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Promoting Environmentally Responsible Behaviors Using Motivational Interviewing

Techniques

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Abstract

An experimental design was used to determine whether environmentally responsible behaviors (ERBs) could be promoted by exposing participants to two motivational interviewing techniques—provision of information and engagement in a decisional balance exercise. We hypothesized (a) a main effect of the information manipulation such that provision of basic as well as normative information about the current state of global warming would be more effective than basic information only at promoting ERBs, which would in turn be more effective than a control information group and (b) a main effect of the decisional balance manipulation such that engagement in a decisional balance activity would be more effective than engagement in a control activity at promoting ERBs. We had no basis on which to hypothesize an interaction between the information and decisional balance manipulations. On some of the dependent measures, the predicted main effect for information manipulation was found as well as an unexpected interaction effect. Exploratory analyses were conducted to examine any gender effects as well as the validity of the dependent measures used. Effects on environmental attitudes and behaviors were interpreted in light of existing theory and real-world applications.

Promoting Environmentally Responsible Behaviors Using Motivational Interviewing Techniques

Overwhelming evidence identifies global warming to be a real, current threat. For example, the United Nations' Intergovernmental Panel on Climate Change (IPCC; Pachauri, 2007) reported that the 2005 concentration of carbon dioxide in the atmosphere far exceeded the natural range recorded in the past. Further, since 1880, the earth's average temperature has increased 1.4 degrees Fahrenheit, and most of this increase has occurred in recent years. This temperature increase has led to the rapid melting of Arctic ice, glaciers, and mountain snow as well as a notable increase in extreme weather events like hurricanes and wildfires (National, 2007). Indeed, ice in the Arctic and Greenland could be completely gone by the end of this century (Handwerk, 2004). According to one study, a million species are currently at risk for extinction due to climate change (Thomas, 2007 as cited in Roach, 2007). For example, with the rise in sea temperatures, coral reefs were recorded at their highest death rate in 1998, a rate that is expected to rise in the coming years (National, 2007). Even if fossil fuel emissions ceased entirely, experts predict that there are still enough substantial fossil fuel emissions already in the atmosphere to raise the earth's temperature one degree Fahrenheit this century (Schulte, 2006). In sum, the effects of global warming are best understood as real and harmful to the earth at both macro and micro levels.

Unfortunately, reductions in fossil fuel emissions and elimination of other factors contributing to global warming are unlikely. In reality, scientists identify human behavior as a primary contributor to this climate change phenomenon.

According to the IPCC (2007, as cited in Roach, 2007), there is a 90 percent probability that human activity is the cause underlying “Earth's warming temperatures, rising seas, more intense storms, and a host of other environmental maladies.” Koger and Scott (2007) find that the daily business of the billions of people around the globe emits excessive amounts of greenhouse gases into the atmosphere. Additionally, these gases in such amounts threaten the very survival of humans, not to mention other species. Human behaviors such as industrialization, deforestation, pollution, and carbon dioxide emissions are direct contributors to global warming (National, 2007). Furthermore, there is no evidence that depicts these harmful human habits to be decreasing nor even staying the same. Given the rate at which fossil fuel emissions are currently increasing, experts predict that the earth's temperature will rise 2.5 to 8 degrees this coming century (Schulte, 2006).

In response to the threat of global warming, scientists from many different academic spheres are attempting to find a solution. The Brundtland Report defines a sustainable society as one operating in a state of sustainable development, or “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Encyclopedia, 2000). It is a relatively new phenomenon to witness personnel from two seemingly different realms such as psychology and sustainability collaborating on the same issues to work towards sustainable development. Scientists in many branches of psychology, however, have applied their training to environmental sustainability and have in this way offered insight into human contribution to the problem of climate change. In a call for integration, Koger and Scott (2007) urge psychologists to use their particular

expertise to work towards a solution to the climate change crisis. Cognitive psychologists, for example, might recognize environmentally harmful behaviors as resulting from faulty, biased ways of thinking that can be altered through cognitive behavior practices. Social psychologists might stress the influence of society in making environmentally harmful practices “the norm,” while clinical psychologists might emphasize that “healing the planet and healing the self go hand in hand” (Koger & Scott, p. 13).

Much of the research so far investigating links between psychology and sustainability has taken a social/cognitive approach in its focus on how people’s thinking and behavior relate to the problem. In a study of 101 non-psychology students at a British University, Pahl, Harris, Todd, and Rutter (2005) found a considerable gap between how concerned people *said* they were about environmental issues and how *active* they actually were. This means that those who claimed to have very positive attitudes about the environment were not very active in environmentally responsible behaviors (ERBs). These findings demonstrate the phenomenon of the attitude-behavior discrepancy. Pelletier (2002) also reports evidence of this gap, concluding that even those who know they should be more pro-environmental often do not make much of an effort. This discrepancy is dangerous in the struggle to instigate action against global warming, as large-scale *action* seems to be the only way to combat climate change.

Additionally, in a study of 1,250 households, Gatersleben, Steg, and Vlek (2002) found that people hold beliefs that their behavior is no more beneficial or harmful for the environment than is other people’s behavior. According to Winter and

Koger (2004), women, however, do tend to exhibit more pro-environmental concerns than men. Pahl and colleagues (2005) also found evidence to suggest the existence of this gender difference. If people feel they can simply “disappear in the crowd,” it is difficult to instigate large-scale change. Furthermore, Gatersleben and colleagues found that lack of knowledge about how people’s behavior affects their environment is often a factor in whether or not they take action. Those with a lack of knowledge about the target problem have no basis on which to form attitudes or take action. Thus, bridging the gap between attitude and behavior may be an issue of providing information, as well.

It is clear that psychology is applicable to climate change in that “a psychological shift” (Koger & Scott, 2007, p. 15) is required to combat global warming. Not only must scientists work to discover the mechanisms that underlie climate change, but they must also consider psychological research and efforts towards changing society’s overall way of thinking about the environmental situation. The new movement of conservation psychology has some psychologists now working daily to apply psychological theory and practice directly to environmentally-harmful behaviors. Conservation psychology is made up of psychologists from many traditional areas of the science, yet clinical psychology is underrepresented. The application of clinical psychology could potentially lie in the recognition that the harmful effects of global warming can potentially lead to stress-related and other disorders (Koger & Scott, 2007) as well as understanding change and how environmentally harmful behaviors can be decreased or even eliminated.

The current study was an attempt to apply techniques from motivational interviewing (MI), a clinical approach used to decrease resistance to behavior change, to the problem of environmentally harmful behaviors. MI is often used in clinical settings to motivate ambivalent clients to resolve that ambivalence for themselves and in this way move towards instituting more healthy, productive behaviors. The current study's application of this technique as it applies to sustainability offers insight into methods for promoting environmentally responsible attitudes and behaviors. To provide a context for the proposed study, the following literature review summarizes the ways in which psychologists understand and conceptualize change of a problem behavior as well as techniques psychologists use to motivate this change.

Understanding and Conceptualizing Change

Two related theories that provide a basis for understanding and conceptualizing change are well-represented in the psychological literature. The first, self-determination theory (SDT), focuses on the quality of the motivation to change as it relates to the probability of long-lasting behavior change. The second, the transtheoretical model of change, identifies stages of change through which people progress and cycle that are determined by readiness to change a problem behavior.

Self-determination theory. SDT is a way of explaining motivation to change that rests on the idea that participants must recognize their self-efficacy and make the decision to change on their own accord. The psychologist's goal of instigating behavior change in a person lies in increasing internalized motivation to change a behavior rather than change dependent on some external reason that bears a weak link to the self (Markland, Ryan, Tobin, & Rollnick, 2005).

Thus, SDT can and has been used to explore the question of *why* people are motivated to be more pro-environmental. Namely, Pelletier (2002) reports numerous studies in which The Motivation Towards the Environment Scale was used. Studies confirm the reliability and validity of this scale, and its purpose is to identify different types of motivation. Those types of motivation that are theorized as being more self-determined tend to yield higher self-reported participation in pro-environmental behaviors in the research. This finding holds for various types of pro-environmental behaviors from reusing products to energy conservation.

The current study attempted to promote internalized motivation towards improving the state of the environment that would then theoretically lead to increased pro-environmental attitudes and behaviors. We attempted to internally motivate participants by trusting the final decision to change to participants' discretion and by appealing to the individual's role in climate change in the information manipulation. Using a measure of intrinsic motivation administered after the experimental intervention as well as measures assessing willingness to become involved in pro-environmental behaviors post-intervention allowed analysis of how intrinsic motivation was related to future intentions to be more pro-environmental.

Transtheoretical model of change. The transtheoretical model of change is a way of understanding and assessing participants' readiness to change a problem behavior (Prochaska & Norcross, 2001). In the same way that SDT helps to explain why certain clinical strategies are generally successful in promoting change, the transtheoretical model of change is a method for practitioners and researchers to gauge how ready clients are to institute and maintain behavior change.

This model proposes that people's motivation to change a problem behavior can lie in one of five "stages of change": precontemplation, contemplation, preparation, action, and maintenance (Perz, DiClemente, & Carbonari, 1996; Prochaska & Norcross, 2001; Segan, Borland, & Greenwood, 2004; Velicer, Hughes, Fava, Prochaska, & DiClemente, 1995). Those assessed in the *precontemplation stage* generally either deny or do not realize they have a problem, and thus they have no intention to change their behavior in the next six months. Those in the *contemplation stage* may recognize that they should change, but they are still ambivalent about doing so. Participants in the *preparation stage* recognize that they should change, have weighed the costs and benefits, and are beginning to formulate plans for changing their behavior. In the *action stage*, participants have actually begun to change their behavior. Finally, the *maintenance stage* consists of those who have maintained behavior change for at least six months. Some research, however, provides evidence that points more accurately to three or four distinct stages of change. When narrowed to four stages of change, it is generally because the preparation stage has been eliminated through factor analysis of a stage of change measure (DiClemente, Prochaska, Fairhurst, Velicer, Velasquez, & Rossi, 1991; Levesque, Gelles, & Velicer, 2000), while those who adhere to only three stages eliminate both the preparation and maintenance stages (Forsberg, Halldin, & Wennberg, 2003). In the current study, we focused on strategies drawn from clinical techniques as well as from SDT and the transtheoretical model of change, as concepts from both are useful in understanding what motivates people towards change.

Instigating Change: Motivational Interviewing

The goal of MI is for clients resisting change or harboring conflicting emotions about change to be motivated to take action. According to Markland and colleagues (2005), “[i]t is assumed that most clients entering counseling will hold conflicting motivations” (p. 813). Therefore, the purpose of MI is to utilize various techniques to allow the participant to resolve ambivalence about change for him or herself. It is thought that this process will then facilitate action.

The four general principles of MI are: express empathy, develop discrepancy, roll with resistance, and support self-efficacy (Miller & Rollnick, 2002). In the MI context, this means that the interviewer identifies with the client’s plight to the best of his or her ability (express empathy), helps the client to realize the discrepancy between his or her ideals and actual behaviors (develop discrepancy), accepts the client’s resistance to change while recognizing it as a step towards resolving ambivalence (roll with resistance), and is generally non-directive and lets the client work through the process of change for him or herself (support self-efficacy). Miller and Rollnick, however, stress that MI is not a process that follows a script. Rather, it is an integration of a number of strategies—especially as those strategies encompass the above four principles—that come together in the midst of a dynamic human interaction for the purpose of facilitating change. The interviewer generally begins with an open question and works through an in-depth discussion of the client’s ambivalence about change that will hopefully lead to “change talk”—that is, expressions that show the client is beginning to resolve his or her ambivalence and is moving closer to actually enacting change.

MI is thought to be especially crucial when clients are assessed to be in the transtheoretical model of change's earlier stages of change—namely precontemplation and contemplation. Miller and Rollnick (2004) stress that motivation to change is the largest obstacle to overcome in these early stages, because it is at this point when people are most resistant towards or ambivalent about change. With its focus on the need for motivation to change, MI can have the most impact in these situations, as Gintner and Choate (2003) find is the case for college student binge drinkers who are reluctant or ambivalent about changing. In effect, the primary purpose is to move participants further along the continuum, preferably as far as the preparation stage, found to be “the point at which the balance of pros and cons shifted in favor of change, and the person decided” (Miller & Rollnick, 2004, p. 304).

Miller and Rollnick (2002) comment that research on cases in which “pure” MI was used are scarce. Oftentimes, it is impossible to conduct full-length MI with a client. For this reason, psychologists have developed adaptations of MI (AMIs). These generally involve structured feedback as well as briefer motivational interventions (Burke, Dunn, Atkins, & Phelps, 2004). Not only have the techniques used in MI proven effective for treatment (especially for substance abuse issues), but they have proven just as effective as longer treatments such as cognitive behavioral skills training (Burke et al., 2004). Markland and colleagues (2005) note that AMIs have been shown in the literature to yield robust effects. For example, in a study of 90 psychiatric patients, Humfress, Igel, Lamont, Tanner, Morgan, and Schmidt (2002) found that a brief motivational intervention was effective in improving patients' attitudes to their care, motivation to change, compliance, and outcome. In their review

of the MI literature, Miller and Rollnick (2002) confirm this statement, concluding that AMIs have shown to be more effective than no treatment, applicable to a wide range of problem behaviors, and both statistically and practically significant (p. 241-242).

In the current study, we developed an AMI in that we chose two techniques drawn from MI principles to use in our intervention: providing information and engagement in a decisional balance exercise. Along with providing *basic* information, another condition will involve additional provision of *normative* information to examine whether this piece has an effect on participants' ERBs. The remainder of the literature review thus examines how the following techniques are currently understood and utilized: providing basic information, providing normative information, and engagement in a decisional balance exercise.

Providing basic information. Sometimes, providing participants with information about the harm their behaviors are causing is not good enough to instigate behavior change. Yet, providing clients with information is seen as part of the counselor's role in MI (Markland et al., 2005). When this technique is used in the context of MI, studies show that informing participants regarding the nature of the problem (e.g., alcohol use, global warming) can, in fact, promote intrinsic motivation as this concept is defined by SDT (Daniels & Murphy, 1997; Gintner & Choate, 2003; Humfress et al., 2002). Ultimately, MI utilizes provision of information as a means through which to motivate change.

In the framework of the transtheoretical model of change, the consciousness-raising process of change is often utilized for those in the precontemplation and

contemplation stages of change in order to increase “awareness of a problem and its potential solutions” (Perz et al., 1996, p. 463). Additionally, providing participants with basic information about the state of global warming engages them in the environmental reevaluation process of change, which encourages the client to assess the effects his or her problem behaviors are having on the physical environment. Like consciousness-raising, environmental reevaluation is especially useful in the earlier stages of change (Daniels & Murphy, 1997). Theorists behind the transtheoretical model of change see providing information as an opportunity for participants to process the information given to them in a way that helps them become more ready for change.

In the environmental sustainability field, researchers often use the provision of basic information as a standard procedure to promote internalized motivation on environmental issues (Pelletier, 2002). Osbaldiston and Sheldon (2003) provided information about the state of the environment to participants in a study that examined the effects of autonomy-supportive counselors on participants’ levels of internalized motivation. Pelletier stresses that it is logical that people must possess knowledge about the environmental situation in order to be able to have an impact on the situation. Further, though studies mention providing information as a standard procedure in assessing environmentally responsible attitudes and behaviors, most have failed to isolate this technique in order to see the actual effects it has on outcome measures.

Research on the efficacy of educational interventions alone in promoting environmentally responsible attitudes and behaviors is disheartening, but Stern (2000)

believes it is advantageous to place hope in an overarching educational intervention strategy that incorporates scientific aspects. Unfortunately, though this type of information has been effective on occasion, the reasons behind why and when it works are not entirely understood. In the current study, we explored whether simply providing basic (including scientific) information about the state of global warming and possible solutions would have an effect on willingness to engage in ERBs.

Providing normative information. Besides providing basic information about the nature of a problem to participants, MI also can incorporate providing participants with information regarding personal norms (Miller & Rollnick, 2004). The idea that people internalize social and moral norms has been studied extensively (Markland et al., 2005). From the perspective of SDT, the goal of intervention is to achieve internalized motivation to change, which is thought to be affected by these social and moral norms. Additionally, in the framework of the transtheoretical model of change, the internalization of norms is an integral part of resolving ambivalence in that these norms affect the very ways in which people conceptualize their problem behaviors.

This trend continues with regard to environmental norms. Pelletier (2002) emphasizes the importance of the behavior of both organizations and other individuals as factors that affect people's likelihood to engage in pro-environmental behaviors. In a survey of 810 people, Thogerson (2006) reports highly internalized norms with regard to pro-environmental behavior. He also stresses that the more people internalize norms, the more likely they are to act in compliance with these norms. Stern (2000) advises that personally-relevant information is most effective in instigating change if participants have an idea of ways in which they can actually help

combat the problem. In the current study, the purpose of providing normative information was to develop discrepancy for the participant between the ERBs norms in the United States of America and the ERBs norms in the rest of the world. Additionally, participants learned about a range of ways in which they could be effective—not just about life-changing, drastic actions they should take to make a difference. The intent was that participants become aware of the conflict between their values and behaviors, which could lead to behavior change that aligns behavior more closely with internalized norms (Miller & Rollnick, 2004).

Decisional balance. In the MI framework, engagement in a decisional balance exercise generally entails having participants identify the short- and long-term costs and benefits to themselves and others of changing a problem behavior. Research has demonstrated the efficacy of engaging participants in such activities as working through the time-sensitive pros and cons of changing or maintaining a problem behavior (Gintner & Choate, 2003; Miller & Rollnick, 2004). In a study engaging smokers in decisional balance, DiClemente and colleagues (1991) found that this exercise of evaluating the pros and cons of their behavior was critical for participants in reducing cigarette smoking. Through a decisional balance exercise, the goal is once again to develop discrepancy that may prove a useful tool in motivating participants to actually enact the proposed change (Daniels & Murphy, 1997).

This MI technique can be easily understood from the perspective of SDT. It reinforces the fact that the decision to change is in participants' hands and will affect their lives (as SDT would stress). Thus, the problem is made more personally-relevant. From the perspective of the transtheoretical model of change, the goal is to

move participants further through the stages until they are active and eventually maintaining change. In this way, decisional balance is a useful tool in assisting participants to engage themselves in making a strong, thought-out decision.

Purpose

The current study directly applied MI techniques, often used in treating substance abuse and addictions, to environmentally harmful behaviors. Miller and Rollnick (2004) encourage the use of MI in any context where participants may feel ambivalent about changing a behavior. In order to help participants resolve their ambivalence about environmentally-relevant change, we used two techniques described in the MI literature: providing information and decisional balance. Additionally, we examined the effects of providing basic information against providing both basic and normative information. In this way, we are attempting to demonstrate that these techniques can prove useful when applied to sustainability issues.

Furthermore, we attempted to measure not only attitudes, but also behavior, recognizing the attitude-behavior discrepancy in that behaviors cannot always be predicted by attitudes. We attempted to make up for this discrepancy by instituting a more behavioral measure involving mild deceit. The goal is to have a measure in which risks of social desirability and reactance effects are reduced. This measure was intended to offer insight into Pahl and colleagues' (2005) finding of a gap between concern for the environment and action in doing something about it.

The techniques drawn from MI intended to promote ERBs are: providing basic information, providing normative information, and facilitating subject

participation in a decisional balance exercise. From this, We hypothesized (a) a main effect of the information manipulation such that provision of basic as well as normative information about the current state of global warming would be more effective than basic information only at promoting ERBs, which would in turn be more effective than a control information group and (b) a main effect of the decisional balance manipulation such that engagement in a decisional balance activity would be more effective than engagement in a control activity at promoting ERBs. We had no basis on which to hypothesize an interaction between the information and decisional balance manipulations.

Method

Participants

Participants were 180 Illinois Wesleyan University undergraduate students. They were recruited based on their enrollment in a general psychology course. Some received course credit for participating, while those who participated after already having completed the course received either \$5 or a \$10 gift certificate to university shops.

Ages of those who participated ranged from 18 years old to 23 years old ($M = 19.00$, $SD = 0.95$). Additionally, 84 participants were men, while 96 were women. Most of the participants were first-year students at 63.3%. 26.1% were sophomores, 5% juniors, and 5.6% seniors. Information on participants' racial/ethnic background was also collected. Thirteen participants identified themselves as African-American, 6 as Asian American, 3 as Latino/Latina/Hispanic, 150 as White/Caucasian/European-American, 5 as Other/Biracial/Multiracial, and 3 did not

wish to respond. No participants identified themselves as Native-American.

Responses to major field of study indicated that participants ranged from focus on the physical sciences to languages to the fine arts. Finally, we asked participants how long they have lived in the United States in order to make sure the normative information piece was relevant to the majority of the sample. The majority of participants indicated that they have lived in the United States for most of their lives. Only 11 participants said they have lived in the United States for 11 or less years.

Independent Variables: Motivational Interviewing Technique Manipulations

Two MI techniques used to resolve ambivalence were manipulated in this study: providing information and engagement in decisional balance (Gintner & Choate, 2003).

Providing information. Participants were randomly assigned, within gender, to one of the following three manipulations, which differed based on the type of information provided to participants: (a) those who received basic information about the nature of global warming (basic only information condition), (b) those who received basic information *as well as* information comparing the average United States of America citizen's contribution to global warming to the rest of the world's contribution (basic plus normative information condition), and (c) those who participated in an unrelated task to provide a control for the previous two conditions (control information condition).

All participants viewed a PowerPoint presentation on personal computers in a computer lab using the MediaLab software package. For each condition, the PowerPoint presentations contained 18 informational slides laid out in similar fashion

with identical backgrounds. The amount of information presented in each slide show was comparable, and all presentations included a voiceover. The three presentations differed with respect to the content presented as it pertained to each condition.

Information presented in the basic information condition included threats of global warming, evidence regarding the causes of environmental damage, and how these causes directly lead to carbon emissions (see Appendix A for PowerPoint slides).

The information presented to participants in the basic plus normative information condition was identical to the information presented to those in the basic only information condition with one exception: normative information that contrasts the average U.S.A. citizen's contribution to global warming to the rest of the world's contribution to global warming was included. The presentation for this condition was identical to the presentation for the basic only information condition, except slides that presented the normative information replaced slides from the basic information condition that simply provided additional information (see Appendix B for PowerPoint slides). In this way, we were able to measure the effect of creating a contrast between actions of a group with which participants were likely to identify closely to the actions of a larger, global group. Including the basic only information presentation within the basic plus normative information condition allowed us to see the ways in which normative information might go beyond providing only basic information to motivate change.

Subject matter for the control information condition presentation was literature—a basic history of some literature movements and examples of authors

from these eras was presented (see Appendix C for PowerPoint slides). Though participants still engaged in a task in which they were presented with information, any reference to sustainability issues was omitted.

Decisional balance. The second experimental manipulation was designed to test the hypothesis that the MI technique of engaging in a decisional balance activity would create an increased willingness to change. Participants were randomly assigned, within gender, to one of two manipulations for this independent variable: (a) those who participated in a decisional balance exercise (decisional balance condition) and (b) those who participated in an unrelated control activity (control decisional balance condition).

Participants in the decisional balance condition were instructed (via software) that they had 5 minutes to list costs and benefits to themselves and the environment of changing or maintaining their environmentally relevant behavior (see Appendix D for instructions given to participants). The MediaLab software prompted participants to complete this activity using paper and pencil. Participants did this on a 4-celled grid with labels across the top that read “For Myself” and “For the Environment.” Labels down the left side of the grid read “Costs” and “Benefits” (see Appendix E for a small copy of the grid). On their computer screens, the grids they had were replicated to help participants organize their thoughts. At the end of the 5 minutes, MediaLab instructed participants to stop writing. Returning to MediaLab on the computer, the participants then completed a 3-minute free-response activity during which they provided an overall evaluation of whether and why the benefits of changing outweigh the costs.

Instead of weighing costs and benefits of reducing environmentally harmful behaviors, participants in the control decisional balance condition generated information about their four favorite books (see Appendix F for instructions given to participants). They received the same grid; however, both their paper versions and the version replicated on their computer screens inserted “Book 1,” “Book 2,” “Book 3,” and “Book 4” prompts *inside* each of the four squares (see Appendix G for a small copy of the grid). As in the decisional balance condition, participants took notes for 5 minutes, only they listed as much information about each of their four favorite books as they could. At the end of 5 minutes, MediaLab signaled participants to stop writing, and they then completed a 3-minute free response activity, as in the decisional balance condition. In the control decisional balance condition, however, participants spent 3 minutes comparing and contrasting the four books about which they chose to write.

Dependent Measures: Attitudes

The effects of the independent variable manipulations were analyzed utilizing five measures: four self-report questionnaires and one behavioral measure. The first of these self-report measures was used to gauge environmental attitudes.

New Environmental Paradigm (NEP). This self-report measure is one of the most reliable and frequently-used measures for assessing environmental attitudes (Dunlap et al., 2000). Participants were asked post-intervention to respond on a 7-point scale to indicate how strongly they agreed or disagreed with 15 statements about the environment (see Appendix H for the NEP).

Dependent Measures: Readiness to Change

Two self-report measures were used to assess participants' readiness to change their behaviors. The first of these was adapted for the purposes of this study, while the second was taken from literature on the subject of motivation to change environmentally harmful behaviors.

Environmental Readiness to Change Questionnaire (E-RCQ). Stage of change in acting in a more environmentally sustainable manner was assessed pre- and post-intervention using the E-RCQ, which was closely adapted from the Readiness to Change Questionnaire (Forsberg, Halldin, & Wennberg, 2003) for this study. The Readiness to Change Questionnaire was originally designed to assess stage of change with respect to decreasing alcohol use. For this study, references to alcohol use were replaced with references to environmentally harmful behaviors. The E-RCQ consists of 15 items divided evenly among three anticipated factors: Precontemplation, Contemplation, and Action. Examples of items are, "It is a waste of time thinking about global warming" (Precontemplation), "I enjoy living as I please, but sometimes my behaviors are harmful to the environment" (Contemplation), and "I am trying to engage in less environmentally harmful behaviors than I used to" (Action; see Appendix I for the E-RCQ). Responses were assessed on a 5-point Likert scale with "1" being "strongly disagree" and "5" being "strongly agree."

Based on prior measures and theory behind the stage of change model, three subscale scores were calculated for each participant: Precontemplation, Contemplation, and Action. We eliminated 1 item from the Precontemplation Subscale, as it lowered the scale's internal reliability, so the final subscale consisted

of 4 items, $\alpha = .82$. We eliminated 2 items from the Contemplation Subscale for the same reason, so the final subscale consisted of 3 items, $\alpha = .78$. No items were eliminated from the 5-item Action Subscale, $\alpha = .91$. An overall 12-item readiness to change score was also calculated for each participant, $\alpha = .92$.

Internalized Motivation Scale (IMS). This is a 4-item self-report measure that assessed whether motivation to participate in ERBs was generally intrinsic or extrinsic. Versions of this measure have been used in the SDT literature (Osbaldeston & Sheldon, 2003; Ryan & Connell, 1989). Items instructed participants to indicate whether they plan to engage in ERBs because they find them interesting or enjoyable (intrinsic), because they feel they must do them (extrinsic), because they feel they should do them (introjected), or because they value them and find them important to do (identified). Responses were assessed on a 5-point Likert scale with “1” being “strongly disagree” and “5” being “strongly agree.”

In accordance with the methods used by Osbaldeston and Sheldon (2003), analyses of the IMS items for the current study were conducted based on a participant's overall IMS score. That is, each participant's IMS score was conducted by adding together scores on the intrinsic and identified items and subtracting the scores on the extrinsic and introjected items. Thus, the more positive a participant's score, the more he or she was motivated by intrinsic factors to behave in an environmentally responsible manner. The more negative a participant's score, the more he or she was motivated by extrinsic factors to behave in an environmentally responsible manner. A score near zero indicates that a participant is equally motivated by both intrinsic and extrinsic factors.

Dependent Measures: Behavior Change

Two measures intended to assess participants' intentions to actually implement change in their daily behavior. The first of these assessed *past* engagement in ERBs on the basis of a percentage of all opportunities at pretest and *intended* engagement in ERBs at posttest. The second behavior change measure led participants to believe that they were actually volunteering for a campus organization in which they would invest time toward ERBs.

Environmental Behaviors Questionnaire (EBQ). This self-report measure was administered both pre- and post-intervention. It assessed each participant's past and anticipated levels of engagement in sustainable behaviors. This measure consisted of a list of 24 ERBs, such as, "Turning off water while brushing your teeth or shaving." The items on this questionnaire were developed based on publicly available lists of recommended actions provided by organizations such as the National Wildlife Federation and National Geographic. Pre-intervention, participants answered with regard to the percentage of opportunities to engage in these ERBs they have taken advantage of in the last 6 weeks. Post-intervention, they responded with regard to the percentage of these opportunities they intended to take advantage of in the next six weeks (see Appendix J for the post-intervention version of the EBQ).

From the pretest data, we saw that a substantial number of participants circled "NA" as their response to many items, particularly those related to car use, meaning they did not feel those items applied to them. Thus, there were 15 items left on the EBQ after dropping those items to which 10 percent of participants did not respond (or circled "NA"). Scale scores were then developed on the basis of exploratory factor

analyses, and two factors emerge. The first factor contained 4 items that seemed to load on a consciousness-raising factor (EBQ Consciousness-Raising Subscale), $\alpha = .88$. An example of an item on this scale is, “On a daily basis, encourage others to engage in more pro-environmental behaviors.” The second factor loaded on 11 items dealing with various environmentally-related behaviors (EBQ Specific Behaviors Subscale), $\alpha = .78$. An example of an item on this scale is, “Turn off computer/electronics vs. leaving on standby.” We therefore analyzed scores for the EBQ on these two subscales.

IWU Green Group volunteer form. Post-intervention, MediaLab prompted participants to complete a form purportedly from a (fictitious) campus pro-environmental group (see Appendix K for the IWU Green Group volunteer form). This form provided participants with a list of 11 campus-related ERBs and asked them how willing they would be to help with the activities (e.g., Rake leaves for composting on campus, Help transport paper and cans in recycling bins). They were also asked how many total hours they would be willing to volunteer each month to help with these types of activities. Finally, they were asked whether or not they would like the researchers to provide their contact information to the (fictitious) campus pro-environmental group. We hoped that this measure—particularly the last item—would allow us to obtain a more accurate picture of the extent to which the interventions encouraged actual willingness to participate in ERBs.

Procedure

The current study consisted of three phases: pre-testing, independent variable manipulations presented on computers, and administration of the dependent

measures. Mass testing of participants was conducted in general psychology courses earlier in the semester. During the mass testing, participants received a paper-version of the E-RCQ and EBQ (as it relates to behaviors engaged in during the last 6 weeks), along with questionnaires administered for other projects in the university's psychology department. Later in the semester, students were given the opportunity to sign up for the current study through the psychology department. The current study took place between 3 weeks and 4 months after the mass testing data was collected.

Before participants arrived at the departmental microcomputer lab in which the research was conducted, they were randomly assigned, within gender, to one of the six experimental conditions formed by manipulation of the type of information (three levels) and decisional balance (two levels) independent variables: (1) control information, control decisional balance; (2) basic only information, control decisional balance; (3) basic plus normative information, control decisional balance; (4) control information, decisional balance; (5) basic only information, decisional balance; and (6) basic plus normative information, decisional balance. Random assignment was done within gender in order to maintain balance between genders and to control for any potential gender confounds in the results. When participants entered the experimental room, they read through and signed the informed consent (see Appendix L for the informed consent form). When they were ready to begin, they received packets with either the decisional balance or control decisional balance grid (depending on their condition) and the IWU Green Group volunteer form.

The researcher started the MediaLab program that guided the remainder of the experiment, typing in the condition number and identification number assigned to

each participant. MediaLab then presented the appropriate PowerPoint presentations for each participant's condition. Throughout the manipulation phase, the activity a participant was engaged in varied with the condition to which that participant was assigned. The type of information manipulation always came first and the decisional balance manipulation second.

After the manipulation of the independent variables was complete, all participants were administered the Environmental Behaviors Questionnaire (EBQ), Internalized Motivation Scale (IMS), New Environmental Paradigm (NEP), and Environmental Readiness to Change Questionnaire (E-RCQ) in random order, with the exception that the IMS always followed the EBQ. This was done so that participants would indicate intended engagement in ERBs and subsequently indicate their motivation to participate in these ERBs. Participants then provided demographic information (see Appendix M for demographic information requested) to help gain a sense of the population sampled. At this time, MediaLab instructed participants to fill out and place the IWU Green Group volunteer form in the box by the door and to then retrieve the debriefing form from the experimenter. The debriefing form disclosed that the information requested by the volunteer form would not really be provided to the fictional IWU Green Group (see Appendix N for debriefing form).

Results

Preliminary Analyses

Missing data. Missing data was a problem primarily for pretest measures. This is thought to be in large part because the measures for the current study were placed last in the mass testing questionnaire packet. Because administration of measures for

mass testing was often rushed for time, many participants were unable or chose not to finish the measures for the current study. Also, because the measures were paper-based, participants had the option to pick and choose to which items (if any) they responded. Finally, not all students in the classes were present the day the mass testing measures were administered, so this resulted in their not having pretest data for the study, as well.

Participants who did not have a pretest score for the E-RCQ were thus excluded from the analyses of covariance (ANCOVA), as they did not have a score for the covariate used. This resulted in an exclusion of 31 participants for the ANCOVA analyses.

Data Analysis Method

Each dependent measure was analyzed using a 2 (decisional balance) x 3 (information) ANCOVA with the participant's pretest readiness to change score entered as a covariate. According to Newton and Rudestam (1999), the ANCOVA is effective in experiments when participants' pretest scores are available, because it allows experimenters to control for within group differences and to sharpen focus on between group differences. In this way, researchers can improve power and precision and gain a more accurate estimate of manipulation effects. Additionally, data interpretation for true experiments is the same for an ANCOVA as for an analysis of variance (ANOVA; Newton & Rudestam, 1999, p. 222).

For the current study, the main focus was between group differences brought about by the decisional balance and information experimental manipulations. We suspected, however, that participants' preexisting readiness to change and gender

might also have an effect on outcome measures. Thus we controlled for these potential effects in two ways. First, overall preexisting readiness to change (overall pretest E-RCQ scores) was used as a covariate for analyses in order to control for within group differences. For all of the ANCOVAs run (with the exception of the ANCOVA for the IMS), this covariate was a significant factor, indicating that preexisting readiness to change *was*, in fact, a factor in how participants responded post-intervention. Second, possible effects of gender within groups were handled by balancing the number of males and females in each cell. Loss of subjects after balancing gender across conditions, however, occurred because of the decision to include the covariate in analyses. ANCOVAs reported below were first run with gender as an additional independent variable. While there were main effects for gender, only 2 of 27 possible interactions between gender and the experimental manipulations were significant. Because this is close to what we would expect by chance (1.35 tests significant for 27 tests at $p < .05$), and because of the relatively small effect sizes, results presented below were collapsed across gender. (Main effects for gender are discussed in supplementary analyses.)

The following results focus on the predicted effects of the experimental manipulations as assessed using the 2 x 3 ANCOVAs. For all primary analyses, we hypothesized a main effect of the information manipulation, expecting that an increasing amount of information across the three conditions would lead to increased promotion of ERBs; we also hypothesized a main effect of the decisional balance manipulation, expecting that engagement in the decisional balance exercise would

lead to increased promotion of ERBs. We had no basis on which to hypothesize an interaction between the information and decisional balance manipulations.

Experimental Manipulation Effects: Attitudes

New Environmental Paradigm (NEP). The NEP was used as the primary measure with which to gauge participants' environmental attitudes. The ANCOVA yielded no significant main effects for information group or decisional balance group and no significant interaction effect between information and decisional balance group on the NEP. That is, there is no evidence that the experimental manipulation influenced participants' environmental attitudes. See Table 1 for descriptive statistics and *F*-values related to analyses for the NEP. As evident from the means, participants overall reported pro-environmental attitudes ($M = 4.83$, $SD = 0.87$) in comparison to a neutral stance, as represented by the scale midpoint, $t(179) = 12.73$, $p = .000$.

Experimental Manipulation Effects: Readiness to Change

Participants' readiness to change environmentally harmful behaviors was assessed using two related measures. The primary dependent measure was the Environmental Readiness to Change Questionnaire (E-RCQ) and its three subscales: Precontemplation, Contemplation, and Action. The secondary measure, the Internalized Motivation Scale (IMS), was an indication of whether motivation to change was more intrinsic or extrinsic.

Environmental Readiness to Change Questionnaire (E-RCQ). Results from the ANCOVAs yielded no significant main effects or interaction effects of the experimental manipulation for the Precontemplation or Contemplation Subscales. Thus there was no evidence that the experimental manipulation either decreased

participants' levels of precontemplation or increased levels of contemplation and action. The ANCOVA for the E-RCQ Action Subscale yielded neither a main effect for the decisional balance manipulation nor an interaction effect between information condition and decisional balance condition. The main effect for the information manipulation, however, was significant, $F(2, 142) = 3.19, p = .044$, partial $\eta^2 = 0.043$. Using the Bonferroni adjustment for post hoc pairwise comparisons, we found that participants who received basic as well as normative environmental information reported themselves as significantly more ready to *enact* environmental change ($M = 3.42, SD = 0.87$) than participants in the basic information only group ($M = 3.14, SD = 0.93$). The control information group ($M = 3.22, SD = 0.87$), however, did not differ significantly from the other two information groups. See Table 2 for descriptive statistics and F -values related to analyses for all readiness and motivation to change scales.

Descriptive analyses indicated that participants reported relatively low levels of precontemplation (overall $M = 1.89, SD = 0.73$) and relatively high levels of contemplation (overall $M = 3.72, SD = 0.81$) and action (overall $M = 3.21, SD = 0.90$). Based on a one-way ANOVA, these differences were statistically significant, $F(2, 178) = 209.70, p = .000$, partial $\eta^2 = 0.539$. The post hoc test with a Bonferroni adjustment indicated that all three means differed from one another. Additional analyses indicated that, relative to a neutral position on each scale (defined by the scale midpoint), participants' precontemplation levels were significantly lower, $t(179) = -20.35, p = .000$, while contemplation, $t(179) = 12.05, p = .000$, and action, $t(179) = 17.9, p = .002$, levels were significantly higher than neutral.

Internalized Motivation Scale (IMS). A more positive IMS score indicates a more intrinsic motivation to act in a more environmentally responsible manner, whereas a more negative IMS score indicates more extrinsic motivation. Results from the ANCOVA yielded no significant main effects or interaction effects of the experimental manipulation for participants' IMS scores. That is, there is no evidence that the experimental manipulation influenced the source of participants' motivation to change environmentally harmful behaviors. See Table 2 for descriptive statistics and *F*-values related to analyses for all readiness and motivation to change scales. As evident from means, participants reported significantly more external than internal motivation to change environmentally harmful behaviors (overall $M = -0.71$, $SD = 1.62$) in comparison to the neutral scale midpoint of 0, $t(179) = -5.83$, $p = .000$.

Experimental Manipulation Effects: Behavior Change

Participants' intent to actually implement behavior change with regard to the environment was measured using the two subscales of the Environmental Behaviors Questionnaire (EBQ), Consciousness-Raising and Specific Behaviors, as well as participants' responses on the volunteer form for a hypothetical campus "green group."

Environmental Behaviors Questionnaire (EBQ). Each scale score on the EBQ reflects the mean percentage of all possible opportunities to engage in ERBs that participants intend to take advantage of in the future. Results from the ANCOVA yielded no significant main effects or interaction effects of the experimental manipulation for the EBQ Consciousness-Raising Subscale. Additionally, analyses did not yield a main effect for decisional balance or an interaction effect for the EBQ

Specific Behaviors Subscale. See Table 3 for descriptive statistics and F -values related to analyses for all behavior change measures.

On the other hand, results showed a main effect of the information manipulation for the Specific Behaviors Subscale $F(2, 142) = 5.46, p = .005$, partial $\eta^2 = 0.071$. Using the Bonferroni adjustment for post hoc pairwise comparisons, we found that participants who received basic as well as normative environmental information reported significantly higher intent to engage in ERBs ($M = 60.74, SD = 14.69$) than participants in either the basic only ($M = 53.71, SD = 16.61$) or control ($M = 52.63, SD = 17.02$) information conditions. The basic only and control information conditions did not differ significantly from one another.

Descriptively, a dependent t -test demonstrated that participants' scores on the EBQ Consciousness-Raising (overall $M = 24.66, SD = 22.61$) and Specific Behaviors (overall $M = 54.79, SD = 16.47$) Subscales were significantly different, $t(176) = 21.46, p = .000$. That is, overall, participants reported intention to engage in over half of future opportunities to be personally active in specific ERBs and intention to engage in only one quarter of future opportunities to raise awareness about climate change.

IWU Green Group volunteer form. For the volunteer form, ANCOVAs were conducted for Behavior Count and Hours. These reflect, respectively, the number of campus sustainability activities out of 11 possible for which participants expressed an interest in volunteering and the number of hours a month participants said they would donate toward sustainable activities. Additionally, the information regarding whether

or not participants agreed to release their contact information (Contact) to this hypothetical sustainability group was analyzed using a chi-square analysis.

See Table 3 for descriptive statistics and F -values related to analyses for all behavior change scales. Results from the ANCOVA yielded no significant main effects or interaction effects of the experimental manipulation on the total number of activities participants said they would volunteer for. That is, the experimental manipulation seemed to have no effect on whether participants would explicitly volunteer for specific campus sustainability activities. Overall, participants volunteered for about 2 out of 11 of these proposed campus sustainability activities (overall $M = 2.17$, $SD = 2.59$).

The ANCOVA for the number of hours for which participants volunteered yielded no main effects for either the information or the decisional balance manipulations. The effect for the interaction between information and decisional balance group, however, was significant, $F(2, 130) = 3.13$, $p = .047$, partial $\eta^2 = 0.046$. Survey of the means for the interaction indicated that participants in five of the experimental conditions volunteered between 3.90 and 5.08 hours with the exception of participants in the basic plus normative information, no decisional balance condition. This group volunteered almost twice as many hours as everyone else ($M = 7.82$, $SD = 7.60$).

The chi-square analysis conducted on participants' responses to the Contact item did not yield significant results for the information manipulation, $\chi^2(2) = .619$, $p = .734$, or for the decisional balance manipulation, $\chi^2(1) = .007$, $p = .933$, indicating that neither intervention had a significant impact on whether or not participants

agreed to be contacted by the hypothetical group. Overall, 76.7 percent of participants declined having their information released to the IWU Green Group, while 23.3 percent gave their consent.

Supplementary Analyses

In order to gain a better descriptive sense of our results and to explore future directions for research in the field, we conducted supplementary analyses. These examined main effects of gender on overall scales for the dependent measures as well as the validity of the primary dependent measure developed for this study (i.e., the Environmental Readiness to Change Questionnaire).

Gender effects. Using independent *t*-tests, we found that males and females significantly differed from each other on three of the six scales examined. Specifically, women reported significantly more positive environmental attitudes, environmental readiness to change, and intended environmental behaviors. See Table 4 for descriptive information and *t*-values regarding gender effects.

Measure validation. The E-RCQ was developed for the current study based on theory and prior measures relating to stage of change. The Readiness to Change Questionnaire used by Forberg, Halldin, and Wennberg (2003) focused on alcohol use and guided the development of the E-RCQ used in the current study. Overall, both measures focus on three stages of change (precontemplation, contemplation, and action) and contain similar items with the exception that the E-RCQ targets environmentally harmful behaviors. Analyses were conducted to examine construct validity of the E-RCQ, including internal consistency, test-retest reliability,

correlations with other measures of environmental attitudes and behaviors, and its sensitivity to change.

As indicated, internal consistencies for the overall and subscales of the readiness to change measure were acceptable to excellent. The overall E-RCQ scale consisted of 12 items with the Precontemplation items recoded, $\alpha = .92$. The Precontemplation ($\alpha = .82$), Contemplation ($\alpha = .78$), and Action ($\alpha = .91$) Subscales also exhibited good internal consistency. A Pearson's r calculated between overall pretest E-RCQ and overall posttest E-RCQ scores indicated the E-RCQ to have acceptable test-retest reliability, $r = .79, p < .01$. Test-retest reliabilities of the Precontemplation, $r = .61, p < .01$, Contemplation, $r = .63, p < .01$, and Action, $r = .78, p < .01$, Subscales were also acceptable, especially in light of expectations for change due to the experimental manipulations.

Validity of the E-RCQ was also evaluated by calculating the correlations of the overall pretest and posttest E-RCQ scores with other dependent variables in the study. Since similar patterns exist for pretest and posttest E-RCQ scores, for clarity here we focus on posttest scores only. Readers can see correlations of both the pretest and posttest E-RCQ scores with all other measures in the first two columns of Table 5. The E-RCQ was strongly correlated with the NEP ($r = .55, p < .01$), a well-established measure of environmental attitudes, indicating that an increase in readiness to change is related to increased pro-environmental attitudes. The correlation of the E-RCQ with the IMS did not reach significance, $r = .05$. The E-RCQ was strongly correlated with both the overall pretest EBQ ($r = .53, p < .01$) and the overall posttest EBQ ($r = .68, p < .01$), indicating that as participants' readiness to

change increased, so did their intentions to engage in ERBs in the future. Finally, the Behavior Count ($r = .53, p < .01$) and Hours ($r = .38, p < .01$) responses were also significantly correlated with the E-RCQ, indicating that increased readiness to change was related to an increased willingness to volunteer time to campus sustainability activities. All significant correlations of the E-RCQ with other measures were in the direction that would be expected based on existing theory.

Theoretically, as a measure of change, the E-RCQ should be sensitive to change. It was not sensitive to the impact of the experimental manipulation with the exception of the information condition on the Action Subscale (as reported earlier). Dependent t -tests, however, indicated that participants' scores overall changed significantly in a pro-environmental direction from pretest to posttest, regardless of experimental condition, $t(148) = -4.32, p = .000$. Furthermore, the correlation between pretest E-RCQ overall score and change score from pretest to posttest on the overall E-RCQ was significant in the way that suggests precontemplators changed the most in a pro-environmental direction ($r = -.43, p < .01$).

Discussion

Research Question and Hypotheses

The purpose of the current study was to assess the effectiveness of certain MI techniques specifically when applied to environmentally harmful behaviors. Global warming is a real problem (Pachauri, 2007), and it is essential to continue research on how we can combat climate change. Since human behavior has been implicated as the primary contributor to climate change in the research (Koger & Scott, 2007; Pachauri, 2007), exploring how human behavior can be changed is the ideal place to start.

Attempts to intervene, however, have found discrepancies in how active people say they are in ERBs and how active they actually are (Pahl et al., 2005). Additionally, Gatersleben and colleagues (2002) found that whether people are informed about the problem determines whether they will take action. Because MI is said to be useful in any context in which participants must resolve ambivalence about changing a problem behavior (Miller & Rollnick, 2004), it may be an effective technique in reducing the human contribution to climate change. In the current study, two MI techniques were used in an attempt to promote ERBs: provision of information and engagement in a decisional balance exercise. Based on prior literature, we hypothesized (a) a main effect of the information manipulation such that provision of basic as well as normative information about the current state of global warming would be more effective than basic information only at promoting ERBs, which would in turn be more effective than a control information group and (b) a main effect of the decisional balance manipulation such that engagement in a decisional balance activity would be more effective than engagement in a control activity at promoting ERBs. We had no basis on which to hypothesize an interaction between the information and decisional balance manipulations.

Instigating Pro-Environmental Change: The Effects of Two Motivational Interviewing Strategies

Provision of information. Within the framework of MI, provision of information is conceptualized as a way to motivate change (Markland et al., 2005). In the current study, a main effect of the information manipulation was found on two dependent measures meant to assess readiness to act and intent to engage in ERBs.

However, no main effect was found for attitudes, internalization of motivation, level of contemplation, or willingness to volunteer for a hypothetical campus sustainability organization. Analysis of the main effect for the information manipulation on the action-oriented dependent measure revealed that basic information alone did not seem to have an effect in promoting ERBs. The added normative information, however, was the source of the main effect of information condition. For both dependent measures, post hoc analyses indicated that it was the basic plus normative information group that differed from the basic information only group (on the E-RCQ Action Subscale) and from the basic only and control information groups (on the EBQ Specific Behaviors Subscale).

Thus, it can be concluded that, in some cases, the added normative piece is essential in order to promote change. From the perspective of self-determination theory (SDT), this could be because the automatic nature of these social and moral norms causes them to be internalized, which leads to strong, embedded attitudes and behaviors (Markland et al., 2005). Furthermore, Pelletier (2002) and Thogerson (2006) found that *environmental* norms are among those social and moral norms that people internalize. In the current study, the Internalized Motivation Scale, which was intended to assess intrinsic/extrinsic motivation to participate in ERBs, revealed that people in general (regardless of experimental condition) participate in ERBs for extrinsic reasons. We might have expected at least those people who were affected positively by the normative information to demonstrate enhanced intrinsic motivation to participate in ERBs, which would fit in with the idea from SDT that self-determined change bears a strong link to the self. We did not, however, find this

relationship. This could be because of the unreliability of the IMS in the current study or because social and moral norms have a lasting effect on people's thoughts and behaviors, even if they are made aware of faulty norms.

An alternative explanation for the effectiveness of normative information stems from the transtheoretical model of change. In terms of this theory, provision of normative information may have been effective because norms affect the very way in which people conceptualize their problem behaviors, and a new perspective on a problem behavior can urge someone to resolve his or her ambivalence about changing it. Gatersleben and colleagues (2002) found that people often have both a lack of information about how their behavior affects the environment and additionally feel as if their behavior is fine, because they do not feel as if they act any differently from everyone else. In the current study, it seems that providing normative information may have prohibited them from getting "lost in the crowd." When behavior of a group with which participants were likely to identify was contrasted with others' behaviors, participants' own contribution may have become more evident. This could assist in developing discrepancies between participants' attitudes and their actual behaviors, which could then instigate behavior change.

Decisional balance. In the current study, we found no significant effects of the decisional balance manipulation on any of the outcome measures. There are many reasons why we may have failed to find the anticipated effects.

First of all, the design of the decisional balance exercise may not have been strong enough to lead participants to develop enough discrepancy between their values and their actual behaviors (another of the four principles of MI; Miller &

Rollnick, 2002). It is expected that most people value the idea of environmental sustainability and having clean surroundings in which to live; however, most people are not active behaviorally in keeping their surroundings clean (Pahl et al., 2005). This presents a real discrepancy between values and behavior of the type that decisional balance exercises are meant to elucidate for participants in order to instigate change. From the perspective of MI, it is thought that if people are made aware of the conflict between what they value and what they actually do, they will be motivated to act in a way that sets their values in line with their behaviors. Thus, instead of having participants identify the pros and cons of changing or maintaining their current environmentally-related behaviors (as in the current study), future research might have participants write explicitly about how their actual personal engagement in ERBs does or does not correspond to the values they hold. Maybe in this way, more concrete discrepancies can be developed.

Additionally, MI is built around *human interaction* that provides the context in which the four key principles (express empathy, develop discrepancy, roll with resistance, support self-efficacy) of MI are easy to utilize. Simulating the MI environment in computer-driven manner (as we have in the current study) deprived participants of another human being who could provide them with many resources throughout the change process. A counselor-figure could express empathy, which is one of the four principles of MI. Theoretically, this is essential in allowing participants to accept and work with their own strengths and weaknesses. Additionally, a counselor could “roll with resistance” in a way that is probably more effective when manifested in a one-on-one, human interaction. In the current study,

participants were not challenged directly to explore any resistance they experienced to change. A counselor, however, would support participants in confronting and working through their resistance. The alternative viewpoint available when interacting with another human being may also be necessary to allow participants to see the discrepancy they are creating between their own values and behavior. Without someone to point out the discrepancies, listing them and writing about them may not be enough.

It is also possible that, in our attempt to support self-efficacy (in keeping with the principles of MI) and allow participants to be self-guided in this exercise, they did not engage deeply enough in the activity to elicit change. Further research could analyze participant engagement in this exercise to see if level of engagement is a good predictor of positive change on outcome measures. These analyses would help researchers to assess the extent to which participants were engaged in the MI necessity: “change talk.” It would be expected that those who participated on a surface level would be less affected by this decisional balance exercise than those who thought the exercise through deeply (Miller & Rollnick, 2002).

Finally, psychologists might be led to believe that the decisional balance exercise highlighted for participants their cognitive dissonance. In the current study, the intent was to elicit behavior change, but other ways may exist to reduce cognitive dissonance that are not behavioral. Participants’ pro-environmental attitudes were relatively high compared to the neutral scale midpoint, while their intended engagement in ERBs was relatively low. Additionally, the measure formulated to gain a more purely behavioral sense of participants’ willingness to be pro-

environmental found just over a fifth of participants willing to be contacted by the fictional pro-environmental campus group. This demonstrates that participants may have been reducing their dissonance in other ways. A human interviewer may have helped in not allowing participants to discount the ways in which their future behaviors would have a negative impact. Future studies might construct intervention strategies that would hold participants more behaviorally accountable, such as suggesting specific behaviors that they should engage in or emphasizing more the way in which each individual has a detrimental impact, even if it is only a seemingly insignificant behavior.

Understanding and Conceptualizing Change

The two primary theories used to inform the predictions of the current study also can help explain findings. SDT and the transtheoretical model of change point out reasons behind why certain people are motivated and ready to instigate change in their lives.

Self-determination theory (SDT). According to SDT, motivation to change should bear a strong link to the self in order to be acted upon (Markland et al., 2005). Results from the IMS in the current study yielded means that imply participants tend to be motivated more extrinsically overall to participate in ERBs. From the perspective of SDT, this trend seems disheartening. However, it is possible that the adaptation of the IMS from Osbaldiston and Sheldon (2003) for the current study is not a sufficiently sensitive measure. Specifically, it was the only measure that did not significantly correlate with the majority of the other outcome measures.

On the other hand, perhaps sustainability is more naturally motivated by extrinsic factors. Maybe people have difficulty connecting these types of issues to their own lives. If this is true, researchers in the field need to rethink their approach to the problem. Future studies might research how different methods of increasing intrinsic motivation and/or increasing extrinsic motivation to participate in ERBs yield short- and long-term behavioral effects.

Transtheoretical model of change. For the purpose of primary analyses for the current study, the readiness to change measure was developed and utilized both as a pretest and posttest measure to assess affiliation with each of the three stages of change. Correlational analyses indicated that participants with overall less readiness to change at the outset changed the most over time. This result is in line with Gintner and Choate's (2003) findings that MI has the most impact for those in earlier stages of change.

Furthermore, the development of the readiness to change questionnaire for the current study seems promising, and it is suggested that researchers in the future continue to use and work on this measure. Based on reliability analyses and its correlations with measures of environmental attitudes and intended environmental behavior, it seems that the readiness to change questionnaire provides a particularly useful assessment of participants' environmental attitudes and intentions. Basically, the E-RCQ helps to answer questions regarding how ready a person is to hold more positive attitudes toward the environment as well as how ready a person is to act on these beliefs to benefit the environment. In this way, this measure may help bridge the gap between attitudes and behaviors; it seems to embody an "in between" construct

that begs further exploration. Tapping into this alternative construct could be useful to informing future research by way of assessing not just the attitudes participants *have*, but also the attitudes that they are *ready* to have.

Gender Effects

The gender effects found in the study indicated that females tend to exhibit more pro-environmental tendencies than males. This is in line with literature on the phenomenon (Pahl et al., 2005; Winter & Koger, 2004). Winter and Koger (2004) suggest that the idea of an ethic of care may help explain the cause of this effect. In terms of this construct, women are more likely to see the ways in which people depend on and connect with their environment. In light of the ecofeminism movement, women are also more aware of the ways in which the family unit is directly affected by a damaged, polluted environment.

Strengths and Limitations

Many design elements of the current study were especially strong. First, we utilized an experimental design in which participants were randomly assigned to experimental conditions. Second, using participants' pretest data as a covariate for the primary outcome analyses was beneficial in controlling for apparent within-group differences. Finally, engaging participants in both seeing and hearing the information presentations also seemed to be effective in holding their attention as closely as possible for the duration of the presentations.

The development of the E-RCQ for the current study seems to have been a success, as well. Not only did scores on this measure correlate with scores on other environmental attitudes and behavior measures used in the current study, but they

also correlated with scores on the NEP, a well-established measure in the literature on environmental attitudes.

Besides those discussed in the context of the specific interventions, additional limitations of the current study must be acknowledged in hopes that future research can attempt to account for and mediate these difficulties.

Missing data. The first limitation lies in that a number of participants were missing pretest data. We cannot be entirely sure if this absence of data was random, especially as analysis of posttest data suggested that those missing pretest data (and thus dropped in posttest analyses) were somewhat lower in levels of environmentally responsible attitudes, behaviors, and readiness to change than were participants not missing pretest data.

Nature of self-report measures. The outcome measures used in this study were self-report. This could lead to reporting biases, including social desirability. It is possible that social desirability in these self-report measures is responsible for the overall positive increases in participants' scores from pretest to posttest, regardless of experimental condition. The ideal way to assess behavior change is to observe behavior change, and future research should strive to include more comprehensive measures of observable behavior, such as creating a situation in which participants are presented with a real decision of whether or not to engage in an ERB or giving participants the opportunity to actually join a campus sustainability organization and tracking which participants take advantage of this opportunity.

In the current study, the attempt at attaining a more direct observation of behavior change was the IWU Green Group volunteer form. The idea was to use mild

deception in order to make participants believe that the organization was an actual group that was just started. By asking participants with which specific campus sustainability activities they would be willing to help, how many hours a month they would be willing to donate to the group, and whether or not they would like the researchers to release the participants' contact information to the IWU Green Group, we hoped that the possibility that they could be contacted and asked to participate in sustainability activities would be real to participants. Therefore, while the current study did take steps towards observing "green" behavior more directly, future research should extend this method.

Additionally, a measure that was dropped from the current study due to time constraints was an implicit attitudes measure. Our intentions were to see how well participants receiving the interventions were at associating images of people participating in ERBs and of people participating in environmentally harmful behaviors with both positive and negative words. Future research might use this implicit measure in experiments in order to assess attitudes in a way that minimizes social desirability effects.

Sample characteristics. The participants used in this study were all college undergraduates. Because of this narrow sampling, the external validity of the current study's results may be in question. Additionally, this specific sample was subject to a great deal of "green" activity on campus. In fact, during the time in which the current study was conducted, the university which all participants attended experienced unusually high levels of green activity. For example, the Office of Residential Life implemented new jobs and programs that promoted large-scale campus sustainability

action. The university also sponsored Focus the Nation, an event that hosted speakers and activities for a week that relate to sustainability issues. Many students on campus were either required to go to some of these Focus the Nation activities or received extra credit for attending and participating in scheduled events. Although there is no way to test for this, increased campus green activity may account for the overall increase in participants' reporting of pro-environmental attitudes and behaviors that was found regardless of experimental condition. Further, these campus events may have in this way decreased the ability of the current study to detect manipulation effects.

Human interaction in motivational interviewing. Dynamic human interaction is a large part of the process of MI. Perhaps the largest limitation of the current study is that human contact with participants was minimal. Though participants did engage in minimal contact with the researcher, the one-on-one human interaction that would be found in a counseling setting was unavailable to participants. Therefore, it was truly difficult to implement the four principles that define MI: express empathy, develop discrepancy, roll with resistance, and support self-efficacy. Expressing empathy and supporting self-efficacy were especially difficult to do in the current study without another person involved who could clearly empathize with participants' ambivalent feelings and openly support them in making their own decisions regarding the issue at hand.

Perhaps studies that apply MI techniques to sustainability issues in the future can find the means with which to train researchers to engage in MI with participants, as this human interaction seems to be essential in many ways to motivating any sort

of lasting behavior change. Again, as Miller and Rollnick (2002) stress, MI is really a dynamic *human* interaction with the purpose of facilitating change. It is probable that specific MI strategies must then be examined in the context of this human interaction.

Summary

The Brundtland Report defines a sustainable society as one operating in a state of sustainable development, or “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (Encyclopedia, 2000). Hopefully, our society can one day live up to this definition of a sustainable society for the benefit of the future. Has the current study demonstrated ways to bring about the “psychological shift” that Koger and Scott (2007, p. 15) say is necessary to combat climate change? As Miller and Rollnick (2004) stress, MI is a useful way to approach problem behaviors in any given context. We have not demonstrated this entirely in the ways expected, but we have demonstrated that MI *can* give us some ideas about how to motivate human behavior in a positive direction so that we can fight global warming.

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