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DESIGNING EFFECTIVE MESSAGES FOR INCREASING READINESS TO USE ALTERNATIVE TRANSPORTATION

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DESIGNING EFFECTIVE MESSAGES FOR INCREASING READINESS TO USE

ALTERNATIVE TRANSPORTATION

BY

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MASTER OF ARTS THESIS

OF

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2013

ABSTRACT

The use of single-occupancy vehicles (SOVs) has had a profound impact on human health and the environment. In order to change the impact our travel behavior has on both the environment and our health, change needs to occur at an individual level. The purpose of this study was to determine effective framing strategies that will encourage individuals to use alternative, or sustainable transportation (ST), i.e. commuting by means other than SOV, and to compare the efficacy of this intervention to that of a "green" eating (GE) intervention. Using the Transtheoretical model (TTM) and its key constructs, self-efficacy and decisional balance, data were collected from 134 undergraduate students at the University of Rhode Island measuring their attitudes towards ST and GE, respectively. The intervention consisted of a pretest survey, four educational modules, tailored messaging and finally, a posttest. Data from the pretest survey contained each participant's *Stage of Change* reflecting attitudes toward ST and GE. After the pretest, participants were randomized into the GE group or the ST group. Participants in the GE and ST groups received educational modules over the course of three weeks. Between each educational module, participants received motivational messages tailored to their respective stage, as determined in the pretest. Results from tests revealed that there were small positive shifts in stages in each of the treatment groups as well as small increases in decisional balance and self-efficacy as a result of the ST intervention.

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CHAPTER 1

INTRODUCTION

With growing concern about global climate change, behavior change interventions are becoming more critical. Encouraging individuals to use sustainable transportation (ST), defined as commuting by any other means than a single occupancy vehicle (SOV), may have a positive impact on reducing Greenhouse Gas emissions which contribute to climate change. Among a plethora of advantages of using ST, as opposed to conventional automobile travel, it may also improve population health and help reduce obesity. This study is part of a larger study, which also incorporates a green eating intervention. Both are sustainable behaviors associated with distinctly different manifestations. However, they might reflect an underlying dimension of 'sustainable thinking.' Using the TTM as a platform for developing effective communications can provide more precise message tailoring. Framing the important issues in a manner that is both understandable and encouraging is a challenging task. However, the predictive nature of the TTM's core constructs allow for message tailoring that is both unique and meaningful to each set of individuals in their respective stage of change.

CHAPTER 2

LITERATURE REVIEW

This review will focus primarily on sustainable transportation. The use of

single occupancy vehicles (SOVs) as the dominant means of transportation is

unsustainable and has forced the spotlight on one of the most difficult and complex

challenges of the 21st century – managing global climate change. Recently there has

been a tremendous amount of interest expressed by scholars, public officials, and

concerned citizens. However, even with numerous research findings indicating the

anthropogenic and adverse impact on the environment, global climate change has been

portrayed as inevitable, irrelevant, and sometimes even nonexistent. Surprisingly,

skepticism about the validity of global climate change remains. But, the scientific

community almost unanimously agrees that global climate change is indeed occurring,

caused by human activities, and is actually worsening with time (Nerlich, Koteyko, &

Brown, 2009). Global climate change is the result of enormous amounts of green

house gasses (GHGs) emitted into our atmosphere. Whether we are heating our homes

or powering our neighborhoods, fossil-fuel based energy resources produce the

majority of these GHGs (Shannon, Giles-Corti, Pikora, Bulsara, Shilton, & Bull,

2006). A key contributor is the prevailing current choice of automobile transportation

(Balsas, 2003; Shannon et al., 2006; Toor, 2003). In the United States, transportation

accounts for more than two-thirds of petroleum consumption with over fifty percent of

it being used by personal vehicles (U.S. Energy Information Administration, 2012). It

is estimated that over 32 percent of U.S. carbon emissions is directly from transportation (U.S. Energy Information Administration, 2012). With over 95 percent of personal trips taken in the United States being by automobile, motorized vehicles account for twenty five percent of the total petroleum consumption (Toor, 2003). Of even greater concern is, that nearly all of these trips are Single Occupancy. Single Occupancy Vehicles (SOVs) are defined as vehicles that are operated and used by only one person at a time. It is the use of SOVs then, which deserves a great deal of attention.

There has been a steady rise in the amount of SOVs on the road due in part to the rapid growth of the population (Goetz, Dempsey, and Larson, 2002). This is cause for concern for an abundance of reasons (Ben-Elia & Ettema, 2011). Black (1996) identifies the following issues related to the use of SOVs: noise pollution, structural damage from vibration, water pollution due to runoff from streets and highways, loss of wetlands, loss of open spaces, loss of historic buildings, marine pollution due to petroleum spills, productivity losses due to accidents, decreases in property values, national security concerns and finally macroeconomic concerns (p.151). Rather than discussing each of these issues in detail, I will instead focus on the relatively pertinent findings that support the focus of my research.

Congestion has become a major area of concern as the number of vehicles on the road have increased considerably over the past few decades. In the past, managing congestion issues was as easy as using more space for roadways (Black, 1996). However, the rapid growth has created a sense of urgency that was nonexistent in previous years (Goetz et al., 2002). Part of this urgency stems from the fact that cities

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and towns all across the United States are running out of space and money to expand and build new infrastructure. Public officials have also been reluctant to invest in new environmentally friendly transport infrastructure because of the associated costs. Ironically, this has further aggravated the situation and increased costs (Giorgi, 2003). Building more roads is no longer the preferred solution to solving congestion problems, due to countless issues (Batterbury, 2003), including urban sprawl. Urban sprawl has recently been given more attention as building more roadways and communities farther away increases the necessity to own a motor vehicle.

Cities and towns have been built around the automobile being the dominant mode of transportation. According to Szyliowicz (2003), a tremendous amount of space is reserved for parking lots, parking facilities, and roadways. One attempt to deal with this issue is land use planning, which incorporates public officials, experts, and others to create sustainable policies for how land is used (Wei & Lovegrove, 2010). Land use planners research and implement strategies to decrease the amount of SOVs on the road. They have discovered that it is the built environment that directly influences the amount of auto dependence (Wei & Lovegrove, 2010). It is clear that with the above-mentioned issues, there is a need for both for policy reform and in particular, for behavior change.

At the policy level, land use planners have begun working on building communities that consider bicycle riders, walkers, and users of public transport, instead of building communities that cater to automobiles. Researchers and political officials alike can agree that our current infrastructure is not safe for pedestrians who

choose to walk or ride their bicycle for transportation. Wei and Lovegrove (2010) have termed pedestrians using these modes for transport "Vulnerable Road Users" (VRUs). With more and more vehicles on the road, and less and less space for people to commute by walking and cycling, more fatalities are occurring every year (Wegman, Zhang &Dijkstra, 2010). Commuting by bicycle is one of the most sustainable transport modes available for several reasons. Bicycles are relatively inexpensive and low-cost for maintenance. They are also quiet, don't emit any pollutants into the air, and require considerably less space than current popular modes like SOVs (Wegman et al., 2010). It has been found (Wei and Lovegrove, 2010) that increased bicycle use is associated with decreased total road collision fatalities. Road collisions pose a burden on society with the costs associated with automobile accidents, and more importantly, the fatalities that occur. Although improving conditions for walking and bicycling is highly desirable, researchers admit that unfortunately there is a period where it may be unsafe (Wei and Lovegrove, 2010). With more pedestrians on the road, there is an increase in the likelihood that someone is struck by a vehicle. However, scholars also attest that after a short period, there will be far more bicycles on the road. This means that infrastructure will eventually improve, and motor vehicle operators will be forced to pay more attention and care to others on the road (Elvik, 2009). Even though there are alternatives to using SOVs, it is still rather difficult for people to give up their cars (Batterbury, 2003). It is believed that part of the reason is due to the amount of precise planning needed in order to use these alternatives (Batterbury, 2003; Garling & Schuitema, 2007).

In addition to the amount of precise planning that needs to occur for people who switch from using SOVs to either walking, bicycling, and public transit, there may be other factors that act as barriers. Several scholars have suggested specific strategies to decrease these barriers and increase bicycling and walking for transport. The use of SOVs has been engraved in American culture for decades. The automobile has become more than just a way of getting around; it has become a status symbol that enhances our feelings of autonomy and prestige (Gatersleben & Uzzell, 2007). It reflects a part of our identity. Garling and Schuitema (2007) discuss the car as being "attractive". They suggest radical strategies for decreasing car use, and increasing the use of alternative modes – reduce the attractiveness of the car and increase the attractiveness of alternative modes. First, they suggest a physical change that would improve infrastructure for public transport, walking and cycling. One way of doing this is to decrease the amount of parking places while increasing the amount of speed ramps on roads. Another suggestion would be to make driving a car much more expensive than it already is, while simultaneously decreasing the costs for using alternative modes. Other researchers have discussed similar ideas (Rose & Marfurt, 2007; Steg & Gifford, 2005; De Vos, Derudder, Acker & Witlox, 2012). Henson and Essex (2003) discuss current transport policy and how to make possible the goals put in place: to "design a network that is a combination of an inefficient network for car use and a more efficient network for local foot and cycle use" (p.228). Although these ideas seem plausible, they may not be practical. Transportation Demand Management [TDM], is the implementation of strategies and policies to reduce travel demand by way of SOV (Eriksson, Nordulund & Garvill, 2010). As gas prices soar, so too does

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the urgency to develop and implement TDM strategies. Eriksson and colleagues (2010) discuss "push and pull" methods for reducing car use. It was concluded that utilizing both methods simultaneously had the best effect for changing behavior. Push measures attempted to make car use less beneficial by raising costs for using cars with taxes and higher gasoline prices. Pull measures aimed to improve the alternative options. Neither push nor pull measures were effective alone, but together they showed promise. There has been a rise in research and interest regarding sustainable transportation, based on economic considerations. Of greater importance however, is the effect our current modes of transport have on our health.

The most obvious impact on health from the heavy reliance on automobiles for transportation is the amount of pollution emitted into the atmosphere. While some scholars focus on how pollution affects global warming, others are more concerned with its impact on the health of the population (Frank, Andresen & Schmid, 2004; Carver, Timperio, Hesketh, & Crawford, 2010). Pollution emitted from automobiles has been found to exacerbate asthma and other breathing issues, as well as cause other health-related issues, including cancer and heart disease (Toor, 2003). Of the many related health issues, a great deal of attention is focused on obesity.

Obesity is a growing concern in all parts of the world, especially in the United States. According to Frank (Frank et al., 2004), approximately 280,000 deaths in the United States every year are the result of obesity. Research has shown a connection with transport mode used and health. Recent research has found that there are higher levels of obesity in communities where the private automobile is the dominant means for transportation (Lopez-Zatina, Lee, &Friis, 2006). Frank et al., (2004) found that

increased time spent driving is a sedentary form of behavior and increases the odds of being obese.

Researchers have identified sedentary lifestyles as being a major contributing factor to the increase in obesity rates across the United States and the world (Salmon, Crawford, Owen & Bauman, 2003; Stahl, Rutten, Nutbeam, Bauman, Kannas, Abel, Luschen, Diaz, Rodriquez, Vinck, Van Der Zee, 2001; Poortinga, 2006). A sedentary lifestyle incorporates very little or no physical activity (Salmon et al., 2003). Spending long periods of time in sedentary behavior is likely to increase the risks of becoming overweight and obese, as well as developing other serious health issues (Salmon et al., 2003). Using an automobile encourages very little physical activity as it is very easy and convenient, and requires almost no walking or energy expenditure. Because of the steady increase in the amount of vehicles on the road, more space is consistently dedicated to building larger roadways for vehicles. This means that there is less space for people who enjoy walking or using parks (Giles-Corti & Donovan, 2002). As mentioned earlier, the physical environment and the way land is used can significantly impact our modes of transportation, but it also impacts our daily routines and behavior (Frank, Saelens, Powell & Chapman, 2007). Babey, Hastert, Yu & Brown, (2008) state, "the availability of places to engage in physical activity is an important environmental characteristic that may influence physical activity levels" (p. 345). Studies indicate that adolescents have a lower level of physical activity in part because of their built environment (Carver et al., 2010). Neighborhoods with more parks and recreation services for adolescents coincide with a greater proportion of healthy adolescents and lower levels of obesity. Conversely, neighborhoods with less parks

and recreational facilities see a greater proportion of unhealthy adolescents and higher rates of obesity. Wells, Ashdown, Davies, Cowett and Yang (2007) provide a framework that relates one's physical environment to obesity. Their study finds that individuals who perceive their environment as having "green" infrastructure such as parks, playgrounds, and greenways are more likely to walk in the neighborhood or use sustainable transportation. Neighborhoods that are designed without a 'green' or 'active living' infrastructure are more likely to have a higher percentage of individuals who are obese. This study finds that even people who use buses or trains are more physically active and are healthier than those who drive exclusively. Physical activity has been shown to help to reduce several chronic diseases and physical activity increases when individuals use sustainable transportation (Cerin et al., 2009).

Another health-related issue that is caused by driving automobiles has only begun to receive attention in the past decade: Traffic stress is related to traffic and transportation patterns. Gee & Takeuchi (2004) found that the more vehicles were present in a particular neighborhood, the higher the stress levels were amongst its residents. Some of the stressors that affected residents the most were road rage, noise pollution (high levels of physical noise), vehicle maintenance, car accidents and even post-traumatic stress. A comparative study indicated that the effect of traffic stress on health was worse for people who lived in environments with more car use than it was for those who lived in areas with less car use. Features of transportation systems in our communities and population transportation choices drastically affect our stress levels and overall well-being.

Because the current effects of climate change impact mostly those in remote regions and are thought to occur far into the future, or are temporary (e.g. extreme weather), they appear mostly invisible, and the public has a difficult time understanding its severity and the dire need for more attention. Communication plays a major role in people's perceptions of climate change and because of this, effective communication is crucial for attitude and behavior change. Because people still perceive climate change as a virtual risk and not a real one, they "act upon pre-established beliefs" (Nerlich et al., p. 2, 2010). Many if not all of these pre-established beliefs come directly from one's culture, turning the issue of climate change from a scientific phenomenon into a cultural one (p. 2). This statement reflects the complexity of communicating climate change effectively. An older model used by scientists and other public officials was the "public understanding of science model" which essentially perceives the public as ready and wanting to be filled with information. The problem with this however, is the assumption that communication occurs in a linear fashion between scientists and the public. Using traditional media as a channel for communicating climate change issues contributed to this assumption. This view is quite frankly, too simplistic. Just because a person obtains knowledge does not mean that 1. they understand the information, 2. they know why the knowledge is important, or 3. that they understand how to use this knowledge. Nerlich argued that (as cited in Thaler & Sunsteen, 2008), ordinary people are seen as being poor decision makers unless "nudged" to make the correct, expert-approved choice as a result of expert manipulation of their apparent 'choice architecture'.

This evidence highlights the fact that older models of communication strategies need to change in order to be effective. Communication through traditional media may prove to be ineffective in today's highly technological world. Coupled with this idea, is the issue that scientists have had great difficulty communicating complex concerns to the lay public. Nerlich and colleagues (2010) identify improving science communication as the major approach to improving climate change communication. The language that scientists use is much different from that of the general public. Words that scientists use to create one message with one meaning translate into multiple messages with various perceptions of the message's meaning. With the rapid growth of technology in recent years, an opportunity to improve communication between scientists and the public has emerged, especially given the fact that individuals have grown adept at using social media.

Lakoff (2010) provides an interesting perspective by modifying the framing concept to apply to sustainable behaviors. Encouraging sustainable transportation use directly impacts the well-being of our environment and helps reduce the negative impacts on global climate change. Frames are mental schemas that allow us to store and make sense of all our knowledge (Lakoff, 2010). Individuals perceive the world based on the mental frames they have acquired in life. These frames develop in systems and one word within the system can trigger an emotional response. Lakoff states that climate change communication needs to be framed in a way that people will comprehend. It was once believed that simply communicating a message was all it took to create an impact. Although words are not frames, they can be used to activate certain desired frames (Lakoff, 2010 p. 73). If there is a lack of frames around a

particular issue, like global climate change, any words or messages will have very little or no impact. Lakoff states that the facts need to be framed properly in order for any change to occur (p. 73). Determining how to present these facts is the challenge for this research study. It is precisely this issue that deserves investigation. Citizens in the United States are experiencing "hypocognition", which Lakoff defines as the "lack of ideas we need" to construct appropriate and effective frames for increasing the understanding of the crisis of climate change (Lakoff, 2010 p. 76). This is one of the major reasons why communicating climate change issues is rather difficult. It is also the major reason for why message framing deserves attention. Lakoff's solution to this problem is to begin framing the truth effectively. Part of why this issue is so complex is because people have built up frames that are incorrect or contradict scientific findings about climate change. Within these incorrect frames are the perceptions created by the carbon industry in the United States through multi-million dollar ad campaigns (Cox, 2010). These messages create resistance to change and doubt of scientific findings. Ultimately it is words that move people to act. But if people don't have frames for understanding those words, or why the messages created with those words have merit, then no change will occur. Building frames that will provide a platform for using certain messages will allow clearer communication between climate change scientists and the public.

Research surrounding message framing has been considerable in the areas of health communication and behavior change. Theories of message effects and framing have been applied to research regarding physical activity, disease prevention, consumer behavior and shows hope for expansion into other areas of research.

Countless studies have utilized prospect theory (Kahneman and Tversky, 1979; Kees, 2011) in hopes of crafting more effective messages. Specifically, gain framing and loss framing has been studied in numerous situations. However, even with extensive use of gain and loss frames in studies, researchers have yet to develop a clear understanding of how and when to use certain frames in specific situations (Cappella, 2006; Rothman, Bartels, Wlaschin & Salovey, 2006). There has been research highlighting the significance of effective framing and its potential on encouraging behavior change (Detweiler, Bedell, Salovey, Pronin, Rothman, 1999). Understanding effective message design methods may increase the likelihood of behavior change.

An intervention that aims to increase the readiness of individuals to engage in environmentally conscious behavior may prove to be an effective tool for future behavior change research. The current study will expose individuals to motivational messages aimed to increase their knowledge about the benefits of either using sustainable transportation or green eating. In order to increase the impact of the intervention, designing effective messages is critical. Lakoff (2010) suggests that, when individuals lack the appropriate frameworks for understanding messages, it becomes more difficult to inform them of an issue. Therefore, to ensure that the information is both understandable and effective, participants should initially be exposed to limited information and gradually receive more information during the intervention.

Prochaska's Transtheoretical Model (TTM; Prochaska, Norcross, &DiClemente, 1994) was developed to understand how people successfully change behaviors. Initially, the model was created to help tobacco smokers quit, but since has

been widely adopted in a multitude of research areas. The TTM posits five unique *Stages of Change* individuals go through when seeking to change any behavior. When individuals are in the *Precontemplation* stage they may be in denial, may not realize there is a problem, or simply don't want to change. Those who are in *Contemplation*, are thinking about changing their behavior usually in the next six months. When individuals start planning to change within the next month and taking steps to prepare for a change, they are classified into the *Preparation* Stage.In the *Action* stage an individual has actually taken action to change the behavior within the past 6 months. After having been in *Action* for at least six months, they are classified in the final stage of the model, *Maintenance.* Those individuals who have successfully managed their change for more than 6 months are in this stage. Although the model describes these stages in order, it is also possible to skip stages at times, especially while relapsing to an earlier stage. However, sometimes after relapse, individuals move back to the precontemplation stage. Understanding how people change is complex. Although there have been a great deal of research studies conducted using this theoretical framework, only recently have researchers addressed behaviors associated with sustainability, such as energy conservation, readiness for climate change impacts (e.g., sea-level rise), and in particular, sustainable transportation. Over the past several decades, researchers have integrated two key constructs into the TTM: decisional balance and self efficacy.

 Decisional balance was conceptualized by Janis and Mann as a conflict model that contained a balance sheet of potential gains and losses (Prochaska, Velicer, Rossi, Goldstein, Marcus, Rakowski, Fiore, Harlow, Redding, Rosenbloom& Rossi, 1994). Prochaska and colleagues (1994) utilized this theory to support behavior change

research efforts using TTM. It was discovered that only two of the many factors involved in Janis and Mann's model were needed; the pros and cons of changing a particular behavior held predictive value. It was concluded that interventions for those in the early stages of change should target increasing the pros of changing because doing so would most likely result in progression from the precontemplation stage to the contemplation stage. Decreasing the *Cons* of change is critical for people in the more advanced stages.

Self-efficacy is the belief that individuals have about their own capabilities to succeed in a particular situation (Bandura, 1995). Self-efficacy theory posits that when a person seeks to change a behavior, some of the motivation to change comes from their perceptions of what they are capable of and what those capabilities will lead to as a result (Strecher et al., 1986). Self-efficacy has been widely used among scholars because of its ability to predict behavior change (Desharnais, Bouillon, Godin, 1986). When a person believes they are capable of accomplishing a task, the likelihood of behavior change is increased. Conversely, when a person believes that they are incapable of completing a task or making a change, the likelihood of a change in behavior is decreased. Greater *self-efficacy* can improve the chance of behavior change and because of this, it has become the most accepted and supported construct across different theories of health behavior change (Redding et al., 2006). Self-efficacy is an important variable used in the Transtheoretical model. Self-efficacy is used as a measure for determining an individual's confidence in their ability to achieve a particular task. Understanding participants' perceived self-efficacy would enable

targeting messages to be sent that seek to increase efficacy in hopes of increasing the likelihood of change.

Among the many organizations that have a major carbon footprint are higher education institutions (Balsas, 2003; Toor, 2003). Universities typically see tens of thousands of people commuting to and from campus every day. Most of these trips are by SOV. This large use of SOV significantly contributes to the University's overall carbon footprint and causes a host of other important issues including heavy congestion, noise pollution, deteriorating roadways, increased risks of car accidents and poor air quality conditions (Toor, 2003). Universities typically face a tremendous amount of pressure from surrounding neighborhoods for these reasons. Given the advantages that Universities have, they are in a good position to make meaningful changes to become more environmentally responsible (Balsas, 2003; Toor, 2003). In addition to the things universities can do to cut their carbon footprint, perhaps what can be done within the campus culture and in the classroom has even greater significance. Universities have the opportunity to teach college students about the importance of sustainability and the impact that our current transportation choices have on the environment. While it is unreasonable to see drastic changes upfront, it is highly likely that college students will take this knowledge with them into the future, as they become the next generation of leaders. However, campuses are currently working to become 'greener". In doing this, some universities have taken the initiative to combat the tremendous carbon footprint by focusing attention toward reducing SOV use among both students and faculty (Shannon et al., 2006).

At the University of Western Australia, researchers investigated ways to increase the use of sustainable modes of transport (Shannon et al., 2006). Using the TTM, they collected information from approximately 4400 people at the University. Each person was assigned to one of 6 stages of behavior change: Precontemplation, contemplation, preparation, action, maintenance, and relapse (relapse is not usually considered a stage, but can be considered part of the model). Precontemplators are individuals who do not regularly use sustainable transportation (walk/cycle/public transport) and have no intention to do so. Individuals in the contemplation stage don't use sustainable transportation but are thinking about it. Those in the preparation stage have made plans for changing their transportation behavior. The action stage comprises individuals who are actively using sustainable transportation. Individuals in the maintenance stage regularly use sustainable transportation and have been doing so in the last six months. Lastly, those in the relapse stage are individuals who formerly used sustainable transportation but stopped. Understanding stages of change is crucial for determining how to create effective messages that will encourage individuals to move from one stage to the next. Aside from determining the stages of the participants, barriers and motivators were also recorded, as well as participants' self-efficacy. The results from the study indicate that between 20-30% of staff and students could be encouraged to change their travel behavior in the short-term (Shannon et al., 2006). This research provided integral information for future research in sustainable transportation.

Although researchers have only recently begun to use interventions as a way to change sustainability related behavior, the results have strongly supported the

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effectiveness of this method. However, because many people have difficulty understanding what constitutes sustainable behavior, developing the right type of intervention can be challenging (Gudmundsson, 2003). According to Garling and Schuitema (2007), interventions aimed at informing and educating people can be very helpful. While these types of interventions are often useful when endorsed by celebrities or other well-known public figures, interventions that are individualized and tailored to a specific audience or group can be just as effective. There is evidence that suggests that educating the citizenry about the impacts of driving SOVs could effectively change their transportation behavior. Borek and Bohon (2008) posit that it is imperative to shift human behavior if we are to successfully reduce the levels of carbon dioxide emissions (p.1294). Scholars aim to shift human behavior with the use of message tailoring, a process for creating individualized communications based on assessments of specific individuals or groups (Rimer & Kreuter, 2006). Nisbet and Gick (2008) have drawn a parallel between health promotion strategies and pro-environmental promotion strategies. They posit that using established health behavior change models like TTM can increase pro-environmental actions. Providing a framework for the design of behavior change interventions can help facilitate change (Nisbet & Gick, 2008). Because TTM allows researchers to match stage-appropriate interventions with recipients' receptivity to information, better messages can be designed to help those attempting to change a behavior. Tailored messages that are focused on the specific needs of the target audience in a form that can be easily processed by that audience is when informational messages in interventions will be the most effective (Van de Velde, Verbeke, Popp & Huylenbroeck, 2010).

Five hundred and eighty eight students from the University of Rhode Island and the University of New Hampshire participated in a study that aimed to develop reliable measures for alternative transportation (AT), decisional balance and self-efficacy, as well as to examine associations with stage of change for AT. In the study, approximately twenty five percent of students were in the action or maintenance stages while only four percent were in the preparation stage. The majority of the remaining students indicated that they were not ready for change. Both key constructs, decisional balance and self-efficacy, accurately predicted relationships with stage of change for AT. The results of the study indicated that AT interventions should target the large percentage of individuals who are not yet ready to take action. With the development and validation of these measures, creating interventions that aim to change behaviors related to ST may prove to be effective.

The purpose of the current study was to test the effectiveness of a sustainable transportation (ST) intervention based on the TTM and message framing in encouraging individuals to change their attitudes towards sustainable transportation. A two-group randomized experimental pre-post design using a three-week behavior change intervention with repeated measures, where each group served as a control group for each other, sought to test the following hypotheses:

H1a: The Pros of ST will increase as a result of the ST intervention.

H1b: The Cons of ST will decrease as a result of the ST intervention.

H2: ST self-efficacy will increase as a result of the ST intervention.

H3: Individuals will advance in stages from pretest to posttest as a result of the ST intervention.

CHAPTER 3

METHODOLOGY

Methods

Recruitment

All participants were undergraduate students enrolled in *Communication Fundamentals* (COM100) at the University of Rhode Island and were invited to participate in the study by their instructors. Human subjects approval was obtained from the University of Rhode Island Institutional Review Board for all surveys and procedures. Students read an online informed consent form explaining the study. After reading the informed consent form, all research participants were sent a link to Surveymonkey.com to fill out the pre-test survey. The pre-test survey collected demographic information and attitudes towards green eating and sustainable transportation. Upon completion of the pre-test survey, students listed their class section of COM100, respectively. All students received extra credit for participation. After completing the pre-test survey, participants were entered into the study. N =192 students agreed to enter the study by completing the pretest survey.

Procedure

Intervention Description

N=192 students completed a pretest survey online via surveymonkey.com. After completion of the pretest survey, participants were randomly assigned at an individual level to one of two Intervention conditions. The two randomly assigned groups of subjects then received four interventions each, designed to either promote

(1) Sustainable Transportation (ST) or (2) Green Eating (GE). Subjects viewed four intervention messages (powerpoint modules) focusing either on GE or ST in five-day intervals. All powerpoint modules were delivered online via Sakai, the online classroom management system used by URI. Pretest data indicated participants' 'Stage of Change'. While the messages in the powerpoint modules were not specific to the subjects' Stage of Change, participants also received two messages that were tailored to their respective stage that aimed to complement the message in each of the powerpoint modules within three days of exposure. After viewing the fourth module, participants were asked to complete a post-test survey.

Email Reminders

Using the Sakai course site technology, we were able to monitor individuals who were not actively participating in the study. Individuals who did not open the powerpoint modules were considered non-participatory. In order to achieve maximum participation, email reminders were sent to individuals' email addresses reminding them to open and view the powerpoint modules to receive full credit for participation. Email reminders were sent once a week.

Measures

Stages of change

The stages of change for ST was developed by Mundorf, Redding et al. (unpublished) using items derived from earlier research. The current study will follow the same staging procedure. The following definition of ST was provided:

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"Sustainable transportation includes any way of getting to [school] other than driving by yourself (single occupancy vehicle use). So walking, biking, public transportation (bus/subway/train) and carpooling are all means of Sustainable Transportation." Then, participants were asked to choose one statement best reflecting their situation: (1) "I do not regularly use Sustainable transportation and I do not intend to start within the next six months" (precontemplation); (2) "I am thinking about regularly using Sustainable transportation within the next six months" (contemplation); (3) "I am planning to regularly use Sustainable transportation within the next 30 days" (preparation); (4) "I regularly use Sustainable transportation and have been for less than 6 months" (action); or (5) "I regularly use Sustainable transportation and have for 6 months or more" (maintenance).

A similar instrument for stage of change was used for Green Eating (Katie Weller, unpublished master's thesis, 2011). The following definition for GE was provided: "Green eating includes, participating in most of the following behaviors: Eating locally grown foods, produce that is in season, and limited intake of processed foods. Consuming foods and beverages that are labeled fair trade certified or certified organic. Consuming meatless meals weekly and (if consuming animal products) selecting meats, poultry and dairy that do not contain hormones or antibiotics." Then, participants were ask to choose one statement best reflecting their situation: (1) "I do not regularly practice green eating and do not intend to start within the next 6 months" (precontemplation); (2) "I am thinking about practicing green eating within the next 6 months" (contemplation); (3) "I am planning on practicing green eating within the next 30 days" (preparation); (4) "I regularly practice green eating and have been doing

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so for less than 6 months" (action); or (5) "I regularly practice green eating and have

ben doing so for 6 months or more" (maintenance).

Decisional balance

For the decisional balance measure, 24 items also developed by Mundorf,

Redding et al. (unpublished) were included in the initial survey. Half of the items in

the survey reflected pros of using ST, while the second half reflected cons of using ST.

Participants rated the importance of each statement to their own ST decision-making

on a five-point Likert scale (1=not important to 5=extremely important). Scores for

decisional balance were determined by calculating the total sum of weights for the

questions in each category (pros and cons). In this sample, the Cronbach's coefficient

alpha's for the ST Pros scale (α=.848) and for the ST Cons scale (α=.717) were good.

Self-efficacy

Self-efficacy was measured using an 8-item scale (Mundorf, Redding et al,

unpublished). Each participant was required to rate their degree of confidence that

they could/would use ST in each specific situation on a five-point Likert Scale (1=not

at all confident to 5=very confident). The survey also included 10 items that measured

participants' self-efficacy in regards to GE. In this sample, the coefficient alpha for the

ST Self-Efficacy scale was good (α=.864).

Tailored Message Design

Messages were tailored for four different groups: (1) Precontemplation, (2) Contemplation, (3) Preparation, and (4) Action/Maintenance. For the precontemplation stage, messages focused on raising awareness about sustainable transportation. Precontemplators are not thinking about using sustainable transportation within the next six months or may be opposed to using it. Messages sent to participants in this group aimed to introduce practical and easy solutions when considering what mode of transport to use. The primary goal was to get precontemplators into the next stage, contemplation. Participants in the contemplation stage received messages aimed to get them to think about using sustainable transportation even more. Participants in this group were already thinking about using sustainable transportation within the next six months. Motivational messages attempt to get these individuals to start taking steps to prepare to use sustainable transportation. In the Preparation stage, participants were already taking steps to prepare for behavior change within the next thirty days. Participants in this group were aware of the benefits of using sustainable transportation and realize the consequences associated with using SOVs. Messages that were sent to individuals in this group consisted of motivational words encouraging them to take action. These messages included practical ways for them to put their plan into action immediately. Finally, participants in the Action/Maintenance stages received motivational messages that encouraged them to continue doing what they were doing. They also received messages that provided fun facts or tips for them to use when deciding how to travel.

Analyses

The data were collected in a database (Microsoft Excel) and analyzed using the Statistical Package for the Social Sciences (SPSS for Windows). Chi-square tests were used to measure baseline differences between treatment groups to ensure that both treatment groups (1.Sustainable Transportation, 2.Green Eating) were comparable at baseline. Stage of change over time for both sustainable transportation behaviors and green eating behaviors were measured for both the Sustainable Transportation Group (Tx1) and the Green Eating Group (Tx2) using Chi-square tests to determine whether there was any statistically significant change over time. To test for differences between the sustainable transportation group (Tx1) and the green eating group (Tx2), Chi-square tests were used to compare stage of change data at pretest for both groups with stage of change data at posttest for both groups. A two-way repeated measures multivariate analysis of variance (MANOVA) by treatment group and stage for sustainable transportation behavior was conducted on three outcome variables: Pros for sustainable transportation, cons for sustainable transportation and efficacy for sustainable transportation. Follow-up ANOVAs with repeated measures for each dependent variable were also conducted.

CHAPTER 4

FINDINGS

Baseline Differences by Treatment Group

Participants were randomized at an individual level into the sustainable

transportation treatment group (treatment group 1) or the green eating treatment group

(treatment group 2). Chi-square tests comparing the sustainable transportation

treatment group and the green eating treatment group for green eating stage of change

at baseline showed no significant differences. Chi-square tests comparing both

treatment groups' stage of change for sustainable transportation behavior at baseline

also showed no significant differences. This indicated that the randomization was

successful and that the two treatment groups were comparable at baseline on GE and

ST stages of change. This also allows for each of the treatment groups to act as a

control group for one another.

Demographics

Demographics of the full baseline sample can be found in Table 1. Participants

(n=192) were 37.2% male, 62.8% female, and mostly (86.5%) White. Within the

sample, 75.9% indicated that they were first year students, 17.3% were sophomores,

3.7% were juniors, and 3.1% were seniors.

Table 1. Baseline Descriptives.

Race and Ethnicity	*n*	*Percent*
White	166	86.5
Black or African American	4	2.1
Hispanic/Latino	4	2.1
Asian	11	5.7
American Indian or Alaska Native	1	.5
Mixed	3	1.6
Other	3	1.6
Gender		
Male	71	37.2
Female	120	62.8
Enrollment Status		
First Year	145	75.9
Sophomore	33	17.3
Junior	7	3.7
Senior	6	3.1
Baseline Stage Distribution – Green Eating		
	n	*Percent*
PC	61	31.8
C	56	29.2
PR	34	17.7
A	14	7.3
M	27	14.1
Total	192	100
Baseline Stage Distribution – Sustainable Transportation		
	n	*Percent*
PC	69	35.9
C	29	15.1
PR	8	4.2
A	44	22.9
M	42	21.9
Total	192	100
Baseline Scores for Dependent Variables for Sustainable Transportation/Green Eating		
	n	Mean (Standard Deviation)
Pre – ST SE score	188	2.6223 (.88231)
Pre – ST Con Score	186	2.9534 (.74389)
Pre – ST Pro Score	175	3.2160 (.71041)
Pre – GE SE score	186	2.8636 (.76712)
Pre – GE Con Score	182	2.8912

		(.68305)
Pre – GE Pro Score	187	3.4866 (.77458)

Baseline Stage Distribution of full sample for Sustainable Transportation/Green Eating Behavior

The stage of change distribution of participants' attitudes towards green eating is shown in Table 1.

The participants' stages of change for sustainable transportation behavior is also shown in Table 1. Data collected from the pretest survey measuring stage of change for sustainable transportation behavior indicated that 35.9% of participants were in precontemplation, 15.1% in contemplation, 4.2% in preparation, 22.9% in action, and 21.9% in maintenance.

Table 2. Means, standard deviations (in parentheses) and sample sizes in T-scores of decisional balance (pros and cons), and self-efficacy by stages of change for ST at pre-test.

	Sustainable Transportation Behavior					
	PC	**C**	**PR**	**A**	**M**	Total
Pros	45.77	52.84	47.80	51.50	52.42	
	(10.46)	(8.13)	(8.48)	(9.20)	(9.95)	
	n = 56	n = 28	n = 5	n = 44	n = 42	n= 175
Cons	51.44	49.93	47.63	51.39	46.58	
	(9.66)	(9.61)	(8.81)	(9.29)	(11.18)	
	n = 66	n = 29	n = 6	n = 44	n = 41	n= 186
Self-	47.30	49.15	52.62	51.40	53.09	
Efficacy	(10.74)	(7.08)	(10.46)	(9.88)	(9.60)	
	n = 68	n = 28	n = 8	n = 44	n = 40	n= 188

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Note: PC = precontemplation ; C = contemplation ; PR = preparation ; A = Action ; M = maintenance

T-scores were calculated for pros and cons, and self-efficacy by ST stage of change at pretest. As predicted by the TTM, participants in the precontemplation stage, who were not thinking about changing their transportation behavior, perceived higher cons than pros. By contrast, participants in the maintenance stage indicated more pros than cons to changing behavior accompanied by higher self-efficacy compared to those in any of the lower levels of stage of change. This information concurs with past studies, which observed and concluded the capacity for self-efficacy and decisional balance to serve as important predictors of behavior change.

Table 3. Descriptive information for participants (N=59) that were lost to follow-up at the end of the study.

Baseline	Follow-up	Missing	
N=193	N=134	Count	Percent
		59	30.6
Pre – SOC Sustainable Transportation			
	Frequency	Percent	
PC	20	33.9	
C	4	6.8	
PR	4	6.8	
A	13	22.0	
M	18	30.5	
Total	59	100.0	
Pre – SOC Green Eating			
Stage	Frequency	Percent	
PC	24	40.7	
C	14	23.7	
PR	11	18.6	
A	5	8.5	
M	5	8.5	
Total	59	100.0	
Pre – What is your age (in years)?			
Age	Frequency	Percent	
18	33	55.9	
19	18	30.5	
20	4	6.8	
21	2	3.4	
22	1	1.7	
Missing	1	1.7	
Total	59	100	
Pre – What is your gender?			
	Frequency	Percent	
Male	28	47.5	
Female	30	50.8	
Missing	1	1.7	
Total	59	100	
Pre – Which one of the following best applies to you?			
	Frequency	Percent	
White	48	81.4	
Black or African American	1	1.7	
Asian	5	8.5	
American Indian	1	1.7	
Mixed	3	5.1	
Other	1	1.7	
Total	59	100.0	

Table 3 describes characteristics of the participants (n=59) that were lost to follow-up at the end of the study. The baseline sample size was N=193. At follow-up the sample size was N=134. The total number of missing participants was 59 or 30.6% of the total baseline sample. Data collected for SOC for ST indicated the following: 33.9% were in precontemplation, 6.8% were in contemplation, 6.8% were in preparation, 22.0% were in action and 30.5% were in maintenance, respectively.

Participants who identified their age as 18 years old comprised 55.9% of the total number of participants lost at follow-up. 30.5% were 19, 6.8% were 20, 3.4% were 21, and 1.7% were 22.

Of the 59 individuals lost to follow-up, 28 identified themselves as being male while 30 identified themselves as being female. Of these participants, 81.4% indicated that they were White, 1.7% were Black or African American, and 8.5% were Asian.

Table 4. Crosstabulation of Pre-test stage for ST by Post-test stage for ST by Treatment group.

Treatment Group			Post – SOC Sustainable Transportation					
			PC	C	PR	A	M	Total
ST Group	Pre – SOC Sustainable Transportation	PC	15	7	2	1	2	27
		C	5	2	4	3	0	14
		PR	0	0	1	0	0	1
		A	4	2	3	4	2	15
		M	2	0	1	1	5	9
	Total		26	11	11	9	9	66
GE Group	Pre – SOC Sustainable Transportation	PC	8	8	3	1	2	22
		C	3	5	0	3	0	11
		PR	0	0	2	1	0	3
		A	2	2	3	3	6	16
		M	1	2	1	3	8	15
	Total		14	17	9	11	16	67

Sustainable Transportation Behavior: *Pre-Post comparison of SOC for*
Sustainable Transportation Treatment Group

In the sustainable transportation treatment group, there were a total of 66
participants. In measuring stage of change for sustainable transportation behavior,
baseline data indicated that 40.9% of participants in the ST treatment group were in
precontemplation, 21.2% were in contemplation, 1.5% were in preparation, 22.7%
were in action, and 13.6% were in maintenance (Table 4.)

At post-test, seven participants moved from the precontemplation stage to
contemplation. Two participants moved from precontemplation to preparation. One
participant moved from precontemplation to action. And finally two moved from
precontemplation to maintenance.

A chi-square test comparing sustainable transportation stages from the pretest
and posttest for the sustainable transportation treatment group resulted in significant
pre-post differences being found (χ^2 (16) = 32.77, p < .05). Posttest data indicated that
39.4% of participants were in precontemplation, 16.7% were in contemplation, 16.7%
were in preparation, 13.6% were in action, and 13.6% were in maintenance.

Sustainable Transportation Behavior: *Pre-Post comparison of SOC for Green*
Eating Treatment Group

In the green eating treatment group, baseline data for SOC indicated that
32.8% of participants were in precontemplation, 16.4% were in contemplation, 4.5%
were in preparation, 23.9% were in action, and 22.4% were in maintenance.

At post-test, eight participants moved from the precontemplation stage to the
contemplation stage. Three participants moved from precontemplation to preparation.

One participant moved from precontemplation to action, and two participants moved from precontemplation to maintenance.

At posttest, a total of 20.9% of participants were in precontemplation, 25.4% were in contemplation, 13.4% were in preparation, 16.4% were in action, and 23.9% were in maintenance. A chi-square test found significant pre-post differences in stages of GE (χ^2 (16) = 34.88, p < .05).

Table 5. Mean scores and standard deviations (in parentheses) for pros, cons and self-efficacy by stage at pre-test and post-test for each treatment group.

Treatment Group: Sustainable Transportation							
Pre-Test				Post-Test			
Stage	Pros	Cons	Self-Efficacy	N	Pros	Cons	Self-Efficacy	N
PC	2.84 (.6596)	3.00 (.6152)	2.23 (1.142)	17	2.74 (.6911)	3.26 (.8661)	1.89 (.9770)	17
C	3.23 (.6717)	3.25 (.5046)	2.36 (.6795)	10	3.28 (.3047)	2.93 (.5164)	2.45 (.7288)	10
PR	3.21 (.5685)	3.20 (.5374)	2.46 (.6703)	10	3.21 (.4557)	2.86 (.5018)	2.53 (.7105)	10
A	3.32 (.8280)	3.00 (.4906)	3.23 (1.079)	7	3.75 (.6267)	2.90 (.7444)	3.16 (.7453)	7
M	3.73 (.3881)	2.00 (1.278)	4.11 (.6965)	6	3.75 (.7943)	2.55 (1.420)	3.52 (.7987)	6
Total	3.16 (.6816)	2.97 (.7496)	2.67 (1.085)	50	3.20 (.6910)	2.98 (.8173)	2.50 (.9782)	50

Treatment Group: Green Eating							
Pre-Test				Post-Test			
Stage	Pros	Cons	Self-Efficacy	N	Pros	Cons	Self-Efficacy	N
PC	2.82 (.6051)	3.41 (.6994)	2.78 (1.162)	10	2.98 (.7284)	3.63 (.6126)	2.30 (.9388)	10
C	3.13 (.7441)	3.38 (.9251)	2.16 (.6107)	15	3.12 (.5954)	3.26 (.7286)	2.30 (.6274)	15
PR	3.36 (.6022)	3.30 (.6183)	2.36 (.6617)	6	2.91 (1.000)	2.66 (.8366)	2.97 (.7484)	6
A	3.50 (.3534)	3.09 (.6072)	2.57 (.4851)	11	3.55 (.6202)	3.03 (.7810)	2.84 (.9616)	11
M	3.42 (.7932)	2.58 (.6954)	2.77 (.6161)	15	3.57 (.7544)	2.64 (.7233)	2.61 (.8918)	15
Total	3.25 (.6814)	3.11 (.7924)	2.53 (.7438)	57	3.27 (.7411)	3.05 (7927)	2.61 (.8918)	57

Note: PC = precontemplation ; C = contemplation ; PR = preparation ; A = Action ; M = maintenance

Table 5 reflects the mean scores and standard deviations for pros, cons and self-efficacy by stage, recorded at both pretest and posttest for both treatment groups. This data allows for an analysis of the reliability of using decisional balance and self-efficacy as key constructs. More importantly, it identifies the effectiveness of the sustainable transportation intervention modules.

Pre-test description of all treatment groups

As expected, the mean *Pros* scores of participants were higher with each progressing stage. Also as expected, scores for *Cons* were generally, but not consistently, lower with each advancing stage. Consistent with expectations, scores for self-efficacy showed the lowest score in the precontemplation stage and conversely, the maintenance stage had the highest self-efficacy score.

ST treatment group at post-test

At post-test, the sustainable transportation treatment group's pros scores were slightly, but not significantly higher in the contemplation, action and maintenance stages. The precontemplation stage had a slightly lower, but not significantly different, score and the preparation stage stayed the same. Cons scores at post-test were slightly lower in every stage except precontemplation and maintenance, where the scores were slightly, but not significantly higher than they were at pre-test. The self-efficacy mean scores were slightly, but not significantly higher in the contemplation and preparation stages while they were slightly, but not significantly lower in all other stages.

GE treatment group at post-test

At post-test, mean scores for pros was slightly but not significantly higher in the precontemplation, action and maintenance stages, while it was slightly but not significantly lower in the contemplation and preparation stages. Cons mean scores were slightly but not significantly lower in all stages except for precontemplation and maintenance stages. Finally, self-efficacy scores at post-test were slightly but not significantly higher in contemplation, preparation and action stages and slightly but not significantly lower at precontemplation and maintenance.

MANOVA Findings

A repeated measures MANOVA on ST Pros, ST Cons, and ST Efficacy by ST Stage and Treatment Group (shown in Table 5) found no significant differences (Wilk's λ=0.98, $F(3,103) = 0.70$, $p>.05$) in the Treatment Group X Time Interaction term.

CHAPTER 5

CONCLUSION

Discussion

This research study contributes useful insights, which have the potential to positively impact future studies that seek to use interventions aimed at changing transportation behaviors. It sought to test the effectiveness of a specific communication design utilizing the Transtheoretical model of behavior change as a platform for organizing and tailoring messages with the objective of increasing readiness to use alternative/sustainable transportation. The TTM posits that individuals move through five unique stages when attempting to change a behavior. Each of the stages of change specifies distinct attitudes and behaviors with which individuals identify. Therefore, individuals within each respective stage display specific attitudes and behaviors that vary from those in other stages. For example, individuals in the precontemplation stage are not thinking about changing and/or may have a negative attitude towards changing a given behavior. In contrast, those in the maintenance stage have positive attitudes towards a given behavior and have actually successfully changed and maintained a new behavior. Messages aimed to influence individuals with attitudes that are characteristic of the precontemplation stage of change will be ineffective and possibly meaningless to individuals with attitudes and behaviors characteristic of the maintenance stage. Past research has found that targeted interventions using the TTM framework have been successful as both a predictor and motivator of behavior change. The results from this study will contribute to the

ongoing research and development of the TTM and intervention-based health communication strategies.

Data collected for the 30% of participants who were lost at follow-up at the end of the study seem to indicate that the majority of them were either in the precontemplation or maintenance stages regarding sustainable transportation behavior. For green eating behavior, over half of those lost were either in the precontemplation or contemplation stages. It was expected that the majority of the participants who were lost at follow-up would have identified with one of the earlier stages and the results validated these expectations. For those who identified themselves as being in the maintenance stage, it is possible that they considered themselves already very knowledgeable about the topics and therefore saw little value in participating in the study. Aside from this data, there are no other significant findings regarding the participants who dropped out of the study.

Information collected at the pretest regarding sustainable transportation attitudes and behaviors was collected to form a baseline so that the results could be later compared with those at the posttest, after receiving the intervention treatments. Of the entire sample population, stage of change for ST was recorded at pretest and again at posttest and a comparison of the two revealed whether a shift in stages occurred. It was found that there were positive shifts in the precontemplation and contemplation stages. At posttest there were fewer subjects in precontemplation than at pretest. At posttest, more people were in contemplation compared to pretest. While

an increase in the contemplation stage may have occurred because of a shift from participants from precontemplation, it may also mean that some participants regressed from the advanced stages. Nevertheless, this is mostly a positive trend as a key goal of TTM is to target those in precontemplation and encourage movement to contemplation. Doing so has been found to nearly double the likelihood of successful behavior change (Prochaska et al., 1992). In the action and maintenance stages at posttest, there was a decrease in percentage of individuals who identified with this stage at pretest.

While some of the shifts that occurred were in the expected direction, they weren't as strong or consistent as expected. There are several explanations for why the intervention had a limited impact. First, considering the size and length of the study along with the point in the semester that the study began, participants may not have participated with full interest or at full capacity subsequent to the pretest. Second, it is quite possible that the 'workload' required of students (e.g., Logging into a website to read educational modules every four days, and logging in to read tailored messaging every two days, and then finally taking a posttest) was perceived by participants as too much work. The sizeable proportion (30%) of students dropping out of the study over time supports this idea. Finally, an important possibility that merits further thought and consideration is whether the unexpected results discussed above were indicative of a relapse occurring. Further investigation may produce important findings that could improve future method and design of behavior change interventions, and is warranted.

Pre-test scores confirm that relevant *Stage of Change and other TTM* measures were consistent with expectations and generally support the applicability of the TTM model to Sustainable Transportation. T-scores were collected to analyze the differences between participants' ratings of self-efficacy and decisional balance at pretest to those collected at posttest regarding their sustainable transportation behavior. As expected, t-scores for pros were higher across advanced stage groups. Also as expected, t-scores for cons were higher for precontemplators than they were for any other stage and were lower in more advanced stage groups. Self-efficacy scores also got higher across stage groups. These results were expected as the TTM posits that self-efficacy will increase as participants advance to higher stages of change in the model. Because this information was collected at the pretest before any intervention, it supports the validity of the the TTM and stages of change, increasing the potential for more accurate and effective tailored communications.

Comparison of the posttest mean scores for self-efficacy and decisional balance by stage of change between the treatment groups for sustainable transportation behavior resulted in interesting, although still not significant, findings. The ST intervention may have had some impact that was not demonstrated here since the sample sizes were so small, limiting statistical power. In this particular study, there wasn't a significant difference between the treatment groups when comparing scores. While this indicates that the ST and GE interventions had very comparable impact on ST Pros, ST Cons and ST Efficacy, it would be interesting to see whether any

difference emerged in a comparable study with either a larger sample size or with a true no treatment control group.

Focusing on sustainable transportation behavior, multiple chi-square tests were used to compare stage of change at the pretest with stage of change at the posttest for each of the treatment groups. A pre-post comparison of stage of change for the ST treatment group resulted in significant differences being found. After receiving the intervention modules, the ST treatment group showed significant movement, especially from the precontemplation stage. Thirty-seven percent of the participants who were in precontemplation at the pretest moved out of precontemplation to the contemplation, preparation, action stages, respectively. Initially it appears as though the ST intervention modules worked in motivating participants in the ST treatment group to consider and/or make changes. The GE treatment group also showed some significant stage movement. Chi-square tests attained significance when comparing pre/post stage of change for sustainable transportation behavior. Approximately sixty four percent of the individuals that started in precontemplation shifted to other stages. This is an important observation as it may suggest that the intervention (i.e. educational modules and tailored messages) may have had some effect on stage progress that was not evident in the other measures.

Limitations

There are several limitations in this study that deserve attention. First, and maybe most significant, was the size of the surveys. The pretest survey was twenty-seven pages long and may have discouraged continued participation. The pretest

survey contained an abundance of questions and information related to two relatively new areas of study. In effect, this may have caused message overload, in turn reducing interest to participate. It is also possible that participants who completed the study, and that were overwhelmed by the length of the surveys, weren't diligent in providing honest and accurate feedback. In other words, parts of their response could be inaccurate if their goal was to finish the survey as quickly as possible, rather than a goal of answering every question as accurately as possible. With low recruitment levels and a significant dropout rate, the resulting sample size was small. It is possible that intervention effects were not found in the study for these reasons. It is difficult to assess change when the sample size is not large enough to find meaningful differences. The initial sample size was relatively low considering the number of students that were offered the opportunity to earn extra credit. Recruitment may have been low because of the timing of the study. The study began at the start of the second week of the spring semester. While students were offered extra credit in return for their participation in the study, at such an early point in the semester students may perceive extra credit as unnecessary and not worth the amount of effort required for the study. The study took place over approximately three weeks. This may also explain some of the difficulty of retaining participants. The first three weeks of the semester are perhaps the most critical for students and with each passing week, their workloads increase. As the study progressed over the three weeks, participants may have been overwhelmed with work.

Sakai was used as the platform for distributing the educational modules and tailored messages. While Sakai worked as a platform for storing and sharing the

modules and messages, there was no monitoring system that indicated whether or not participants viewed the modules in their entirety or actually read any of the tailored messages. In addition, students may not be accustomed to consistently checking the Sakai site. To combat this potential issue, email reminders were sent to all participants' university email accounts containing links to view the modules along with reminders to view them. Also, when tailored messages were posted to Sakai, emails were automatically sent to participants' email addresses alerting them of new material being posted. However, one drawback to this solution was the possibility that students may not have checked their email accounts regularly. Students who completed the study may have simply clicked through the modules and messages without reading them, or may have not opened them at all. There could be no intervention effect of modules and messages if they did not view them.

As with most research in the social sciences, participants in this study mostly consisted of college students. This means that these results may not generalize to other groups. This is an important limitation in general, but holds more significance in this particular study. Without a doubt, college students' intelligence, socio-economic status, residence and age are all factors that contribute to their responses to research studies. It is also possible that this sample (a) hadn't ever driven or owned an automobile and therefore didn't truly understand the financial, health, and environmental impacts of their use; or (b) didn't currently own and drive a vehicle; or (c) didn't drive often because of the convenience of living in on-campus housing of a walker and biker-friendly university landscape. All of the above could have contributed to limited responses.

Future research

  The findings in this study suggest several factors that may benefit future intervention-based studies. Future research should concentrate efforts to adding diversity in both age and ethnic backgrounds to the sample recruited. This is imperative and may offer more generalizable and accurate information. It is also important to recruit and retain as many participants as possible. Having more participants will not only improve the accuracy of information collected, but will allow results to attain significance when used to determine effect. It is also important for future studies designed to measure a change in behavior after an intervention, to have a true no treatment control group. While the green eating treatment group and the sustainable transportation treatment group worked as comparison groups for one another, having a true no treatment control group would be very useful to gain a better understanding of the impact of the treatment. When considering the design of the intervention, it may be useful to begin the study several weeks into the semester or to make the study span a longer period. It may also be useful to limit the amount of messaging so as to avoid the potential of message overload. In addition to the messaging, the amount of survey items for participants to complete must be reasonable. Having too long a survey deters participants from fully cooperating.

  It may be helpful in the future to use additional constructs from other theories. Using the Health Belief Model might help to more accurately understand how and why participants feel the way they do about sustainable transportation by assessing

their perceived susceptibility, severity, benefits, and of course efficacy. Another theory that could potentially benefit intervention studies would be Social Cognitive Theory. If we can understand participants' perceptions of risk and efficacy beliefs, we could further segment them into groups according to their motivation to seek information. Having a better assessment of motivation would be helpful for future studies. Social cognitive theory constructs can also be utilized for interventions that use technology. Specifically, social media sites provide participants the opportunity to interact with others and may effectively engage them. Social media is a plausible option for future digital interventions. Social media sites have a more familiar and user-friendly interface that would allow for greater interaction and engagement. It is also important to note that there should be a system in place for measuring the completion of viewing educational modules. This would provide helpful feedback and may help to better understand findings.

Conclusion

The pervasive use of SOVs has created a sense of urgency among the citizens of our planet. Their continued use as the dominant mode of transportation has created a wide array of urgent issues that undoubtedly deserve our collective attention and require our collective energy for finding solutions. The social, economic, health and environmental impacts of using SOVs continue to grow. With the growth in the impact, comes a growth in awareness and solidarity. Researchers are now more focused than ever. Heavy exploration into alternative fuels is underway and theoretical

frameworks are being developed and tested. Our political leaders are under immense pressure. After much delay, there is finally an awareness that is large enough for policy change. Citizens of our planet are demanding change now more than ever. For that change to occur however, a considerable amount of work needs to be completed. While a growing awareness sweeps the country and the world, for change to actually occur it is imperative and necessary that we work together. Communication is the key to such change. Understanding and appreciating human difference is a required goal for our increasingly globalized society if we are to survive the challenges of the twenty first century. Encouraging change is complex and difficult. The Transtheoretical model has proved to be a valid and effective way for motivating individuals to change. The more we understand about human behavior and how to motivate a change in said behavior, the greater our success will be. Developing and implementing communication strategies that use the TTM platform to enhance effectiveness and therefore success of behavior change interventions, makes a once unforeseeable change, a real one. With diligence and dedication, and commitment and teamwork, sustainable transportation will prevail and will help contribute to a sustainable future.

APPENDIX A

Green Eating/Sustainable Transportation Survey

1. Informed Consent

The University of Rhode Island
Department of Communication Studies
206 Davis Hall
The University of Rhode Island
Department of Nutrition and Food Sciences
112 Ranger Hall

*1. Welcome!

You have been invited to take part in a research project described below. The researchers will explain the project to you in detail upon request. You should feel free to ask questions either in person or by e-mail. If you have more questions later, Dr. Geoffrey Greene at gwg@uri.edu or Dr. Norbert Mundorf at mundorf@uri.edu, the researchers mainly responsible for this study, will discuss them with you.

Description of the Project:
This study is related to ongoing research at the Departments of Communication Studies and Nutrition and Food Science, and the URI Transportation Center. The URI Department of Communication Studies and Department of Nutrition and Food Sciences are conducting research on environmentally conscious behaviors in college students regarding alternative transportation to and from URI and sustainable eating practices.You will be asked questions so that we can understand more about our community members' alternative transportation and sustainable eating attitudes and behaviors.
You must be at least 18 years old to be in this study.

What will be done:
The whole study takes about 3 weeks to complete. If you choose to participate, you will fill out a survey (20-25 minutes), view 4 educational modules (5-10 minutes each), and fill out another survey (20-25 minutes). All of the questions being asked have come from established survey instruments.

Benefits of this study:
The results of this study may help us to learn more about alternative transportation

attitudes and behavior change among university students, as well as therelationships between dietary practices, eating behaviors and environmental issues among university students in order to develop programs to improve health. The study will also assist you in learning about transportation and eating and what roles they play in environmental and human health.

Risks or discomfort:
These questions should not pose any risk or discomfort. If any question is uncomfortable, simply refrain from answering that question. Only authorized personnel will have access to your responses.

Confidentiality:
Your participation in this study is anonymous, unless you want extra credit. Even then, your participation will be confidential. If you want extra credit, you will provide your e-mail and course information at the end of the survey, and that component will be removed from your survey responses. Your part in this study is confidential; however, you should understand that any form of communication over the Internet does carry a minimal risk of loss of confidentiality. None of the information will identify you by name. At the end of the study, the database will be removed from the SurveyMonkey site. The de-identifed data will be stored on a password-protected computer. All hardcopy records will be kept in locked file cabinets in 112 Ranger Hall.

Decision to stop at any time:
The decision to take part in this study is up to you. You do not have to participate. If you decide to take part in the study, you may stop at any time. Whatever you decide will in no way adversely affect your grade in any class, nor your status as a student or employee at the University. If you wish to stop, simply inform Professor Norbert Mundorf at mundorf@uri.edu (401) 874-4725 or Dr. Geoffrey Greene at gwg@uri.edu (401) 874-4028 of your decision.

Rights and Concerns:
If you are not satisfied with the way this study is performed, or have any questions about your rights as a research subject, you may discuss any concerns or complaintswith Professor Norbert Mundorf, confidentially, at (401) 874-4725 mundorf@uri.edu or Geoffrey Greene at gwg@uri.edu (401) 874-4028.In addition, if you have any questions of your rights as a research participant you may contact the office of the Vice President for Research,70 Lower College Road, Suite 2, University of Rhode Island, Kingston, Rhode Island, telephone: (401) 874-4328.

We appreciate you taking the time to participate in this important research.

Dr. Norbert Mundorf
URI Dept. of Communication Studies and Transportation Center

Dr. Geoffrey Greene
URI Dept. of Nutrition and Food Sciences

○ I Agree To Participate

○ I Prefer Not To

2. Status and Residence Question

1. Are you currently employed as faculty or staff or registered as a student at the URI -Kingston campus?

○ Yes, enrolled as a student

○ Yes, employed as faculty

○ Yes, employed as staff

○ Both employed and taking courses

○ No, I am not currently faculty, staff or student at URI-Kingston

2. Please provide us with some detail about your where you live

○ live in university housing in Kingston (on-campus residents)

○ live in non-university housing in Kingston (off-campus residents)

○ live outside of Kingston (off-campus residents)

3. In a typical week, how do you most often travel to URI?

○ drive alone

○ carpool (at least 2 people per vehicle)

○ bike, skate, or use a scooter / similar devices

○ walk

○ use URI on-campus shuttle services

○ use non-URI public transportation (train, bus, etc.)

Now in more detail, thinking about the number of one-way trips you make to and from campus (for work and other purposes), please answer the following:

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4. On average, how many one-way trips to and from URI do you make each week?

[   ]

5. Of these one-way trips to and from URI, how many use each of these modes:

drive alone

[   ]

carpool (at least 2 people per vehicle)

[   ]

bike, skate, scooter etc.

[   ]

walk

[   ]

non-URI public transportation (bus, train etc.)

[   ]

6. Do you either own or share a car?

○   I own my own vehicle

○   I share a Vehicle

○   Neither own nor share - No Access to a vehicle

7. If you own a car, what is the average gas mileage (miles per gallon) for the vehicle you drive most often?

[   ]

3. Alternative Transportation Questions

Alternative transportation includes any way of getting to URI other than driving by yourself (single occupancy vehicle use). Walking, biking, public transportation (bus/subway/train) and carpooling are all means of alternative transportation.

1. Based on this definition of alternative transportation, which of the following best describes your situation now:

I do not regularly use alternative transportation to URI and I do not intend to start within the next 6 months.

○   I am thinking about regularly using alternative transportation to URI within the next 6 months.

○   I am planning to regularly use alternative transportation to URI within the next 30 days.

○   I regularly use alternative transportation to URI and have been doing so for less than 6 months.

○   I regularly use alternative transportation to URI and have been

doing so for 6 months or more.

2. Recycling includes regularly collecting all (or most) glass, metals, plastics and paper and depositing them in designated recycling bins.

○ I do not regularly recycle and do not intend to start within the next 6 months.

○ I am thinking about regularly recycling within the next 6 months.

○ I am planning to regularly recycle within the next 30 days.

○ I regularly recycle and have been doing so for less than 6 months.

○ I regularly recycle and have been doing so for 6 months or more.

3. Regular exercise is any planned physical activity (e.g., brisk walking, jogging, bicycling, swimming, basketball, aerobics classes, etc.) performed to increase physical fitness. Such activity should be performed 5 or more times per week for 30 or more minutes per session at a level that increases your breathing rate and causes you to break a sweat. Using this definition…

○ I do not regularly exercise (at least 5x/week, 30 mins) and do not plan to start within the next 6 months.

○ I am thinking about regularly exercising (at least 5x/week, 30 mins) within the next 6 months.

○ I am planning to regularly exercise (at least 5x/week, 30 mins) within the next 30 days.

○ I regularly exercise (at least 5x/week, 30 mins) and have been doing so for less than 6 months.

○ I regularly exercise (at least 5x/week, 30 mins) and have been doing so for 6 months or more.

4. Practicing effective stress management means that you successfully deal with the stresses in your daily life. Effective stress management often includes consistently making time for relaxation, physical activities, talking with others, and/or fun, social activities. Do you practice effective stress management in your daily life?

○ No, I do not practice effective stress management and I do not intend to start within the next 6 months.

○ No, but I am thinking about practicing effective stress management within the next 6 months.

○ No, but I plan to practice effective stress management within the next 30 days.

○ Yes, I practice effective stress management and have been doing so for less than 6 months.

○ Yes, I practice effective stress management and have been doing so for 6 months or more.

5. If you were to increase your use of alternative transportation to URI, how likely would you be to:

	Not at all likely				Extremely likely
carpool (at least 2 people per vehicle)?	○	○	○	○	○
use non-URI public transportation?	○	○	○	○	○
bike, skate, or use a scooter / similar device?	○	○	○	○	○
walk?	○	○	○	○	○

6. Pros and Cons of Alternative Transportation

Here are some advantages and disadvantages of using alternative transportation to URI. Alternative transportation includes walking, biking, public transportation, and carpooling. We don't want to ask whether you agree or disagree with each statement. Instead we want you to ask, HOW IMPORTANT is each statement TO ME in MY decisions about whether or not to use alternative transportation?

For each item (below), HOW IMPORTANT is it to me that...?
   (Not Important, Slightly Important, Somewhat
   Important, Very Important, Extremely Important)

Using alternative transportation can be a hassle
Using alternative transportation is not practical from where I live
Using alternative transportation is one way to improve my own health and the health of the planet
Worrying about climate change is not worth the time
Using alternative transportation is part of being green
As climate change proceeds, my transportation choices won't make a difference anyhow
Alternative transportation is worth the extra effort
Climate change is overblown by the media
Alternative transportation can save me money (gas/parking)

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(Not Important, Slightly Important, Somewhat
Important, Very Important, Extremely Important)

Using alternative transportation can be too much trouble
Alternative transportation is more enjoyable
Walking or biking is not practical from where I live
By using alternative transportation, I can help to protect
the planet
Walking or biking to URI can help me clear my head
and get some fresh air
Alternative transportation would be too difficult
I can get work done while riding the bus or carpooling
Riding the bus is safer than driving
I save time driving by myself
Climate change is not that serious a problem
I am proud that I can help the environment by using
alternative transportation

**7. Are there other advantages to alternative transportation that you can think of?
If so, list here:**

**8. Are there other disadvantages to alternative transportation that you can think
of? If so, list here:**

9. Confidence in Alternative Transportation

**Here are some situations that can make alternative transportation more
challenging. Alternative transportation means walking, biking, public
transportation, and carpooling to URI. Please rate HOW CONFIDENT you are
for each statement below:**

**How confident or sure are you that you would use alternative transportation even
when...?**
I am tired

The weather is bad
I am stressed out
I am running late
I have errands to run
It is inconvenient
The available transportation doesn't work with my schedule
I have other people to pick up

10. Please rate the importance of each of these factors in determining your mode of transportation

	Very important	Somewhat important	Does not affect my choice
Reliability			
Private vehicle availability			
Traffic			

4. Student Questions

1. What is your enrollment status at URI?

○ Full-time

○ Part-time

○ Non-traditional part-time

○ Not a student

2. What year in school are you?

○ First year

○ Sophomore

○ Junior

○ Senior

○ Graduate

3. What is your current major?

[   ]

4. How often do you use each of the following Campus Connector Shuttle buses?

	Daily	More than once a week	More than once a month	More than once a semester	I've only ridden it a few times	Aware of it, but I've never ridden	Not aware of this option
RIPTA On-campus Shuttle or Hill Climber Service	○	○	○	○	○	○	○
Flex Bus	○	○	○	○	○	○	○
Kingston Train Station Service	○	○	○	○	○	○	○
Night Service	○	○	○	○	○	○	○
RideShare with RIPTA	○	○	○	○	○	○	○

5. Questions for URI Campus Residents

Questions for students, faculty and staff who live in university-housing on Kingston Campus

1. Do you work off-campus?

○ No, I do not work off-campus

○ Yes, in Kingston, Narragansett, North Kingstown, Wakefield

○ Yes, in another Rhode Island town

○ Yes, in Massachusetts

○ Yes, in Connecticut

2. Do you keep a car in Kingston?

○ Yes, in a URI lot

○ Yes, in a private or Town lot

○ No

6. Questions for off-campus students, staff, or faculty
1. Please provide us with some detail about where you live:

How many miles away from URI do you live?

How long (in minutes) does it usually take to go to URI from your current residence?

What are two major cross streets closest to

your residence?

What is the five (5) digit ZIP code of your residence?

2. Is there a RIPTA bus stop within a five (5) minute walk of your residence?

○ Yes

○ No

○ Don't Know

3. In a typical week, how many days do you travel to URI?

○ 7

○ 6

○ 5

○ 4

○ 3

○ 2

○ 1

4. On a typical day, approximately how many hours do you spend on the URI campus?

○ 1-2

○ 3-4

○ 5-6

○ 6-8

○ more than 8

5. Have you ever used a website to coordinate a carpool to or from URI?

○ No, but I hear they exist

○ No, I did not know they exist

○ Yes, but I don't remember which one

○ Yes

6. If you have used a website to coordinate a carpool to or from URI, which one?

[   ]

7. Do you own a bike suitable for commuting to campus during weather suitable days?

○ Yes

○ No

8. Have you commuted to campus via bike?

○ Yes

○ No

9. If you have not commuted to campus by bike, what is the primary reason?

○ Lack of time

○ Lack of safe travel facility

○ Lack of on-campus storage

7. Questions for private vehicle student, faculty and staff commuters

1. In what on-campus building do you spend the majority of your work/study day?

[   ]

2. How long (in minutes) does it typically take to walk to the building you mentioned (in the last question) from your usual parking lot?

[   ]

3. During this semester, how many people are typically in the car when you commute to URI?

○ 1 (driver only)

○ 2

○ 3 or more

4. Of those days that you drive to campus, do you typically move your car (errands or intra-campus/in-town trip) before your work or school day ends and you commute home?

○ Yes- Work Related

○ Yes- Personal Errands

○ Yes- Sometimes one or both reasons

○ No, rarely or never

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8. Satisfaction Questions

1. Please rate your satisfaction with the following:

                       Excellent Good Fair Poor

Conditions for
pedestrians
Accommodation
of bicyclists
Snow removal

2. Please rate your satisfaction with the Campus Shuttle Buses:

     Excellent Good Fair Poor
Frequency of Service
On-time performance/schedule
reliability

3. Please rate your satisfaction with the RIPTA Buses:

               Excellent Good Fair Poor
Frequency of Service
On-time performance/schedule reliability

9. Green Eating Questions
1. Green eating includes, participating in most of the following behaviors:
• Eating locally grown foods, produce that is in season and limited intake of processed foods.
• Consuming foods and beverages that are labeled fair trade certified or certified organic.
• Consuming meatless meals weekly and (if consuming animal products) selecting meats, poultry and dairy that do not contain hormones or antibiotics.

Based on the above definition for green eating, which of the following best describes you now:

○ I do not regularly practice green eating and do not intend to start within the next 6 months

○ I am thinking about practicing green eating within the next 6 months

○ I am planning on practicing green eating within the next 30 days

○ I regularly practice green eating and have been doing so for less than 6 months

○ I regularly practice green eating and have been doing so for 6 months or more

10. Behavior

1. Please select the answer that BEST describes your usual behavior.

(Barely ever to never, Rarely, Sometimes, Often, Always)

Locally grown foods are grown within 100 miles of your location.
Based on this, how often do you eat locally grown foods?
When in season, how often do you shop at farmer's markets?
When in season, how often do you grow your own produce?
Minimally processed foods are items that are closest to their natural
form. For example a tomato is minimally processed compared to
ketchup. Based on this definition, how often do you consume
minimally processed foods?
A "meatless meal" or plant-based meal does not contain meat, fish,
or poultry. Based on this definition, how often do you consume
vegetarian meals?
How often do you choose foods that are labeled USDA organic?
How often do you buy individually wrapped single serving items
like single serving beverages or snacks?
How often do you use reusable shopping bags for shopping?
How often do you select meats, poultry, and dairy products that are
raised without antibiotics or hormones?
How often do you select food or beverages that are labeled fair trade
certified?
How often do you buy meat or poultry products labeled "free range"
or "cage free"?

11. Eating habits

1. As per the US Dietary Guidelines recommendations, one serving of fruit or vegetables is equal to one cup. Below are some examples that are equivalent to a "1 cup" serving:

1 cup cooked or raw fruits or vegetables
2 cups garden salad
One medium-sized piece of fruit
1/2 cup dried fruit
8 floz (1cup) of 100% fruit or vegetable juice

In total, approximately how many cups of fruits AND vegetables do you consume per day?

○ Less than 1 cup

○ 1 cup

○ 2 cups

○ 3 cups

○ 4 cups

○ 5 cups

○ 6 cups

○ 7 or more cups

2. On average how many times per week do you consume red meat?

○ Never

○ 1-3 times/ week

○ 4-6 times/ week

○ 7 or more times/ week

3. Which of the following best describes the MAJORITY of your meals during the academic year?

○ I eat meals prepared at home

○ I purchase frozen or ready-to-eat meals

○ I eat at dining halls/restaurants

○ I get fast food / take out

4. Do you have a campus meal plan?

○ Yes

○ No

5. How often do you eat fast food/ take-out?

○ Never

○ 1-2 times per month

○ 3-4 times per month

○ 2-3 times per week

○ Every day

6. Of the foods you eat most often, how sure are you of where they originally came from (i.e. where the food was grown and/ or produced)?

○ Not at all sure

○ Somewhat sure

○ Fairly Sure

○ Very sure

12. Environmental Behaviors

1. Please rate the level of importance you feel green eating is to protect the following:

	Not at all important	A little important	Neutral	Very important	Supremly important
Future generations	O	O	O	O	O
My health	O	O	O	O	O
Animals	O	O	O	O	O
People in the community	O	O	O	O	O
My lifestyle	O	O	O	O	O
Plants	O	O	O	O	O
My future	O	O	O	O	O
Humanity	O	O	O	O	O
The environment	O	O	O	O	O

2. Listed below are statements about the relationship between humans, including yourself, and the environment.

For each statement, please indicate the extent to which you agree or disagree

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Humans have the right to modify their natural environment to suit their needs.	O	O	O	O	O
When humans interfere with the environment it often produces disastrous consequences.	O	O	O	O	O
The balance of nature is able to cope with the impacts of the current industrialization.	O	O	O	O	O

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	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
The so-called ecological crisis is exaggerated.	○	○	○	○	○
We are on the path to eliminating many of our natural resources.	○	○	○	○	○
I don't think eating green will help the environment.	○	○	○	○	○
I don't know how to eat green in dining halls/restaurants, and I don't care.	○	○	○	○	○
The people around me would not support me in eating green (e.g., they might make negative comments).	○	○	○	○	○
Eating green is not normal among my family and friends.	○	○	○	○	○
Eating green is too expensive for me.	○	○	○	○	○
Eating green is inconvenient for me.	○	○	○	○	○
Usually, I make food choices for my health.	○	○	○	○	○
I would like to eat green, but I don't know how.	○	○	○	○	○
I eat food because I like it, I don't care if it is healthy or unhealthy.	○	○	○	○	○

3. Please answer the following questions based on your current level of interest.

	Not at all interested	Somewhat interested	I don't care either way	Moderately interested	Extremely interested
I would like to learn more on how my behaviors impact the environment.	○	○	○	○	○

	Not at all interested	Somewhat interested	I don't care either way	Moderately interested	Extremely interested
I am interested in learning more on how to eat green.	○	○	○	○	○

4. Please rate the follow:

	Extremely difficult	Somewhat difficult	Neither difficult nor easy	Fairly easy	Extremely easy
How difficult do you feel it would be for individuals to eat green.	○	○	○	○	○

5. Consider environment issues such as global warming, natural resource depletion, rainforest extinction, etc. when answering the following:

	Not important at all	Minimally important	Neutral	Somewhat important	Extremely important
How important are environmental issues to you in general?	○	○	○	○	○
How important are environmental issues to you when purchasing or selecting foods?	○	○	○	○	○

13. Decisional Balance

1. Here are some advantages and disadvantages of green eating. Please indicate how important each one is in your deciding to eat green.

	Not at all important	A little important	Neutral	Very important	Supremely important
Eating green is impossible for me as a college student	○	○	○	○	○
Eating green is not practical in my life right now	○	○	○	○	○
Eating green is one way to improve my own health and the health of	○	○	○	○	○

	Not at all important	A little important	Neutral	Very important	Supremely important
the planet					
My friends think green eating is important	○	○	○	○	○
Green eating is worth the extra effort	○	○	○	○	○
Growing my own food can save me money	○	○	○	○	○
Growing my own food is not practical where I live	○	○	○	○	○
Eating green can be too expensive	○	○	○	○	○
Buying local is too expensive	○	○	○	○	○
By eating green, I can help protect the planet	○	○	○	○	○
Eating green would be too difficult	○	○	○	○	○
I would like to eat green, but the people I live with would not enjoy it.	○	○	○	○	○
Eating organic is safer and healthier for me than eating non-organic foods	○	○	○	○	○
Meat production is detrimental to the environment	○	○	○	○	○
I know where most of the food I eat comes from	○	○	○	○	○
I can't find how my food was produced, so can't eat green	○	○	○	○	○
I buy healthier foods when I shop at farmer's markets	○	○	○	○	○
Eating minimally processed foods is better for my health	○	○	○	○	○
Eating a vegetarian diet can be healthier for me	○	○	○	○	○
Buying food in bulk can help reduce waste	○	○	○	○	○
By eating green I can help conserve non-renewable resources	○	○	○	○	○

	Not at all important	A little important	Neutral	Very important	Supremely important
By eating green I can improve the quality of my diet	○	○	○	○	○
By eating green I can support the local economy	○	○	○	○	○
Eating local can help support small farmers	○	○	○	○	○
Sustainably produced foods aren't available to me	○	○	○	○	○
I am proud that I can help the environment by eating green	○	○	○	○	○
I can't find green foods where I shop	○	○	○	○	○
It is easy for me to find green foods where I eat	○	○	○	○	○
Fair trade foods are too expensive for me	○	○	○	○	○

2. Are there other advantages to green eating that you can think of?

3. Are there other disadvantages to green eating that you can think of?

14. Self Efficacy

1. REMINDER: Green eating means eating locally grown produce, meat-less meals, limited intake of processed foods, consuming foods that are labeled fair-trade or certified organic and (if applicable) selecting meats, poultry and dairy that do not contain hormones or antibiotics; and consuming foods and beverages that are fair trade certified.

Please rate HOW CONFIDENT you feel that you could eat green under each of the following circumstances?

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	Not at all confident	Not very confident	Somewhat confident	Very confident	Extremely confident
When I am busy	○	○	○	○	○
When I am at school during the semester	○	○	○	○	○
When I am at home	○	○	○	○	○
When It is inconvenient	○	○	○	○	○
When around my friends	○	○	○	○	○
When I am with my family	○	○	○	○	○
When I go out to eat	○	○	○	○	○
When I eat in the dining halls or cafeterias	○	○	○	○	○
Over the summer	○	○	○	○	○

2. Can you think of any other barriers that would prevent you or others from eating green?

3. How frequently do you go to restaurants or shop at grocery markets where locally produced or locally grown food ingredients are served?

○ Never

○ Once in a while

○ Sometimes

○ Frequently

○ Always

15. Demographic Information
1. How many years have you been a student/faculty/staff member at URI?

○ <1

○ 1-3

○ 3-5

○ 5-10

○ >10

2. What is Your Age? (in years)

[   ]

3. What is your gender?

○ Male

○ Female

4. How do you describe your racial/ethnic group?

○ White

○ Black or African American

○ Asian

○ Hispanic / Latino

○ Native Hawaiian or Other Pacific Islander

○ American Indian or Alaska Native

○ Other

5. What is your current relationship status?

○ Single

○ Single, in a committed relationship

○ Married

○ Separated

○ Divorced

○ Widowed

○ Living with a significant other

6. How many children do you have?

○ 0

○ 1

○ 2

○ 3

○ 4

○ 5 or more

7. What is your height?

Feet [   ]

Inches [   ]

8. What is your current weight (in pounds)?

[   ]

9. How many people (not including yourself) live in your household during the academic year?

○ I live alone

○ 1-2

○ 3-4

○ 5-6

○ More than 6

10. How many children live in your household?

[▼]

11. How much would you like to weigh in pounds?

[   ]

12. How important is it for you to reach your weight goal?

☐ Not important at all

☐ Minimally important

☐ Somewhat important

☐ Very important

☐ Extremely important

13. What is your rate of eating?

- ☐ Very slow
- ☐ Slow
- ☐ Medium
- ☐ Fast
- ☐ Very fast

14. Are you a vegan? (One who does not eat or use any animal products)

- ○ Yes
- ○ No

15. Are you a vegetarian? (One who does not eat meat)

- ○ Yes
- ○ No

16. Post-Evaluation Feedback

1. Rate the degree to which the program motivated you to make a to change your behavior:

Didn't look : Activities	Not at all	Slightly	Moderately	Mostly	Very Much
○	○	○	○	○	○

2. Rate the degree to which you liked the program:

Didn't look t Activities	Not at all	Slightly	Moderately	Mostly	Very Much
○	○	○	○	○	○

5. What was your overall opinion of the program?

Didn't look at Activities	Not good at all	Needs Improvement	Satisfactory	Good	Excellent
○	○	○	○	○	◉

6. Rate the degree to how likely you would be to recommend the program to a friend?

Didn't look at Activities	Not at all	Slightly	Moderately	Mostly	Very Much
○	○	○	○	○	○

7. What did you like about the program?
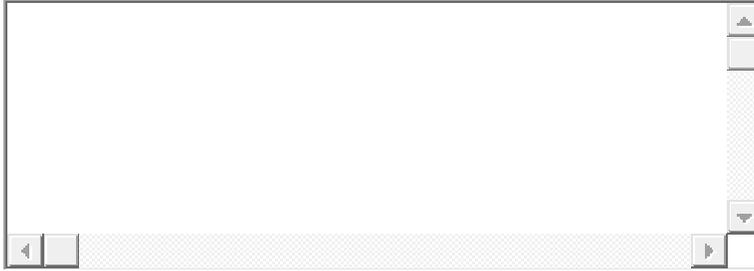
8. Please indicate ways for making improvements to the program:

17. Class Credit

1. To receive extra credit for participation in this study please provide:

URI Student ID:

Email:

18. Future Research

1. The Department of Nutrition and Food Sciences and Department of Communication Studies have several additional studies scheduled this year. Participants interested in hearing more about these studies should enter their contact information below. Compensation for participating in additional studies ranges from $15 to $ 75. By entering your name and email address below you are agreeing to receive further information about these Nutrition Department and Communication Department studies.

Name:

Email:

Phone Number:

Thank you very much for participating in this study

APPENDIX B

Stage-Tailored Messages For Intervention

<u>Module 1</u>

<u>Message 1:</u>

<u>*Precontemplation*</u>
You said you were not considering using more sustainable transportation

(carpool/bike/walk/bus) to get to campus. Consider all the benefits that you could

enjoy by using sustainable transportation more often. This choice may make sense for

you sometime in the future.

<u>*Contemplation*</u>
You said you were thinking about using more sustainable transportation

(carpool/bike/walk/bus) to get to campus. Consider all the benefits that you could

enjoy by using sustainable transportation more often. Then, you can try it out and see

whether starting to use sustainable transportation more often makes sense for you.

<u>*Preparation*</u>
You said you were planning to start using sustainable transportation

(carpool/bike/walk/bus) to get to campus. You realize many benefits that you can

enjoy by using sustainable transportation more often. Consider how soon you will start

using what specific kinds of sustainable transportation more.

<u>*Action/Maintenance*</u>

You said you were already using sustainable transportation (carpool/bike/walk/bus) sometimes to get to campus. This is great! You can save even more money (gas, wear & tear) by using sustainable transportation even more often.

Message 2:

Precontemplation
Have you ever thought about what it would be like to use sustainable transportation (carpool/bus/bike/walk) to get to campus? Many URI students already use sustainable transportation by taking the bus. They take the bus because it's cheap and convenient, but also because they can get reading done on the way to class or finish a last-minute assignment.

Contemplation
If you're thinking about using more sustainable transportation like walking, riding your bike or taking the bus, think about how much money you could save! Think about what form of sustainable transportation works best for you, and give it a try!

Preparation
You've probably realized that most sustainable transportation options are very practical for college students. Plan out everything you need to do to start using sustainable transportation (carpool/bike/walk/bus). Sometimes thinking about the various benefits of using sustainable transportation can help you decide which specific kind you'd most like to try.

Action/Maintenance

People like you realize how beneficial using sustainable transportation is! Not only are

you saving a ton of money, but you're also taking steps to improve your overall health.

Keep up the good work!

Module 2

Message 1:

Precontemplation
Still wondering if using sustainable transportation is right for you? Consider the many options available to start using today! Like taking the bus, riding your bike, or even carpooling! Any of these modes will help you save money and live healthier.

Contemplation
With the growth of issues related to using single occupancy vehicles, more and more people are thinking about using sustainable transportation. Each sustainable transport mode offers its own benefits. Bicycling, for example, will help you lose weight and will lower your carbon footprint! Start trying out different options today.

Preparation
Sometimes the hardest part about changing is the first step, starting. You're ready to begin using sustainable transportation; all you have to do is start. Break through that barrier. You've taken time to think about using it, now all you have to do is put your plan into action. You can do it!

Action/Maintenance
According to the American Public Transportation Association, riding a bus is 79 times safer than riding in an automobile, and riding a train or subway is even safer. Your daily transportation choices positively impact multiple facets of your life! Keep up the good work!

Message 2:

Precontemplation

Did you know that if you can reduce your personal transport carbon footprint by just

20%, you would save 359kg of CO_2 – that's the same amount of CO_2 emitted by the

electricity used to power a TV for over three years!

Contemplation
Did you know that if you take the bus on just one five mile journey each week, over a

year you could save 36kg of CO_2 compared with driving – that's the same amount of

CO_2 produced by electricity that powers a light bulb for over two years!

Preparation
Using sustainable transportation will keep you healthy. Did you know that daily short

walks to and from the bus stop and your destination can burn 22,630 calories a year?!

Action/Maintenance
By now, you've probably realized how using sustainable transportation has improved

your health, saved you money, and helped the environment. Your daily transport

choices serve as a model for those who are considering using sustainable

transportation. Keep up the excellent work, leader!

Module 3

Message 1:

Precontemplation
If you're thinking about how much money you could save if you started using

sustainable transportation, think about this: URI students can purchase RIPTA

monthly bus passes at half of the original price! Think about it.

Contemplation

If you're thinking about using sustainable transportation, you're thinking about much more than how to get around. Using sustainable transportation will help the environment, the economy, and your social life and will also improve your health.

Preparation

You've given some major thought to using sustainable transportation, great job! Now it's time to do what you've thought about doing. If you feel the time is right, try taking the bus to school or work. Or you can walk or ride your bicycle. There are plenty of options to choose from, try the one that benefits you the most.

Action/Maintenance

Using sustainable transportation is helping to keep you healthy! Did you know that daily walks to and from the bus stop and your destination can burn 22,630 calories a year? Keep up the good work!

Message 2:

Precontemplation

Did you know that after you start your car it takes 10 minutes for the emission control system to work at full capacity? This means your car burns more gas and emits more pollution. On your next trip to the store, you can save money and the environment by walking or riding your bike.

Contemplation

Many URI students are already taking advantage of the cheap transportation available to students. RIPTA offers free shuttles to get around on campus, and discounted rates for any busses/shuttles going off campus. You've been thinking about how you can

use sustainable transportation, the next step is to create a realistic plan that will work for you.

Preparation
Have you put your plan into action yet? Plan a day this week to use the most practical form of sustainable transportation. After you do this, you'll realize how great using sustainable transportation is. What do you have to lose?

Action/Maintenance
You're doing an excellent job! Remember to take some time to think about what impact you make when you use sustainable transportation. You're enjoying better health, saving more money, protecting the environment, meeting new people, getting exercise, and lowering your carbon footprint!

Module 4

Message 1:

Precontemplation
Thinking about using sustainable transportation? Have you thought about how you can help save the planet? Many people look the other way and hope someone else will take care of our climate change problem….but if everyone did that, the problem wouldn't get solved. YOU are the future! YOU can make a difference! YOU can help solve our climate change problem. Think about it…

Contemplation
There is a lot to think about isn't there? These modules have made you think even MORE about using sustainable transportation, haven't they? If you're thinking about

using sustainable transportation you realize the important challenges our generation

must face. If you're thinking about using sustainable transportation you not only

understand *what* needs to be done, you understand *why* it needs to be done. The next

step takes courage. Create your own plan, and make it work. The future of our planet

depends on YOU!

Preparation
Great job getting ready! Are you a little hesitant to start? Or are you ready?!! Change

can sometimes make us nervous, probably because we don't know what to expect

when we step outside of our comfort zones. But change can be, and is very often,

GOOD! You know what great things will result from using sustainable

transportation…..all you have to do is take action. You can do it! The future of our

planet depends on YOU!

Action/Maintenance
You're doing a fantastic job! Keep it up! YOU are a leader! While the world is

becoming aware of the severity of global climate change, they'll be looking to leaders

like you who have figured out a huge part of the solution…engaging in the use of

sustainable transportation! It feels good being a leader, staying healthy, AND saving

the world at the same time……doesn't it?!

Message 2:

Precontemplation
Using sustainable transportation can sometimes be inconvenient. But it's important to

remember that there are a TON of options available. There is guaranteed to be at least

one from of sustainable transportation that is practical for you to use. You don't have to stop driving completely, but try to substitute some of your trips by riding your bicycle or walking. Maybe you can take the bus to school a couple days a week…it'll surely save you some money. Remember, sustainable transportation can help get you in shape, and keep you in shape too! It's definitely something to think about.

Contemplation
Have you started preparing yet? You've thought about the pros and the cons of using sustainable transportation. By now, it is clear that the pros of using sustainable transportation far outweigh the cons. Changing the way you travel will make you feel good. You'll feel good about what you're doing for the environment, what you're doing for your health, and what you're doing for your wallet (A nice benefit for a college student in a bad economy!).

Preparation
Have you used sustainable transportation this week? If you did, congratulations! If you didn't, no need to worry…you're taking the right steps to start! If you have questions about using sustainable transportation, sometimes friends are the best people to ask. Talk to your friends to find out what they do, or how they get motivated. Let your friends know what you're doing…sometimes shining the spotlight on ourselves is a great way to follow through with our plans. You've come a long way….you're almost there! Keep taking steps toward using sustainable transportation, your steps get added together and soon you'll be ready!

Action/Maintenance

Have you realized how much money you're saving by using sustainable transportation? Do you notice any difference in your mood? You should be feeling great for multiple reasons! You're saving the planet and getting exercise at the same time! The steps you've taken to get you where you are today are the steps everyone needs to take. You've had the knowledge, courage and determination to make a difference in the world. Sometimes we can't always see immediate results from our actions, but it is a proven fact that they will come! Keep it up! Your planet thankful for your hard work!

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