

Consideration of Immediate and Future Consequences in Accepting and Responding to Anthropogenic Climate Change

Victor Corral-Verdugo^{1*}, Joaquin Caso-Niebla², Cesar Tapia-Fonllem¹, Martha Frías-Armenta¹

¹University of Sonora, Hermosillo, Mexico

²Autonomous University of Baja California, Ensenada, Mexico

Email: *victorcorral@sociales.uson.mx

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Abstract

Decreasing greenhouse gas emissions (climate change mitigation) is one of the most important types of pro-environmental behavior. Greenhouse gases have been repeatedly cited as a leading cause of climate change (CC). However, before engaging in CC mitigation behaviors, individuals must accept the reality of CC. Few studies addressing the influence of individual time perspective on climate change mitigation have been found. No study investigating the relationship between time perspectives and acceptance of the reality of CC exists. This study was aimed at filling that research gap. The study examines the impact of consideration of immediate and distant consequences of behavior on individual acceptance of the reality of CC and commitment to engage in CC mitigation behaviors. Two-hundred-and-forty-five undergraduate students responded to an instrument investigating those variables. A structural-equation model revealed that consideration of distant consequences affects acceptance of CC, but considering immediate consequences do not influence that acceptance. Accepting that CC is real affects the commitment to act pro-environmentally, which in turn influences CC mitigation commitment. Consideration of distant consequences also positively affects willingness to engage in CC mitigation; yet, consideration of immediate consequences produced no effect on that commitment.

Keywords

Climate Change, Mitigation, Immediate, Future, Consequences

1. Introduction

1.1. Climate Change and Mitigation Behavior

Climate change (CC) is probably the most serious and pressing environmental

problem humankind has ever faced. Although climate variability is a natural phenomenon that has manifested itself through eons Earth's history, the current CC is peculiar because it is caused by humans, a fact accepted by more than 97% of the scientific community (Cook, Nuccitelli, Green et al., 2013). The emission of greenhouse gases—carbon dioxide, methane and nitrous oxide—from people's daily activities (use of fossil fuels, changes in soil use, intensive agricultural patterns) is responsible for the elevation of average temperature and changes in climate variability (Crowley, 2000).

A number of pro-environmental behaviors inhibit the emission of greenhouse gases. These behaviors include walking or biking instead of driving a car, decreasing meat eating, eating fresh seasonable and local vegetables, using natural fertilizers in agriculture, energy and water conservation, avoiding air travel, and reducing consumption of products, among many others (Gatersleben, Steg, & Vlek, 2002; Brüger, Morton, & Dessai, 2015). People who engage in those behaviors usually make a conscious commitment to face the consequences of climate change (Whitmarsh, 2009; Broomell, Budescu, & Por, 2015). Thus, the study of this kind of commitment is important in determining factors that promote CC mitigation behavior. The study of actions committed specifically to fight climate change is particularly relevant, because a difference exists between actions intentionally directed to mitigate climate change and actions driven by other types of intentions (such as economic reasons, moral imperatives, habits, etc.); these differences may be crucial in fighting climate change (Whitmarsh, 2009).

Yet, before an individual develops a commitment to engage in CC mitigation behaviors, she or he must accept that climate change is actually happening and humans are causing it (Howe & Leiserowitz, 2013). Although the scientific knowledge and certainty regarding CC have solidified in recent decades, public understanding of climate change has not improved. The problem is that as more scientific knowledge is achieved, the more polarized the popular perceptions in regard to this phenomenon become (Weber & Stern, 2011). As a consequence of this discrepancy many people deny that CC is occurring; therefore, they are not able to face and solve it. Climate change denial may be total or take the form of skepticism or uncertainty (Whitmarsh, 2009).

1.2. Time Perspective and Climate Change

Once acceptance of CC reality and the commitment to inhibit its effects are established as preconditions for climate change mitigation, researchers need to determine psychological factors that facilitate CC acceptance and commitment to engage in CC mitigation behaviors. *Time perspective* (i.e., drawing on past memories, experience the present or looking forward to future) is one of those factors.

The pertinent literature in the environmental psychology field reveals the importance of time perspective in influencing people's decision to engage in environmentally-protective behaviors (Joireman, Van Lange, & Van Vugt, 2004; Mil-

font & Gouveia, 2006; Pahl & Bauer, 2013). According to the literature, people who are more future-oriented tend to engage in more sustainable actions than those who reveal a propensity towards the past, the present or the immediate future (Corral-Verdugo, Fraijo-Sing, & Pinheiro, 2006; Pinheiro & Corral-Verdugo, 2010; Milfont, Wilson, & Diniz, 2012). Environmental problems involve not only a conflict between personal and social costs and benefits but also a conflict between short-term and long-term interests (Cameron, Brown, & Chapman, 1998; Milfont & Gouveia, 2006). As such the study of this divergent time perspective is relevant in the psychology of sustainability field. However, most of the study on the relationship between time perspective and pro-environmental behaviors has focused on the influence that future orientation has on people's determination to protect the environment.

With this emphasis on the effect of future perspective on environmental concern it is not surprising that researchers choose to develop and use measures of future propensity in their studies. One of those measures is the Consideration of Future Consequences scale (CFCS). Developed by Strathman, Gleicher, Boninger, & Edwards (1994), the CFCS has been traditionally assumed as a unidimensional scale assessing a factor that ranges from low CFC of immediate behavior to high CFC of immediate behavior (Arnocky, Milfont, & Nicol, 2014). However, multiple studies have found a bi-factorial structure of the CFCS, which seems to reveal a dimension tackling the consideration of short-term or immediate consequences of behavior, and another that addresses the consideration of long-term or distant consequences (Adams, 2012; Arnocky et al., 2014; Charlton, Gossett, & Charlton, 2011; Toepoel, 2010). If this bi-dimensional structure in the CFCS continues to be confirmed, the instrument would be helpful in investigating the conflict between short-term and long-term interests in environmental matters, adding a temporal dimension other than the future orientation into the investigation of CC determinants. More than purely confirming the bi-dimensional structure of the CFCS throughout factor analysis, the idea is to examine the instrument's "ability to differentially predict relevant outcomes" (Joireman, Shaffer, Balliet, & Strathman, 2012: p. 1278). Human acceptance and response to climate change are two of those relevant outcomes.

One study (Joireman, Kees, & Sprott, 2010) showed that compulsive buying tendencies (highly associated to greenhouse emissions) positively correlated with immediate consideration of consequences, while the correlation with future consequences was nonsignificant. Another study (Khachatryan, Joireman, & Casavant, 2013) demonstrated that preference for biofuels (corn- and cellulose-based ethanol) was negatively related to consideration of immediate consequences and positively associated with consideration of future consequences.

Arnocky et al. (2014: p. 556), using the CFCS, distinguished between CFC-Immediate and CFC-Future and found that low scores on the CFC-Immediate predicted environmental concern, with nonsignificant effects for CFC-Future. They also found that "the associations between future time perspective and sustainable

behaviors are driven by reduced immediate concerns”. These findings suggest that the immediate consideration of consequences is predictive of greenhouse-gas emission behaviors while the consideration of distant consequences could be associated to the commitment to mitigate climate change. No studies investigating the association between considerations of consequences of behavior and acceptance of CC occurrence have been found.

Therefore, the purpose of this study was to test a model of inter-relations between consideration of immediate and distant consequences of behavior, acceptance of the reality of climate change, and the commitment to engage in pro-environmental and CC mitigation behaviors.

2. Methods

2.1. Participants

Two-hundred and forty-five undergraduate students (143 females, 102 males) attending a public Mexican university participated in this study. They responded to a pencil and paper instrument. Their average age was 20.4 years ($SD = 1.7$) and their socio-economic status was mostly middle-class.

2.2. Instrument

Four scales in Likert-type response format were used. One scale investigated levels of *acceptance of climate change*, indicating how much the respondent agreed (1 = total disagreement... 5 = total agreement) with 5 items stating that climate change is real, important and caused by humans. One more scale assessed *commitment to engage in actions to mitigate climate change*—such as reducing use of car, conserving water at home, buying locally produced food, turning off electronic devices, etc.—with 12 items using a 5-option response-format (1 = not likely at all... 5 = very likely). *Commitment to engage in general pro-environmental behaviors*—such as giving money to environmental groups, voting for pro-environmental candidates, boycotting companies that are not environmentally friendly, etc.—was measured using 12 items in the same 1 - 5 response format. These three scales were developed by Bain et al. (2016) for an international study on human responses to climate change. The Consideration of Future Consequences Scale (Strathman et al., 1994) was the fourth used instrument. It includes 14 items revealing both consideration of immediate consequences (“My behavior is only influenced by the immediate outcomes”, “I only act to satisfy immediate concerns”) and consideration of distant consequences (“I consider how things might be in the future”, “My behavior is generally influenced by future consequences”) using a 5-point response format (1 = not at all like me... 5 = very much like me). In addition, participants were asked to manifest with a “yes” or “no” response whether or not they accepted that climate change is real and humans are causing it. All scales were administered in Spanish in the same order to all participants. The Spanish translation of those instruments was produced using the back-translation method.

2.3. Procedure

The instrument was administered in the participants' classroom. They were debriefed on the aims of the study and their informed consent to participate was obtained. None refused to collaborate with the study. The administration of the scales took about fifteen minutes.

2.4. Data Analysis

Univariate statistics (means, standard deviations, maximum and minimum values), as well as one indicator of internal consistency for the scales (Cronbach's alpha) were computed. An exploratory factor analysis was performed on the CFC scale, in order to verify its two-dimensional structure. A matrix of correlation between the analyzed variables—acceptance of CC, commitment to mitigate CC, commitment to pro-environmental behavior, immediate consideration of consequences, distant consideration of consequences—was also obtained. Parcels were computed from the items of every scale (the exception was acceptance of CC, wherein all the items were considered without parceling), so that they could be used as indicators for the factors in a structural model, utilizing the EQS statistical package (Bentler, 2006). This structural model specified that the two considerations of future consequences of behavior (immediate and distant) would affect both acceptance of CC and the commitment to engage in actions that mitigate climate change. The model also specified that consideration of distant consequences positively influences acceptance of CC, while consideration of immediate consequences exerts a negative influence on that acceptance. A positive influence of consideration of distant consequences and a negative effect of immediate consequences on pro-environmental commitment were also specified. Moreover, according to the model, acceptance of CC influences both commitment to pro-environmental behaviors and to CC mitigating behaviors. A significant association between both types of commitment was expected.

3. Results

Table 1 shows the frequency and percentages of participants that accepted that climate change is real and humans are causing it (according to responses to the Acceptance of Climate Change Scale). Slightly more than eighty-four percent of these participants believed in the reality of CC while almost thirteen percent either denied the reality of CC or were skeptic of its human causes.

An exploratory factor analysis (principal components and Varimax rotation) of the CFC scale revealed two clearly distinguishable dimensions of the scale with items saliently and significantly loading on either a factor of consideration of immediate consequences, or a factor of consideration of distant consequences. These two factors explained 45.6% of the variance in the participants' responses to the CFC instrument.

Tables 2-4 show that the levels of internal consistency of all the used the scales are acceptable; Cronbach's alphas values resulted .70 or higher for every

Table 1. Respondents that believe climate change is real and humans are causing it.

	Frequency	Percentage
1) I think climate change is occurring and human activities are having significant effects	211	84.4
2) I think climate change is occurring but human activities are not having significant effects	32	12.8
3) I do not believe climate change is occurring	2	.8

Table 2. Reliability and univariate statistics of climate-change acceptance scale.

SCALE/Items	Mean	SD	Min	Max	Alpha
CLIMATE CHANGE ACCEPTANCE .70	4.27	.68	1	5	.70
Climate change is real	4.58	.76			
Humans significantly affect climate change	4.28	.92			
Coping with CC is a very important problem 4.01 .88	4.01	.88			
Climate change is caused by human beings 3.86 1.0	3.86	1.0			
Climate change is not real (reversed) 4.62 .76	4.62	.76			

assessed dimension. The univariate statistics revealed high levels of climate change acceptance among the respondents (mean = 4.27, SD = .68); participants also produced a moderately high mean (3.82, SD = 1.43) in their report of pro-environmental commitment, and a higher commitment to engage in actions that mitigate climate change (mean = 4.18, SD = 1.06). The level of consideration of distant consequences of behavior was significantly higher (mean = 3.53, SD = 1.04) than the one produced in regard to consideration of immediate consequences (mean = 2.41, SD = 1.08; $t = 15.5$, $p < .0001$).

Table 5 shows the matrix of interrelations among the studied variables. All of these variables correlated positively and significantly with each other, except the consideration of immediate consequences, which demonstrated no significant correlation to any of the remaining variables. This matrix suggests that consideration of distant consequences, acceptance of CC reality, pro-environmental commitment, and willingness to engage in CC mitigating behaviors go together in responding to climate change. Therefore, the subsequently performed structural-equation model used this evidence in its specification phase.

The measurement model of the structural equation analysis (see **Figure 1**) produced high and significant ($p < .05$) factor loadings between every factor and their corresponding indicators. These results seem to evidence convergent validity for the used measures. The value of the structural coefficients between factors is lower than the value of those factor loadings, which indicates discriminant

Table 3. Reliability and univariate statistics of pro-environmental commitment and climate change mitigation commitment scales.

SCALE/Items	Mean	SD	Min	Max	Alpha
PROENVIRONMENTAL COMMITMENT	3.82	1.43	1	5	.84
Give money to an environmental group	3.75	1.64			
Read environmental groups' publications	4.19	1.07			
Sign a petition in support of protecting the environment	4.28	1.08			
Call government official to support environmental protection	3.68	1.57			
Vote for pro-environmental candidate	4.05	1.26			
Write to newspaper in support of environmental protection	3.59	1.59			
Boycott companies that are not environmentally friendly	3.64	1.77			
Join or renew membership of an environmental group	3.71	1.47			
Volunteer to help a pro-environmental group	3.96	1.21			
Attend public manifestations to protect the environment	3.50	1.61			
Upload pro-environmental messages in social networks	3.50	1.61			
Talk to friends and family about environmental policies	3.98	1.30			
CLIMATE CHANGE MITIGATION COMMITMENT	4.18	1.06	1	5	.88
Install energy-saving devices at home	4.50	1.00			
Buy environmentally-friendly products	4.32	.93			
Conserve water at home	4.48	.85			
Reduce use of air conditioning or heating	3.86	1.26			
Reduce use of car	3.83	1.33			
Turn off lights and appliances when not in use	4.66	.79			
Avoid or reduce meat consumption	3.76	1.26			
Recycle products	4.17	.97			
Turn off electronic devices instead of pausing them	4.40	.92			
Buy locally produced food	4.10	1.10			
Share car to travel or carpooling	4.08	1.21			
Purchase items with minimal packaging	4.01	1.21			

validity (Corral-Verdugo & Figueredo, 1999). Most of the hypothesized relations between factors were confirmed, according to the results of the tested structural

Table 4. Reliability and univariate statistics of consideration of immediate and distant consequences scales.

SCALE/Items	Mean	SD	Min	Max	Alpha
CONSIDERATION OF DISTANT CONSEQUENCES	3.53	1.04	1	5	.73
I consider how things might be in the future, and try to influence those things with my day to day behavior.	3.88	.90			
Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.	3.28	1.05			
My convenience is a big factor in the decisions I make or the actions I take.	3.08	1.12			
I am willing to sacrifice my immediate happiness or "well-being in order to achieve future outcomes".	3.16	1.11			
I think it is important to take warnings about negative outcomes seriously even if the negative outcome will not occur for many years.	3.81	1.01			
I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.	3.40	1.05			
When I make a decision, I think about how it might affect me in the future.	4.20	0.94			
My behavior is generally influenced by future consequences.	3.45	1.13			
CONSIDERATION OF IMMEDIATE CONSEQUENCES	2.41	1.08	1	5	.83
I only act to satisfy immediate concerns, figuring the future will take care of itself.	2.44	1.09			
My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.	2.58	1.09			
I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.	2.21	1.02			
I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.	2.18	1.06			
I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.	2.39	1.10			
Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.	2.69	1.10			

model. The consideration of distant consequences affected the level of acceptance of the reality of CC (structural coefficient = .37; $p < .05$), but considering immediate consequences did not produce such effect. Accepting that climate change is real influenced the commitment to act pro-environmentally (structural coefficient = .18; $p < .05$), which, in turn, influenced CC mitigation commitment (structural coefficient = .55; $p < .05$). Consideration of distant consequences also positively affected both the willingness to engage in CC mitigation (structural

Table 5. Correlation matrix of studied variables.

	CCAcept	Proenv Comm	Mitig Commit	Distant Cons.
CCAcept				
Proenv Comm	.18*			
Mitig Comm	.17*	.49*		
Distant Cons.	.28*	.18*	.24*	
Immediate C.	-.10	.02	.04	.01

*Significant at $p < .01$.

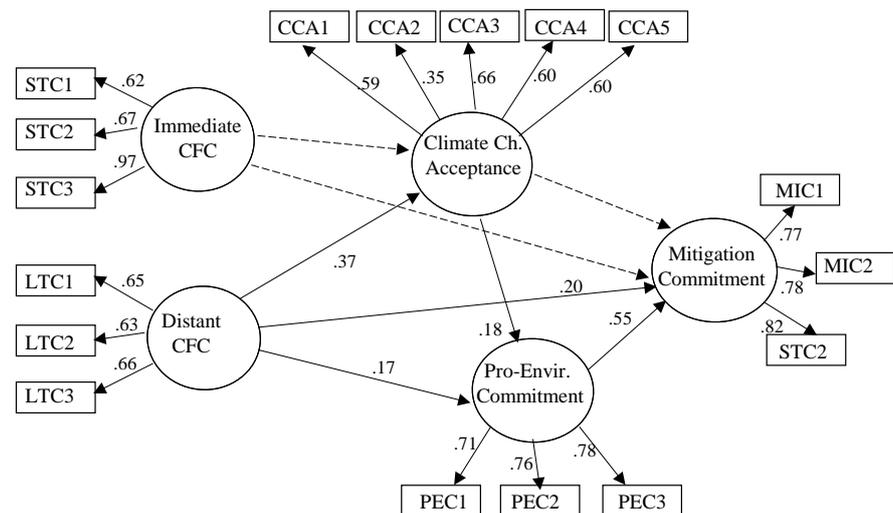


Figure 1. Model of interrelations between immediate and distant consideration of future consequences, acceptance of climate change, pro-environmental commitment and mitigation commitment. All factor loadings and the structural coefficient are significant ($p < .05$), except the ones indicated by dotted-line arrows. Goodness of fit: $Chi\text{-squared} = 185$ (110 df), $p < .001$; $BNNFI = .92$, $CFI = .94$; $RMSEA = .05$. Mitigation Commitment $R^2 = .41$.

coefficient = .20; $p < .05$) and the commitment to act pro-environmentally (structural coefficient = .17; $p < .05$); yet, consideration of immediate consequences produced no effect on either commitment.

Goodness of fit indicators of this model seems to evidence its adequacy. Although the chi-square value ($\chi^2 = 185$, 110 df) associated to this model was significant ($p < .0001$), the practical indices $BNNFI$ (.92) and CFI (.94) as well as $RMSEA$ (.05) values support the pertinence of this model of interrelations.

4. Discussion

As previous studies and our results show, humans often attend to immediate consequences of their behavior to the detriment of consideration of their long-term consequences. Clearly, greenhouse-gas emitting behaviors produce distant consequences (climate change) and our *temporal myopia* (i.e., seeing only the short-term) prevents us from anticipating the consequences of our actions in the

distant future. Behaviors such as moderate consumption of products (Strathman et al., 1994), the support to public transportation systems (Joireman et al., 2004), and recycling (Ebreo & Vining, 2001) are inhibited in individuals who do not perceive the future consequences of their behavior. Although our sample of participants consisted of people with an above average level of education, we found variability in levels of consideration of immediate and future consequences, and commitment to protect the environment; a variability that was sufficient enough to reveal significant associations between those variables.

Our study not only found that time orientation is a significant factor influencing the commitment to act inhibiting climate change; it also indicated that such orientation influences the acceptance of CC as a phenomenon that is happening and is resulting from human causes. People who were prone to anticipate the distant consequences of their behavior were more likely to accept the reality of anthropogenic CC; conversely, those who focused on immediate consequences of behaviors did not easily accept the CC reality. It is likely that their bias toward immediate consequences prevented their acceptance of such climatic phenomenon because it is difficult to perceive a connection between short-term consequences of own behavior and more distant effects, especially when the immediate consequences are not similar to the ones that supposedly will occur. In the case of climate change the problem is that its more dangerous manifestations have not fully developed.

This differential influence of consideration of immediate and distant consequences also applies to the commitment to mitigate CC and engage in general pro-environmental behaviors. The distant consequences consideration was significantly associated to such commitments. However, no association between consideration of immediate consequences was found on either commitment. These findings replicate previous results (Arnocky et al., 2014; Joireman et al., 2010; Khachatryan et al., 2013) showing that consideration of future consequences correlates positively with environmental concern; yet in those studies consideration of immediate consequences also (negatively) correlated with such concern. Our study, however, found consideration of short-term consequences was not significantly associated with any other examined factor. This discrepancy deserves further study. Although it is not very clear why these findings did not result as expected, we speculate that since most of the climate change consequences are yet to come, a person with high levels of consideration of future consequences is more prone to accept the occurrence of CC. As a consequence, he or she is more determined to engage in CC mitigating behaviors. Conversely, someone more inclined to the consideration of immediate consequences is indifferent in accepting CC as a real phenomenon and in engaging in CC mitigating behaviors.

Our results also contribute to the analysis of the components of social dilemmas, as seen in the case of climate change and other environmental and social problems. A number of authors have noticed that, very often in these problems, individual self-interest is also short-term interest and this egoistic consideration

of immediate consequences is at odds with long-term collective interest (Joireman et al., 2004; Milfont & Gouveia, 2006; Nordlund & Garvill, 2003). Since it is clear that this situation involves a social conflict (egoistic vs. collective interest) and a temporal conflict (immediate vs. future interest), those authors have referred to it as the “expanded definition of social dilemmas” implying that, in studying social dilemmas, a temporal consideration is as important as the consideration of individual vs. collective benefits (as the traditional approach to social dilemmas conceives this situation). Our study results suggest that long-term interest not only influences collective interest but also affects the levels of awareness concerning a situation that jeopardizes such collective interest (i.e., climate stability).

If future consideration of consequences is important in influencing CC acceptance and commitment to engage in CC mitigation behaviors, what can be done to promote a future orientation among people? Although there is no definitive answer to such question, some aspects addressing it have been provided in previous studies. For instance, the use of prospect-concept priming tasks activates future thinking, and results in increased environmental concern. These tasks prime future orientation by asking people to envision what their everyday life circumstances might be in years in the future (Arnocky et al., 2014). One more possibility is the implementation of educational programs that include “the acquisition of time-administration skills, the training in planning tasks, in combination with the development of social norms and values” (Corral-Verdugo et al., 2006: p. 146). According to the authors issuing the latter recommendation, it could be a fruitful strategy in developing a future-oriented perspective and, subsequently, a pro-environmental commitment. More strategies should be implemented and tested in trying to promote future orientation among people.

Concern for immediate consideration of consequences may be a trait selected by evolutionary pressures (Ricklefs, 2016): paying attention to the immediate was valuable in ancestral times because it allowed individuals to focus on the most urgent and important everyday problems, such as surviving and obtaining mates. Indeed, this “enhancing-short-term-considerations” trait continues being valuable in our daily adaptation to the environment. Yet, in some cases (such as facing CC) the activation of a more-distant-consideration of consequences proves useful. Humans are also equipped to anticipate the future, and we can use this feature of our species’ nature to fight the dangerous consequences of climate change.

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