly asking about identity. Because issue importance should be a key aspect of the degree to which the issue is part of identity, we treat the two constructs as relatively interchangeable and expect that environmental importance would have effects parallel to any past findings using the construct environmental identity. We expected, independent of threat, that those high in environmental importance would provide less defensive and more proactive responses than those low in environmental importance. We were less certain if environmental

importance would moderate the effect of threat but recognized it was a possibility: we speculated that those with high environmental importance might respond least defensively and most proactively when they are in the low control condition, since this condition contains the highest threat. Since some forms of threat appear to cause people to cling more firmly to their existing worldviews (Vess & Arndt, 2008). We reasoned that a general feeling of lack of personal control might also prompt people to lean more toward their worldviews and related values.

Study 1 Method

Participants

Participants consisted of 79 undergraduate students from a psychology participation pool. Four participants were excluded due to a failed completion of the manipulation. Of the remaining 75 participants 47 of them were female and the mean age of participants was 19.68 (SD = 4.17). Participants were a relatively low in ethnic diversity, with 44 participants (58.7%) reporting being Caucasian, 9 reporting Asian descent and 4 participants reporting African American, Hispanic, or Other; ethnicity was unknown for 18 participants who either failed to answer or provided information that does not clearly reflect ethnicity (i.e. religion or nationality). Most participants reported not being affiliated with a political party (42.7%) with almost equal numbers of Liberals (22.7%), and Conservatives (18.7%) with NDP (8%), Green (5.3%), and other political parties (2.7%) less frequent. Participants were asked their socio-economic status and 64% of the sample represented the Upper-Middle class with the second most frequent status being Lower-Middle class, representing 26.7% of the sample and 4% of the sample reported being each of the remaining socio-economic statuses (Lower and Upper Class).

Procedure

The primary purpose of the study was to alter the perceived personal control participants felt when considering a severe local climate change threat expected in the not-too-distant future, with the expectation that those induced to feel low control would feel more threatened by the climate risk. Because environmental importance/identity can play a role in environmental reactions, and sometimes moderates reactions to threat, we also included a measure of how important the environment was to participants[1]. Participants were told that the purpose of the study was to examine people's attitudes, behaviors, and thoughts about social issues including the environment. They were first asked to provide demographic information and provide a baseline of their environmental importance by answering a single question: "How important are environmental issues (such as climate change/ global warming) to you?"

After the completion of these background measures, participants were randomly assigned to either a high personal control or a low personal control condition, which was our manipulation of threat level in the current study. We manipulated their feelings of personal control using a manipulation developed by MacGregor and Cavallo (2011) which asked participants to think of a series of commonly experienced events. Participants were either led to think of experiences in which they had control over actions and outcomes, or situations where they lacked control. For

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[1] It should be noted that Study 1 of this package was not initially designed with the intention to test a personal control X environmental importance interaction hypothesis. We included environmental importance as an important baseline variable and potential predictor of responses, but did not initially make explicit predictions about interactions. As a result, we acknowledge that sample size is relatively low for testing personal control X environmental importance interactions.

example, those who were high in personal control would indicate yes or no to the statement "*I was late for an appointment or event because of something I did*" whereas those who were low in personal control would indicate yes or no to the statement "*I was late for an appointment or event due to circumstances beyond my control*". Items varied according to condition; all were typical enough that there was a high likelihood participants would answer yes to a substantial number of the primes (see Appendix A for the full control manipulation). As a manipulation check at the end of the study we reminded participants of the scenarios they answered "*yes*" or "*no*" to and asked participants how much control they felt they had in the scenarios they contemplated on a four point scale with 1 being "*no control*" and 4 being "*total control*".

After completing the personal control manipulation participants were presented with a fabricated newspaper article depicting predicted future environmental consequences (by the year 2050) due to climate change (see Appendix B). The article highlighted how serious future consequence would be by providing detailed information about severe future consequences (i.e. rise in greenhouse gases, rise in deaths from air pollution, and greater water shortages), all based on actual scientific predictions. We expected that the predicted dire consequences would be particularly threatening - and more likely to elicit defensive responding - when people felt low levels of control, relative to when they felt higher control[2].

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[2] In the spirit of full disclosure, we note that Study 1 was conducted early in our development of methods and manipulations, and the original design actually included several additional conditions yielding a much larger and more complex overall study design. We later made the decision to include a portion of the larger Study 1 that we thought could best speak to the questions raised in the current thesis but to pare it down to only the relevant conditions. The current study was part of a larger initial design involving a 2 (message seriousness: high, low) x 2 (risk geographical location: local, distant) x 2 (personal control: high, low) between subjects design. The overall design yielded a highly complicated and uninterpretable pattern of findings which would do little to elucidate the

Following the article participants completed a number of dependent variables intended to capture people's tendency to deny or minimize climate change (defensive responses) or to respond more proactively to climate change. These dependent variables included some defensive responses: skepticism toward climate change and its perceived severity. We also measured possible proactive responses: intended participation in and perceived effectiveness of a variety of environmental behaviours, their perceived ability to make a difference, and their perceived control over personal outcomes. In addition to these dependent variables, a number of

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questions at hand in the current thesis. Some of this was due to methodological flaws and ambiguities that we later learned from and attempted to improve upon. For example, in the original larger study design, we made initial attempts at manipulating threat seriousness by changing factual information in the message (for example predicting 1,000 versus 18,000 pollution-related deaths in a city of 2 Million by 2040). We later determined that this method was problematic because one message was far closer to actual scientific estimates than the other (in this case, 1,000 deaths is a large under-estimate and is even lower than present-day estimates of pollution-related deaths). Therefore, we were varying more than just threat seriousness – messages also vary in accuracy, plausibility, likelihood, etc., which could give people a clear alternative reason for skepticism or uncertainty. The two conditions were too different to be confident that only message seriousness that was influencing participants. In preliminary analyses, message seriousness yielded few significant effects or interactions, and no consistently interpretable patterns. Notably, in Study 2 we learned from the problems in Study 1's design and developed more direct and comparable climate change risk information. In the original study, we also varied geographical location (Toronto ON vs Dallas TX) which, as the current thesis developed, was deemed beyond the scope of the current set of questions.

As a result, we chose to hold the severity and location conditions constant by selecting only participants who read the threat message that was framed as high seriousness (this message was also higher in accuracy based on scientific predictions) and local (to highlight the most personally relevant circumstances). Among this set of participants reading about a serious local threat, participants were randomly assigned to either a high or low personal control condition.

individual differences (i.e., life satisfaction, lay theories, self-esteem, and personality) were also assessed but will not be considered for the purpose of this thesis.

Measures

Defensive responses to the threat of climate change.

Skepticism. Participants were asked to indicate the extent to which they are skeptical of climate change information. We used items from two sources. We used two items from a global warming scale (Risen & Critcher, 2011). These items were "*Global warming is a proven fact*" (reverse coded) and "*Global warming is a theory that has not yet been proven*", They both used a 5-point scale with 1 representing "*strongly disagree*" and 5 representing *"strongly agree"* (*Cronbach's alpha* = .87). The second skepticism scale came from Whitmarsh (2011) and it consisted of 17 items, all were completed on a 7-point scale with 1 representing "*strongly disagree*" and 7 representing *"strongly agree*" (*Cronbach's alpha* = .95). Five of the seventeen items were reverse scored making a higher score represent higher skepticism. Both of the scales were highly correlated (r = .57, p < .001) so they were aggregated for analytical purposes. Due to the difference in scaling we standardized the scales and created a single scale mean by averaging the standardized mean of each scale. To view all scales for Study 1 in the order that they appeared to participants see Appendix C.

Severity. This measure, from Spence and Pidgeon (2010), assessed the degree to which participants felt that climate change consequences will be severe. This included three items that were answered on a 7-point scale with 1 representing "*strongly disagree*" and 7 representing "*strongly agree*" with a higher score indicating greater perceived severity. One of the three items was reverse coded (*Cronbach's alpha* = .82).

Proactive responses to the threat of climate change

Ability to make a difference. We were interested in whether feelings of control could influence individuals' belief in whether they could make a difference so two items were created to measure this. The two items were "*I feel that by engaging in environmentally sustainable behaviours, I can make a real difference*" and "*I feel like any action I take to be environmentally responsible is only a 'drop in the bucket' and won't make a difference".* Both items had a 1 to 7 scaling where 1 indicated "*strongly disagree"* and 7 indicated "*strongly agree"* The second item was reverse scored and the mean of the two values was used ($r = .56$, $p < .001$). Higher values indicate a greater ability to make a difference.

Control over personal outcomes. We also created a single item to assess how much control participants believed they had over their own personal outcomes. The item was "*I believe that I have a lot of control over the personal outcomes in my life*" and it was answered on a 7-point scale where 1 indicated "*strongly disagree"* and 7 indicated "*strongly agree".*

Environmental behavior intentions and effectiveness. We also measured individuals' intentions to engage in pro-environmental behaviours. We provided participants with a list of 22 pro-environmental behaviours and asked them to rate how likely they would be to engage in each behaviour in the next few years (adapted from Bashir et al., 2014). Their intention was measured on a 7-point scale with 1 representing "*extremely unlikely"* and 7 representing *"extremely likely".* Participants were then presented with the same list of behaviours and asked how effective they were in fighting climate change. This was also measured on a 7-point scale with 1 representing "*extremely ineffective"* and 7 representing *"extremely effective"* (*Cronbach's alpha* for behavioural intentions = .92; *Cronbach's alpha* for behavioural effectiveness = .94).

Study 1 Results

Manipulation checks and Preliminary Analyses

Personal control.   An independent samples t-test revealed a main effect of personal control condition, $t(73) = -6.051$, $p < .001$. Those in the low personal control condition ($M = 2.25$, $SD = .65$) felt they had less personal control in their recalled experiences than those in the high personal control condition ($M = 3.08$, $SD = .53$).

Environmental importance. An independent samples t-test revealed that the premeasure of environmental importance was not significantly different between those who were in the low ($M = 6.06$, $SD = 1.97$) and high ($M = 5.82$, $SD = .1.652$) personal control conditions, $t(73) = .56$, $p = .576$. This suggests environmental identity was equal across control conditions, indicating successful random assignment.

Correlations between measures of interest. As a preliminary step, we examined the correlations between our variables of interest (see Table 1). Many of these variables were significantly correlated in meaningful ways. In general measures thought to reflect defensiveness (high skepticism, low severity ratings) were related to lower proactive response (perceived ability to make a difference, motivation to act, etc.) (all p's < .038). Environmental importance predicted less defensive responding and more proactive responding, though it was unrelated to perceived effectiveness of pro-environmental behaviours or perceived personal control.

In all subsequent analyses, we examined the effect of perceived control condition, initial environmental importance as a continuous variable, and the interaction between these variables. Our primary hypothesis centered on heightened defensiveness in the face of low personal control (which we conceptualized as being higher in threat): we expected people might be more defensive and less proactive when personal control was low. However we also included

environmental importance; we expected that those who regarded the environment as more personally important would show less defensive and more proactive responses (in general), and that environmental importance and threat might interact such that high-importance participants would show less defensiveness especially under low personal control than those who regarded the environment to be low in importance.

Defensive Responses to the Threat of Climate Change

      Perceived severity of possible outcomes. We conducted a condition (control: low, high) x environmental importance multiple regression analysis. This analysis revealed no main effect of personal control ($b = -.06$, $B = -.06$, $se = .11$; $t_{(71)} = -.57$, $p = .571$, 95% confidence interval [CI] $= [-.277, .154]$) but a main effect of environmental importance ($b = .18$, $B = .32$, $se = .06$; $t_{(71)} = 2.91$, $p = .005$, CI $= [.056, .298]$) indicating that those who value the environment to a greater degree see the threat as more severe. This analysis also revealed an interaction ($b = -.12$, $B = -.22$, $se = .06$; $t_{(71)} = -2.01$, $p = .048$, CI $= [-.244, -.001]$) (see Figure 1). Once an interaction was established we examined the simple effects in each condition at one standard deviation below the mean and one standard deviation above the mean for our measure of environmental importance. When calculating the simple effects we used an effect vector, giving low control a value of -1 and high control a value of 1. Among those high in environmental importance (one standard deviation above the mean), the control effect was marginally significant such that people perceived greater severity in the low control condition ($b = -.28$, $B = -.28$, $se = .15$; t(71) $= -1.83$, $p = .072$; CI $[-.589, .026]$) but among those low in environmental importance (one standard deviation below the mean) the condition effect was not significant ($b = .16$, $B = .16$, $se = .15$; t(71) $= 1.03$, $p = .305$; CI $[-.148, .465]$). When looking at the simple slopes, results reveal that among those induced to experience low control those with high environmental importance

perceive the outcomes to be more severe than those with low environmental importance ($b = .3$, $B = .54$, $se = .08$; $t_{(71)} = 3.74$, $p < .001$; CI [.140, .459]). Among those who experienced high control there were no differences in ratings of severity, regardless of initial level of environmental importance ($b = -.06$, $B = .1$, $se = .09$; $t_{(71)} = .60$, $p = .553$; CI [-.308, .554]).

Skepticism toward climate change. We conducted another condition (control: low, high) x environmental importance multiple regression analysis. This analysis revealed a main effect of environmental importance ($b = -.15$, $B = -.32$, $se = .05$; $t_{(72)} = -2.89$, $p = .005$, CI = [-.260, -.048]) where those who were higher in environmental importance reported less skepticism than those who were lower in environmental importance. There was no main effect of personal control ($b = .15$, $B = .17$, $se = .10$; $t_{(72)} = 1.56$, $p = .123$, [-.041, .339]) or interaction ($b = .05$, $B = .11$, $se = .05$; $t(71) = .97$, $p = .336$, CI = [-.055, .159]) (see Figure 2).

Proactive Responses to the Threat of Climate Change

Behavioural intentions. We conducted a condition (perceived control: low, high) x environmental importance multiple regression analysis on people's pro-environmental behavioural intentions. Analyses revealed a main effect of environmental importance, $t(72) = 3.11$, $p = .003$, CI = [.069, .314]: those higher in environmental importance had greater intentions to participate in pro-environmental behaviours in the future than those low in environmental importance ($b = .19$, $B = .34$, $se = .06$). There was no main effect of personal control ($b = -.11$, $B = -.11$, $se = .11$; $t(72) = -.95$, $p = .346$, CI = [-.324, .115]) and no interaction between personal control and environmental importance ($b = -.03$, $B = -.06$, $se = .06$; $t(71) = -.53$, $p = .597$, CI = [-.157, .091]) (see Figure 3).

Perceived effectiveness of environmental behaviours. We conducted a condition (control: low, high) x environmental importance multiple regression analysis. This analysis

revealed no main effect of environmental importance (b = .05, B = .11, se = .06; $t(71)$ = .91, p = .364, CI = [-.061, .165]) and no main effect of personal control (b = -.004, B = -.004, se = .1; $t(71)$ = -.04, p = .972, CI = [-.205, .198]) but did reveal an interaction (b = -.12, B = -.24, se = .06; $t(71)$ = -2.09, p = .04, CI = [-.232, -.005]) which suggests that environmental importance moderates the effect of control on ratings on the effectiveness of environmental behaviours (see Figure 4). This effect was not significant when participants were high in environmental importance (i.e. one standard deviation above the mean) (b = -.22, B = -.25, se = .14; $t(71)$ = -1.51, p = .136, CI = [-.504, .070]) nor low in environmental importance (i.e. one standard deviation below the mean) (b = .21, B = .24, se = .14; $t(71)$ = 1.47, p = .147, CI = [-.076, .496]). Next we examined the simple slopes and found that in the low control condition, those low in environmental importance viewed pro-environmental action less effective than those high in importance. (b = .17, B = .35, se = .08; $t(71)$ = 2.28, p = .026; CI [.021, .319]). Among those who experienced high control there were no differences in ratings of effectiveness, regardless of initial level of environmental importance (b = -.07, B = -.14, se = .09; $t(71)$ = -.78, p = .438; CI [-.237, .104]).

Ability to make a difference. We conducted a condition (control: low, high) x environmental importance multiple regression analysis which revealed both a marginal main effect of personal control (b = -.20, B = -.18, se = .12; $t(72)$ = -1.75, p = .084, CI = [-.432, .028]) with those low in personal control able to make a greater difference than those high in personal control, and a significant main effect of environmental importance (b = .25, B = .06, se = .06; $t(72)$ = 3.92, p < .001, CI = [.124, .380]) suggesting that those who are high in environmental importance believe they are better able to make a difference than those low in environmental importance. The interaction, though trending, did not reach significance (b = -.10, B = -.17, se =

.06; $t(71)$ = -1.62, p = .111, CI = [-.232, .024]) (see Figure 5). However, to fully describe any patterns in evidence we further examined the simple effects in each condition in the same manner as above. This effect was significant among those high in environmental importance (one standard deviation above the mean) (b = -.39, B = -.35, se = .16; $t(71)$ = -2.40, p = .019; CI [-.714, -.065]) indicating those who valued the environment felt they could make a difference to a greater degree when in the low control condition. The condition difference was not significant for those with low environmental importance (one standard deviation below the mean) (b =-.02, B = -.02, se = .16; $t(71)$ = -.10, p = .920; CI [-.339, .307]). When looking at the simple slopes we found that participants in the low control condition reported more belief in their ability to make a difference when they were high rather than low in environmental importance. (b = .34, B = .56, se = .08; $t(71)$ = 4.05, p < .001; CI [.173, .510]). Among those who experienced high control, environmental importance did not significantly predict the degree to which people reported being able to make a difference (b = .13, B = .22, se = .10; $t(71)$ = 1.39, p = .169; CI [-.058, .327]).

Control over personal outcomes. We conducted a condition (control: low, high) x environmental importance multiple regression analysis. This analysis revealed no main effect of personal control (b = .19, B = .16, se = .13; $t(71)$ = 1.45, p = .152, CI = [-.073, .456]) or a main effect of environmental importance (b = .09, B = .13, se = .08; $t(71)$ = 1.14, p = .260, CI = [-.064, .233]) but we did find an interaction (b = -.16, B = -.24, se = .08; $t(71)$ = -2.13, p = .037, CI = [-.307, -.010]) (see Figure 6). We further examined the simple effects in each condition in the same manner as above. This effect was not significant among those who were high in environmental importance (one standard deviation above the mean) (b = -.09, B = -.08, se = .19; $t(71)$ = -.50, p = .622; CI [-.471, .283]) but it was significant for those who were low in environmental importance (one standard deviation below the mean) (b = .48, B = .41, se = .19;

t(71) = 2.53, *p* = .013, CI [.102, .853]). When looking at the simple slopes we found that when participants were experiencing the low control condition there were significant differences in their control of personal outcomes when they were high in environmental importance or low environmental importance (*b* = .24, *B* = -.37, *se* = .1; *t*(71) = 2.48, *p* = .016; CI [.047, .439]) with those who were high in environmental importance reporting greater control over their personal outcomes than those who were low in environmental importance. Among those who experienced high control there were no significant differences in ratings of control over personal outcomes (*b* = -.07, *B* = -.11, *se* = .11; *t*(71) = -.658, *p* = .513; CI [-.298, .150]).

Study 1 Discussion

Study 1 was designed to test the hypothesis that participants in the low control condition (i.e. the condition we intended to be more threatening) would respond more defensively when presented with climate change risk information than those in the high control condition. However, the main effect prediction about the high versus low control condition was not supported - instead, personal control (high, low) interacted with environmental identity to produce some effects consistent with our tentative moderation predictions. Of the two measures on defensiveness, severity yielded a significant interaction indicating that those who experienced low control were only more likely to acknowledge this threat as severe if they were high in environmental importance. This means that among those in the low control condition, people who were low in environmental importance showed responses more consistent with defensiveness than those high in environmental importance. However, the overall pattern suggested that more of the "action" was in the fact that high-importance participants acted especially non-defensively when in the low personal control condition rather than that low-importance participants showed any true evidence of defensiveness, given that low-importance

participants did not differ across the two personal control conditions meant to vary threat. We know from Steele (1988) that when identity is under threat, thinking about personally important values may be one way to affirm the self and gather resources to acknowledge and confront that threat. It is possible that those who are high in environmental importance were better able to respond against the threat because they were able to affirm the importance of their environmental values over the course of the study.

This resistance to defensiveness in the low control condition among those who were high in environmental importance was not only true for some defensive but for some proactive measures as well. Overall, participants who were both high in environmental importance and in the low control condition provided more proactive responses on nearly all of our measures. They perceived pro-environmental behaviours to be more effective and they perceived greater control over their personal outcomes. Although the interaction was non-significant, a similar pattern emerged for belief in the ability to make a difference.

Of the dependent measures that had no interaction between personal control and environmental importance (i.e. skepticism, behavioural intentions, and ability to make a difference) we were still able to consistently see a main effect of environmental importance, with those who were high in environmental importance reporting less skepticism, greater behavioural intentions, and greater ability to make a difference.

Overall, we found more clear evidence for the buffering effect of high environmental importance than direct evidence of defensiveness under threat among low-environmental importance participants. Participants who were low in environmental importance were not more likely to respond defensively when they were experiencing high versus low personal control. We considered that perhaps our threat was not strong enough. The control manipulation we used

(MacGregor & Cavallo, 2011) to manipulate threat level was rather subtle and unrelated to the environment. We speculated that a stronger threat that is more overt and environmentally relevant would strengthen these effects. In Study 2, we decided to test a possible underlying reason that environmental importance moderates these effects by directly manipulating self-affirmation in a more traditional design and manipulating the severity of the passage they read on threatening climate change outcomes. Since we will be manipulating self-affirmation directly we do not expect that environmental importance will interact with threat in Study 2, particularly in the affirmed condition; our manipulation of self-affirmation should parallel the individual difference effect in Study 1 experimentally, reducing the relevance of individual differences.

Study 2

After our first study, we determined that people's initial feelings of environmental identity may play an important role in their responses to environmental threat. Although those for whom environmental values were important tended to mobilize under low personal control, there was not clear evidence that those who do not value the environment showed greater defensiveness. We speculated that for people who highly identify with environmental issues and find these issues important, reading about and responding to items geared toward environmental concerns may trigger these values which could act as an affirmation. Self-affirmation has been repeatedly found to decrease defensive responses to threat by allowing individuals to respond adaptively (Sherman, 2013). By affirming a value that is personally important it can help recruit resources to deal with current threats to the self (Sherman, 2013; Sherman & Cohen, 2006).

There have been numerous studies documenting how the use of affirmation can help people accept negative or threatening information involving their health and allow them to take the steps necessary to care for themselves (e.g. Howell & Shepperd, 2012; Sherman, Nelson, &

Steele, 2000; van Koningsbruggen & Das, 2009; van Koningsbruggen, Das, & Roskos-Ewoldsen, 2009). When participants were given a fictitious risk calculation about a fabricated disease, those who were self-affirmed were more likely to view their 'lifetime-risk feedback' than those who were not affirmed (Howell & Shepperd, 2012). In a follow-up study by Howell and Shepperd (2012) using the same calculation and disease, participants were either told that this disease was treatable or untreatable. Presumably, emphasizing an illness' untreatability would increase the threat level the information conveyed. For those who did not complete a self-affirmation those in the untreatable (higher threat) condition were more likely to avoid their feedback than those in the treatable condition, however for those that did affirm there was no difference between the treatment conditions, they were both less likely to avoid their feedback than those who did not affirm. In other words, increased threat level triggered defensive reaction, but this tendency was mitigated among those who were affirmed. Overall, those who affirmed were less likely to avoid their feedback information than those who did not affirm.

Similarly, Sherman et al. (2000) and van Koningsbruggen et al. (2009) found similar results when presenting participants with health information about caffeine consumption. Participants who were coffee drinkers (i.e., for whom the negative health information would present a direct threat) were far more accepting of the threatening health information when they were affirmed than when they were not. The affirmation did nothing for participants who were not coffee drinkers and therefore not personally threatened.

While the majority of this literature addresses ways that self-affirmation can help in educational and health care settings by allowing people to overcome a threat to the self from stereotype threat to unwanted health diagnosis (Sherman & Cohen, 2014), there have been some

studies extending the scope of affirmation to a more collective, rather than individual, threat such as climate change.

In a study conducted by Sparks, Jessop, Chapman, and Holmes (2010) participants were either affirmed (by listing instances when they exhibited kindness) or not affirmed in which case they responded to opinion statements. Participants were then given six passages about climate change taken from both newspapers and books. The results indicated that participants who were affirmed believed they were personally better able to make a difference than those who were not affirmed. The results from our first study were consistent with the findings of Sparks et al. (2010) indicating that self-affirmation can enable participants to view their personal actions as effective; similarly those with high environmental identity (in our Study 1) saw their actions as more effective when faced with threat than those with low environmental identity. After finding that affirmation increased participants' perceived impact, Sparks et al. (2010) conducted a second study comparing the motivations and intentions of recyclers and non-recyclers. Participants were asked about their past recycling behaviour prior to any affirmation or environment information and this was used to determine which group participants fell into (recyclers vs. non-recyclers). Participants were also affirmed by selecting the value that was most important to them from a list of nine before reading a recycling information sheet that stated some benefits of recycling and possible repercussions for not recycling. Those in the control condition read the recycling information after reporting their recycling behaviour with no affirmation task. They found that among participants who were non-recyclers, those who were self-affirmed had greater intentions for recycling in the future than those in the control condition (who were, instead, more likely to derogate recycling) but the affirmation did not increase their attitudes toward recycling. Among those who were recyclers, there were no differences between

those who were affirmed and not on either their attitudes or intentions to recycle. The authors suggest that self-affirmation may allow participants a sense of agency and motivation for action.

In Sparks et al. (2010), all participants were exposed to the same information about climate change (Study 1) and recycling (Study 2), and they found those who were affirmed had greater feelings of efficacy and non-recyclers had greater intentions to recycle. In this case, the affirmation appeared to reduce the tendency to defend against the threat and bolstered a more high-efficacy proactive kind of response. However, a follow up study probed the potential downsides of affirmation, asking whether it could have a polarizing effect among those of different environmental orientations (van Prooijen, Sparks & Jessop, 2012). Participants completed a scale on their ecological world one week prior to completing the study. At Time 2, participants were either affirmed or not; they were affirmed by selecting the most important value from a list of nine and describing why it was important and how they used the value. Those who were not affirmed completed a task where they listed everything they had eaten or drank that day. Unlike the previous study by Sparks et al. (2010) participants were not presented with any environmental threat information, rather the researchers depended on participants' prior worldviews of climate change and the environment, not a specific threat. Under these conditions, affirmation had markedly different effects: Participants who were initially positively oriented toward environmental issues responded more proactively (i.e. they were more moral when contemplating environmental judgements, they reported less effort necessary to make pro-environmental behavioural changes, greater intentions to increase pro-environmental behaviours) than those who received no affirmation. Those who were negatively oriented toward environmental issues responded with less moral judgements, more effort necessary, and lower levels of self-efficacy when they were affirmed. These results underline the need for care in how

communications are designed: although affirmations can help reduce defensiveness to a specific threat, they can also bolster confidence in existing worldviews (perhaps especially in the absence of a threat that establishes the issues at hand).

Given the limited research on affirmation for the collective threat of climate change, more investigation is warranted. Although Sparks et al (2010) presented environmental threat information, level of threat was not manipulated. In order to assess how self-affirmation can mitigate the defensive responses people have when presented with especially threatening climate change information we will manipulate threat level to better examine the causal role of affirmation on higher threat situations. Manipulating severity will give us control over what information participants receive and allow us to examine self-affirmation at a high threat as well as a lower threat situation. By changing our threat manipulation from a subtle control manipulation (Study 1) to a more explicit message that is related to the environmental domain we may be able to have a better test of whether the threat is influencing participants' responses to the information. We will use a traditional affirmation of values manipulation excluding environmental causes and examine dependent variables that assess both defensive responding and proactive responding. The defensive responses assessed in our second study included a measure on human contribution to climate change (downgrading the role of humans would be considered defensive), the fear experienced when thinking about climate change (denying fear could be defensive), and the perceived personal risk climate change posed (minimizing risk would be considered defensive). We chose these to better evaluate diverging reactions; the majority of research in this area focuses on the proactive responses of participants so the defensive responses are not well- documented. The proactive responses in our second study

were more similar to Study 1; we evaluated participants' perceived ability to make a difference, participants' positive emotions, and their motivation to improve environmental behaviours.

Accordingly, Study 2 was designed as a 2 (self-affirmation: affirmed, not affirmed) x 2 (Severity: high, low) between subjects design in order to determine how self-affirmation and the severity of the message presented to participants (i.e. the severity of the threat) interact to produce defensive and proactive responses. Based on previous research of self-affirmation in the health domain showing self-affirmation to mitigate defensive responses, especially under high threat, when defensiveness would otherwise be the dominant response, our hypothesis for our second study is those who are affirmed and presented with the more threatening information will exhibit less defensive and more proactive responding than those who do not affirm and are presented with the more threatening information.

Study 2 Method

Participants

Participants consisted of 35 undergraduate students from Wilfrid Laurier University and 215 participants recruited from Amazon's Mechanical Turk (MTurk) for a total of 250 participants. After examination of the attention checks it was determined that 51 participants either failed to complete the attention checks correctly or failed to complete the attention checks at all, leading to a final sample of 199 participants.

There were no significant differences between the undergraduate students and MTurk participants on any of the dependent variables; as a result they were combined and used as a single sample for all analyses. Of those 199 participants, 64.8% were female and the mean age of participants was 38.04 years old. The political orientation of participants was largely liberal, with 59.8% of participants identifying as left of 'Centre' (on a scale of 1 (Left/Very Liberal) to

10 (Right/Very Conservative) and the 5 in the middle representing the Centre) and 19.6%

identifying as right of 'Centre', with the remaining 17.1% identifying as Centre. Most

participants completed as least some college or university (86.9%) and only one participant

completed less than high school.

Procedure

Participants were told that the purpose of the study was to examine people's attitudes,

behaviors, and thoughts about social issues including the environment.   They were first asked to

provide demographic information and provide a baseline of their environmental identity by

answering two questions. The first was "How important are environmental issues (such as

climate change/ global warming) to you?" and was answered on a 10-point scale with 1

representing "*not at all important*" and 10 representing *"extremely important"*. The second item

was "To what degree is being engaged in environmental issues a central part of your identity?"

with a 10-point scale with 1 representing *"not at all part of my identity"* and 10 representing

"extremely central to my identity". These two items were highly correlated ($r=.756$, $p < .001$) so

to rule out moderation we used the mean of the two responses as their environmental importance

score.

After the completion of these background measures, participants were randomly assigned

to one of four conditions in a 2 (severity: high vs. low) $\times$ 2 (Affirmation: affirmed vs. not

affirmed) between-participants experimental design. We manipulated the severity of future

climate change consequences by presenting participants with one of two fabricated articles (See

Appendix D).   Both articles described the very same set of environmental outcomes

(temperature, weather events, pollution-related illness, food and water shortage) but outcomes

were either presented in a way that was either very threatening or less threatening. For example

the threatening article interspersed additional severe-sounding adjectives through the otherwise identical description, stating that consequences would be 'dramatic', 'serious', 'life changing', 'significant', 'extreme', etc. Those who experienced the less threatening article did not read these additional qualifiers, it only provided the events that were likely to happen without these embellishments.

After reading the article, participants were then presented with the self-affirmation manipulation (See Appendix E). In this manipulation participants were given a list of values (e.g. creativity, loyalty, family, honesty, innocence, etc.) and were either asked to choose the value that is most important to them and explain why it is the trait that is most important to them (self-affirmation condition) or they were asked to choose the value that is least important to them and explain why it might be important to someone else (no affirmation condition). As a manipulation check participants were asked how important the trait they selected was to them.

Following the article and affirmation exercises, participants completed a number of dependent variables. These dependent variables included measures of affect, human causality, severity of climate change, perceived personal risk, and their participation in and the effectiveness of a variety of environmental behaviours. In addition to these dependent variables, a number of individual differences were also reported but are beyond the scope of the current study and will not be examined.

Measures

Defensive responses to the threat of climate change.

Human causality. Participants were asked to indicate the extent to which they believe climate change is caused by humans. The item measuring this was "*To what extent do you think that current behaviours of humans are causing climate change effects in the future?*" with an 11-

point scale with 0 being "*not at all related*" and 100 being "*extremely causally related*" (scale increased by 10). To view all scales for Study 2 in the order that they appeared to participants see Appendix F.

Perceived personal risk. This scale was designed to measure the level of risk an individual felt they had when it came to climate change outcomes. It includes four items about the amount of risk the participants feel their family, people close to them, and themselves will experience in the next 20 years. These items are responded to on a 4-point scale ranging from 0 to 3 where 0 represents "*Not likely*" and 3 represents "*Very likely*" (*Cronbach's alpha* = .82).

Fear of Future Consequences. We also created a measure of fear and asked participants to indicate the level of fear they felt toward the article they read with the item "*I think the news article was upsetting or frightening*" where participants answered on an 11-point scale were 0 represented "*Strongly Disagree*" and 10 indicated "*Strongly Agree*".

Proactive responses to the threat of climate change.

Positive and negative affect. We were also interested in how emotions felt immediately after being exposed to the article may differ between conditions. Right after the article manipulation of severity participants were presented with a list of emotions (adapted from Watson, Clark, & Tellegen, 1988; e.g. scared, inspired, calm, distressed) and were asked to rate each item on the extent to which the emotions were being experienced right at that moment on a scale of 1 "*Very slightly or not at all*" to 5 "*Extremely*" (*Cronbach's alpha* for positive affect = .83; *Cronbach's alpha* for negative affect = .9).

Ability to make a difference. We were interested in whether feelings of control could influence individuals' belief in whether they could make a difference so two items were included to measure this. The two items were "*I feel that by engaging in environmentally sustainable*

behaviours, I can make a real difference" and *"I feel like any action I take to be environmentally responsible is only a 'drop in the bucket' and won't make a difference"*. The second item was reverse scored. Both items had a 1 to 7 scaling where 1 indicated "*strongly disagree"* and 7 indicated "s*trongly agree"*. These items were significantly correlated ($r = .562$, $p < .001$) and their mean was used in future analyses (*Cronbach's alpha = .72*).

Motivation to act now. We asked participants to indicate how motivated they were to act in an environmentally friendly way with the item "*Feel motivated to start acting now to improve the environmental sustainability of your behaviours?"* that was responded to on a 10 – point scale where 1 represented "*Not at all"* and 10 represented *"Very much"*.

Consideration of future consequences. We were curious to see whether the conditions would differ in their focus on short or long term consequences (Strathman, Gleicher, Boninger, & Edwards, 1994). This scale has both short term (i.e. I only act to satisfy immediate concerns, figuring the future will take care of itself") and long term (i.e. Often I engage in a particular behaviour in order to achieve outcomes that may not result for many years) considerations, each responded to on a 5-point scale with 1 representing "*Extremely uncharacteristic"* and 5 representing "*Extremely characteristic"*. In order to assess both aspects of the scale at once we used a difference score by subtracting the short-term consequences from the long-term consequences, resulting in higher scores for those who consider more long-term consequences and lower numbers for those who prefer short-term consequences (*Cronbach's alpha* for short-term consequences = .87; *Cronbach's alpha* for long-term consequences = .72).

Study 2 Results

Manipulation Check and Preliminary Analyses

Self-affirmation. In order to assess whether the self-affirmation manipulation was successful, we conducted an independent samples t-test comparing the rated importance of the value they discussed (higher numbers indicate greater importance). Those in the not-affirmed condition rated the value less important ($M = 2.82$, $SD = 2.11$) than those who were affirmed ($M = 10.50$, $SD = .93$), $t (197) = 33.66$, $p < .001$.

Environmental importance. In order to rule out environmental importance as a potential moderator we ran regressions using effect vectors of severity and affirmation and centred environmental importance for all dependent variables and none of the interactions with environmental importance were significant (all p's > .074). This indicates that environmental importance was not moderating the effects of severity and affirmation.

Theoretically we expected affirmation to override the effects of personal importance especially in the affirmation condition, though it would be conceivable that environmental importance would moderate effects in the control condition. Although three-way interactions reflecting this possibility did not emerge, we also examined severity by environmental importance interactions in the affirmation and control conditions separately to determine whether we were overlooking a perhaps weak effect. Main effects of environmental importance emerged throughout, but interactions did not emerge in either the affirmation or control conditions.

Correlations between measures of interest. As a preliminary step, we examined the correlations between our variables of interest (see Table 2). Again, measures thought to reflect defensiveness were generally related to less proactive responding, and environmental importance predicted all variables except for positive affect.

Overall, we expected that participants would respond more defensively to the threat that was framed as higher in severity – that is, although the risk was described in more dire terms, it would ironically lead people to adjust their subjective certainty estimates in ways that minimized the risk instead. However, we expected that affirmation would disrupt this defensive process, allowing people to acknowledge the threat and respond less defensively and more proactively. Specifically, then, we expect a significant interaction between threat level and affirmation: higher threat may produce more defensiveness in the control condition, but in the affirmation people will be more likely to acknowledge actual threat level, perhaps resulting in a reversal: people may acknowledge more threat and mobilize more under more severe threat.

Defensive Responses to Climate Change Threat

Perceived personal risk. A 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA revealed no main effects of affirmation, $F(1, 195) = .62$, $p = .433$ $\eta^2 = .003$, nor severity $F(1, 195) = .06$, $p = .803$, $\eta^2 < .001$. However there was an interaction, $F(1, 195) = 4.85$, $p = .029$, $\eta^2 = .024$ (see Figure 7). First, we examined simple effects in the control (not affirmed) group and found that, consistent with predictions, those who were not affirmed reported marginally *less* personal risk when they were exposed to a highly severe outcome ($M = 2.47$, $SD = .70$) than when they were exposed to a less severe outcome ($M = 2.73$, $SD = .78$), $F(1, 195) = 2.9$, $p = .09$, $\eta^2 = .015$. However, this defensive pattern was disrupted for those who received an affirmation: those exposed to a high or low severity threat reported equal levels of personal risk, $F(1, 195) = 1.98$, $p = .161$, $\eta^2 = .01$.

In addition, simple effects revealed that in the low-severity condition, control participants ($M = 2.73$, $SD = .78$) reported greater personal risk than affirmed participants (M 2.41, $SD = .77$),

F (1, 195) = 4.68, p = .032, η^2 = .023, while no difference emerged among those who were exposed to a highly severe outcome, F (1, 195) = .96, p = .328, η^2 = .005.

Perceived extent of human causality. Another 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA revealed a similar pattern with regards to human causality. We found no main effects of affirmation, F (1, 195) = .59, p = .81, η^2 < .001, or severity, F (1, 195) = .97, p = .326, η^2 = .005, but a marginal interaction, F (1, 195) = 3.22, p = .074, η^2 = .016 (see Figure 8). The simple effects in the control (not affirmed) condition revealed that that among those who do not affirm, they were less likely to blame climate change consequences on humans if they were exposed to a highly severe consequence (M = 7.69, SD = 2.69) compared to when they were exposed to a less severe consequence (M = 8.78, SD = 2.57), F (1, 195) = 3.73, p = .055, η^2 = .019. However, this defensive pattern was disrupted for those who received an affirmation: those exposed to a high or low severity threat reported equal levels of human causality (see Figure 8), F (1, 195) = .34, p = .561, η^2 = .002. No other simple effects were significant.

Fear of future consequences. Another 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA revealed no main effect of affirmation, F (1, 193) = .27, p = .603, η^2 = .001. There was a marginal main effect of severity, F (1, 193) = 2.94, p = .088, η^2 = .015, showing that those who were exposed to highly severe consequences (M = 5.81, SD = 2.89) were more frightened or upset than those exposed to less severe consequences (M = 5.09, SD = 2.84). In addition to this main effect there was an interaction, F (1, 193) = 5.69, p = .018, η^2 = .029 which revealed that when participants were not affirmed (control condition), participant did not acknowledge the more severe outcomes as more scary than the less severe outcome, F (1, 193) = .22, p = .641, η^2 = .001 (see Figure 9).

However, among those who were affirmed, those who were exposed to the highly severe consequences ($M = 6.38$, $SD = 3.00$) reported significantly greater fear than those who were exposed to the less severe consequences ($M = 4.72$, $SD = 2.81$), $F (1, 193) = 8.63$, $p = .004$, $\eta^2 = .043$ (see Figure 9). Acknowledging negative emotion in response to severe threat may be consistent with the notion that affirmation attenuates defensive denial.

Additionally, among those who were exposed to highly severe consequences those who were not affirmed ($M = 5.20$, $SD = 2.66$) reported being less frightened by the consequences than those who were affirmed ($M = 6.38$, $SD = 3.00$), $F (1, 195) = 4$, $p = .047$, $\eta^2 = .02$, again consistent with the notion of defensive denial among non-affirmed participants. There were no differences found among those who were exposed to the less severe consequences, $F (1, 193) = 1.84$, $p = .176$, $\eta^2 = .009$.

Proactive Responses to Climate Change Threat

Ability to make a difference. We conducted a 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA to determine any differences in participants' belief in their ability to make a difference. There were no significant main effects of severity, $F (1,195) = .8$, $p = .372$, $\eta^2 = .004$, or self-affirmation, $F (1, 195) = .38$, $p = .538$, $\eta^2 = .002$.

The predicted interaction was significant, $F (1, 195) = 5.39$, $p = .021$, $\eta^2 = .027$ (see Figure 10). This interaction shows that when participants were not affirmed (control condition), those who were exposed to highly severe consequences ($M = 6.22$, $SD = 2.20$) believe they can make less of a difference than those exposed to less severe consequences ($M = 7.24$, $SD = 2.36$), $F (1, 195) = 4.99$, $p = .027$, $\eta^2 = .025$, demonstrating a deficit in proactive beliefs. However, after an affirmation, participants reported an equal level of belief that they can make a difference

among those exposed to highly severe ($M = 7.15$, $SD = 2.17$) vs. less severe ($M = 6.7$, $SD = 2.22$) environmental consequences, $F (1, 195) = 1.06$, $p = .305$, $\eta^2 = .005$.

Additionally, while there were no differences between the affirmed ($M = 6.7$, $SD = 2.22$) and the not affirmed ($M = 7.24$, $SD = 2.36$) in the less severe condition, $F (1, 195) = 1.53$, $p = .218$, $\eta^2 = .008$, in the more severe condition, participants who were affirmed ($M = 7.15$, $SD = 2.17$) reported more belief they can make a difference than those in the not affirmed ($M = 6.22$, $SD = 2.20$) condition, $F (1, 195) = 4.13$, $p = .044$, $\eta^2 = .021$.

Positive and negative affect. A 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA of the positive items on the PANAS revealed no main effects of affirmation $F (1, 195) = .801$, $p = .372$, $\eta^2 = .004$, or severity, $F (1, 195) = 2.52$, $p = .112$, $\eta^2 = .013$. However, a severity x affirmation interaction, $F (1, 195) = 5.61$, $p = .019$, $\eta^2 = .028$ revealed that among those who do not affirm (control condition) there is no difference between those exposed to a highly severe outcome vs. a less severe outcome, $F (1, 195) = .29$, $p = .591$, $\eta^2 = .001$, while those who do self-affirm reported more positive emotions when they were in the high severity condition ($M = 3.56$, $SD = .78$) than those in the less severe condition ($M = 3.08$, $SD = .90$), $F (1, 195) = 8.16$, $p = .005$, $\eta^2 = .04$ (see Figure 11). It is worth noting that affirmed participants report both fear *and* positive emotion in response to severe threat. Although this is only speculation, this mix of emotions may reflect their blend of 1) acknowledgement of threat while 2) maintaining a hopeful mobilization to action.

Additionally, of those who were exposed to a highly severe outcome, those who affirm ($M = 3.56$, $SD = .78$) experience more positive emotions than those who do not affirm ($M = 3.16$, $SD = .96$) once again demonstrating the ability to mobilize proactive responding when faced

with high threat when affirmed, F (1, 195) = 5.09, p = .025, η^2 = .025, while those who were exposed to a less severe outcome show no difference between the affirmed (M = 3.08, SD = .90) and the not affirmed (M = 3.26, SD = .78), F (1, 195) = 1.14, p = .287, η^2 = .006.

A 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA of the negative items on the PANAS revealed no main effect of affirmation, F (1, 195) = 2.51, p = .115, η^2 = .013, or severity, F (1, 195) = 1.13, p = .299, η^2 = .006, and no interaction, F (1, 195) = .02, p = .891, η^2 < .001.

Motivation to act. Another 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA revealed no main effects of affirmation F (1, 195) = 1.26, p = .264, η^2 = .006, or severity, F (1, 195) = .453, p = .502, η^2 = .002. However, the predicted interaction, F (1, 195) = 4.3, p = .04, η^2 = .022 revealed that among those who do not affirm (control condition), participants were marginally less motivated to take action to mitigate negative climate change outcomes when the threat is severe (high severity condition) (M = 5.93, SD = 2.30) than when the threat is less severe (low severity condition) (M = 6.90, SD = 2.43), F (1, 195) = 3.64, p = .058, η^2 = .018 (see Figure 12). Participants who did affirm did not report different levels of motivation regardless of severity condition, F (1, 195) = 1.02, p = .314, η^2 = .005.

Additionally, when participants were exposed to a highly severe outcome, those who affirmed (M = 7.06, SD = 2.42) experienced greater motivation than those who do not affirm (M = 5.93, SD = 2.31), F (1, 195) = 4.87, p = .028, η^2 = .024, once again displaying proactive responding under high threat, while those who were exposed to a less severe outcome show no difference between the affirmed (M = 6.57, SD = 2.71) and the not affirmed (M = 6.90, SD = 2.44), F (1, 195) = .48, p = .491, η^2 = .002.

Consideration of future consequences. We conducted a final 2 (Self-Affirmation: Affirmed, Not Affirmed) x 2 (Severity: High Severity, Low Severity) between-subjects ANOVA to determine any differences in participants' consideration of future consequences. There were no significant main effects of severity, F (1,195) = 1.3, p = .255, η^2 = .007, or affirmation, F (1, 195) = 1.72, p = .192, η^2 = .009.

There was a marginal interaction, F (1, 195) = 3.79, p = .053, η^2 = .019, revealing that among those who did not affirm (control condition) those who experienced the high severity condition were more likely to defensively consider short-term consequences rather than long-term consequences (M = .77, SD = 1.3) than those in the less severe condition (M = 1.28, SD = 1.21), F (1, 195) = 4.6, p = .033, η^2 = .023 (see Figure 13). There was no effect of severity on the consideration for future consequences of those who were able to self-affirm, F (1, 195) = .34, p = .562, η^2 = .002.

Additionally, among those who experienced the highly severe condition, participants who affirmed themselves were more likely to consider more long-term consequences as opposed to short-term consequences (M = 1.3, SD =.95) than those who did not affirm themselves (M = .77, SD = 1.3), F (1, 195) = 5.07, p = .025, η^2 = .025. There were no differences between the affirmed (M = 1.17, SD = 1.1) and the not affirmed (M = 1.3, SD = 1.21) when they were exposed to the less severe condition, F (1, 195) = .21, p = .645, η^2 = .001.

Study 2 Discussion

Study 2 provided more support for our original hypothesis that participants in the high severity condition would respond more defensively (and less proactively) when presented with climate change threat than those in the low severity condition. It also provided some support for our hypothesis that those who self-affirm will be able to react less defensively and more

proactively when they are presented with a highly threatening future outcome (high severity condition). Two of our defensive measures show similar patterns indicating that in the control condition (not-affirmed), those in the severe condition responded more defensively (by denying personal risk and humans' role in climate change) than those in the less severe condition. This is consistent with the findings of Sparks, et al. (2010) where participants were more likely to derogate recycling information when they were not able to affirm. We were able to extend this finding and establish that affirmation is particularly effective at mitigating (and even reversing) defensiveness under conditions of more severe threat. Experiencing a self-affirmation disrupted this pattern; there were no differences between those who experienced the high or low severity. Our third defensive measure also supports the hypothesized increased defensiveness in those who did not affirm; they were unable to acknowledge the severity of the high severe condition and rated it no more frightening than those in the low severe condition. In contrast, those in the affirmation condition acknowledge this threat when they are in the high severity threat represented by higher reported fear.

There was an unexpected effect on personal risk which resulted in a reversal where affirmed participants in the low severe group actually acknowledged less risk than the control condition. It could be a result of greater calibration tendency; affirmed participants are more likely to upgrade danger in high risk situations but perhaps feel confident to downgrade danger in lower risk situations. However this pattern only occurred on this variable and not consistently throughout, so we hesitate to interpret it too conclusively.

We also found patterns consistent with predictions with regard to proactive measures. When control (non-affirmed) participants encountered a severe threat (vs a less severe one), they were less likely to respond proactively: they were less likely to believe they were able to make a

difference, they were less motivated to act now to rectify climate change issues, and they favoured short-term consequences as opposed to long-term ones. In contrast, affirmation was effective in prompting greater proactive tendencies under threat: those who affirmed and read about a severe threat believed they were better able to make a difference, they were motivated to act now, preferred long-term consequences to short term, and had more positive emotions than the control condition under high threat.

General Discussion

The present thesis had two central goals. First, we sought to investigate the ways that more severe levels of threat (about climate change) may trigger people's psychological defenses, ironically resulting in people downgrading the perceived certainty and severity of the threat itself. Second, we sought to investigate factors that might attenuate the tendency to defend against threat, and instead respond proactively, by mobilizing in the face of more severe threat. Across two studies we used different manipulations of threat (perceived control in Study 1, outcome severity in Study 2), and examined different factors that might mitigate defensiveness (environmental importance in Study 1, self-affirmation in Study 2). We speculated that people who value the environment highly may experience this value almost as an affirmation when environmental threat is present.

The current studies are among the first to demonstrate that responses to threatening messages about climate change may be contingent on the values people bring to mind. Specifically, individual differences in environmental value, and experimentally induced state of self-affirmation (reflecting on personal values) both played a role in how people responded to threatening messages about climate change. Our first study showed that when participants were high in environmental importance they responded especially non-defensively under high threat

(low personal control) by displaying less defensiveness and more proactive responses. Notably though, those who were low in environmental importance showed no difference in response between threat conditions in Study 1, hence we found more evidence for a "mobilization" hypothesis among those who value the environment rather than a defensive hypothesis among those who do not. We speculated that those high in environmental importance may be affirming themselves by activating environmental values while considering the climate change threat. As a result, in Study 2 we pursued self-affirmation as a possible way to mitigate defensive responses toward climate change information. Across Study 1 and 2, the high threat condition demonstrated a relatively consistent tendency for those who were affirmed, or who valued the environment, to respond less defensively and more proactively.

In other words, evidence across studies suggested that a focus on important values might lead people to mobilize under threat. On the other hand, evidence for the initial hypothesis that threat would lead to defensive responding provided less consistent evidence. In Study 1 we failed to see any differences between threat conditions for those who did not value the environment. Considering the possibility that the threat manipulation in Study 1 (a manipulation of perceived control unrelated to the climate context) was too subtle to evoke strong defensiveness, we opted for a more overt manipulation in Study 2. We simply manipulated the description of the outcomes of climate change by adding a series of dramatic and serious sounding qualifiers. Using this approach, we did successfully demonstrate that greater threat appeared to provoke greater defensiveness and less proactive responding among participants who had not been affirmed. We captured a number of responses consistent with this overall interpretation: for instance, control participants who were exposed to severe threat responded with decreased

estimates of their personal risk due to climate change, humans' contribution to climate change, and their fear of future climate change consequences.

These studies were able to extend the previous research in this area (Sparks, et al, 2010; van Prooijen, et al, 2012) and distinguish that self-affirmation can mitigate defensive responses to climate change when the threat is explicit and, especially, when the threat is severe. This would suggest that when communicating information about climate change, having individuals contemplate a personal value that is important to them first may help them acknowledge the threat of the message and allow them the resources to respond proactively rather than automatically becoming defensive. It would seem that this is especially true for individuals who do not find environmental issues overly important. Since the manipulation effect of the values affirmation was stronger than participants' individual differences in environmental importance, those who were low in importance that self-affirmed experienced decreased defensive responding and increased proactive responding. Those low in importance are the individuals who would be the ideal target for messages conveying the severity of climate change.

Though these studies improve our understanding of how self-affirmation can mitigate defensive responding, there are important limitations as well. First, additional replications with larger sample size would provide more definitive evidence of self-affirmation and environmental identity's role in defensive responding, especially in Study 1 when our moderator was not planned. Also, our studies were not conducted consecutively so the flow from Study 1 to Study 2 was rather disjointed. Although the two studies showed some intriguing similarities at a broad level, the independent and dependent variables across studies differed enough to make comparison across the two only speculative. Although the dependent variables differed enough to make direct comparison more difficult, it is worth noting that dependent variables across both

studies did generally capture one of the two main categories of response: defensive responding (minimizing risk, causality or certainty) or proactive responding (motivation, efficacy, action). However, follow up research with equivalent variables would be preferable for comparison.

The manipulation of threat is also potentially problematic. In Study 1 we manipulated feelings of control separate from the climate change message, but could not be certain it actually made people feel more threatened in that context. In Study 2 we manipulated threat by altering the severity of the climate change message. However using this approach, one possible problem is that conditions will convey different information about the actual outcomes of climate change (which people might find less factually plausible, etc). While we believe that our severity manipulation in Study 2 remained relatively consistent between conditions (by varying only descriptive adjectives), it is still possible that participants interpreted the conditions differently in a way that was unrelated to our intended manipulation of severity.

We realize the difficulty in studying defensiveness, and that research on defensiveness often receives criticism because of the circular logic underlying its presumed effects. For example, when someone is exposed to a more severe threat, one might wish to assess whether the threat is more severe using a manipulation check. However, if defensiveness is expected, one might expect people to fail to acknowledge severity, hence a manipulation check might not be expected to work (or even to show a reverse effect). It is hard to disentangle individuals' actual beliefs from what could be considered defensive responses. For the purposes of our studies we grouped diverse measures into two categories: defensive and proactive. However, we recognize that defensiveness is difficult to measure convincingly with a particular dependent variable; rather it is the overall pattern of findings that seems better able to demonstrate probable defensive responding. For example, since affirmation is expected to attenuate or remove

defensiveness, we might expect non-defensive responses to severe threat following affirmation, and the reverse – defensive responses to severe threat – in a control condition. This pattern, as shown in Study 2, may be better evidence of defensiveness than any specific measure. Also, examining correlational patterns helps to clarify how defensive responses may have consequences: for example, when participants acknowledged that the climate change outcomes were severe (low defensiveness, in our view), they were less skeptical and more inclined to act (see Table 1), relative to those who were unable to acknowledge the severity of the outcomes.

.Psychological research on environmental issues is a growing field with important implications. This research can help inform both researchers and organizations interested in understanding how to communicate climate change to the general population in a way that will foster action rather than inaction. The next steps of research should first be to clarify the operational definition of defensiveness. Since this is a complex topic that is rather circular in its logic we need to have a clear definition of what we mean by defensiveness and how we intend to measure it, or what experimental conditions to set up to allow us to test it in terms of overall patterns. After that has been established it would be important to replicate the interaction effects between severity and self-affirmation, and perhaps examine the connection between affirmation and environmental identity. Further research on whether self-affirmation can influence any long-term behaviour changes in individuals would be key in determining how useful self-affirmation can be as a resource. Since climate change is an issue that involves everyone it would be beneficial to develop a social intervention much like the educational and health care interventions that are commonly developed with aspects of self-affirmation research to increase academic performance and the acceptance/compliance with health care providers orders (Sherman & Cohen, 2014).

Climate change is a broad issue with unlimited ramifications if it goes unhindered. Although it must be addressed from many perspectives (e.g., technological, biological, political, etc.), research on the psychological dimension is essential. As climate activists communicate increasingly dire messages (which may well be dire because they are aligned with scientific realities), there is a marked risk that defensiveness will increase as well. When faced with a severe threat (that either seems uncontrollable or too big to address), people might be best served to mobilize resources and start addressing the problem however they can. Instead though, people's psychological need to defend against (increasingly severe) threat may lead many people to bury their heads deeper in the sand. The motivations of those committed to initiating change, then, might be at odds with the motivations of many uncommitted individuals, for whom dire messages could do more harm than good. However, achieving a better understanding of the antecedents (and mitigators) of defensiveness can allow communicators to develop more effective messages that promote, rather than reduce, desired action.

Appendix A – Study 1 Control Manipulation

High Control

"For each of the following events, try to remember if these situations applied to you at least one time in your life. If the situation has happened in the past, please select 'Yes'. If not, please select 'No'."

1. I was late for an appointment or event because of something I did.

2. I did not do something that I had said that I would do.

3. I was stuck in traffic because I decided to take a particular route.

4. I forgot to write down something important.

5. I did better (or worse) than expected on a test or assignment because of the way I studied or prepared.

6. I received a discount on something I bought because I researched it or waited for it to go on sale.

7. I had an enjoyable day at the beach or pool (or ski resort) because I knew the weather forecast and planned accordingly.

Low Control

"For each of the following events, try to remember if these situations applied to you at least one time in your life. If the situation has happened in the past, please select 'Yes'. If not, please select 'No'."

1. I was late for an appointment or event due to circumstances beyond my control.

2. Something that I could not foresee prevented me from doing something I said I would do.

3. I was stuck in traffic because of construction.

4. I couldn't find a pen or paper when I needed to write down something important.

5. I did better (or worse) than expected on a test or assignment because of the way it was graded.

6. I received a discount on something I bought because of a pricing mistake.

7. I had an enjoyable day at the beach or pool (or ski resort) because the weather changed suddenly.

Appendix B – Study 1 Climate Change Information

"In the media, we hear lots of messages about the environment. In this section, we would like to

assess your perception of these messages. Below is an excerpt from an article that

appeared in a paper."

The effects of climate change are becoming more apparent as the years go on. All over the

world cities continue putting toxins into the air, soil, and water. Toronto has a population

of approximately 2 million and is among the top contributors to the pollution responsible

for climate change and contributes more than most North American cities of comparable

size and population. Environmental experts suggest that the area surrounding Toronto will

suffer from the environmental decisions Toronto has made. Within the next 40 years

greenhouse gas output will rise by 50%, deaths from air pollution may increase to 18,000

people, and 775,000 more will live in water-stressed areas in fewer than four decades.

Appendix C – Study 1 Materials

Participants Perceived ability to Make a Difference

"To what extent do you agree or disagree with the following statements?"

1 – Strongly Disagree; 7 – Strongly Agree

1. I feel that by engaging in environmentally sustainable behaviours, I can make a real difference.

2. I feel like any action I take to be environmentally responsible is only a "drop in the bucket" and won't make a difference.

Participants Control Over Personal Outcomes

"To what extent do you agree or disagree with the following statements?"

1 – Strongly Disagree; 7 – Strongly Agree

1. I believe that I have a lot of control over the personal outcomes in my life.

Behavioural Intentions and Perceived Effectiveness of Environmental Behaviours –

Adapted from Bashir et al. (2014).

Participants were asked to first look at a list of environmental behaviours and indicated their intentions to engage in each behaviour.

"Now, we would like you to complete the following environmental behaviours questionnaire.

How likely would you be to engage in each of the following behaviours in the next few years?"

1 – Extremely Unlikely; 7 – Extremely Likely

Then they were asked to look at the same list and indicate the effectiveness of each behaviour.

"In your opinion, how effective is each of the following actions in fighting climate change?"

1 – Very Ineffective; 7 – Very Effective

1.   Read a conservation or environmental magazine or electronic publication

2.   Have a serious discussion on environmental issues with friends or family members

3.   Watch a video (online or on television) about the environment

4.   Use scrap paper

5.   Purchase second-hand goods

6.   Carry a refillable coffee mug or water bottle

7.   Turn off lights when not in use

8.   Share a car journey with someone else

9.   Buy environmentally-friendly products

10.   Eat food which is organic, locally-grown or in season

11.   Purchase products with less packaging

12.   Avoid buying disposable products or choose to buy re-usable products

13.   Support a "green" company or business or avoid buying from a company with environmentally unsustainable practices

14.   Actively look for recycling bins to dispose of recyclable items

15.   Reduce the amount of water I use (e.g., shorter showers, not running tap water unnecessarily during toothbrushing & dishwashing, avoiding other water-wasting activities)

16.   Share information about the environment through social media (such as facebook and twitter)

17.   Participate in online groups that support environmental causes

18.   Join environmental action groups

19.   Take action by participating in protests

20.   Make voting decisions on the basis of candidates' commitment to fighting climate change

21.   Pressure my political representatives to take a stand on climate issues

22.   Weigh environmental concerns heavily when making major purchase decisions (vehicles,

appliances, etc)

Skepticism toward Climate Change

Beliefs about Climate Change, Risen & Critcher (2011)

"Please indicate the extent to which you agree or disagree with each of the following

statements."

1 – Strongly Disagree; 5 – Strongly Agree

1. Global warming is a proven fact.

2. Global warming is a theory that has not yet been proven.

Skepticism Whitmarsh (2011)

"Consider the following statements and indicate the extent to which you agree or disagree."

1 – Strongly Disagree; 7 – Strongly Agree

1. Climate change is too complex and uncertain for scientists to make useful forecasts

2. Claims that human activities are changing the climate are exaggerated

3. The media is often too alarmist about issues like climate change

4. I do not believe climate change is a real problem

5. Floods and heat-waves are not increasing, there is just more reporting of it in the media

these days

6. Climate change is just a natural fluctuation in Earth's temperatures

7. It is too early to say whether climate change is really a problem

8. There is too much conflicting evidence about climate change to know whether it is actually

happening

9. Too much fuss is made about climate change

10. The evidence for climate change is unreliable

11. Many leading experts still question if human activity is contributing to climate change

12. I am uncertain about whether climate change is really happening

13. There is solid evidence that the Earth is warming because of human activities

14. Recent floods and heat-waves in this country are due to climate change

15. I am convinced that climate change is really happening

16. Experts are agreed that climate change is a real problem

17. Changes in climate over the last 100 years are mainly caused by human activities

Perceived Severity of Climate Change – Spence and Pidgeon (2011)

"Please respond to the following questions."

1 – Strongly Disagree; 7 – Strongly Agree

1. The consequences of climate change will be severe.

2. Impacts of climate change are likely to be extreme.

3. The effects of climate change are unlikely to be too serious.

Appendix D – Study 2 Climate Change Information/Severity Manipulation

High Severity

Global warming is an important issue in today's world. The Intergovernmental Panel on Climate Change has warned us repeatedly that humans are playing a role in the heating of the planet. Scientists agree that if our current behaviour does not change immediately, Canada will experience dramatic effects. Many scientists predict that within 20 years (2035), most people in Canada will experience life changing consequences, including serious water shortages, major disruptions in food supply, significantly higher rates of illness due to pollution, substantially higher average temperatures and more extreme and dangerous weather patterns.

Low Severity

Global warming is an important issue in today's world. The Intergovernmental Panel on Climate Change has warned us repeatedly that humans are playing a role in the heating of the planet. Scientists agree that if our current behaviour does not change immediately, Canada will experience effects. Many scientists predict that within 20 years (2035), most people in Canada will experience consequences involving water and food costs, pollution-related illness, and temperature and weather patterns.

Appendix E – Study 2 Self-Affirmation Manipulation

Affirmation

*"We are interested in student's opinions of different attitudes and values. From the list of values printed below please **select** the value that is the **most important to you**, **personally**. If the value you feel is most important in your life is not on the list you may add it in and use it to answer the question on this page."*

Creativity, family, loyalty, self-discipline, non-conformity, patience, pride, purity, honesty, concern about appearance/ fashion, concern for others, religion/spirituality, politics, obedience to parents, self-respect, being a good friend, independence, financial responsibility, athletics, other value (please indicate).

*"Please write a paragraph describing the reasons why this value is **important to you, personally.**"*

No Affirmation

*"We are interested in students' opinions of different attitudes and values. From the list of values printed below please **select** the value that is the **least important to you, personally**. If the value you feel is least important in your life is not on the list you may add it and use it to answer the question on this page."*

Creativity, family, loyalty, self-discipline, non-conformity, patience, pride, purity, honesty, concern about appearance/ fashion, concern for others, religion/spirituality, politics, obedience to parents, self-respect, being a good friend, independence, financial responsibility, athletics, other value (please indicate)

*"Please write a paragraph describing the reasons why this value might be **important to <u>other</u>**

<u>people</u>. Do not describe why it is unimportant to you – focus only on its importance for other

people."*

Appendix F – Study 2 Materials

Positive and Negative Affect – Adapted from Watson, Clark, & Tellegen (1988)

"Using the scale below, please indicate the extent to which you feel each of the following items

describes you right at this moment.*"*

1 – Very slightly or not at all; 5 – Extremely

1. Distressed

2. Calm

3. Dread

4. Anxious

5. Happy

6. Determined

7. Content

8. Scared

9. Inspired

10. Worried

Perceived Human Causality

"To what extent do you think that current behaviours of humans are causing climate change

effects in the future?"

0 – Not at all Related; 11 – Extremely Causally Related

Perceived ability to Make a Difference

"To what extent do you agree or disagree with the following statements?"

1 – Strongly Disagree; 7 – Strongly Agree

3. I feel that by engaging in environmentally sustainable behaviours, I can make a real difference.

4. I feel like any action I take to be environmentally responsible is only a "drop in the bucket" and won't make a difference.

Motivation to Act Now

"When you think about North America as it will be in 2034, to what extent did you:"

1 – Not at all; 10 – Very much

1. Feel motivated to start acting now to improve the environmental sustainability of your behaviours?

Perception of Personal Risk

"The next few questions will ask you about your perceptions of risk related to global climate change."

0 – Not at all/likely; Very much/likely

1. How much will you be negatively impacted by global climate change **within the next 20 years**?

2. How likely do you think it is that in the **next 20 years** you, your family and people close to you will be affected by a decrease in general standards of living (eg. unemployment, lower pay)?

3. How likely do you think it is that in the next 20 years you, your family and people close to you will be affected by shortages of food supplies (inefficient water for crops)?

4. How likely do you think it is that in the next 20 years you, your family and people close to you will be affected by natural disasters (eg. floods, hurricanes)?

Behavioural Intentions and Perceived Effectiveness of Environmental Behaviours –

Adapted from Bashir et al. (2014).

Participants were asked to first look at a list of environmental behaviours and indicated their intentions to engage in each behaviour.

"Now, we would like you to complete the following environmental behaviours questionnaire. How likely would you be to engage in each of the following behaviours in the next few years?"

1 – Extremely Unlikely; 7 – Extremely Likely

Then they were asked to look at the same list and indicate the effectiveness of each behaviour.

"In your opinion, how effective is each of the following actions in fighting climate change?"

1 – Very Ineffective; 7 – Very Effective

1. Read a conservation or environmental magazine or electronic publication

2. Have a serious discussion on environmental issues with friends or family members

3. Watch a video (online or on television) about the environment

4. Use scrap paper

5. Purchase second-hand goods

6. Carry a refillable coffee mug or water bottle

7. Turn off lights when not in use

8. Share a car journey with someone else

9. Buy environmentally-friendly products

10. Eat food which is organic, locally-grown or in season

11. Purchase products with less packaging

12. Avoid buying disposable products or choose to buy re-usable products

13.   Support a "green" company or business or avoid buying from a company with environmentally unsustainable practices

14.   Actively look for recycling bins to dispose of recyclable items

15.   Reduce the amount of water I use (e.g., shorter showers, not running tap water unnecessarily during toothbrushing & dishwashing, avoiding other water-wasting activities)

16.   Share information about the environment through social media (such as facebook and twitter)

17.   Participate in online groups that support environmental causes

18.   Join environmental action groups

19.   Take action by participating in protests

20.   Make voting decisions on the basis of candidates' commitment to fighting climate change

21.   Pressure my political representatives to take a stand on climate issues

22.   Weigh environmental concerns heavily when making major purchase decisions (vehicles, appliances, etc)

Consideration of Future Consequences

"For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please select a "1"; if the statement is extremely characteristic of you (very much like you) please select a "5". And, of course, use the numbers in the middle if you fall between the extremes. Please keep the following scale in mind as you rate each of the statements below."

1. I consider how things might be in the future, and try to influence those things with my day to day behaviour.

2. Often I engage in a particular behaviour in order to achieve outcomes that may not result for many years.

3. I only act to satisfy immediate concerns, figuring the future will take care of itself.

4. My behaviour is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.

5. My convenience is a big factor in the decisions I make or the actions I take.

6. I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.

7. I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.

8. I think it is more important to perform a behaviour with important distant consequences than a behaviour with less-important immediate consequences.

9. I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.

10. I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.

11. I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.

12. Since my day to day work has specific outcomes, it is more important to me than behaviour that has distant outcomes.

Fear of Future Consequences.

"Please answer the following questions about your reactions to the news article and your opinions on this issue."

0 – Strongly disagree; 10 – Strongly Agree

1. I think the news article was upsetting or frightening.

Table 1

Study 1: Correlations evaluating relationships between environmental importance and dependent variables.

	EI	SK	SE	BI	BE	Diff	PO
Environmental Importance (EI)							
Skepticism (SK)	-.328**						
Severity (SE)	.351**	-.596**					
Behavioural Intentions (BI)	.349**	-.255*	.435**				
Behavioural Effectiveness (BE)	.136	-.205	.354**	.400**			
Ability to Make a Difference (Diff)	.423**	-.346**	.400**	.510**	.381**		
Control over Personal Outcomes (PO)	.150	-.348**	.499**	.240*	.185	.356**	

Note: *p* < .01 **

  p <.05 *

Table 2

Study 2: Correlations evaluating relationships between environmental importance and dependent variables.

	EI	PR	HC	FC	Diff	PA	MA	CFC
Environmental Importance (EI)								
Personal Risk (PR)	.542**							
Human Contribution (HC)	.614**	.580**						
Fear of Consequences (FC)	.435**	.458**	.359**					
Ability to Make a Difference (Diff)	.590**	.416**	.432**	.352**				
Positive Affect (PA)	.069	.094	-.062	.057	.208**			
Motivation to Act (MA)	.721**	.556**	.586**	.457**	.674**	.234**		
Consideration of Future Consequences (CFC)	.393**	.280**	.306**	.102	.342**	.158*	.342**	

Note: $p < .01$ **
$p < .05$ *
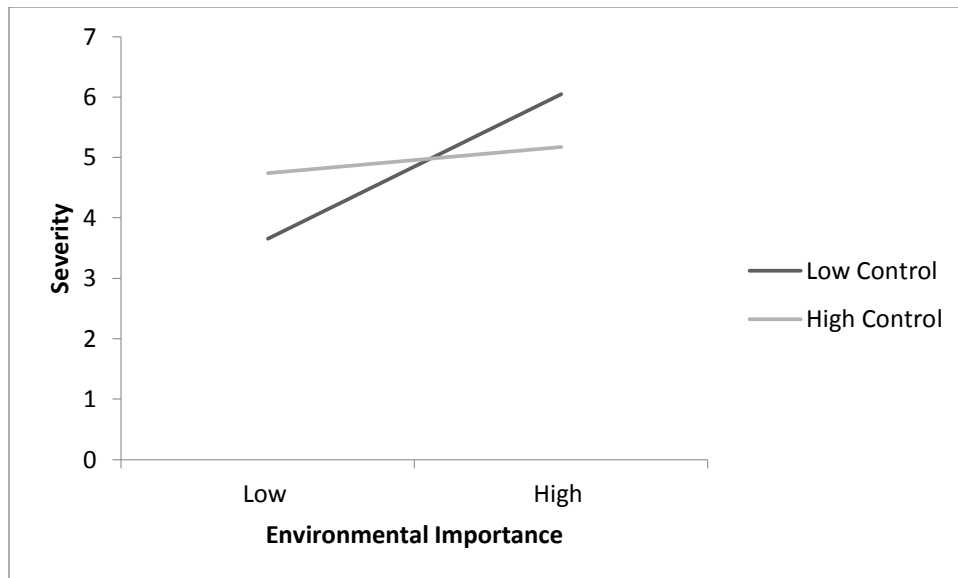
Figure 1. Participant ratings of the severity of climate change, as a function of condition

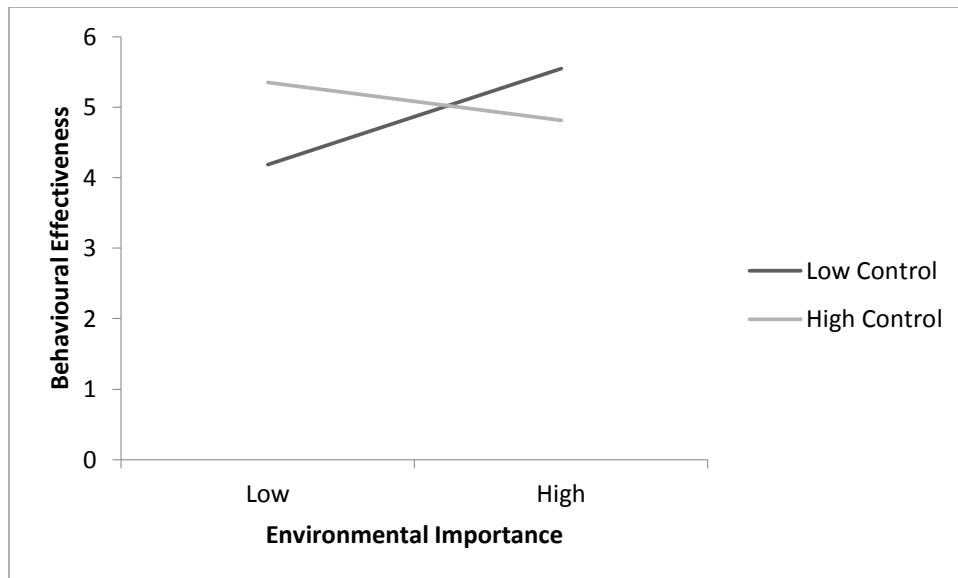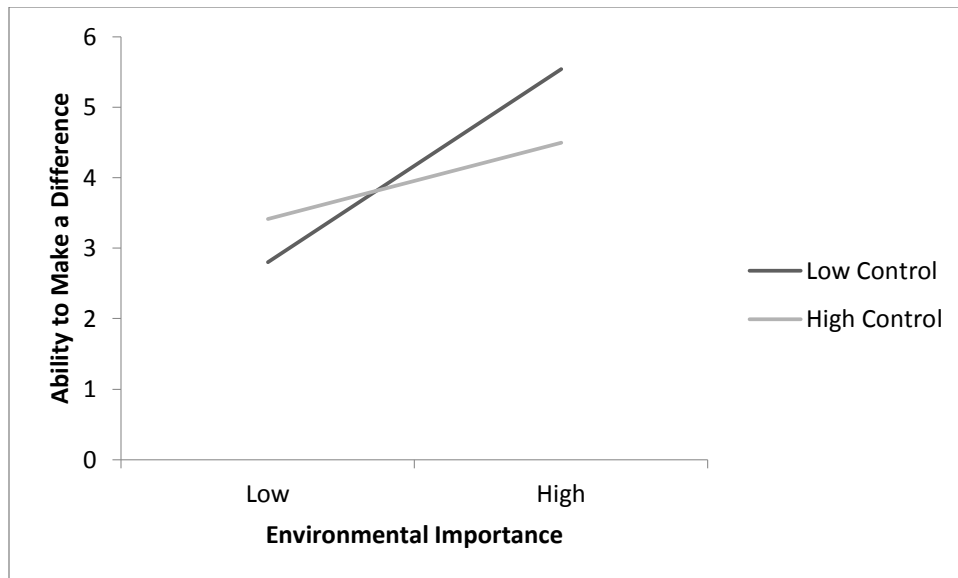(high/low control) and environmental importance (Study 1). Higher numbers indicate greater

severity.
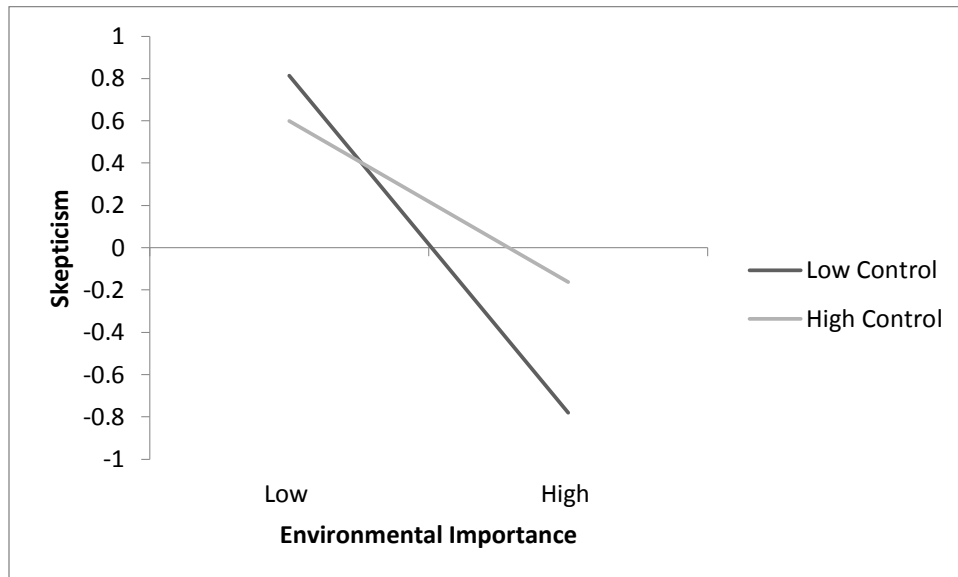
Figure 2. Participant standardized ratings of skepticism toward climate change, as a function of

condition (high/low control) and environmental importance (Study 1). Higher numbers indicate
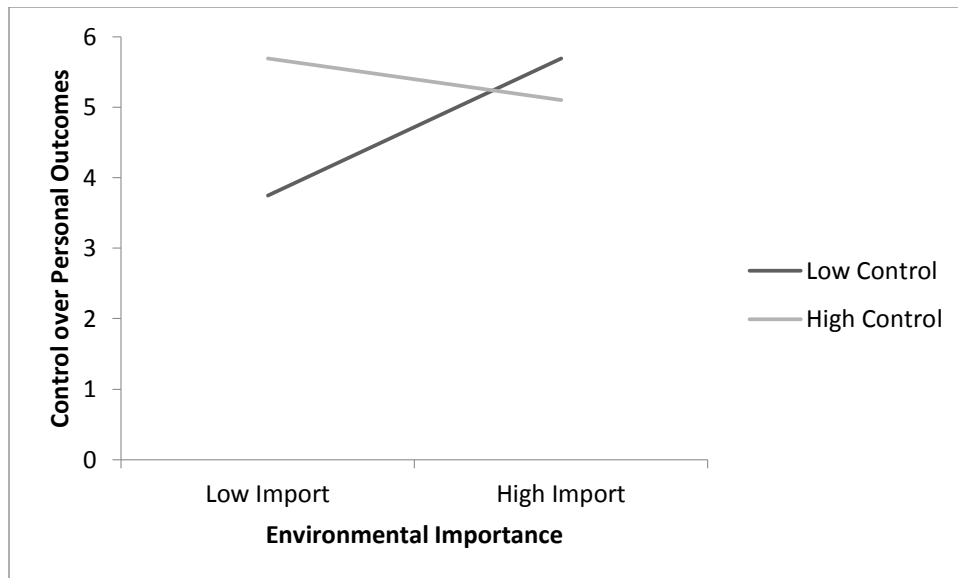
greater skepticism.
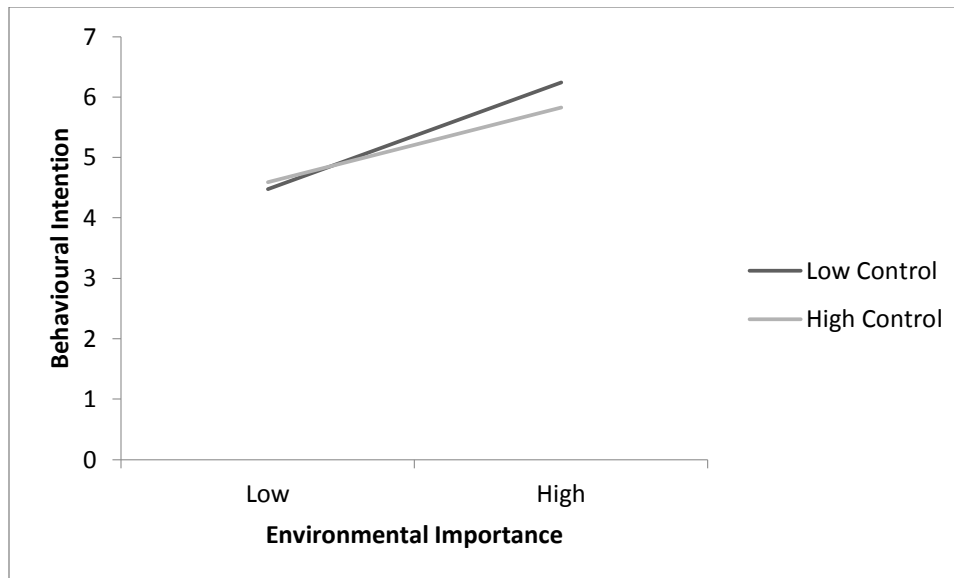
Figure 3. Participant ratings of their intention to engage in pro-environmental behaviours, as a function of condition (high/low control) and environmental importance (Study 1). Higher numbers indicate greater intention to engage in behaviours.

Figure 4. Participant ratings of the effectiveness of environmental behaviours, as a function of condition (high/low control) and environmental importance (Study 1). Higher numbers indicate greater effectiveness.

Figure 5. Participant ratings of their ability to make a difference, as a function of condition

(high/low control) and environmental importance (Study 1). Higher numbers indicate greater

ability to make a difference.

Figure 6. Participant ratings of perceived control over their personal outcomes, as a function of condition (high/low control) and environmental importance (Study 1). Higher numbers indicate greater control.
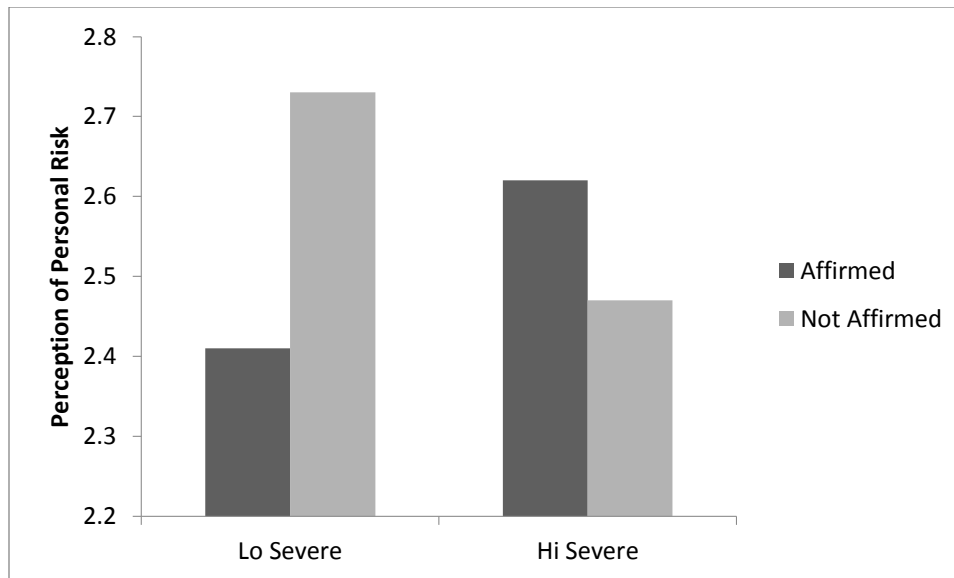
Figure 7. Participant ratings of personal risk, as a function of severity (high/low) and self-

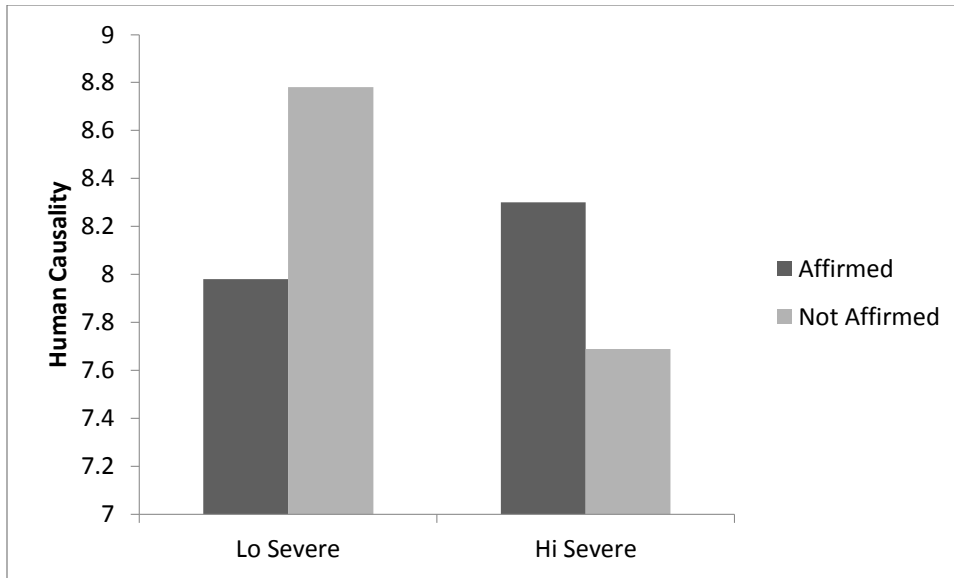affirmation (affirmed/not) (Study 2). Higher numbers indicate greater personal risk.

Figure 8. Participant ratings of human contribution to climate change, as a function of severity (high/low) and self-affirmation (affirmed/not). Higher numbers indicate greater proportion of climate change is caused by humans.
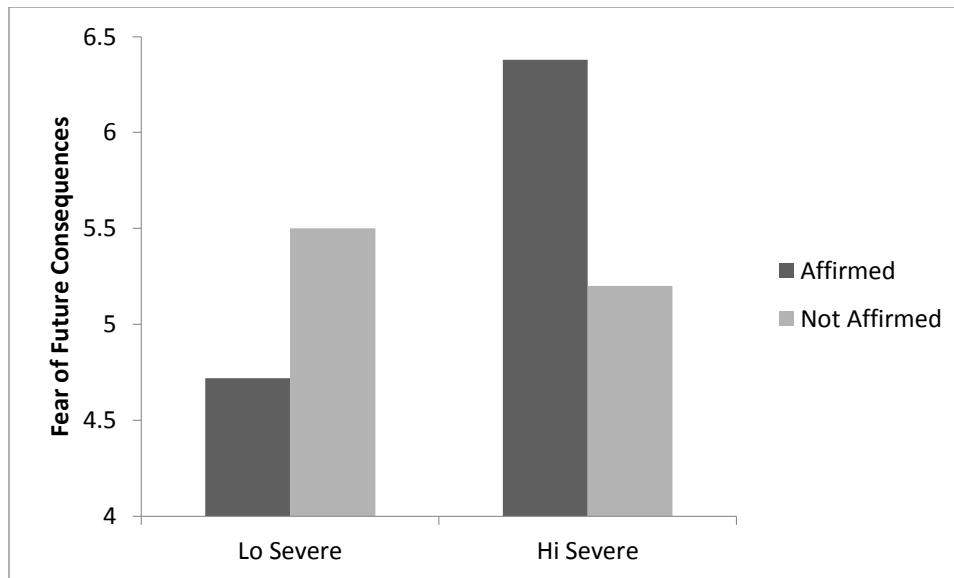
Figure 9. Participant ratings of fear of future climate change consequences, as a function of

severity (high/low) and self-affirmation (affirmed/not) (Study 2). Higher numbers indicate
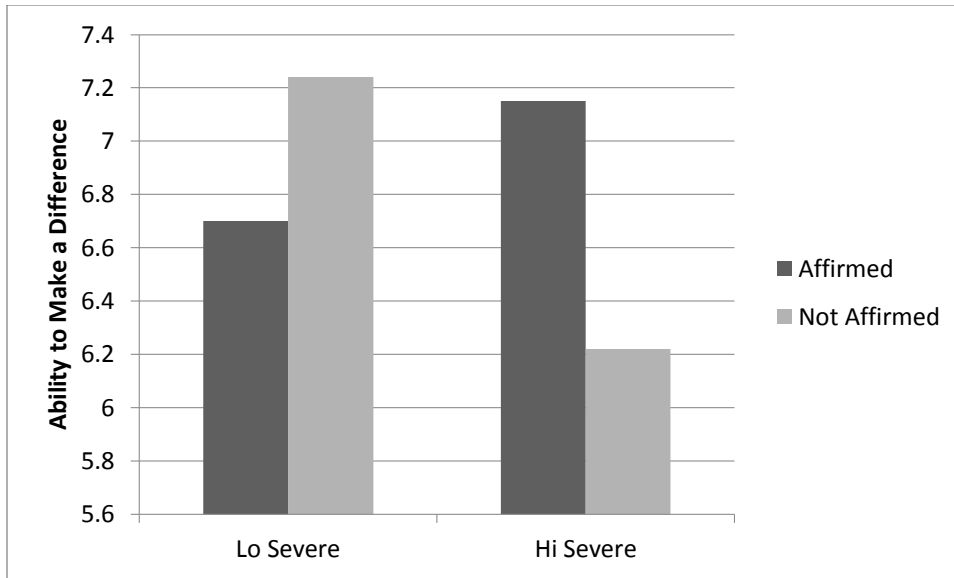
greater fear of consequences.

Figure 10. Participant ratings of their ability to make a difference, as a function of severity

(high/low) and self-affirmation (affirmed/not) (Study 2). Higher numbers indicate greater ability
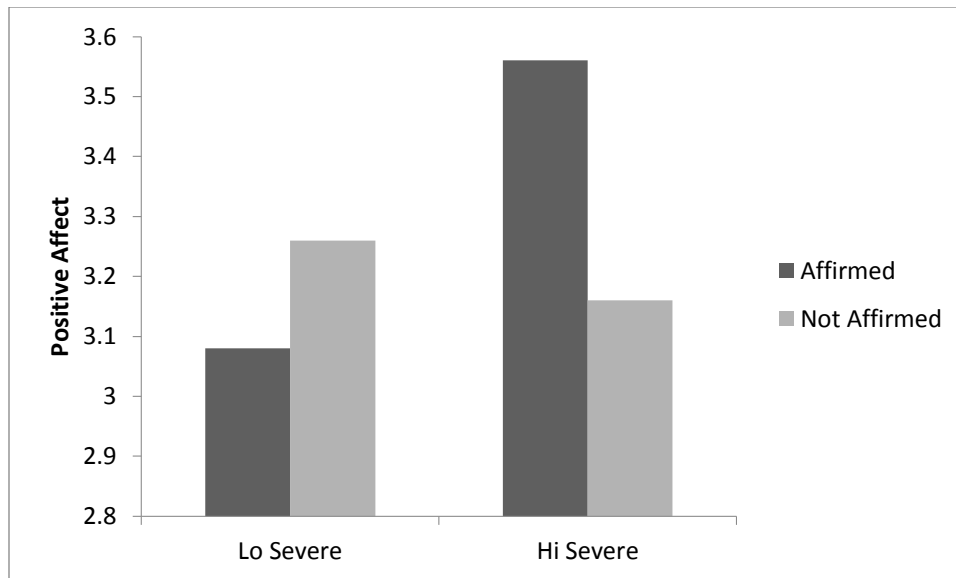
to make a difference.

Figure 11. Participant ratings of positive affect, as a function of severity (high/low) and self-

affirmation (affirmed/not) (Study 2). Higher numbers indicate greater positive affect.
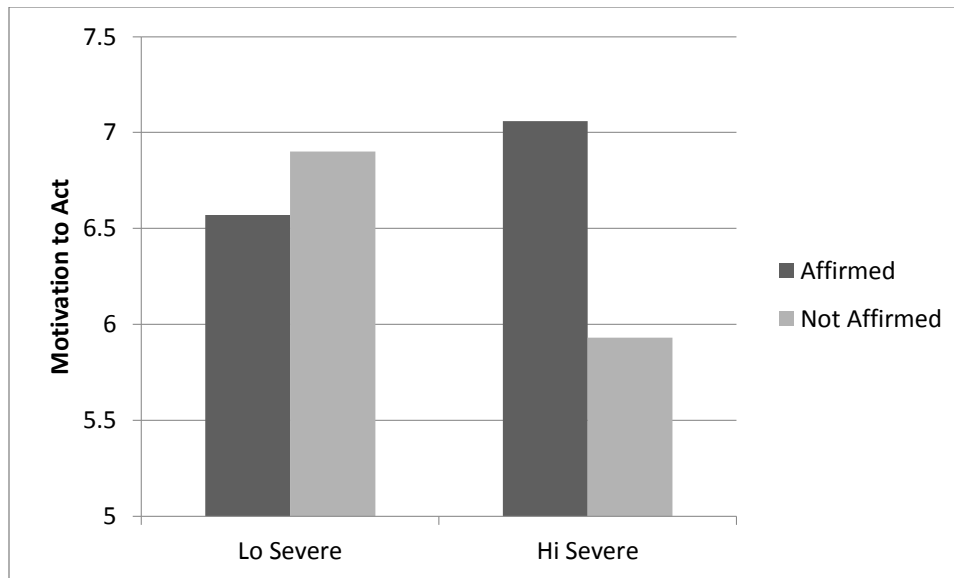
Figure 12. Participant ratings of their motivation to act now, as a function of severity (high/low) and self-affirmation (affirmed/not) (Study 2). Higher numbers indicate greater motivation to act now.
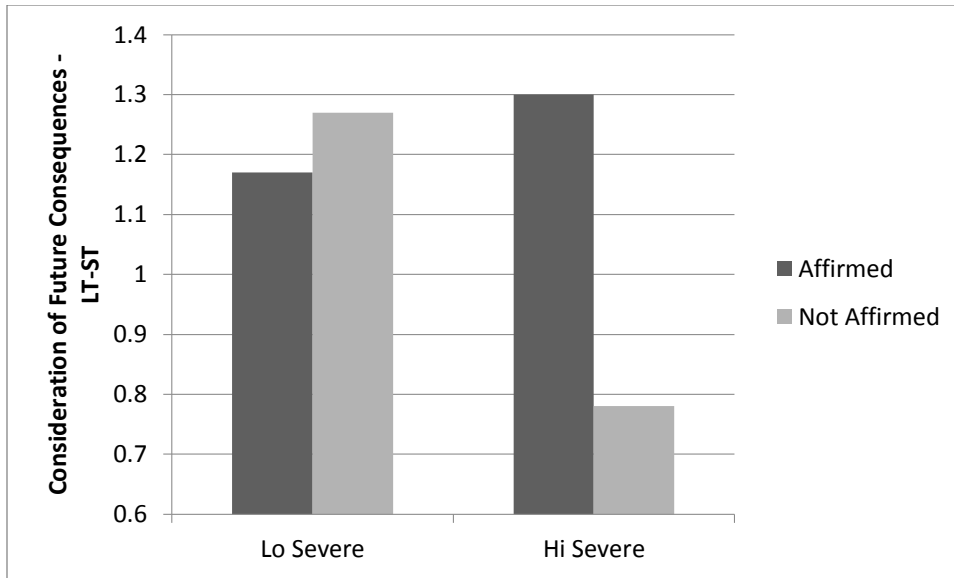
Figure 13. Participant ratings of their consideration of future consequences, as a function of

severity (high/low) and self-affirmation (affirmed/not) (Study 2). Higher numbers indicate

greater preference for long-term consequences.

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