

**Positive vs. Negative Prompting for Litter Control:
A Systematic Field Evaluation of Relative Effectiveness**

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in
partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Psychology

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April 17, 2009
Blacksburg, Virginia

Keywords: environment, behavior, message framing, antecedent, litter, community intervention

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ABSTRACT

Attempts by behavior scientists to test interventions designed to promote environmentally-responsible behavior (ERB) have been documented for decades. Numerous behavioral scientists have looked to community-based interventions to decrease environment-destructive behaviors, as well as to increase environmental-protective behaviors (Geller, 1995). Litter is one of the most obvious examples of environmental degradation. Litter, defined here as misplaced waste material (Geller, Winett, & Everett, 1982), is a form of environmental pollution that not only degrades the quality of the environment but also proves costly to taxpayers. A wide variety of ecological and monetary benefits result from a decrease in litter. The current research examined the effectiveness of positive vs. negative antecedent messages to reduce littering behavior.

A methodology similar to that used by Geller, Witmer, and Orebaugh (1976), in which handbills containing weekly supermarket specials and special anti-litter message prompts were distributed at local community shopping centers, was used in the current research. In the first study, handbills with no anti-litter messages were distributed for a one-week period to determine percentage of handbills that were littered, and to serve as a baseline. The total percentage of handbills littered was 38.5. A second, web-based, study was conducted to determine the six specific (three positive or gain-framed, and three negative or loss-framed) anti-litter antecedent messages to be added to the handbills. In the third study, handbills with anti-litter messages were distributed for a two-week period. Upon addition of anti-litter prompts, results revealed 36.09%

of distributed handbills were littered. Although no significant interactions were found, several significant main effects were found for store location, distribution period, and gender. The gender effect, indicating women littered at significantly higher rates than males, is notable. Survey research in the area of gender differences related to environmental concerns often has often shown modest differences between men and women, with women frequently displaying greater levels of environmental concern as compared to men. Based on behavioral observations (instead of self-report measures frequently used in previous research), the present research demonstrated significantly more women littering than men.

Although slightly more handbills, in terms of total handbill numbers, containing positive antecedents were littered as compared to those containing negative antecedents (which might be interpreted as stronger impact of loss-framed messages), this difference was not statistically significant. Similarly, there were no statistically significant differences found among each of the six anti-litter messages.

Comparisons of Study 1 (baseline) and Study 2 (prompting intervention) revealed significantly more littered handbills in the baseline condition as compared to the anti-litter message condition. These results indicate a beneficial anti-litter effect of the prompts added to handbills.

Conclusions based on the findings of the three studies within the present research are discussed. Implications for policies, public campaigns, and follow-up research designs are noted. Suggestions for future research involving message prompts and ERBs are offered.

Acknowledgments

I have had an endless amount of support and encouragement from so many individuals throughout my graduate career and I would like to thank all of them. First, I would like to express my deepest gratitude to Dr. Scott Geller, my advisor and mentor. He has inspired me to be my best and is always very proud of my accomplishments. His leadership and encouragement have provided an excellent foundation for my success in the pursuit of my doctorate. Without his guidance, this dissertation would not have been possible. I would also like to thank him for his continuous encouragement, patience and support throughout my graduate career.

My special thanks also to my research committee members, Dr. Lee Cooper, Dr. Kirby Deater-Deckard, and Dr. Richard Winett. Thanks to Dr. Winett, whose early research on environmental responsibility has been a model and inspiration to me during the dissertation process. Thanks to Dr. Deater-Deckard, who often offered positive words of encouragement and support and whose expertise on approach/avoidance was a great contribution to both my preliminary exam and dissertation research. Thanks to Dr. Cooper for consistently encouraging me to see “the big picture” and for his invaluable feedback and support in my growth and evolution as a therapist. The committee’s enthusiasm and assistance have kept me motivated throughout the research process. The insights and suggestions they provided were invaluable and greatly appreciated.

Thanks also to my advisor in my Masters program at Barry University, Dr. Gerene Starratt, who helped shape my future goals and plans and was the first individual to show me what an impact an amazing teacher can have on students. I am grateful for the influential leadership, support and supervision of my clinical supervisors Dr. Russell Jones and Dr. George

Clum. I am also thankful to individuals who were instrumental in developing and improving my skills as a teacher, Dr. Robin Panneton, Dr. Phil Lehman, and Dean Karen DePauw.

Sincere thanks also to the entire Psychology Department at Virginia Tech. I believe the knowledge, caring and help I have received from faculty, staff and students in this department have well prepared me for all of my future endeavors. Thanks also to my fellow graduate students at Virginia Tech, without whom school (and life in general) would be much less enjoyable.

The support of all of my friends has been very much appreciated. Several of these friends that have been in my life for many years deserve special thanks for their encouragement, assistance in maintaining my sanity, and ability to feign interest when I may have bored them with stories of research and graduate school: Danielle Budash, Chelsea Goebel, Robyn Kennedy, Liz May, and the Paulsen family. Your calls and support from across the miles have been priceless.

I would also like to express my gratitude to all of the friends I have made at Virginia Tech. Among countless others who have offered their friendship to me, I would like to acknowledge Denise Adkins, Rachael Budowle, Matthew Cox, Tommy Cunningham, Ashley Dorough, Chris Downing, Ian Ehrhart, Leah Farrell, Wes Keene, Phil Lehman, and Doug and Kendra Wiegand. You have all provided meaningful relationships in my life. I have had good times with and learned from each one of you.

A very special thanks goes to every member of the Center for Applied Behavior Systems (CABS). I consider this research center a unique one, and am consistently amazed by how many Cabbies demonstrate “actively caring” on a daily basis. I am indebted to Xin Zhao and Kristen Davidson, who were exceptional undergraduate researchers and were instrumental in carrying

out two of the three studies included in this dissertation. Their efforts and excessive time spent organizing data collection and handbills will always be appreciated. Much appreciation also goes to Dr. Steve Clarke. His willingness to make time for me despite his overwhelming schedule was very selfless and his statistical knowledge and advice contributed greatly to this project, and I am quite grateful for his friendship.

Thanks also to folks who have become new sources of support in my life at the Charleston Area Medical Center. Thanks to Dr. Melisa Sirbu for always being there for me when I am in need of guidance and advice or a friendly smile. Thanks to Dr. Linton, whose door is always open and is committed to the growth, progress, and careers of his interns. Special thanks to Dr. Adina Bowe for providing laughter and chocolate that always makes me feel better, and for becoming such a wonderful friend.

I would like to express my extreme appreciation to my entire family, who have encouraged, motivated, and supported me throughout my life. Thanks to my mother, who is my favorite “tree-hugger” and inspired the current research project by encouraging and modeling environmentally-responsible behaviors since I was an infant. Thanks to my father, who instilled a strong work ethic in me and made me believe I could be anything I wanted to be. Thanks to my brothers, Eric, David and Tommy, for expressing to me how proud they are of their big sister, and for always being a special part of my life. Thanks to my sister, Sarah, whose positive attitude and sweet voice always brighten my day. Thanks to my grandparents, Rodger and Jean Drake, who fostered my intellectual curiosity and encouraged all of my academic pursuits. Thanks to my grandmother, Barbara Hall, who taught me that the most important thing in life is to care for those around you, and to always appreciate family. Thanks to my other parents, Cathy and Frank, who I feel lucky to call family and whose thoughts and prayers at every milestone made me feel

loved and encouraged. Thanks to Cami, for keeping me company during long nights of dissertation work and for loving me unconditionally.

Finally, and most importantly, I would like to thank my husband, David Esposito, for *everything*. Words cannot express my gratitude for his constant love, encouragement and help throughout my graduate career and my life. I cannot imagine a more supportive and caring husband. With you by my side, I know we can handle and accomplish anything. I look forward to sharing our post-graduate school lives together.

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**POSITIVE VS. NEGATIVE PROMPTING FOR LITTER CONTROL:
A SYSTEMATIC FIELD EVALUATION OF RELATIVE EFFECTIVENESS**

Till now man has been up against Nature; from now on he will be up against his own nature.
~Dennis Gabor, *Inventing the Future*, 1964

Problem: Environmentally Responsible Behavior (ERB)

The very first Earth Day was celebrated in 1970, but the second Earth Day did not occur until 1990 – twenty years later. Over the past 39 years, limited concern for the environment has nevertheless led to a notable number of actions intended to reduce or reverse environmental damage.

Among the most serious long-term threats facing the world is the danger that human actions are producing irreversible adverse changes to the environmental conditions that support life on Earth. If this problem is not overcome, there may be no viable world for our descendants to inhabit. Significant changes to human lifestyles might be needed to reach a sustainable level of impact on the environment. Social science can aid in reaching this goal by researching and evaluating environmentally responsible behaviors (ERBs). Knowing what action to take requires an understanding of how interventions to change environmentally degrading behaviors of humans can be most effective at increasing the frequency of ERBs.

According to Keep America Beautiful (<http://www.kab.org/site/Litter>, retrieved March 23, 2009), 88 million tons of garbage were generated in 1960 in the United States. In 2003, 236 million tons of garbage were generated in the United States. In 2008, over 251 million tons of garbage were generated in the United States. Unfortunately much of this garbage was composed of misplaced waste – litter.

Litter is not only costly and unattractive, it is a threat to public health. Litter attracts pests and vermin and is a breeding ground for many types of bacteria. Additionally, discarded items such as broken glass and syringes are litter that is a health hazard in public places. Litter left in, or blown into, the streets can be washed down storm water drains, which carry the litter to streams, lakes, and oceans. A small amount of litter and pollution on beaches and riversides actually originates with people (intentionally or unintentionally) dropping things in or by the rivers, lakes or oceans. A majority of the litter and waste problems begin many miles inland and are brought out to sea through drains, rivers and streams. Thus, the misplaced waste that individuals leave on the ground or other inappropriate places is often carried by weather to other areas in which the litter has potential to be very harmful to the health of humans and animals. In places containing large quantities of litter, hidden and harmful pollutants such as include oil, heavy metals, fertilizers, insect and weed poisons, and E coli bacteria can often be found in the water.

Despite apparent concern for the environment, since the first Earth Day, 39 years have come and gone and many professionals and researchers remain concerned about environmental sustainability. Most environmental experts agree about the importance of acting to reverse environmental degradation in the world and of finding approaches to preserve environmental quality.

The Three-Term Contingency (ABC) Model

The three-term contingency is a model of behavior change which posits behaviors are directed by antecedents that precede them and announce the availability of positive or negative consequences. The positive or negative consequences that follow the behavior affect further incidences of the behavior. This model is also known as the ABC (antecedent-behavior-

consequence) model. According to the ABC model of behavior change, antecedents (or activators) prompt the behavior, which is followed by a consequence which determines its future.

The principle “direct with activators and motivate with consequences” guides the methods of interventions aimed at influencing behavior. Individuals do what they do because of the consequences expected for doing it. Activators indicate what can be done in order to receive a consequence. More than 50 years of behavioral science research has demonstrated the efficacy of this general approach to directing and motivating behavior change (Geller, 2007).

Antecedents

According to Daniels (1989), an antecedent is a person, place, thing, or event coming before the behavior. The antecedent encourages one to perform that behavior. Some antecedents specify a consequence, some do not, and some implicitly reflect a consequence. Behaviors are directed by the antecedent stimuli that came before them and reveal the availability of a positive or negative consequence. Some examples of antecedent examples are prompting, modeling, or commitment strategies.

A sign reading “Please Recycle!” above a recycling receptacle is a prompt that might encourage us to deposit our cans for recycling. A respected individual modeling energy-reducing behaviors (lowering the thermostat in winter) can be an antecedent for others to practice energy-reducing behaviors. Commitment cards that are signed as promises to pick up one piece of litter every day for a month are antecedents designed to reduce environmental litter. Prompts are discriminative stimuli designed to set the occasion for a desired response. They can be general or specific, and verbal or non-verbal.

Prompts used as antecedents in behavioral studies can either specify a consequence, not specify a consequence, or just implicitly reflect a consequence. These antecedent prompts can

also be classified as positive, negative, or neutral. For the current studies, antecedents announcing the availability of a positive consequence will be considered “positive antecedents,” while antecedents announcing the availability of a negative consequence (also referred to as disincentives) will be considered “negative antecedents.” Some antecedents do not clearly specify the availability of either a positive or negative consequence.

The ABC model has been used frequently in environmental behavior interventions. Antecedent techniques aimed at environmental protection are environmental manipulations which are implemented prior to an opportunity for a target behavior to occur, in an effort to increase the frequency of the desired behavior or to decrease the frequency of undesired behaviors (Geller, 1995a). Many types of antecedent strategies are used to influence ERBs, including information and/or education, prompts (including verbal or written, and general or specific), modeling, and promise cards (i.e., a commitment strategy).

Psychological Reactance

In his classic book, “Beyond Freedom and Dignity,” B.F. Skinner (1971) explained individuals are more likely to feel controlled by extrinsic events when they are responding to avoid or escape aversive consequences than when they are responding to earn pleasant consequences. According to Skinner (and many other behavioral scientists), positive reinforcement (and thus antecedents signaling the availability of reinforcement) is the consequence strategy most likely to preserve one’s perception of personal freedom and least likely to encourage resistance and countercontrol. According to Brehm (1966), psychological reactance considers human behaviors within the domain of limited free behavior. Reactance can be viewed as a form of psychological arousal, in which a subject’s motivational state is focused on the reinstatement of free will and the return of behaviors that have been taken away or are

threatened to be taken away. The notion of psychological reactance will be re-visited below in the context of framing messages to influence behavior.

Message Framing

Messages are often used as a means not only of transmitting information but as a way of influencing behaviors. The manner in which the message is presented, or framed (manipulated), can have an impact on whether an individual complies with a particular message. A majority of studies exploring the impact of messages on behavior use a framework of messages identifying benefits of following recommendations (positive consequence) versus cost of not following the recommendations (negative consequence). Messages emphasizing the benefits are often labeled gain-framed messages, while messages emphasizing the cost, or loss, are labeled loss-framed messages.

Most research studies of message framing are in the areas of marketing and health behaviors. Messages which are positively framed are considered to direct attention on the goal of obtaining the positive consequence (or gain) of engaging in the behavior, as compared to negatively-framed messages which are considered to direct attention on avoiding the negative consequence (or loss), from not engaging in the behavior. In most research studies both of these framing conditions are aimed at encouraging the same act. According to Levin, Schneider, and Gaeth (1998) the important question in the area of message framing is which frame, positive or negative, will be more effective in achieving the same end result.

Higgins' (1997, 1999) self-regulatory focus model is quite relevant to message framing literature and investigations. According to Higgins, two distinct self-regulatory foci can be differentiated in individuals. One can adopt a *promotion*-focus orientation or a *prevention*-focus orientation when making decisions and behaving by approaching or avoiding a situation or event.

With a promotion focus, individuals are focused on acquiring gains and tend to act readily; while with a prevention focus, individuals are focused on avoiding losses and tend to act cautiously. Higgins posits the strength of one's regulatory focus shapes how he/she looks at the world. A promotion-focus orientation is often related to issues of accomplishment, hopes and aspirations, whereas a prevention focus orientation is often related to issues of safety, responsibilities, and obligations. A message frame might be thought of as corresponding to the self-regulatory focus if it effectively highlights the interests of one's regulatory-focus orientation (promotion focus vs. prevention focus).

Messages framed to correspond to a promotion orientation would likely emphasize approach goals (such as obtaining more money following a less expensive electricity bill due to reduced energy consumption in the home). Messages framed to correspond to a prevention orientation would likely emphasize avoidance goals (such as not paying higher costs for an expensive electricity bill when unnecessary energy consumption is prevented). Research has also shown both prevention and promotion foci may be generated in reaction to a specific situation, separate from a person's chronic regulatory-focus orientation (Higgins, Shah, & Friedman, 1997). External stimuli (such as antecedent prompts) can be used to provoke a prevention or promotion focus within a situation.

Research findings have been mixed in terms of how alternative framing of messages in positive or negative terms impacts judgments and behaviors. Some studies have shown gain-framed, positive messages (specifying benefits of engaging in a certain behavior) to be more persuasive as compared to loss-framed, negative messages (specifying benefits lost by not engaging in a certain behavior). The opposite outcomes have been demonstrated in other studies

(Levin et al., 1998). These mixed findings quite possibly could be a result of lack of consistent use of terminology across various empirical investigations of message framing.

Meyerowitz and Chaiken's (1987) research provide a classic health study investigation of goal-framing effects. These authors documented women were more likely to engage in breast self-examination (BSE) when given messages emphasizing the negative consequences of not engaging in BSE as compared to when given messages emphasizing the positive consequences of engaging in BSE. It was concluded women were more highly motivated to avoid a loss by complying with the request to engage in BSE than they were to obtain a gain by complying with the request to engage in BSE.

However, Lalor and Hailey (1990) failed to replicate Meyerowitz and Chaiken's results. Additionally, these researchers examined perceived susceptibility and positive versus negative message frame. Although perceived susceptibility was correlated with attitudinal measures, no significant results were found for message frame and perceived susceptibility.

In a more recent investigation of message framing on health behaviors Abhyankar, Connor, and Lawton (2008) examined the impacts of message framing, but in a methodology considered unique to studies described above in that the decisions being made in response to the message were for their child's health, not their own. Gain and loss-framed messages were used to study the intent of mothers to allow their children to receive the measles, mumps, and rubella (MMR) vaccine. Women were instructed to complete a questionnaire assessing their perception of the MMR vaccine, which either contained a positive or negative antecedent message. The results indicated the loss-framed messages were more effective than the gain-framed messages in increasing the number of women obtaining the MMR vaccination for their children.

Other health behaviors that have been examined as a function of message framing, again with varying outcomes of loss versus gain frame, have included resource allocations for AIDS treatment (Levin & Chapman, 1993), HIV testing (Apanovitch, McCarthy, & Salovey, 2003), flossing of teeth (Mann, Sherman, & Updegraff, 2004), colorectal cancer screening (Myers et al., 1991), and skin cancer prevention (Detweiler et al., 1999).

In the area of marketing and purchasing behavior, Ganzach and Karsahi (1995) investigated message effects on buying behavior. In their research, customers of a credit card company who were determined to have not used their card for a three-month period received a message explaining the benefits of the card. The message was communicated either in terms of gains the customers could receive from using their card, or in terms of losses they could incur for not using their credit card. Results from the following two months of card usage revealed the loss-framed message had significantly greater impact than the gain-framed message. This study reported the percentage of individuals who began to use the card in the loss-framed condition was more than double the percentage in the gain-framed condition, and the purchase charges of the individuals receiving the loss-framed messages were more than twice as much as the charges of individuals receiving gain-framed messages.

In an exploration of the relationship between perceived efficacy, depth of processing, and message framing, two experiments were conducted on separate health issues: sexually transmitted disease and skin cancer. For both studies, it was demonstrated the low efficacy condition (i.e., when it was uncertain if following the suggestions would lead to the desired outcome) motivated more in-depth processing as compared to the high efficacy condition (i.e., when there was more certainty that following the suggestions would lead to the desired outcome). It was also shown that when participants processed messages in-depth, negative

frames were more persuasive than positive frames. In contrast, the high efficacy condition led to less effortful message processing in which positive and negative message frames were found to be equally persuasive (Block & Keller, 1995). These findings suggest that when efficacy is low, loss-framed messages might be more effective, and when efficacy is high either loss or gain-framed messages might be equally effective.

It is important to note that a large majority of message framing research in the areas of health and marketing rely solely on surveys and self-report data. Only a small minority of these studies included data from observations of actual behaviors following a presentation of the message(s). This is an obvious limitation in this literature.

Most of the studies described above examined cognitions, memories and attitudes toward the message(s). These do not predict the actual behavior that an individual engages in after being exposed to the message, but instead indicate attention, reported emotional reactions, and ability to remember or recall the messages. These investigations are clearly very different from explorations of impact on behaviors following various message framing conditions.

Message Framing and Psychological Reactance

Although the concepts of countercontrol and psychological reactance (especially based on Brehm's and Skinner's views) have been covered earlier, these concepts are relevant to message framing and deserve further attention in this context. Since individuals are innately uneasy with having their freedoms removed or threatened, they might ignore persuasive efforts and instead experience a boomerang effect, in which individuals do the opposite of the intended behavior advocated by the persuasive messages (Burgoon, Alvaro, Grandpre, & Voulodakis, 2002). In terms of message framing, loss-framed messages can often produce feelings of guilt related to not performing the intended behavior. These feelings of guilt might be perceived by

participants as both restrictive and threatening, and thus reactance may be activated.

Psychological reactance can be identified as a plausible explanation for some negative reactions to loss-framed appeals (Reinhart, 2007).

Research such as that of Reinhart and colleagues (2007) demonstrated the impact of psychological reactance in reference to message framing. These researchers measured the impact of message framing on reactions to messages promoting organ donation. They found that participants who read a gain-framed message reported more favorable reactions toward the message and lower psychological reactance as compared to participants who read a loss-framed message. Additional research into guilt appeals has demonstrated these appeals may produce negative emotional reactions, tied to psychological reactance. Respondents of a guilt request often report feeling heightened levels of anger, disgust, and feeling fewer positive emotions (e.g., Cotte, Coulter, & Moore, 2005; Coulter & Pinto, 1995; Pinto & Priest, 1991).

Message Framing and ERB

Although a majority of the message framing literature specifically examines health and purchasing behaviors, much research using antecedent strategies in the area of environmental responsibility could be characterized as message framing research. When a study of ERB uses a manipulation of different types of antecedent messages framed to alert positive or negative consequences, these can be viewed as using gain-framed (receive positive consequence if complying with behavior) and loss-framed (receive a negative consequence by losing something good or receiving something bad) antecedent appeals as message frames. Although not specifically framed in traditional message-framing terminology, many environmental sustainability intervention studies report findings using variables related to messages as antecedents implemented before a behavior or response (e.g., Austin, Hatfield, Grindle, &

Bailey, 1993; Durdan, Reeder, & Hecht, 1985; Geller, Witmer, & Orebaugh, 1976; Reich & Robertson, 1979; Reiter & Samuel, 1980; Schnelle, McNees, Thomas, Gendrich, & Beagle, 1980). Many of these studies are discussed further in the next section as they relate to current research.

Behavioral Antecedent Interventions Targeting Environmental Protection/Preservation

Among interventions designed to increase ERB, antecedents and/or consequences can be categorized as positive or negative. Federal, state, and local governments have most often used disincentives and penalties, as opposed to incentives and rewards to protect the environment (Geller, 1995a). Despite this tendency by government, behavioral psychologists have often shown a preference for positive reinforcement and interventions using positive consequences over punishment or negative reinforcement and interventions using negative consequences (Geller, 1987). Geller (1995b) maintains that negative attitudes by the public often accompany the threat of a negative consequence, such as the enforcement of litter-control ordinances, and this is why mandated approaches result in short-term impact and limited maintenance and generalization when the threat is removed.

However, mandated policies by the federal government have often been quite successful for fuel economy standards among automobile manufacturers, as well as for home appliance efficiency standards. Although success has been found with mandates, human dynamics clearly affect how much individuals resent the mandate (Kempton, Darley, & Stern, 1992). In a review of positive and negative consequences in environmental interventions, Lehman and Geller (2004) noted environmental behaviorists have generally favored rewards over penalties. This might be due to the negative association of punishers, and the high potential for psychological reactivity (or countercontrol).

As reviewed below, the research of interventions targeting ERB peaked around the mid 1970's, and then declined steadily through the 1980's and on. In spite of some successful demonstrations, behavioral scientists became discouraged by the lack of support and the difficulty of working with large-scale systems, public policies, and deeply-ingrained cultural practices.

The general approach is to define specifically and objectively the ERBs that need to be changed (i.e., increased or decreased in frequency) and then manipulate environmental stimuli or events preceding and/or following a target ERB in order to influence behavior change in desired directions.

Messages as Antecedent Prompts for ERB

A majority of studies exploring impact of antecedent prompts on behavior use a framework of messages identifying benefits of following recommendations (positive consequences) versus cost of not following the recommendations (negative consequences). Although these studies are limited in quantity, particularly those using messages as antecedent prompts specifying a consequence, a few studies used positive and negative message prompts as antecedent strategies to target ERBs.

Winett (1978) evaluated the appropriateness and effectiveness of different kinds of prompts to conserve energy. In this field study, university-produced signs urging persons to conserve energy were placed in rooms where lights were frequently left on, even when the rooms were unoccupied. These initial prompts had no effect, but in the next phase of the study, larger signs with specific information were placed near the exit point of the room, and lights were then left on for only 40% of the observation days.

Geller, Brasted, and Mann (1980) evaluated effectiveness of highly decorated trash receptacles, as compared to ordinary containers, in an indoor shopping mall. Using an ABABA design of these neutral antecedents, results indicated highly decorated bird cans were more successful in encouraging litter deposits as compared to regular mall containers.

In another study of prompting, signs and education were used to increase paper recycling in two college departments. Results of a multiple baseline design suggested by placing neutral signs, which did not imply a consequence, over trash and recycling containers, recyclables were increased from 51% in baseline to 84% in the experimental condition. This study demonstrated informational prompts on recycling to be effective when providing clear information regarding which materials are recyclable (Austin, Hatfield, Grindle, & Bailey, 1993).

Antecedent Strategies Applied to Litter Behaviors

One of the most obvious examples of environmental degradation is litter. Litter, defined here as misplaced waste material (Geller, Winett, & Everett, 1982), is a form of environmental pollution that not only degrades the quality of the environment but also proves costly to taxpayers. A wide variety of ecological and monetary benefits result from a decrease in litter (e.g., an aesthetically cleaner and safer environment; reduction of solid waste in landfill areas; monetary savings for taxpayers; and conservation of energy through recycling of aluminum, glass, and steel). A review of interventions used to encourage appropriate litter disposal reveals that most can be divided into either antecedent-based or consequence-based procedures. Dwyer and colleagues (1993) reported both antecedent and consequence techniques were effective at increasing ERBs. These authors further concluded consequence strategies were the most effective, and antecedents implicating a consequence were more influential than those that did not.

Numerous studies have manipulated antecedent conditions (e.g., prompts, trash receptacles) to prevent littering (e.g. Finnie, 1973; Geller et al., 1982; Miller, Albert, Bostick & Geller, 1976; Stern & Oskamp, 1987). However, research on picking up and disposing of other people's litter has shown minimal effects of prompts (Geller, 1987). For example, Bickman (1972) placed two empty soda cans near a trash receptacle in front of a college library. In one condition, passing pedestrians saw another college student (the model) kick one of the cans and walk on, and in another condition the model picked up one of the cans and deposited it in the trash can. Of the 409 students and 97 nonstudents who passed the litter, only five students and three nonstudents (1.4%) picked up any of the planted litter.

Antecedent strategies targeting litter - no specification of consequence. In research by Finnie (1973), several field experiments were conducted in which a number of antecedent conditions were manipulated to successfully reduce the amount of litter accumulated during a given time. In one experiment, litter receptacles were established on one highway and compared to two other highways that did not have litter receptacles. Litter receptacles were rotated among the three highways every three months and each highway was cleaned before a change of conditions. Using the litter receptacles as neutral antecedents, as compared to no receptacles, reduced roadside litter in the sample areas by 29%.

Durdan, Reeder, and Hecht (1985) examined sign specificity using a message framing approach by comparing four types of antilittering signs. Signs were either general or specific, and the signs contained phrases that were either positively worded or negatively worded (negative signs stated: "Please don't litter! Clear your own table", while positive signs stated: "Please be helpful! Clear your own table"). A significant decrease in litter was found following sign prompts. No differential effects due to specificity were found for either the positive or

negative signs. However, the positively worded prompt was found to be more effective than the negatively worded prompt. Additionally, littering increased significantly when the signs were removed. It is important to note that although this study examined evaluative tone of the antecedent message (positive vs. negative), these messages did not clearly indicate the availability of a consequence.

In similar research, Reiter and Samuel (1980) measured the effects of three message conditions (threatening, cooperative, and no sign) on handbill littering in a parking garage. It was hypothesized that the sign with a threatening message (i.e., “Littering is Unlawful and Subject to a \$10 Fine.”) would induce psychological reactance and therefore would be less effective than the sign emphasizing cooperation (i.e., “Pitch In!”). Results demonstrated the two types of signs posted were both effective in reducing the number of handbills littered, as compared to a no sign condition, but the cooperative (i.e., positive) “Pitch In” message was not found to be any more effective than the threatening (i.e., negative) “Unlawful” message. Since one message indicated the availability of a consequence (“Littering is Unlawful and Subject to a \$10 Fine”), while the other did not indicate a specific consequence (“Pitch In!”), it might be argued that a methodology that implied a consequence for *both* antecedent messages within this study might have yielded quite different results.

Reich and Robertson (1979) also used different antecedent message conditions, but used a public swimming pool as the setting for their field research. These authors looked specifically at messages framed as demands as compared to those framed as requests. Fliers with specific written anti-litter messages were distributed at a swimming pool. The messages in the demand condition read “Don’t litter” and “Don’t you dare litter.” Messages in the request condition read

“Help keep your pool clean” and “Keeping the pool clean depends on you.” Significantly more littered fliers were found in the demand condition as compared to the request condition.

Results comparing conventional trash receptacles to ones designed to attract attention when litter was deposited (i.e., the message “THANKS!” was revealed when litter was placed in the trash can) demonstrated both the number of litter items deposited and the weight of litter deposited to be much greater (approximately double) in the experimental container as compared to the conventional one. These findings indicate receptacles with reinforcing messages can be designed to increase proper litter disposal (O’Neill, Blanck, & Joyner, 1980).

A study by Geller, Witmer, and Orebaugh (1976) was designed to investigate the effectiveness of including antilitter instructions on materials that would pollute the environment if not disposed of properly (i.e., paper handbills). This study determined the behavioral effect of several variables, including methods of presenting specific vs. general disposal instructions, instructions to avoid a specified disposal location that included either a general or specific response alternative, instructions to litter in a specified location, and gender of individual who received the handbill.

In the methodology used for that study (similar to the methodology of the research reported here), individuals were offered a handbill while entering a grocery store (two grocery stores in Blacksburg were the setting of the study). On 40 consecutive days, handbills containing handwritten “Specials of the Week” were distributed. On some days, special instructions as prompts were included at the bottom of the handbill. Handbills were distributed to 100 males and 100 females each day. Following a distribution period, handbills were gathered from the stores’ premises and categorized according to the location the handbill was left on data forms.

Special trash cans used for the study of specific vs. general instructions were placed strategically throughout the stores. The type of instruction included at the bottom of the handbills was manipulated across five conditions, which were alternated daily for five weeks. The five conditions were as follows: 1) baseline – no antilitter prompt; 2) general antilitter prompt: “Please don’t litter. Please dispose of properly”; 3) specific antilitter prompt “Please don’t litter. Please dispose in green trash can located at rear of store”; 4) Demand antilitter prompt “You must not litter, you must dispose in green trash can located at rear of store”; 5) recycle prompt: “Please help us recycle. Please dispose for recycling in green trash can located at rear of store”.

Results demonstrated the instructions to recycle yielded the largest proportion of disposals in the specified can at each store. A general antilitter message on handbills reduced handbill litter on shelves, counters, and display tables of one grocery store by more than 50%. Instructions demanding a certain response (i.e., negatively-worded prompt) were as effective at generating compliance as instructions implying a polite request (i.e., positively-worded prompt). The greatest proportion of litter occurred during baseline conditions. The observed effects of the various prompts were found to be similar for both males and females. The authors concluded the results found here suggest some littering behaviors might be decreased by displaying specific antilitter instructions in the environmental setting. It is important to note this study investigated general vs. specific prompts, and included positively- worded vs. negatively-worded messages; however, these prompts did not specifically announce the availability of a consequence.

Antecedent strategies targeting Litter - alerting the availability of a consequence.

Powers, Osborne, and Anderson (1971) used litter stations with large cans bearing messages alerting individuals to payment for litter disposal in an area of a public forest. In this antecedent

incentive strategy, decreased amounts of litter were found during the replication period for the experimental condition.

In a study using both negative and positive antecedents (as well as rewards in the form of a prize), Baltes and Hayward (1976) promoted the use of distributed litter bags. In the positive prompting condition, participants in certain sections of a college football stadium received litter bags and the message prompt: "Pitch In! You will be a model for other people. You can help to cut down cleaning costs. Dispose of your litterbag after the game at the section exit." In the negative prompting condition, participants in others sections received litter bags and the message prompt: "Pitch In! Don't be a Litterbug. Others will disapprove of your littering. Litter can hurt. Dispose of your litterbag after the game at the section exit." Weight of litter remaining in designated sections showed all treatment conditions resulted in significantly less litter. However, there were no significant differences among the various strategies to encourage litter-bag usage.

Schnelle and colleagues (1980) studied the impact of a series of newspaper articles against measures of littering in target areas of a community using both positive and negative antecedents. A feature article was published in a local newspaper, which included photographs of children picking up litter, along with pictures of some of the extremely littered areas along the street. The article contained an appeal to the public to help clean up the town, and a description of the feedback the newspaper was going to publish daily. Litter was reduced in each of the target areas only when the newspaper identified and gave feedback about that specific area.

Antilittering campaigns can be viewed as attempts to increase the threats of shame and embarrassment for littering. In a study using self-report, Grasmick, Bursik and Kinsey (1991) found negative consequences of shame and embarrassment to be significant motivators in an antilittering campaign. In 1987, after no previous effort to encourage citizens not to litter,

Oklahoma adopted a twofold campaign, the “Adopt-a-Highway” program and the “Don’t Lay that Trash on Oklahoma” program, consisting of highway signs and a media campaign as messages to inform the public.

Results of surveys with questions concerning litter revealed the mean perceived risks of shame and embarrassment for littering were significantly higher in 1989 than in 1982. Perceived risk of shame and embarrassment were measured based on Likert scale responses to the items: “Generally, in most situations I would feel guilty if I were to litter the highways, streets, or a public recreation area” and “Would most of the people whose opinions you value lose respect for you if you were to litter the highways, streets, or a public recreation area?” The increase in the risk of shame and embarrassment, between 1982 and 1989, were accompanied by a decrease in the proportion of respondents who reported they would litter.

Rationale for Current Research

Human behavior contributes significantly to the degradation of our environment, and there are many changes in human behavior which can have meaningful impact on environmental protection. Many have called for community-based interventions as a necessity to decrease environment-destructive behaviors, and to also increase the occurrence of ERBs (Geller, 1995a). Environmental awareness at a global level is currently high, yet people continue to deplete resources at an alarming pace. Advocates of environmental protection and preservation promote issues they want to see turned into policies and laws, but the question is whether such policies and laws will actually make a difference. The chances of making a significant difference are likely increased if relevant *behavior* is taken into account. As Scriabine (1996) points out, there has always been a wide gap between the making of national policies and the knowledge of what

actually leads people to engage in environmentally responsible vs. disruptive behavior. Policies must be created around pragmatic and tested research addressing how to promote constructive environmental behavior.

In an effort to facilitate determining the best ways to advocate ERBs, the current research project examined the impact of anti-litter messages on actual behaviors, using a handbill distribution methodology introduced almost 36 years ago (Geller, 1973, 1975; Geller et al., 1976). The specific aim of this research was to study objectively the impact of various anti-litter messages prompts, as well as gender effects.

Following their 2007 research, Reinhart and colleagues have noted guilt appeals in the form of loss-framed messages used for prompting behavior which can impact others may backfire, and argues gain-framed appeals, which are implied to not arouse feelings of guilt, are more persuasive. Based on findings such as these of Reinhart and colleagues (2007), as well as views among a majority of behavioral psychologists regarding psychological reactance and the efficacy of positive antecedents (e.g., Geller, Winett, & Everett, 1982), we expected to find positive antecedent (gain-framed) messages to be more persuasive in reducing littering as compared to negative antecedent (loss-framed) messages. Given that positive antecedent messages do not limit freedom and instead underscore the potential gains of complying with the requested behavior, they were anticipated to generate more favorable reactions as compared to negative antecedent messages.

Overview of Present Studies

Study 1 examined rates of litter behaviors when using handbills distributed to shoppers at a supermarket. The aim of this first study was to ascertain if enough paper handbills would be littered to allow for adequate differences in littered handbills between varieties of anti-litter

messages. Study 2 was designed to determine which negative antecedent and positive antecedent messages would appear on individual handbills. This study aimed to create six brief written prompts, under the assumption that lengthy, wordy, or confusing messages would be less likely to be read by shoppers in this field setting. Three gain-framed and three loss-framed message prompts were used in order to avoid a common error in experimental design, as observed by Jackson and Jacobs (1983), where a single message is used to represent a category of messages and generalizations are made based on this single message. Information obtained from Study 2 was used to develop appropriate messages to print on handbills used in Study 3. Study 3 used gain-framed antecedent messages printed on handbills to alert to availability of positive consequences if the desired behavior occurs, while loss-framed antecedent messages were used to alert to availability of negative consequences if the target behavior does not occur. Messages were printed on handbills and distributed to shoppers at two shopping centers in the community.

Study 1: Handbill Litter Rates

The aim of the first study was to ascertain if enough paper handbills would be littered to allow for adequate differences in littered handbills between varieties of anti-litter messages. If it was found a sufficient amount of handbills were littered, it was anticipated this could demonstrate varying results between sets of positive vs. negative messages. In the current research, litter is defined as misplaced waste material (Geller, Winett, & Everett, 1982). The handbills in this study only included specials of the week for the supermarket, with no anti-litter message. Thus, this condition could be considered a baseline condition for the prompting conditions in Study 3.

Method

Setting and Participants

Data was collected at a local Kroger supermarket located in Blacksburg, VA. Participants were customers of the Kroger supermarket. A total of 2,697 adult shoppers (1365 males and 1332 females) received the handbill, and thus were participants in this study.

Handbills

Handbills were printed on 3"x 8.5" inch green (recyclable) office paper. On the front of the handbill was printed, in color, the "Weekly Specials" for Kroger, which included photos of the products on sale. The handbills distributed to female participants were marked with extremely small red dots on the back of the handbill so gender effect could be investigated.

Figure 1 depicts a sample handbill.

<Insert Figure 1 About Here>

Procedure

Undergraduate research assistants (RAs) working with the Center for Applied Behavior Systems (CABS) were trained to distribute the handbills with store specials printed on them. RAs distributed handbills in teams of two. One RA gave handbills to female customers while the other RA gave handbills to male customers. The RAs stood outside of a set of sliding doors that serve as the entrance to the supermarket, but were within the store (inside the lobby) of another set of sliding doors which exit to the parking lot. The RAs wore casual, non-identified clothing. According to comments and conversations reported to project leaders, many customers assumed the RAs were employees of Kroger distributing advertisements. The RAs did not initiate conversation, and simply smiled and stated "specials of the week" as they handed the handbill to supermarket patrons upon entering the supermarket.

The RAs distributed handbills twice daily, from 11:30am to 1:30pm and from 4pm to 6pm, for one full week. The RAs were instructed to distribute as many handbills as possible during these time periods, chosen based on data from the Kroger manager indicating they were the busiest times during the day. Following each distribution period, two more RAs spent another 1-2 hours collecting littered handbills from the store premises and parking lot until no more handbills could be found (this included checking behind products in the aisles and under shelves). These RAs recorded information on a data collection sheet to indicate how many littered handbills were collected and what the gender distribution was for these handbills.

Results

During this one-week distribution period, 2697 handbills were distributed (1365 to females, 1332 to males), and 1039 handbills were collected (561 from females, 478 from males) from the store, parking lot, and shopping carts, which were considered littered handbills. The mean number of handbills littered each day was 148. The total percentage of littered handbills was 38.5. Friday (183 littered handbills) and Saturday (222 littered handbills) were seen as the busiest days at the shopping center in terms of both handbill distribution and collection numbers, which was consistent with reports given by store managers. For each of the seven days of data collection, the evening shifts indicated more handbill distribution and collection as compared to the afternoon shifts.

Results of Chi-Square analyses performed on handbills littered indicated a significant difference between female and male littering behavior ($\chi^2 = 7.736$, $p < .01$), with female littered handbills (41.10%) being collected at a significantly higher level as compared to male littered handbills (35.88%).

Conclusions

Results of Study 1 revealed at least 38.5 percent of the distributed handbills were littered. However, this percentage might be even higher because RAs did not collect and record every handbill that was littered. Although all employees were alerted to the study and told not to retrieve handbills, a few store employees did collect handbills found on the floor and on checkout shelves. There are other reasons the store litter counts were underestimations of littering behavior. For example, it is quite possible many shoppers took the handbills and littered them in another location.

Based on data from this one-week study, it seemed enough distributed handbills were littered to obtain differential effects of antecedent prompts when anti-litter messages are added to the handbills.

This study revealed that in order to obtain a more accurate litter count, scheduling of research assistants would have to be adjusted so handbill collectors/counters would begin collecting handbills at the same time in which other RAs would be distributing handbills. This was done to prevent store employees from picking up handbills. Having RAs collect and code handbills very quickly after they are littered could also help keep the premises clean, which might help to avert “litter begets litter” confounds.

In this initial study, it was found females littered more than males. This finding is noteworthy because self-report data in the literature indicate females litter less. Although a majority of the gender effect literature on litter has been based on self-report data, the few studies which have actually measured behavior have either shown no significant gender difference, or reported males littering at higher rates than females. Findings from Study 1 pointed

to the importance of investigating a possible gender effect with a larger number of participants over a longer time period, as accomplished in Study 3.

Study 2: Development of Antilitter Messages

The results from this study were used to determine which of 20 anti-litter messages might be most effective to discourage the littering of handbills distributed in a community setting. Participants were asked to determine which messages they believed would be most influential in decreasing littering behaviors.

Method

Participants

Participants were 288 undergraduate Virginia Tech (VT) students. The VT Sona System was used to recruit participants to rate anti-litter messages. An advertisement was listed on the Sona system, providing a description of the study, what would be involved in participating, and informed consent (See Appendix A for Informed Consent form).

Subjects were students who voluntarily choose to participate in the study via the SONA research website. Both males and females were eligible, and no students were excluded. Due to the fact that handbills with specific anti-litter messages would likely be distributed to a large majority of students at shopping centers in the Blacksburg area in Study 3, undergraduate Virginia Tech students were considered to be representative of the Study 3 sample.

Measures

Message ranking scales. Participants were asked to rank each message in order to ascertain their preference, in a specified order, of positive antecedent prompts and negative antecedent prompts from a list of 20. By being forced to choose a ranking for each message,

participants would not be able to simply choose middle (moderate) anchors for the messages and would have to reveal preferences for certain messages as compared to other messages.

The 20 messages used in the ranking scales came from initial listings of several dozen possible messages, most of which were derivations of numerous prior antecedent prompts used in field research. To narrow down this list to 20 messages, meetings and focus groups with a group composed of students involved in environmental sustainability projects within the CABS were conducted. Several criteria were taken into account when choosing these messages. The positive antecedent messages were aimed at a promotion focus and negative antecedent messages were aimed at a prevention focus (as interpreted from Higgins' 1997 and 1999 works).

For each of the 20 messages, listed below, specific instructions to dispose of litter (as opposed to general prompts) were used following recommendations by Geller (1975) from research demonstrating the effectiveness of specific over general prompts. With the exception of one negative antecedent which is assumed to imply the request of not littering (i.e., Litter is ugly, so don't be ugly), the reader of the prompt instructed to either "dispose of litter properly," "don't litter," or "trash your litter." Participants were asked to rank order (1st through 10th) each of ten messages for both the positive and negative message categories with regard to their potential to decrease littering. The following instructions were provided preceding each message ranking scale, for each of the two groups of messages:

"Please rank the following group of anti-litter messages below by placing a number from one to ten in the space provided in front of the message. A score of 1 indicates the message you believe would be most likely to have an impact on anti-litter behavior; while a score of 10 indicates the message you believe would be least likely to have an impact on anti-litter behavior. Please make sure to rank each message, using each number (1-10) only once."

The gain or promotion focus messages were as follows:

- Please dispose of litter properly to keep America beautiful.

- Don't litter – Keep our planet beautiful.
- Do your part to keep our community clean – dispose of litter properly.
- Disposing of litter properly helps maintain resources for future generations.
- Keeping our planet clean starts with you and me – dispose of litter.
- Join the crowd and go green – please dispose of litter properly.
- Protect our wildlife and dispose of litter properly.
- Take pride in our town – dispose of litter properly.
- Trash your litter to protect the environment.
- Show respect for Mother Earth, trash your litter.

The loss or prevention focus messages were as follows:

- Please dispose of properly to prevent depletion of our resources.
- Avoid possible fines – dispose of litter properly.
- No one likes a litter bug! Trash your litter.
- Dispose of litter properly to avoid damage to our future generations.
- Littering is against the law – don't litter.
- Littering kills wildlife, don't litter.
- Avoid polluting our community – don't litter.
- The fine for littering in Virginia is \$250 or higher. Don't litter.
- Litter is ugly, so don't be ugly.
- Dispose of litter properly to avoid messing up.

Procedure

After logging on to the SONA system, participants were directed to a page providing information about: the investigators, the study, time commitments, procedures, confidentiality, risks and benefits, compensation, rights to voluntary participation, and information about the VT IRB. All information relevant to participation was provided to participants, including the purpose of the experiment, procedures to be followed, a statement ensuring the anonymity of participating subjects, an explanation of the risks and benefits associated with the project, a statement of a participant's right to discontinue participation at any point in the study without penalty or prejudice, and an explanation of how the data will be used, and an assurance of approval of the research by the VT Institutional Review Board (IRB) with relevant contact information in case a participant desired more information regarding the project.

If students chose to participate at this point, they were sent to a secure website, where they were informed of information regarding consent, confidentiality, and anonymity. They electronically signed a consent form, which electronically proceeded the student to the survey. The web-based survey page asked the participant to rank the 20 anti-litter messages (10 positive and 10 negative) by filling in a number from 1-10 for each type of message to indicate messages they believed would have the most to least impact on anti-litter behavior. (See Appendix B for a document containing contents of the survey).

The entire process was estimated to take approximately one hour or less. Completion of the survey marked completion of the study. Participants who completed the survey received one point of extra credit for their psychology course. No participants chose to withdraw or exit the study without completing the survey.

The survey was created using Survey Solutions (www.surveysolutions.com). This electronic program was set up to prevent participants from choosing more than one message for each ranking position, ensuring that each group of messages for each participant would contain a 1st through 10th place preference for each message.

Results

After data were obtained, the average score for each item based on the 288 participants who completed the measure was computed. The three messages with the lowest average scores (indicating highest beliefs in likeliness of impact on anti-litter behaviors) from each of the two categories were the messages printed on handbills for Study 3. The positive messages with the lowest scores (in order from lowest score to highest) were as follows: Take pride in our town – dispose of litter properly; Do your part to keep our community clean – dispose of litter properly; and Don't litter – Keep our planet beautiful.

The negative messages with the lowest scores were as follows: The fine for littering in Virginia is \$250 or higher. Don't litter; Avoid possible fines – dispose of litter properly; Avoid polluting our community – don't litter. See Table 1 for the average ranking scores for each anti-litter message.

Study 3: Systematic Field Evaluation of Positive vs. Negative Prompting

Study 3 examined the effectiveness of antecedent message prompts to reduce littering behaviors using a methodology similar to that used by Geller, Witmer, and Orebaugh (1976).

Hypotheses

Hypothesis 1:

The primary hypothesis of Study 3 was that the number of handbills littered will vary as a function of message type.

Hypothesis 1a: Based on previous research (e.g., Durdan, Reeder, & Hecht, 1985; Reich & Robertson, 1979), it is expected positive antecedent messages will result in a reduced amount of litter as compared to negative antecedent messages.

Hypothesis 2:

Based on results from Study 1, it is hypothesized females will litter at significantly higher rates as compared to males.

Hypothesis 3:

It is also hypothesized significantly less handbills with anti-litter messages will be littered as compared to handbills with no message prompt.

Variables

The dependent variable of this study was percentage of handbills littered. Litter is defined as any handbill left in the store, in the parking lot, or in shopping carts. Independent variables of the study were gender, message type, anti-litter message, store location, and distribution period.

Method

Setting and Participants

Data for this study were collected at one Kroger supermarket and one Food Lion supermarket, both located in Blacksburg, VA. Participants were grocery-store customers. A total of 11,535 adult participant shoppers (5716 males and 5819 females) received a flyer and provided data.

Handbills

Handbills were printed on 3" X 8.5" inch green (recyclable) office paper. On the front of the handbill, the title "Weekly Specials" headed a list of four to seven commodities and their sale prices for Kroger and Food Lion supermarkets (dependent on data distribution location) and included photos of the products on sale. One of the six (three positive and three negative) special anti-litter messages was boldly printed on the bottom of the front of the handbill, below the weekly specials. The same anti-litter message was printed on the back of the handbill in larger print. Figure 2 depicts the front and back of a sample handbill.

<Insert Figure 2 About Here>

The handbills distributed to female participants were marked with extremely small red dots on the back of the handbill. Although the pictures and sale items changed over the two-week data-collection period, the anti-litter messages remained consistent. During the data-collection period, a total of 11,535 handbills were distributed at the two store locations.

Procedure

Undergraduate research assistants (RAs) working with CABS distributed the handbills at the entrances of the two grocery stores. A systematic protocol was used by all RAs, who were thoroughly trained on the protocol. Specifically, the RAs distributed one-page handbills in teams of two. One RA gave handbills to female customers while the other RA gave handbills to male customers. The RAs stood outside the sets of sliding doors that served as the entrance to the supermarkets, but were within the store (inside the lobby) of another set of sliding doors which exit to the parking lot. The RAs wore casual, non-identified clothing. The RAs did not initiate conversation, and simply smiled and stated “specials of the week” as they handed the handbills to supermarket patrons upon entering the supermarket.

The RAs distributed handbills twice daily, from 11:30am to 1:30pm and from 4pm to 6pm, seven days a week for two consecutive weeks at each location. The RAs were instructed to distribute as many handbills as possible during these time periods. These time periods were chosen based on data from Study 1, as well as information from the Kroger managers who indicated these were their busiest times of the day.

At the end of the distribution period, RAs recorded how many handbills were distributed to each gender and returned unused handbills to a research assistant in charge of the project so it could be ascertained how many handbills containing each specific message were distributed. During each distribution period, two other RAs spent another three to four hours collecting littered handbills on the store premises and in the parking lots until no more handbills could be found. (This included checking behind products in the aisles and under shelves).

The RAs recorded information on a data collection sheet to indicate where the handbills were found, and what the gender distribution was for these handbills. (See Appendix C for the

data collection sheet). The RAs also recorded any unusual and/or interesting observations, especially any observations related to the purpose of the field study. By having RAs collecting and recording handbills at the same time that handbills were being distributed, fewer handbills were on floors and the parking lot (as compared to the Study 1), which was a means to reduce “litter begets litter” confounds or concerns.

The RAs collecting littered handbills also monitored employees, providing verbal prompts to remind employees not to pick up littered handbills. Prompts (in the form of small 8” X 11” pieces of paper) were also posted in employee break areas of the shopping centers to remind employees of the study and to request they refrain from picking up handbills.

Results

In accordance with the hypotheses of the current research, the aim of the analyses conducted was two-fold. The first objective was to determine the impact of message type and gender on the amount of handbills littered. The second objective was to investigate the effects of antecedent messages on amount of litter, as compared to no message prompts. Analyses related to each objective are presented separately below.

Over the two weeks of data collection, a total of 11,535 handbills were distributed at the two locations combined. Of these handbills, 4,163 were collected as littered handbills. Thus, 36.09% of distributed handbills were considered to be littered (misplaced waste material). Between the two shopping centers, at Kroger 6,451 handbills were distributed and 2,196 of them were littered (34.04%); and at Food Lion 5,084 handbills were distributed and 1,967 of them were littered (38.69%). Handbills were distributed to a total of 5,821 women, with 2,219 handbills littered (38.12%). Handbills were distributed to a total of 5,714 men, with 1,944 handbills littered (34.02%). Descriptive frequencies for totals of distributed and littered handbills

as a function of the type of anti-litter message, location, gender, and distribution period are shown in Table 2.

Statistical Analyses

Tests of homogeneity of variance indicated the data were normally distributed. Since assumptions of normal distribution and homogeneity of variance were met, parametric statistics (such as ANOVA) were able to be used for the analyses. In investigations of design and analyses of message studies, Jackson and Jacobs (1983) reported when simple ANOVA models are compared to nested models, the simple models were discovered to overestimate the F ratio and also to increase the risk of committing Type I error. They further suggested nested models allow for greater flexibility in experimental design.

For the current study, a nested Analysis of Variance (ANOVA) statistical analysis was conducted to investigate littering relationships. Data collection periods were used as the subject variable. Alpha was set at .01. The factorial model used to analyze the data was a 2 Gender (men vs. women) X 2 Location (Kroger vs. Food Lion) X 2 Distribution Period (afternoon vs. evening) X 2 Message Type (positive vs. negative) X 3 Specific Messages (3 specific positive messages and 3 specific negative messages; nested within message type). The dependent measure was percentage of handbills littered per data collection period. Since no interactions were found from the above model, no further ANOVAs were conducted. Several main effects were revealed, as detailed below. Main effects were found for gender, location, and distribution period, as displayed in Table 3. Figure 3 provides a graphic representation of percentage littered per each independent variable.

<Insert Figure 3 About Here>

Gender

ANOVA revealed a significant main effect for gender, confirming Hypothesis 2. Results revealed females littered at a significantly higher rate ($M = 38.54\%$) as compared to males ($M = 33.98\%$) ($F(1, 573) = 16.229, p < .001$).

Store Location

A main effect was also found for store location, with handbills being littered at a significantly higher rate at Food Lion ($M = 38.45\%$) as compared to Kroger ($M = 34.17\%$) ($F(1, 573) = 15.578, p < .001$).

Distribution Period

A main effect was also found for time of the distribution period, with handbills littered at a significantly higher rate during the evening time period, which occurred from 4:00 p.m. through 6:00 p.m. ($M = 37.77\%$) as compared to during the afternoon time period, which occurred from 11:30 a.m. through 1:30 p.m. ($M = 34.645\%$) ($F(1, 573) = 8.425, p < .01$).

Message Type

No significant difference was found between type of anti-litter message. The amount of handbills littered did not vary significantly as a function of positive versus negative antecedent messages ($M = 36.86\%$ vs. $M = 35.71\%$, respectively). Thus, Hypotheses 1, stating number of handbills littered will vary as a function of message type, and 1a, stating positive antecedent messages will result in a reduced amount of litter as compared to negative antecedent messages, were not confirmed. As can be seen in Table 4, although values did not approach significance, a higher percentage of handbills containing positive messages than those containing negative messages were littered. When examining the six specific anti-litter messages, no significant

differences were found among each of the different anti-litter messages. Percentage of handbills littered per each anti-litter message are displayed in Table 4.

Study 1 vs. Study 3

Study 1 did not contain any anti-litter messages, and thus can be considered a baseline to compare to Study 3, which used message prompts. Since Study 1 took place at only one location (Kroger), data from only this same location from Study 3 was used to determine differences in littering between Studies 1 and 3. In comparing Study 1 to Study 3, it was found the percentage of litter was reduced from Study 1 (38.5% of handbills were littered) to Study 3 (34.04% of handbills were littered). A Chi Square analysis of these two conditions revealed a significant difference between littering behavior in Study 1 as compared to Study 3 ($\chi^2(1) = 16.722, p < .01$), with littered handbills being collected at a significantly higher level in the baseline condition as compared to the anti-litter message condition, thus confirming Hypothesis 3. These results indicate the number of handbills being littered was significantly reduced when the anti-litter prompts were added to handbills. Numbers and percentages of handbills distributed and littered are summarized in Table 5.

Discussion

This study investigated relationships between anti-litter messages, gender and littering behavior. Data revealed a discouraging 36.09% of distributed handbills were considered to be littered (misplaced waste material). A significant main effect of gender revealed that women littered significantly more often than males. Results also showed a significant main effect for store location, indicating handbills were littered more often at Food Lion than Kroger. Plus, handbills were littered significantly more often in the evening than the afternoon distribution period.

Although slightly more handbills, in terms of total handbill numbers, containing positive antecedents were littered as compared to those containing negative antecedents (which might be interpreted as stronger impact of loss-framed messages), this difference was not statistically significant.

No Prompt vs. Anti-Litter Prompt

In comparing Study 1 to Study 3, it was found the percentage of litter was reduced from Study 1 Study 3. This finding demonstrated the amount of littered handbills was significantly reduced when the anti-litter prompts were added to handbills. These results should be interpreted with caution, as data for Study 1 were collected at only one location (Kroger) and were collected over the span of only one week (as compared to two weeks in Study 3). Additionally, Study 1 was conducted in the Spring, while Study 3 was conducted in the Fall. Despite these possible confounds, it appears littering was significantly reduced when anti-litter prompts were used. Although no differences were found between types of messages, simply having an anti-litter prompt on the distributed handbills reduced the number of handbills littered in this environment.

A strength of Study 3 was the attempt to avoid the confound of increased litter in a littered environment. Numerous empirical studies have demonstrated individuals tend to litter more in areas which are already visibly littered (e.g., Finnie, 1973; Geller, Witmer & Tuso, 1977; Krauss, Freedman & Whitcup, 1978). In the present research, having research assistants collect and code handbills very quickly after they were littered likely helped to keep the premises clean, which might have been a way to aid averting “litter begets litter” confounds.

Gender

Due to unexpected findings from Study 1 indicating females littered handbills (with no anti-litter messages) at significantly higher rates than males, it was predicted in Study 3 that

females would litter handbills with anti-litter messages at significantly higher rates than males. The finding that this hypothesis was confirmed is notable. Survey research in the area of gender differences related to environmental concerns often shows modest differences between men and women, with women frequently displaying greater levels of environmental concern as compared to men.

In an earlier review of gender and environmental attitudes and behaviors, Hines, Hungerford and Tomera (1987) reported a meta-analysis of gender and ERB studies resulted in an average correlation coefficient of only .075. The standard deviation (.084) was found to be larger than the correlation coefficient. As a result, these authors concluded research on the relationship between gender and ERBs is meager and inconsistent.

More recently, Zelezny, Chua, and Aldrich (2000) reviewed a decade's worth of research (1988-1998), using meta-analytic techniques. Across 19 studies, 13 of these self-reported survey studies found women *reported* stronger environmental attitudes and behaviors relative to men. In the same publication, findings from two survey studies conducted by these researchers were reported. One study revealed among primary and secondary school students (i.e. children) girls reported stronger pro-environmental responses than boys. A second study performed across 14 European, Latin American and U.S. countries using the New Environmental Paradigm (NEP) scale demonstrated females reported higher environmental attitudes in ten of the countries, males reported higher environmental attitudes in three of the countries, and no differences were found between males and females in one of the countries.

Hunter, Hatch, and Johnson (2004) used a 1993 International Social Survey to investigate the role of gender in private and public environmentally-oriented behaviors across 22 nations. These researchers used six questions to gauge public- and private-sphere environmentally-

oriented behaviors, three representing each category. Private-sphere questions inquired about behaviors related to recycling, buying organic foods, and reduction of driving, while public-sphere questions inquired about behaviors related to signing petition, protest involvement, and membership in environmental preservation groups. Findings of this cross-cultural study revealed that women reported significantly more private-sphere environmentally-oriented behaviors than men in 14 (including the United States) of the 22 nations included. No significant differences were found in the eight remaining nations. In terms of public-sphere behaviors, no significant differences were found between genders for almost all nations.

In contrast to all investigations mentioned above, which used self-report measures of ERBs, a series of five field studies of actual littering (primarily using handbills) examining social norms were conducted by Cialdini, Reno, and Kallgren (1990). Significant gender differences were found in only one of these studies, showing significantly more handbill littering by men.

When investigating litter behaviors of handbills distributed at supermarkets, Geller, Witmer, and Orebaugh (1976) reported no significant gender effects on behavioral responses to various anti-litter instructions. Similarly, Geller, Witmer and Tuso (1977) found no gender differences in litter and disposal behaviors using handbills in the same supermarket settings.

It is important to note that with the exceptions of research by Cialdini and colleagues (1990) and Geller and colleagues (1976, 1977), most documented studies of gender differences resulted from self-report procedures. All of the typical concerns and fears related to the validity and reliability of self-report data are applicable in investigations of ERBs.

In the case of littering, there can be many possible explanations for the present study finding that women litter at higher rates than men, as well as many explanations for the differences in previous *self-report* findings of women littering *less*. One potential reason is

related to social desirability. Social desirability can be described as a defensive tendency for participants to respond to items in a way that seems consistent with societal norms or beliefs. Over the years, researchers have expressed concern regarding the chance that self-report measures might be contaminated by participants responding to items in ways that impact whether they are viewed favorably or unfavorably. Thus, the concept of social desirability response bias has been extensively addressed in findings from survey research in the literature. Zerbe and Paulhus (1987) assert that social desirability response bias arises because of a tendency by people to over-report (under-report) behaviors deemed to be socially or culturally desirable (undesirable).

The possibility for social desirability response bias concerning ERBs might be significant due to the likelihood of strong emotional associations for some in relation to environmental preservation and protection. Certain behaviors can be widely recognized as either good for the environment or bad for the environment. Socially desirable response patterns in self-reports related to other sensitive behaviors such as delinquency, violence, and drug abuse have been shown to hinder accurate implications of self-report scores (Fraboni & Cooper, 1989; King & Bruner, 2000).

Perhaps women are more concerned with negative social perceptions related to littering, so they deny littering in an effort to appear socially desirable, but behave in a different manner than what they report. Women are often socialized as they grow up, both by society and family, to believe more pressure is on females to keep the environment clean and to care about nature. This pressure might translate to an environmentally-friendly response pattern on surveys, which might not translate to their actual behaviors. Consequently, women's responses to ERB questionnaires might be shaped more strongly by social desirability than those of men. In the

literature, women have generally been found to be higher in social desirability as a trait as compared to men (Hebert et al, 1995). In fact, analyses in an investigation of associations among social desirability response bias and gender which included surveys from twelve countries (including the U.S.) indicated women scored significantly higher on a social desirability scale. The authors of this study concluded women are more likely to respond in a socially desirable manner (Bernardi, 2006).

Another explanation for differences in findings from previous research as compared to the current study might be clarified by generational effects. The association between gender and ERBs might have changed over the past years. It is possible that men previously demonstrated less concern for the environment in the past, but have shifted to be more in line, or even more environmentally-conscious, with environmental preservation as compared to women. This could help explain a difference between earlier studies indicating either no gender difference or an indication of lower ERB in men, and the current findings of reduced littering among men. As suggested by Zelezny and colleagues (2000), meta-analytic investigations comparing past and present research on gender and environmental behaviors and attitudes is needed to elucidate possible generational shifts in ERB.

Impact of Positive vs. Negative Messages

In the present research, litter rates were not found to significantly vary as a function of positive versus negative (or gain-framed versus loss-framed) message type. Although fewer handbills containing negative messages were littered as compared to handbills containing positive messages, the results did not approach significance. Some possible explanations for this finding deserve further investigation.

Depth of processing. It is quite possible shoppers' motivation to process messages in the current research was low, resulting in no difference between impact of positive and negative antecedent prompts. If shoppers paid minimal attention to the messages, this would result in simple processing. If motivation to process the messages were high, this would result in deeper and more detailed processing of the information. Chaiken (1980) argues both detailed and simple inferential processing might co-occur, which suggests positively and negatively-framed messages can be equally persuasive when equal levels of types of processing co-occur, which might have been the case in Study 3. Since littering percentages decreased from Study 1 to Study 3 (although these percentages were not found to vary significantly as a function of message type), this might be an indication supporting the notion that equal levels of detailed and simple processing were co-occurring leading to persuasiveness of both positive and negative antecedents.

Response-efficacy. Participants' levels of response-efficacy related to the message requests (reducing litter) may have been another factor affecting results. Response-efficacy refers to individuals' belief or confidence that recommended actions will work (Bandura, 1997). Research from Block and Keller (1995) support the contention that the degree to which individuals process a health-related message varies as a function of their level of perceived efficacy regarding the message. They posit when perceived response-efficacy is low (i.e., performance of the recommendations is uncertain to lead to the desired outcome), individuals consider the tradeoffs of compliance versus noncompliance and therefore, take part in effortful processing of the message.

In research mentioned previously, Meyerowitz and Chaiken's (1987) confirm that with a lower level of response-efficacy, negative message frames are shown to be more effective than

positive message frames. Similarly, Rothman and colleagues (1993) found that when level of response-efficacy was low, women indicated more favorable responses to a negatively-framed pamphlet on skin cancer self-examination as compared to a positively-framed pamphlet. These authors concluded for health matters in which the level of response-efficacy is low, or in which it is uncertain whether the recommended behavior will result in the preferred outcome, negative message framing may be more effective than positive message framing.

It can be argued that the outcome of individual behaviors is very uncertain for long-term ERB impact, and it is possible that level of outcome uncertainty (response-efficacy) might have impacted the effect of positively-framed versus negatively-framed messages in Study 3. For shoppers who might have believed their participation would have little impact on the problem of environmental litter, a negative message frame would have been more effective on compliance.

Issue involvement. “Issue involvement” is an additional variable with possible implications for response to gain-framed versus loss-framed messages. Maheswaran and Meyers-Levy (1990) demonstrated that when individuals are motivated (due to their sufficient concern with the issue) to process a message and engage in effortful processing, negative frames were more effective as compared to positive frames. The authors argue this was because negative information is perceived to be more informative than comparable positive information. They advise using negatively-framed messages when target participants’ involvement with an issue is likely to be high, but advise using positively-framed messages if participants are likely to have a much more casual interest in the issue. Involvement in ERBs and/or litter reduction likely varied between shoppers, thus having an impact on response to message frame. Perhaps since concerns of environmental sustainability are increasing in general, a negative frame will begin to be more effective since issue involvement will be more likely to be high in the general community.

Altruistic appeals. An alternative explanation for the ineffectiveness of positive versus negative message prompting in the present study could be addressed by the uniqueness of the altruistic appeals of most of the specific anti-litter messages used. It is possible previous findings concerning positive and negative message framing might not be an accurate guide concerning the likely consequences of framing variations on ERB because much of this research has addressed other types of behaviors (health, buying, etc.). Gain-framed and loss-framed persuasive messages for altruistic behaviors could be viewed as broadly parallel to altruistic messages and guilt messages, respectively.

Altruistic messages frequently emphasize how an individual's behaviors might benefit others, and it has been argued in the area of health behaviors that such appeals might be especially persuasive (Reinhart et al., 2007), but might also backfire if shame or guilt is experienced as a consequence of the message. In reference to the current research, there may be something unique about persuasive messages that prompt altruistic behaviors. The messages in the current research advocated for individuals to become environmentally responsible in order to help the entire planet and it is possible these prompts could make individuals feel guilty if they do not comply, regardless of the framing approach.

Self-regulatory focus. As explained earlier, individuals might be viewing the world with either a promotion focus (emphasizing approach goals) or prevention focus (emphasizing avoidance goals). Differences in self-regulatory focus (based on Higgins, 1997, 1999 articles) of shoppers might also have played a part in current results. Perhaps different messages elicited a prevention focus in some individuals, while eliciting a promotion focus in others. Since focus differences have been found to be situation-specific in individuals, it is possible that reactions based on self-regulatory focus might have caused individuals to react a certain way to the

positive vs. negative antecedent prompts. Thus, some shoppers were more influenced by the promotion-framed messages, while others found the prevention prompts more influential.

Rothenberg (1991) has maintained it is difficult to distinguish factors which influence the effectiveness of health-related messages and information because they are not based on a satisfactory foundation of research. Despite this deficit in systematic investigation, many advertisers and public service campaign designers have decided appeals that arouse negative emotions will weaken persuasion efforts, and messages framed negatively will be ineffective. The present research suggests this is not necessarily the case.

Store Location

The significant main effect for store location indicated shoppers littered handbills more at Food Lion as compared to Kroger. Data collectors had commented on a few occasions that they perceived Food Lion as a “messier” location than Kroger. They noted there was more pre-existing litter both in the parking lot and in the store. Numerous studies have reported findings supporting the “litter begets litter” concept (e.g., Finnie, 1973; Geller et al., 1977; Reiter & Samuel, 1980) in which more littering occurs if a setting already contains litter. If Food Lion was in fact a setting which was already littered before data collection began for the present study, it is likely more littering might occur in this setting.

The difference in litter percentages between the two locations might also be explained by socioeconomic status (SES). A number of studies have found a positive correlation between education and environmental concern (Van Liere & Dunlap, 1980; Howell & Laska, 1992; Nord & Bridger, 1998). Oskamp and colleagues (1991) reported income and living in a single-family house as predictors of recycling behaviors. Although weak, a meta-analysis by Hines and colleagues (1987) showed a positive relationship between ERB and income and education.

Following Maslow's (1970) hierarchy of needs (basic needs must be met before higher needs), shoppers of a higher SES have already met more basic needs and thus can focus on satisfying their 'higher' needs, including behaving in an environmentally-responsible manner. Perhaps more shoppers of a lower SES were present at Food Lion than at Kroger when the present study was conducted, thus explaining increased littering at the Food Lion location.

Distribution Period

Results demonstrated participants were significantly more likely to litter during the evening hours than afternoon hours. Several factors might account for this. One is the fact that when comparing the two data collection periods of the current research, the evening was busier compared to the afternoon (as evidenced by consistently more handbills being distributed during this time at each location) potentially making it easier for shoppers to litter without being detected. Additionally, shoppers in the evening distribution period might have been more rushed (for example, doing grocery shopping for that evening's meal, trying to get home quickly after work, etc.) and may have simply been more focused on grocery shopping, not paying attention to the anti-litter prompt, nor where they disposed of litter. It might be that afternoon shoppers were operating at a more leisurely place and took the time to notice the prompt and dispose of the handbills properly.

Current Research vs. Previous Findings

In comparing the research of Geller and colleagues (1976) to the current research findings, several interpretations can be made. Since the earlier research (Geller et al., 1976) did not collect data for handbills littered in parking lots, data from parking lot handbills were also removed from the current research in order to make comparisons. Data revealed at baseline (no message) 36.92% of handbills were littered in Geller and colleagues 1976 research, as compared

to the current finding indicating 34.30% of handbills (with no message) were littered (Study 1). Although the percentages of littering for the two studies (conducted over 30 years apart) are comparable, it can be argued they indicate less paper handbills are currently being littered. However, when anti-litter messages were added to the handbills, Geller and colleagues (1976) reveal only 27.91% of the handbills were littered, while the present study reveals 34.27% of handbills were littered (Study 3). As displayed in Table 6, these percentages show a larger gap between findings from several decades ago. With an approximate 9% difference between baseline and message prompt conditions, it seems antecedent messages had a stronger effect in 1976 than they do now. These differences are depicted in Figure 4.

<Insert Figure 4 About Here>

A variety of factors might have influenced this difference in anti-litter message effectiveness. One explanation for the finding that messages had a greater impact in 1976 than they do today can be related to information overload today. In 1976, there were less stimuli and prompts in the environment as compared to now, a time when it seems we are inundated with advertisements, signs and messages. Additionally, and perhaps more importantly, there are many “high-tech” distracters that have become a regular and constant part of most shoppers’ lives. Items such as cell phones, pagers, palm pilots, etc. are technologies that were not commonplace in the 1970’s and currently distract many individuals from being mindful of their surroundings. This increase in external stimuli likely makes paying attention to (or even noticing) message prompts much more difficult today.

It was also a more novel experience in 1976 to be given a handbill containing information or requests for compliance, as compared to recent years when handbills and flyers are distributed

on a much more regular basis. Due to the distractions and competitions for attention noted above, it is likely that many “tune out” antecedents in which they are exposed to on a daily basis.

Another factor which might help elucidate the differences in anti-litter message impact is advertising or public service announcements (PSAs). Many anti-litter advertisements and PSAs were broadcast for years in the 1970’s and 1980’s. In arguably the most famous anti-litter PSA, the American Indian known as Iron Eyes Cody was seen with a tear running down his cheek after watching humans pollute the environment followed by the message “People Start Pollution, People Can Stop It.” Although interest in environmental protection and sustainability has seen a dramatic increase recently, Americans are not typically exposed to these types of anti-litter PSAs or advertisements anymore. With the shift of attention moving towards areas which are proposed to have a larger impact on environmental preservation, such as reducing consumption, reducing energy use, and reusing materials, perhaps one of the simplest ERBs to perform – avoiding littering – has fallen to the wayside as compared to decades ago.

Despite the explanations discussed here, these differences in findings from the two different decades of research should be interpreted with caution due to several differences. One variable that makes the research difficult to compare is the handbills used in 1976 were much larger (8.5” X 11”). Handbills used in the current studies were about 1/3 the size of the previous handbills. The larger handbills were obtrusive and probably more difficult to ignore. Although the town and settings were similar, data were collected at different shopping centers. Further, although Geller and colleagues used many anti-litter messages in 1976, only one could be used to compare to current research (“Please don’t litter. Please dispose of properly”). Lastly, data were collected over a longer time period in 1976 (6 weeks for 5 days a week, excluding Saturday and Sunday vs. 2 weeks for 7 days a week in Study 3 here).

Limitations

One potential confound of the current research is that the *exact same* messages, but framed differently in terms of loss or gain, were not used. An example of using the same positive message “Do your part to keep our community clean – dispose of litter properly” with a negative or loss frame might be “Littering does not keep our community clean – dispose of litter properly.” According to Maheswaran and Meyers-Levy (1990), alternative terms or wording might not be perceptually equivalent. They note in all framing contexts, alternative terminology has the potential to introduce unintended variation in emotional intensity of the specific messages, making it extremely difficult to separate effects due to differences in linguistic connotation from effects due to a positivity or negativity bias.

Additionally, there was no assurance specific anti-litter messages printed on handbills were read by participants. Because the research was conducted in naturally occurring field settings, it was not possible to assess the accuracy and effectiveness of the message manipulations through means typically available in laboratory settings. Thorough checks regarding the strength, specificity, and influence of participants’ attentional focus could not be administered in a practical manner in the field settings. In the absence of such measures, there can be concerns as to whether the message-framing manipulations were even noticed or processed by shoppers. Although research assistants distributing handbills reported most shoppers read the handbills immediately, we did not know if they read or paid attention to the message on the bottom or on the back of the handbill.

When using gain/loss frames, messages from the current research do not necessarily specify individual or personal gain. Of the three gain-framed (positive anti-litter) messages, it could be argued no individual gain was implied. There was only an implication of community (or

planet) gain in the three positive messages: “Take pride in our town – dispose of litter properly,” “Do your part to keep our community clean – dispose of litter properly,” and “Don’t litter – Keep our planet beautiful”.

Of the three loss-framed (negative anti-litter) messages, individual loss was implied in two of the messages (“The fine for littering in Virginia is \$250 or higher. Don’t litter,” and “Avoid possible fines – dispose of litter properly”), but not the third (“Avoid polluting our community – don’t litter”). The fact that each positive message alerted participants to community gains/losses, whereas two of three negative messages called attention to potential individual loss, reflects a possible confound. Future ERB research should investigate framing of messages in terms of personal versus community gain/loss frames.

An inherent element of environmentally-responsible outcomes in general is that most often the reinforcers are not immediate. As Winett and Ester (1983) noted, countless studies have revealed immediate reinforcers most often overshadow future reinforcers, even if the future reinforcers are more advantageous or important. Relevant to the current research, although most participants are likely aware of the long-term benefits of preserving the environment and reducing litter, these benefits are not considered immediate and thus might not be as reinforcing as the convenience of littering.

Another noteworthy limitation is there was no control or no-message condition in Study 3. Although the aim of the current research was specifically focused on the effectiveness of positive antecedents as compared to negative antecedents, this research would have been improved by using a control condition for comparison. As mentioned above, although a control condition was not included in Study 3, when compared to the no-message condition of Study 1, there was a significant decrease in litter percentages when the anti-litter messages were added.

In the area of applied behavioral research, side effects are considered to be *unintended* (or not targeted) behavioral reactions to an intervention (Geller, 1987). One possible side effect from our research is that litter could have been simply displaced from one situation or location to another. For example, a shopper might have brought his/her handbill when leaving the store, but then littered it in another location. Also, since handbills were used as a litter-reduction procedure, distributing paper handbills actually increases the opportunity to litter by providing participants with something to litter.

An additional unintended side effect to our methodology was the use of a large amount of paper to conduct Studies 1 and 3. Each sheet of 8.5" X 11" paper yielded three individual handbills. For the two studies combined, over 4,000 sheets of paper were used. To combat the side effect of depleting resources for this amount of handbills, three things were done. Firstly, leftover handbills not distributed by RAs were returned to the research center to be distributed for the next data collection period (unless the weekly specials had been changed). Additionally, the project leader of the study went through all collected handbills after all data was recorded and set aside handbills that were still in original condition to be re-distributed (unless the specials had changed). Lastly, the paper that was used to produce these handbills was paper made of 30% recycled materials. At the completion of this research, this paper was also sent to be recycled.

Future Directions

Knowing why individuals behave the way they do, which factors might cause them to do so, and what changes might be made to allow individuals to implement more ERBs might signify the difference between developing policies and interventions that work and those that do not. Future research aimed at discovering and manipulating these factors is imperative to increase environmental sustainability efforts.

It is possible individual difference variables are exerting some control over differential findings concerning ERB. It is reasonable to expect variability among individuals will impact when/how individuals will respond to an intervention and when/how they will not. Individual differences in dynamics such as attitudes, values, gratification, and self-image considerations have been mentioned as influences to the selection and maintenance of environmental behavior patterns (Kempton, Darley & Stern, 1992).

Edney (1980) argues many behavioral reinforcement interventions ignore a number of human elements. One element ignored is the long-established evidence that individuals differ from one another – they do not all respond in the same way to the same arrangement of circumstances for rewards and punishments. If individual vulnerabilities to different consequences exist, they could have considerable impact on both a large-scale, as well as an individual basis. Different ERBs likely have different patterns of consequences. Various motives and attitudes concerning environmental issues may relate differently to participating in pro-environment activities (such as recycling and reusing). Findings of research investigating this can have important practical implications for understanding and promoting interventions that are more specific to certain groups of individuals. Future research offering methodologies to assess for individual differences related to ERB could promote research efforts focusing on designing specific interventions.

Protection Motivation Theory (PMT), proposed by Rogers (1975) indicates that being exposed to a health communication supplies the stimulus for an individual to evaluate the: (1) severity of the event, (2) probability of the event occurring, and (3) belief in the efficacy of the recommendations. Many researchers have used PMT to examine risk for health-related decisions (e.g., Struckman-Johnson et al., 1990; Tanner, Hunt, and Eppright, 1991). Findings have

indicated the response efficacy of the recommendations to attain the desired outcome is the most important predictor of behavioral intentions. Conclusions suggest only when an individual believes the recommended behavior is apt to result in the desired outcome will compliance with the recommendations take place.

Block and Keller (1995) propose that designers of campaigns for which the desired behavior is relatively uncertain or includes components of high risk should use negative frames to provoke preventive action. An example these researchers used is related to advertisements encouraging HIV testing. In this case a behavior with inherent uncertainties in the outcome is advocated. It is claimed that such advertisements would likely prompt in-depth processing and cautious evaluation of the tradeoffs in choosing to comply and would likely be more effective if framed negatively, or in terms of the potential loss experienced if not recommendations are not followed.

Based on PMT and findings described above from Block and Keller (1995), determining individuals' level of efficacy or level of certainty the ERB will result in the desired outcome is important in determining the frame of the message. From a PMT perspective, perhaps many participants in the current study did not view the event of littering as severe enough, did not believe negative environmental impact is a probable outcome, or did not believe their behavior could make a difference. It might be that in research related to affecting behaviors related to environmental impact uncertainty could be high, and thus a negative frame should be used. Alternatively, uncertainty might be low (and efficacy in helping change the outcome high), and thus a positive frame could be more effective. Although this effect has been demonstrated in communications regarding health behaviors, more research should be done investigating the relationship between efficacy and/ or uncertainty regarding ERB.

Future ERB research should also address issue involvement (level of concern related to specific issue and motivation to process information regarding the issue) as it associates with impact on reactions to message framing in a behavior-based prompt. Maheswaran and Meyers-Levy (1990) advise when issue involvement is high, messages will likely be processed more carefully and will also be more influential when they are negatively (as compared to positively) framed. In contrast, when issue involvement is low, messages will likely be more influential when messages are framed positively (as compared to negatively).

In 2003, Cialdini conducted research investigating the impact of social norms on reaction to persuasive messages. Based on his findings, he recommended avoiding the tendency to send a normatively muddled message that implies a targeted activity is socially disapproved but widespread (such as informing people of the widespread occurrence of a certain environmentally destructive behavior). Cialdini argues norm-based persuasive messages are likely to be most effective when communicators unite descriptive and injunctive normative messages to work in collaboration rather than in competition with one another (i.e., sending messages the behavior is/is not socially acceptable and is/is not engaged in by many others). This suggests the need for further examination of subjective norms and message framing. Future research should explore not only the impact of normative messages, but possible interaction of normative messages and loss or gain frame.

Future studies might also compare reaction to positive versus negative prompts (through observed behaviors) with measures of attitudes towards environmental issues. Perhaps this could be accomplished by using the New Ecological Paradigm (NEP). This survey has been demonstrated to be a good measure of pro-environmental orientation. It has been established as

internally consistent (Dunlap, Van Liere, Mertig, & Jones, 2000) and has established sufficient construct and predictive validity (Dunlap et al., 2000; Cordano et al., 2003).

Further research using handbills to display message prompts should include the messages at the top of the handbills and attempt to make the messages more prominent. This will help participants notice and attend to the recommendation or request being made in the message. It will also be important to include manipulation checks to ensure handbill messages are being noticed and read.

An extension of the current research would be to use a combination of priming through antecedent messages and providing consequences to follow behaviors. This combination has been shown to be quite effective in other studies of litter control (e.g., Geller, 1980a; Hayes, Johnson, & Cone, 1975; Osborne & Powers, 1980; Tuso & Geller, 1976), and it would be beneficial to conduct research investigating a possible interaction between positive versus negative message prompting, by following with consequences of littering or avoiding littering. An example of using both antecedents and consequences in the study of litter behaviors might be to follow the behavior of disposing of anti-litter handbills properly by giving a reward, such as a coupon or prize, after the subject is observed throwing the handbill in a trash receptacle. Another example could include the use of modeling as an antecedent. Participants could be exposed to models engaged in either environmentally-responsible or environmentally-destructive behaviors, which are followed by either rewards or punishers.

Another important area for future research would be to study psychological reactance and framing of ERB antecedent messages. As previously stated, psychological reactance has been shown to influence the impact of loss-framed messages, but this apparently has not yet been investigated in the realm of ERB. Determining what role psychological reactance might play in

effectiveness of positive/negative prompts, or loss/gain-framed messages, as they relate to ERB would be helpful.

Conclusions

Decades of research, including findings from the present studies, suggest the question of what leads to ERB is a complex one, and it cannot be resolved through one single framework or intervention.

Investigations of ERBs and gender have been somewhat limited. The present research appears to be one of the first to demonstrate a significant gender difference of women littering at higher rates than men, based on behavioral observations (not self-report). This unique finding has implications for social action and research design. Future evaluations of environmental behaviors and attitudes should include gender as a relevant predictor of ERB. Contrary to prior research findings, gender differences reported here might offer a clearer picture of gender and environmentalism. Based on the results, it appears men may have more environmental concern, stronger attitudes towards the environment, and behave in a more environmentally-responsible manner than previously indicated by past studies.

The present research contributes to understanding some conditions under which responsible behaviors towards the environment occur, which has the potential to add value to efforts of environmental sustainability. Findings from this study provide an important contribution to campaigns aimed at increasing ERBs. It can be argued much of the current problems of environmental degradation have behavioral problems at their core. Studies aimed at designing messages to prompt desirable behaviors and make messages more effective can offer an important service for organizations involved in issues of environmental sustainability.

The current study demonstrated the use of antecedent messages has the potential to significantly reduce littering behaviors. Findings here suggest communitywide programs using intervention strategies (such as litter-control ordinances, educational programs, media campaigns, etc.) should contain both positive and negative, or gain-framed and loss-framed, elements. The current research is also important in that it attends to socially significant problems. Empirically-based answers for real world human-environment problems are a necessity, and the present research is one contribution towards this effort.

When comparing the current research to that using a very similar methodology over 30 years ago (Geller et al., 1976), it appears that although anti-litter prompts are still effective, they do not currently have the same power to influence behavior to the degree they did three decades ago. It is possible a cultural shift has taken place both in attitudes towards litter, as well as attentional processes and factors of distraction when presented with a message prompt. The current challenge seems to be overcoming many forms of external stimuli (include technological distractions) in order to cause individuals to “tune in” to messages in their environment.

There are several benefits to using a methodology similar to the one used in the current research. Prompting techniques using messages as antecedents are generally inexpensive and easy to implement and apply on a large-scale. Geller (1986) points out it is cost-effective to employ interventions directly to target behaviors, as compared to attempting to change attitudes in a hope for subsequent and indirect influence on behaviors. Due to the low cost and ease of application on a large-scale, results from current research can be extended beyond litter-control efforts, to other attempts to improve environmental sustainability (such as increasing recycling, reducing energy consumption, reusing materials, etc.). Factors such as societal norms, levels of

processing, motivation, and issue involvement can all influence individuals' reaction to specific messages and should be studied further.

As Scriabine (1996) notes, incorporating rigorous research-driven knowledge of human behaviors into environmental program design holds great promise. Applied research offers insight into the benefits and barriers people encounter in relation to new initiatives aimed at sustainability. Research strategies can assist in perfecting appropriate messages and identifying the most effective means by which these messages can be delivered. The incorporation of such behavioral data into policy procedures has great potential to make policies more effective, enforceable, and beneficial.

In terms of efforts to protect and preserve the environment, it seems people are now ready to alter their behaviors and take action, but they need and want the tools and knowledge regarding what they can do to make a difference. Research based on principles of behavior analysis can help with this. Perhaps it is now time to change the approach from awareness campaigns to campaigns advocating specific behaviors individuals could adopt to protect and sustain our planet. Developing clear, understandable and effective antecedent messages to provide this information could be one step in accomplishing this.

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Table 1.
Average Ranking Score for Each Anti-Litter Message from Study 2

<u>Anti-Litter Message</u>	<u>Mean Ranking Score</u>
Positive Messages:	
Take pride in our town – dispose of litter properly.	4.52*
Do your part to keep our community clean – dispose of litter properly.	4.66*
Don't litter – Keep our planet beautiful.	4.67*
Keeping our planet clean starts with you and me – dispose of litter.	4.71
Protect our wildlife and dispose of litter properly.	4.93
Please dispose of litter properly to keep America beautiful.	5.10
Join the crowd and go green – please dispose of litter properly.	5.52
Disposing of litter properly helps maintain resources for future generations.	6.03
Trash your litter to protect the environment.	6.31
Show respect for Mother Earth, trash your litter.	6.76
Negative Messages:	
The fine for littering in Virginia is \$250 or higher. Don't litter.	2.99*
Avoid possible fines – dispose of litter properly.	4.29*
Avoid polluting our community – don't litter.	4.74*
Littering kills wildlife, don't litter.	4.82
Littering is against the law – don't litter.	4.91
No one likes a litter bug! Trash your litter.	5.20
Dispose of litter properly to avoid damage to our future generations.	5.62
Please dispose of properly to prevent depletion of our resources.	6.10
Litter is ugly, so don't be ugly.	6.72
Dispose of litter properly to avoid messing up.	7.89

Note: Lower scores indicate messages are believed to be *most* likely to have an impact on anti-litter behavior; while higher scores indicate messages believed to be *least* likely to have an impact on anti-litter behavior.

* Messages chosen for use on handbills distributed in Study 3.

Table 2.

Total Number of Handbills Distributed and Littered Per Gender, Message Type, Location, and Time

		Total Distributed	Total Littered
Gender	Women	5821	2219
	Men	5714	1944
Message Type	Positive	5836	2138
	Negative	5699	2025
Location	Kroger	6451	2196
	Food Lion	5084	1967
Distribution Period	Afternoon	4472	1528
	Evening	7063	2635

Table 3.
 Mean Percent and Standard Deviations of Littered Handbills per Location, Gender, Message Type and Time of Day

		Mean	SD
Location	Kroger	34.17	13.50
	Food Lion	38.45	14.45
			$F=15.578$
Gender	Women	38.54	13.77
	Men	33.98	14.14
			$F=16.229$
Message Type	Positive	36.86	13.43
	Negative	35.715	14.794
			$F=1.013$
Distribution Period	Afternoon	34.64	14.27
	Evening	37.77	13.86
			$F=8.43$

Note: per each data collection occurrence

*Significant $>.01$

Table 4.
 Percentage of Handbills Littered per Each Specific Antecedent Message

Anti-Litter Message	Percent Littered
Take pride in our town – dispose of litter properly.	34.50
Do your part to keep our community clean – dispose of litter properly.	38.07
Don't litter – Keep our planet beautiful.	38.01
The fine for littering in Virginia is \$250 or higher. Don't litter.	35.95
Avoid possible fines – dispose of litter properly.	36.27
Avoid polluting our community – don't litter.	34.92

Table 5.
Total Handbill Numbers and Percentages for Study 1 vs. Study 3

		Handbill Littered?		
		Not Littered	Littered	Total
Study 1	Count	1658	1039	2697
	% within Condition	61.5%	38.5%	100.0%
Study 3	Count	4255	2196	6451
	% within Condition	66.0%	34.0%	100.0%
Total	Count	5913	3235	9148
	% within Conditions	64.6%	35.4%	100.0%

Note: Only Kroger location included in analysis.

Table 6.

Percentage of Handbills Littered in Current Studies 1 and 3, Versus Geller et al., 1976

	Percentage Littered Baseline	Percentage Littered with Anti-litter Messages
Geller et al. (1976)	36.92%	27.91%
Present Research	34.30%	34.27%

Note: These percentages exclude handbills littered in parking lots.
Baseline conditions contained no anti-litter message prompt.

Figure 1. Sample Handbill Used for Study 1

Kroger

Weekly Specials

Starkist Chunk Light TUNA
Bumble Bee Tuna
Chicken of the Sea
Pink Salmon
Select Varieties 3-6 oz

Bumble Bee Tuna
Select Varieties 3-6 oz
Chicken of the Sea
Pink Salmon or Tuna
Select Varieties 3 oz Pouch or 6 oz Can
Starkist Tuna
Select Varieties 3-6 oz

99¢

Shady Brook Farms Fresh Whole Turkey Pound
\$1.29

6 pk 24 oz Bottles
4\$10 for

Kroger Butter Quarters
Select Varieties
1 lb Country Club Butter

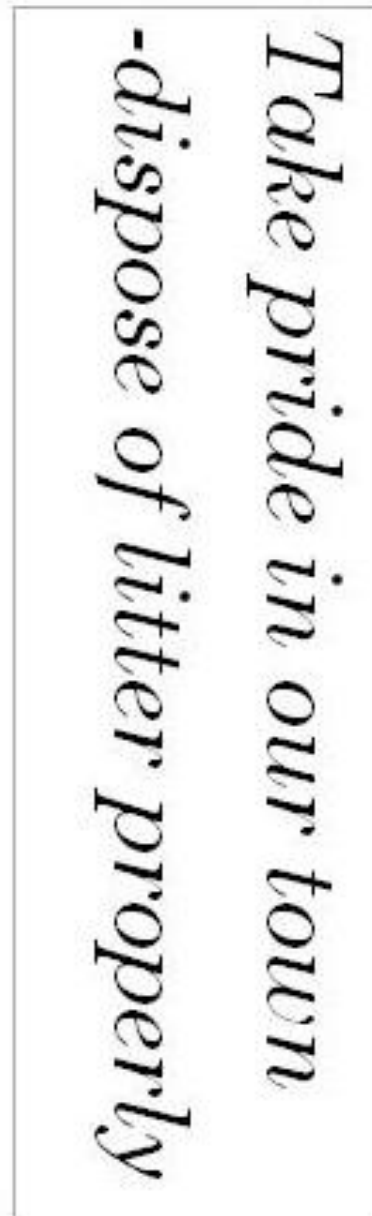
2\$3 for

Luzianne Decaf Tea Bags
24 ct Family Size
2\$6 for

Figure 2. Front and Back of Sample Handbill with Anti-Litter Message for Study 3



Front



Back

Figure 3. Percentage of Handbills Littered as a Function of Independent Variables

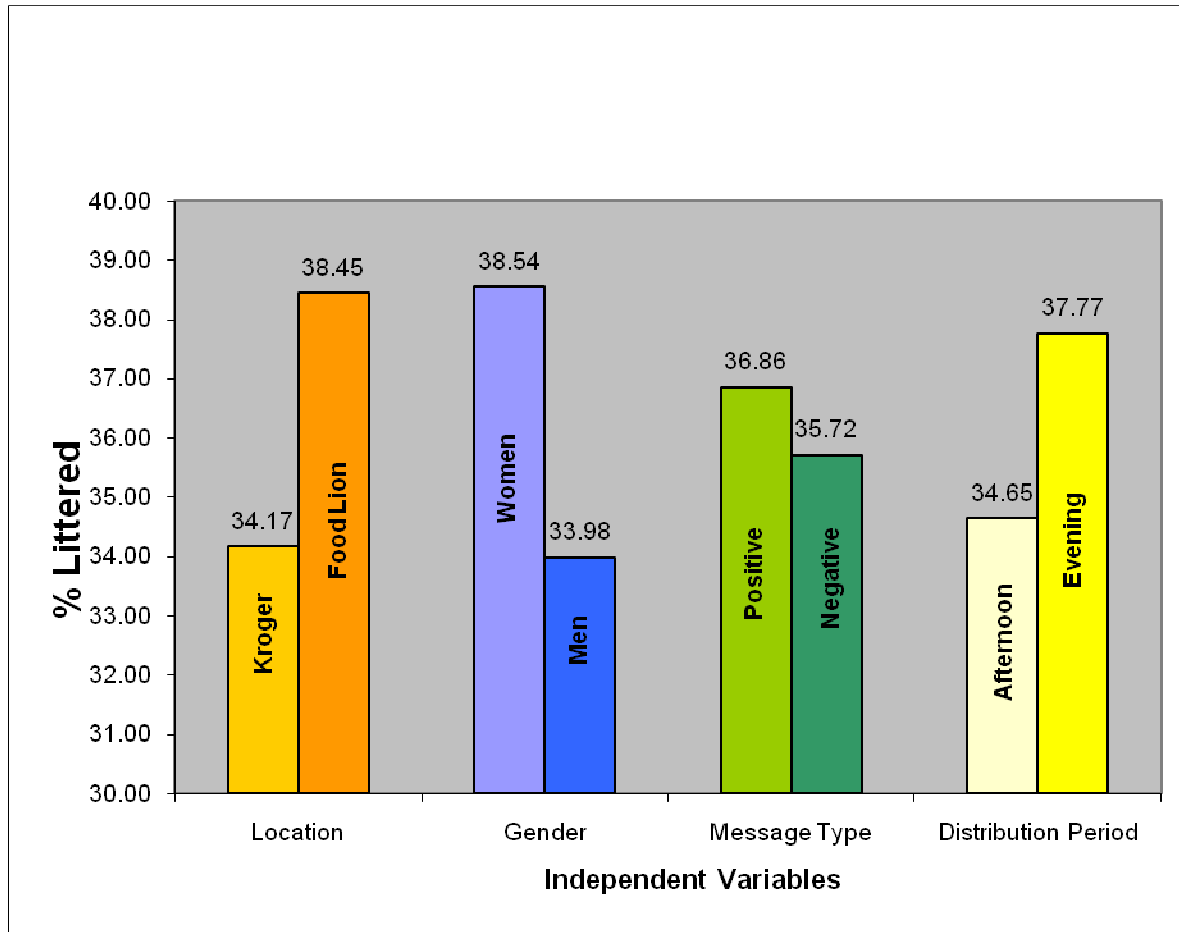
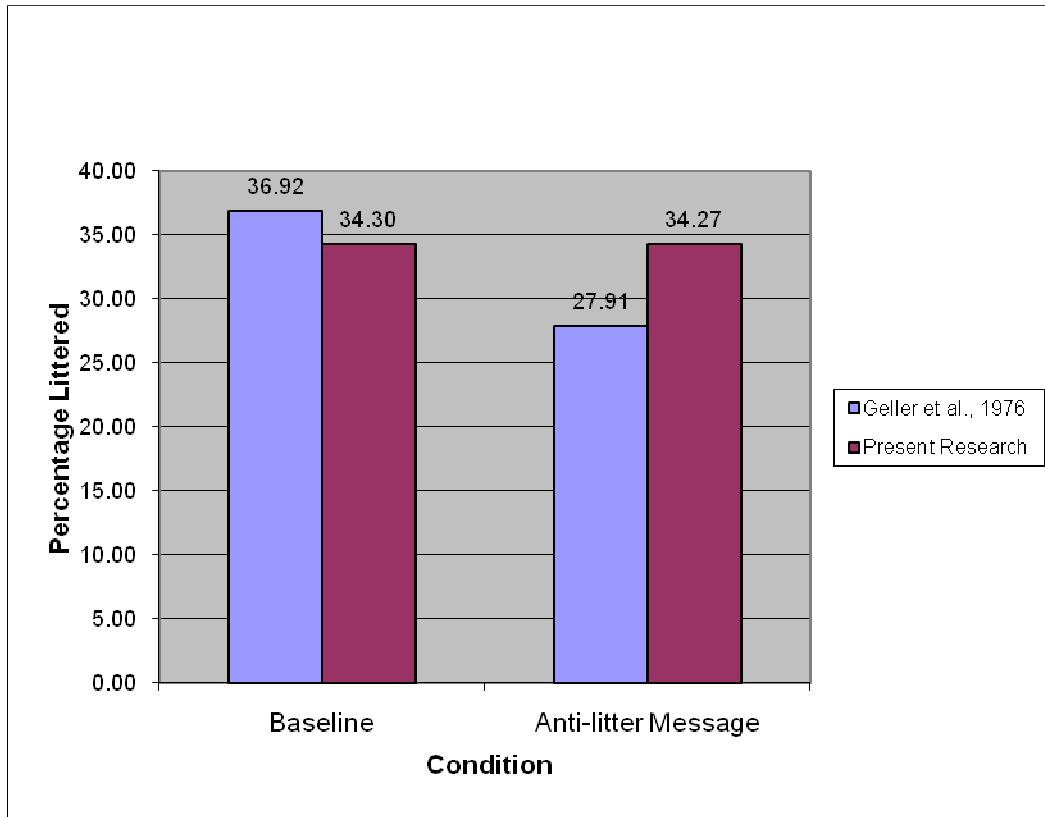


Figure 4. Percentage of Handbills Littered in Present Research vs. Geller et al., 1976



Appendix A: Informed Consent Study 2

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

**Informed Consent for Participants in Research Projects
Involving Human Subjects****STUDY TITLE: Rating Anti-Litter Messages**

My name is Elise Drake and I am a doctoral student in clinical psychology at Virginia Tech. I am a co-investigator on a study related to litter behaviors. The principle investigator of this study is Dr. E. Scott Geller, professor of psychology. This study is being run through the Center for Applied Behavior Systems in the Department of Psychology at Virginia Tech.

The purpose of this study is to evaluate various messages aimed at reducing littering behaviors. The study will enroll up to 200 participants. All participants will be undergraduate students at Virginia Tech.

Before choosing to participate, it is important that you read and understand the following statements:

Study Procedures: If you choose to participate, you will be asked to complete a brief survey. Upon electronically giving your consent (by clicking on the button below), you will be taken to a secure website to complete a survey. The survey will ask you to rate 20 anti-litter messages by rank-ordering these messages. This should take approximately 15-30 minutes to complete. The study must be completed in one session. The time required for your completion of this study is estimated to be less than 30 minutes, and will take place entirely on an electronic basis.

Although **there are no direct benefits to you as a result of your participation**, the information you provide will help to create an intervention to impact litter behaviors and will also help to learn what type of messages might impact environmental behaviors. No promise or guarantee of benefits have been made to encourage you to participate.

There are no more than minimal risks involved with this study.

The only identifying information you will be asked to provide is your name and email, which will be used only to assign you extra credit for your participation.

Your name and or email address will not appear on any of the surveys or measures and will not be connected to any of the information you complete electronically for this study. If you do not properly exit or close your Internet browser when you are finished with your survey it is possible that an outside party could view your responses. Be sure to close your browser after you have submitted your responses or if you choose to discontinue participation. At no time will the researchers release the results of the study to anyone other than individuals working on the project without your written consent. Only the investigators will have access to your data. Survey Solutions will use Secure Sockets Layer (SSL) to encrypt all surveys. SSL is used for transmitting information privately over the Internet. Many corporations and academic institutions require SSL when collecting data. SSL is supported in all modern browsers. Only the investigators and people who are directly working as research assistants will have access to your data. It is possible that the Institutional Review Board (IRB) may view this study's collected data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

You will be compensated with an extra credit point for completion of the study. You will receive one extra credit point for completion of the anti-litter rating survey. This means you will be able to receive one extra credit point for your full participation in the entire study. Your choice to participate in compensation is voluntary.

Taking part in this research is voluntary. You are free to withdraw from the study at any time without penalty. You are free not to answer any questions without penalty. You may withdraw from the research project without penalty at any time prior to completing the survey by closing your Internet browser. In cases where you do not complete the survey in entirety, you will receive one half point of extra credit.

You must be 18 years of age or older to participate.

You may direct study-related inquiries to the Principal Investigator by emailing E. Scott Geller at esgeller@vt.edu or to the Co-Investigator, Elise Drake at edrake@vt.edu. Alternatively, you may mail your questions to: E. Scott Geller or Elise Drake

Center for Applied Behavior Systems
202 Williams Hall
Blacksburg, Virginia, 24061

Please read and indicate your preference to be in the study or not:

This project has been reviewed by the Human Subjects Protection Review Committee, which ensures that research projects involving human subjects follow federal regulations. If I should have any questions about the protection of human research participants regarding this study, I may contact Dr. David Moore, Chair Virginia Tech Institutional Review Board for the Protection of Human Subjects, telephone: (540) 231-4991; email: moored@vt.edu; address:of Research Compliance, 2000 Kraft Drive, Suite 2000 (0497), Blacksburg, VA 24060.

Please print a copy of this informed consent form for your records.

If I voluntarily agree to participate in this study, I will have the following responsibilities:

1) I will complete a web-based survey in which I will rate 20 anti-litter messages.

The combined time required for my completion of this entire study is estimated to be less than 30 minutes, which will occur in one session.

By clicking the "I Agree" button below I am indicating I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent. I have printed a copy of the Consent Form statement for my files. I am acknowledging that I am 18 years of age or older.

Question 2. Once again, please rank the following group of anti-litter messages below by clicking a number from 1st to 10th to the right of each message. A ranking of 1st indicates the message you believe would be *most likely* to have an impact on anti-litter behavior; while a ranking of 10th indicates the message you believe would be *least likely* to have an impact on anti-litter behavior. Please make sure to rank each message, using each ranking (1st -10th) only once.

	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Please dispose of properly to prevent depletion of our resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid possible fines – dispose of litter properly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No one likes a litter bug! Trash your litter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispose of litter properly to avoid damage to our future generations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Littering is against the law – don't litter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Littering kills wildlife, don't litter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Avoid polluting our community – don't litter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The fine for littering in Virginia is \$250 or higher. Don't litter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Litter is ugly, so don't be ugly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Dispose of litter properly to avoid messing up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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