

PROMOTING SOURCE REDUCTION BEHAVIOR

The Role of Motivational Information

RAYMOND DE YOUNG *is Assistant Professor of Conservation Behavior at the University of Michigan. His research centers on people's commitment to environmentally responsible behavior.*

ANDREW DUNCAN *earned his M.S. in natural resource policy at the University of Michigan (as did the others listed below) where he is currently a doctoral student investigating behavioral aspects of materials conservation and solid waste source reduction.*

JEFFREY FRANK *(M.S., environmental education) is with the Council on Environment of New York City involved in environmental education for schoolchildren.*

NANCY GILL *earned her M.S. in natural resource policy. Her interests include open space preservation and resource conservation.*

SHEREEN ROTHMAN *(M.S., environmental education) is currently an Associate in Earth Education.*

JOHN SHENOT *(M.S., natural resource policy) is working in the air toxics program of the Wisconsin Department of Natural Resources.*

ANDREA SHOTKIN *(M.S., environmental education) is currently the programs coordinator for the North American Association of Environmental Education.*

MIRIAM ZWEIZIG *(M.S., environmental education) works for the North American Association of Environmental Education and is active in international environmental education and voluntary water quality monitoring.*

ABSTRACT: In a study of the conservation behavior of 103 grocery shoppers in Chelsea, Michigan, an information and prompting strategy was used to test various rationales for adopting source reduction behavior. The experimental intervention consisted of mailing an educational pamphlet to participants. The experimental design included four treatment groups: a control and three others. These three other treatment groups each received a pamphlet giving environmental, economic, or a combination of

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environmental and economic rationales to reduce waste at the source. From data collected in pre- and postintervention survey instruments, it was shown that both environmental and economic rationales for practicing source reduction led to significant increases in reported source reduction behavior. Additionally, the type of conservation behavior promoted (e.g., toxics use reduction) and the location in which it is practiced (i.e., at home, at a store) were found to have an impact on the success of the interventions. Participants were more likely to adopt home-based source reduction of nontoxics over either store-based activities or activities involving toxics use reduction.

Landfilling, incineration, and recycling are all used to manage society's waste once it has been produced. Source reduction, in contrast, aims to manage waste by minimizing the volume and/or toxicity of waste, with emphasis placed on waste prevention. Avoiding waste generation through source reduction decreases the need to develop or expand waste management systems such as landfills and incinerators and reduces the controversy of siting new facilities.

A significant and unique aspect of source reduction is its role in materials policy. Whereas other waste management methods deal only with waste as a system output, source reduction also addresses the problem of natural resource depletion and individual consumption. In its scope, source reduction is far more comprehensive than its waste management counterparts.

The U.S. Environmental Protection Agency as far back as 1976 had ranked source reduction at the top of its hierarchy of proposed waste management methods (U.S. Environmental Protection Agency, Office of Solid Waste, 1976). But municipalities have not been quick to adopt source reduction as a waste management alternative. This reluctance can be attributed to several causes: (a) current waste management policies exist to dispose of waste, not to avoid it; and (b) source reduction

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requires new patterns of consumption behavior unfamiliar to most consumers. Thus, although national-level waste management strategies officially endorse source reduction, barriers still exist at both the governmental and behavioral levels.

The purpose of this study was to address the behavioral issue. The study investigated the degree to which source reduction behavior in households could be enhanced using economic and environmental rationales. By showing that source reduction behavior could be promoted using simple informational tools, one might be better able to expand use of this underused waste management option.

RESEARCH BACKGROUND

Source reduction, in its most basic sense, is an old behavior pattern. Any culture concerned with survival in an environment of limited resources would be required to use materials in a frugal manner (Kaplan & Kaplan, 1982). This meant repairing a damaged item rather than creating a new one, saving used materials for reuse, and producing objects that maximized efficient use of limited raw materials. To call source reduction "new" is to overlook basic adaptive traits of the human species. Still, in the context of current Western culture, source reduction does present a radical departure from society's way of managing materials. The practice of producing the same product with far less materials, packaging these products more efficiently, keeping toxic materials out of products and simply consuming less are not commonplace in Western government and industry, nor in the minds of many people (Hurst & Relis, 1989).

The issue becomes, then, one of how to motivate people to adopt this behavior. Much behavioral research on conservation motives has assumed that individuals act according to what they perceive to be their greatest economic self-interest (Costanzo, Archer, Aronson, & Pettigrew, 1986). This line of research has tended to emphasize the use of positive reinforcement strategies since, as Geller (1989) points out, the more coercive strategies of punishment and negative reinforcement can result

in either noncompliance or reactance behavior. Another problem with more coercive strategies may be a failure of people to generalize from one conservation behavior, such as recycling, to another, such as source reduction (Simmons & Widmar, 1990).

Although individuals are attentive to their economic self-interest, attempts to promote conservation behavior using monetary reinforcement strategies have encountered difficulties. Such strategies often produce nondurable behavior change; once the rewards are removed, the behavior usually stops (Katzev & Johnson, 1987).

One possible way to promote durable behavior change is to highlight the potential economic benefits inherent in the source reduction behavior. Thus rather than distributing a tangible economic reward to each individual who engages in source reduction, one might simply stress the personal economic advantages of performing such behavior. Such an approach has distinct advantages to communities. Rather than having to continually provide funds to cover monetary rewards, they need only fund an environmental education program.

Other approaches to enhancing conservation behavior have involved asking people to alter their waste disposal and/or purchasing behavior for reasons other than their economic self-interest. These approaches have explored such noneconomic motivational strategies as altruism (Hopper & Nielsen, 1991; Stern, Dietz, & Black, 1986), intrinsic satisfaction (De Young, 1986), and social commitment (Burn & Oskamp, 1986; Katzev & Pardini, 1988; Pardini & Katzev, 1984; Wang & Katzev, 1990) often mediated by a block leader (Burn, 1991; Hopper & Nielsen, 1991; Nielsen & Ellington, 1983). Kashmanian (1989) has pointed out that environmental implications have joined other product attributes (e.g., price, quality, performance, safety) in consumer purchase decisions. The impacts of purchasing behavior on the environment can be used to motivate source reduction behavior (Kashmanian, Kuusinen, & Stoeckle, 1990).

The present study built on these earlier findings and explored the effectiveness of environmental and economic rationales in influencing source reduction behavior. The intervention tools

were carefully worded pamphlets outlining the reasons for adopting source reduction behavior. These reasons were based on either environmental or economic concerns, or both.

Research has also suggested that simply providing reasons for performing a desired behavior may be insufficient to elicit the behavior. Quite independent of attitudes, the perceived difficulties of conservation behavior may prove to be a significant barrier to adoption (Vining & Ebreo, 1990). What is often needed is precise information on *how* to perform the desired behavior: where to do it, when it is to be done, what actions are required, and so on (De Young, 1989; Weigel, 1983). The informational pamphlets used in the present study, which provided the rationale for adopting source reduction, also provided specific procedural information on how to carry out the behavior.

METHODOLOGY

SETTING

Chelsea, Michigan, a village of 3,772 people located in Washtenaw County, Michigan, was chosen as the study area. Under the State of Michigan's Solid Waste Management Act of 1978, Chelsea was required to submit a written plan for diverting 30% of its solid waste from land disposal by 1995. This goal is to be accomplished through source reduction, reuse, recycling, and composting. Source reduction and reuse, together, are expected to reduce the amount of materials going to the landfill by 3%. As of late 1990, Chelsea's landfill had approximately 2 years of capacity remaining at its current rate of fill.

STUDY DESIGN

Study participants were randomly assigned to one of four treatment groups: one group was provided with environmental reasons to source reduce, another received economic reasons to source reduce, and a third group was provided with both

environmental and economic reasons to source reduce. The control group received no rationale for adopting source reduction behavior.

Baseline (pretreatment) and follow-up (posttreatment) survey instruments were used to gather information about participants' source reduction behavior during the study.¹ The 13-week study period was divided into a 3-week baseline period and a 10-week treatment period. At the end of the baseline period each participant received a baseline survey instrument. Statistical analysis of the baseline survey instrument revealed no significant differences between the participants assigned to different treatment groups with respect to income, educational level, gender, race, and household size.

At the beginning of the treatment period, pamphlets were sent out to all treatment groups except the control, along with a cover letter encouraging them to read the materials and consider adopting the proposed changes in behavior. Information contained in the pamphlet included a definition of source reduction, practical suggestions on how to reduce waste by changing purchasing and consumption habits, and a separate page of nontoxic alternatives for the homeowner. The pamphlets varied only in the rationale presented—environmental, economic, or a combination—for adopting the suggested behavior; in all other respects the pamphlets were identical.

At the end of the 10-week treatment period, all treatment groups, including the control, were given a follow-up survey instrument. There were two versions of this follow-up survey instrument, one for all treatment groups except the control and one for the control group. On the control group's survey instrument, questions were omitted or altered if they referred to pamphlets.

In an effort to corroborate the self-reported source reduction behavior change, participants in all four groups were also asked to save their grocery receipts throughout the 13-week study period. These itemized receipts were used to quantify source reduction behavior based on purchasing decisions. This measure showed promise but was hindered by a number of logistical problems that made these data difficult to interpret and report.²

PARTICIPANTS

During autumn 1990, volunteer participants were recruited from weekend shoppers at Polly's Market in Chelsea, Michigan. A short preselection survey instrument was administered. This instrument included demographic questions about the shopper's household and asked whether they would be willing to participate in a longer study. Of the 688 shoppers who completed the survey instrument, 159 (23%) indicated that they would be willing to participate in the 13-week study and went on to complete a baseline survey instrument. Responses to the follow-up survey instrument were received from 103 of these 159 participants (indicating a 65% completion rate). There is always concern of a self-selection bias in a study involving volunteers. There are two levels to this potential bias. First, the initial 159 volunteer participants may differ from the 688 shoppers who filled out the pre-selection instrument. Second, it is possible that the 56 participants who left the study before it was completed are different from those 103 who finished. These possibilities were explored using the preselection survey data on behavior, attitude, motivation, and demographic items. Those who volunteered to participate in the study differed from other shoppers only for the bank of behavior questions. The volunteers reported a small but significantly greater ($p < .05$) prior experience with source reduction behavior. The volunteers did not differ from other shoppers on their attitudes or motivations toward source reduction nor on demographic variables. The possibility of a systematic bias through attrition was examined by comparing data for participants who dropped out at some point after the start of the study with those participants who completed the 13-week study. This analysis showed only one significant difference ($p < .05$) over the 26 questionnaire items examined; people who dropped out were more likely to report that convenience was a factor in their food-shopping decisions. One can conclude that the participants who completed the study differed only slightly from the other shoppers at the market that day. Further, these differences would not predispose them to either of the interventions used.

The sample of participants is notable in that household size, household income, and level of education of the participants are somewhat higher than the national average (significant at $p < .05$). It should also be noted that there was a higher percentage of women among study participants (85%) than in the sample of shoppers who completed the selection survey (65%; significant at $p < .05$).

RESULTS

Data were subjected to two-way analysis of variance and Bonferroni pairwise comparison tests. Responses are significant at $p < .05$, unless otherwise indicated.

SOURCE REDUCTION BEHAVIOR CHANGE

The survey instrument included a series of questions about the participant's source reduction behavior. Nonmetric factor analysis identified a single category of items. This source reduction behavior change category is the study's dependent measure. The individual questionnaire items making up this category, the grand mean for all four groups are listed in Table 1. This table also lists Cronbach's coefficient alpha—a measure of the internal consistency of the category.

A two-way analysis of variance (ANOVA) of the follow-up survey data reveals significant reported change in source reduction behavior for both the economic- and environmental-treatment groups as compared to the control group (see Table 2). The lack of a significant interactive effect suggests that the two treatments combine in an additive fashion. A Bonferroni pairwise comparison test was performed to confirm this notion. It indicates significant differences (at $p < .05$) when comparing the mean scores of the economic- and combined-treatment groups as well as when comparing the mean scores of the environmental- and combined-treatment groups. In both instances the group receiving the combined treatment had a significantly higher

TABLE 1
Source Reduction Behavior Change Category

<i>Stem Question and Items Included</i>	<i>Mean</i>	<i>SD</i>	<i>Alpha</i>
How much change has occurred in your shopping and household habits due to your participation in the study?	2.63	1.14	.95
Save reusable containers			
Use more returnable bottles			
Reduce plastic wrap use			
Reuse aluminum foil			
Buy more durable items			
Buy fewer aerosols			
Not buy overpackaged goods			
Use fewer paper towels			
Buy items packaged in reusable containers			
Buy fewer disposable items			
Buy in bulk			
Reduce toxic cleaner use			
Use nontoxic pesticides			
Use vinegar and baking soda for cleaning			

TABLE 2
Treatment Group Mean Scores on Source Reduction Behavior Change Category

<i>Treatment Group</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
Control	2.04	1.18	23
Economic	2.61	1.08	23
Environmental	2.52	1.12	30
Economic and environmental	3.34	0.82	25

Two-Way Anova Results

<i>Source</i>	<i>df</i>	<i>F Ratio</i>	<i>p</i>
Economic	1	11.89	.002
Environmental	1	9.08	.006
Economic × Environmental	1	0.40	n.s.
	97		

mean score than that of either the economic- or environmental-treatment groups. Therefore, one can conclude that the economic and environmental treatments do combine in an additive fashion, having a significantly greater influence on behavior than either treatment alone.

TABLE 3
Type of Source Reduction Behavior Categories

<i>Category Name and Items Included</i>	<i>Mean</i>	<i>SD</i>	<i>Alpha</i>
Shopping-trash reduction	2.67	1.21	.93
Buy fewer disposable items			
Buy items packaged in reusable containers			
Not buy overpackaged goods			
Buy fewer aerosols			
Buy in bulk			
Buy more durable items			
In-home trash reduction	2.86	1.31	.90
Save reusable containers			
Reuse aluminum foil			
Reduce plastic wrap use			
Use fewer paper towels			
Use more returnable bottles			
In-home toxics reduction	2.27	1.14	.81
Use vinegar and baking soda for cleaning			
Use nontoxic pesticides			
Reduce toxic cleaner use			

NOTE: All pairwise comparisons of means are significant at $p < .05$.

TYPES OF BEHAVIOR CHANGE

The individual questionnaire items in Table 1 can be further analyzed by the type or location of source reduction behavior in question. To accomplish this analysis the items were organized, a priori, into three subcategories of source reduction behavior. One category, in-home toxics reduction, measured the relative level of toxics use reduction occurring in and around the home. The other two categories dealt with source reduction of nontoxic items. The category shopping-trash reduction measured such source reduction behavior occurring in stores whereas in-home trash reduction measured this behavior occurring in and around the home (see Table 3). The relatively high alpha values for each of these categories indicate they retain a high degree of internal coherence after their extraction from the single category shown in Table 1.

The shopping-trash reduction category focused on consumer decisions regarding the purchase of appropriately packaged

TABLE 4
Treatment Group Mean Scores on Shopping-Trash Reduction Category

<i>Treatment Group</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
Control	2.08	1.23	23
Economic	2.71	1.22	23
Environmental	2.57	1.20	30
Economic and environmental	3.30	0.92	25

<i>Two-Way Anova Results</i>			
<i>Source</i>	<i>df</i>	<i>F Ratio</i>	<i>p</i>
Economic	1	11.45	.004
Environmental	1	7.36	.020
Economic x Environmental	1	0.07	n.s.
	97		

items, durable items, and so on. A significant positive change in source reduction behavior, as measured by this category, is observed in the two-way analysis of variance for both the economic and environmental treatment groups (see Table 4).³ The interaction of these two treatments was not significant. A Bonferroni pairwise comparison test indicates a significant difference (at $p < .04$) for this category when comparing the mean scores of the environmental and combined treatment groups. This test was not significant for the comparison of means of the economic- and combined-treatment groups.

The in-home trash reduction category focused on at-home activities that reduce waste (e.g., encouraging reuse of materials, use of durable items in the home). Once again a significant positive change in source reduction behavior as measured by this category was observed for both economic- and environmental-treatment groups (see Table 5). The interaction of these two treatments was not significant. A Bonferroni pairwise comparison test indicates a significant difference (at $p < .05$) for this category when comparing the mean scores of the environmental- and combined-treatment groups as well as when comparing the mean scores of the economic- and combined-treatment groups. Thus the economic and environmental treatments combine in

TABLE 5
Treatment Group Mean Scores on In-Home Trash Reduction Category

<i>Treatment Group</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
Control	2.19	1.33	22
Economic	2.85	1.20	22
Environmental	2.67	1.28	30
Economic and environmental	3.67	1.02	25

Two-Way Anova Results			
<i>Source</i>	<i>df</i>	<i>F Ratio</i>	<i>p</i>
Economic	1	11.40	.001
Environmental	1	7.02	.009
Economic x Environmental	1	0.51	n.s.
	95		

an additive fashion, producing a significantly greater amount of reduction of trash at home than either treatment generated when used alone.

The in-home toxics reduction category focused on behavior involving the use of nontoxic alternatives in the domestic setting. Questions highlighted specific nontoxic alternatives to toxic cleansers and pesticides. In a pattern identical to the previous two, a significant positive change in source reduction behavior as measured by this category was observed for both the economic and environmental treatment groups (see Table 6). The interaction of these two treatments was not significant. A Bonferroni pairwise comparison test indicates a significant difference (at $p < .06$) for this category when comparing the mean scores of the environmental- and combined-treatment groups. This test was not significant for the comparison of means of the economic- and combined-treatment groups.

A pairwise comparison of the mean scores in Table 3 showed they differed significantly (at $p < .05$) from one another. Specifically, the in-home trash reduction category mean is significantly higher than the means of both the shopping-trash reduction category and the in-home toxics reduction category. And the shopping-trash reduction category mean is significantly higher

TABLE 6
Treatment Group Mean Scores on In-Home Toxics Reduction Category

<i>Treatment Group</i>	<i>Mean</i>	<i>SD</i>	<i>N</i>
Control	1.85	1.06	22
Economic	2.20	1.21	22
Environmental	2.16	1.07	30
Economic and environmental	2.83	1.06	25

<i>Two-Way Anova Results</i>			
<i>Source</i>	<i>df</i>	<i>F Ratio</i>	<i>p</i>
Economic	1	5.18	.025
Environmental	1	4.74	.037
Economic × Environmental	1	0.51	n.s.
	95		

that the mean of the in-home toxics reduction category. These data suggest that best results from the intervention were achieved for behavior performed within the home and that participants reported comparatively less reduction in their use of toxics.

DISCUSSION

Individuals reported changes in their conservation behavior when given either environmental or economic reasons to source reduce. These results are consistent with the view that individuals are concerned both about the environment and their economic interests. This study also strongly suggests that a combination of these interventions yield even greater behavior change. This finding has significance for policymakers and environmental educators. Programs to promote source reduction among homeowners should draw from *both* economic and environmental justification for the behavior—neither rationale is as effective alone as when combined with the other.

The study results also indicated that the participants were more likely to practice home-based source reduction activities such as reusing aluminum foil, than consumer-based activities such as buying items with less packaging. Further research is

needed to better understand this finding. It is possible that people feel more familiar with source reduction behaviors at home and therefore are more able to alter them. Another possible explanation for the lower degree of behavior change seen in the consumer-based activities is a lack of source reduction options available to participants. For example, participants did not have the option to purchase staples in bulk; only candy and cookies were sold in bulk bins in the store.

The lower score for the toxics category was an unexpected finding. It may be that individuals' concern over household toxics is overshadowed to some extent by their unfamiliarity with equally effective and convenient substitutes for those toxics. This may decrease willingness to switch to nontoxic or less toxic alternatives. Fortunately, this may be remedied through implementation of a source reduction education effort that highlights household hazardous wastes and their substitutes.

There are potential limitations to the generalizability of these findings. It's unclear how the small village setting, the reduced availability of local solid waste landfill capacity, and being located in an industrialized state might combine to reduce the external validity of these findings. It is worth noting that a good number of states have similar characteristics and, coincidentally, are states with significant solid waste crises. The study also involved volunteers, people willing to participate in an extended study. Future research should examine the effectiveness of these findings with less committed individuals.

The increase in reported source reduction behavior following such a low-intensity and relatively low-cost intervention should be welcomed news to public officials responsible for promoting waste reduction. Those interested in promoting source reduction, including policymakers and educators, should take note of these results in their design of waste management programs. In particular, it was not necessary to directly provide economic rewards to elicit the reported source reduction behavior changes. And with the preference for behavior performed at home, policymakers and educators may first want to focus on designing programs that emphasize the domestic-behavior setting.

Although there is yet much to be investigated in the field of source reduction behavior, this study has shown that it is possible to motivate citizens to significantly increase their practice of source reduction through an appropriate, low-intensity educational intervention. The rationale given for practicing source reduction and the type of behavior requested are important considerations in promoting individual source reduction.

NOTES

1. Five-point Likert-type scales were used on all survey instruments, with 1 corresponding to *no change*, and 5 corresponding to *great change*. Although multiple measures were used to increase the internal validity of the study, the self-reported behavior data are best treated as a measure of behavioral intent (see note 2).

2. The receipt data did tend to corroborate the self-reported behavior data. However, participants frequently indicated that they had lost or forgotten to save receipts, and they often shopped at stores that provided nonitemized receipts. Taking these and other problems into consideration, the usable data received from itemized receipts accounted for less than half of all purchasing decisions made by participants during the study period. This method of measuring source reduction behavior deserves further attention. For additional details see project report available from the first author.

3. An increase in source reduction behavior was reported by all four treatment groups for all three categories of behavior discussed. The increase reported by the control group, who did not receive either informational treatment, might be explained by their (a) having completed the baseline survey instrument and/or (b) collecting and returning their shopping receipts.

REFERENCES

- Burn, S. (1991). Social psychology and the stimulation of recycling behaviors: The block leader approach. *Journal of Applied Social Psychology* 21, 611-629.
- Burn, S. M., & Oskamp, S. (1986). Increasing community recycling with persuasive communication and public commitment. *Journal of Applied Social Psychology* 16, 29-41.
- Costanzo, M., Archer, D., Aronson, E., & Pettigrew, T. (1986). Energy conservation behavior: The difficult path from information to action. *American Psychologist* 41: 521-528.
- De Young, R. (1986). Encouraging environmentally appropriate behavior: The role of intrinsic motivation. *Journal of Environmental Systems* 15, 281-292.

- De Young, R. (1989). Exploring the difference between recyclers and non-recyclers: The role of information. *Journal of Environmental Systems* 18, 341-351.
- Geller, E. S. (1989). Applied behavior analysis and social marketing: An integration for environmental preservation. *Journal of Social Issues* 45, 17-36.
- Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior: Normative and behavioral strategies to expand participation in a community recycling program. *Environment and Behavior* 23, 195-220.
- Hurst, K., & Relis, P. (1989). *The next frontier: Solid waste source reduction*. Santa Barbara, CA: Community Environmental Council, Inc.
- Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world*. New York: Praeger.
- Kashmanian, R. M. (1989). *Promoting source reduction and recyclability in the marketplace: A study of consumer and industry response to promotion of source reduced, recycled, and recyclable products and packaging* (Prepared by Abt Associates, Inc. for the Office of Policy, Planning and Evaluation). Washington, DC: U.S. Environmental Protection Agency.
- Kashmanian, R. M., Kuusinen, T. L., & Stoeckle, A. (1990). Source reduction and recyclability: Promotion strategies. *Resource Recycling* 9, 74-79.
- Katzev, R. D., & Johnson, T. R. (1987). *Promoting energy conservation: An analysis of behavioral research*. Boulder, CO: Westview.
- Katzev, R. D., & Pardini, A. U. (1988). The comparative effectiveness of reward and commitment approaches in motivating community recycling. *Journal of Environmental Systems* 17, 93-113.
- Nielsen, J. M., & Ellington, B. L. (1983). Social processes and resource conservation. In N. R. Feimer and E. S. Geller (Eds.), *Environmental psychology: Directions and perspectives*. New York: Praeger.
- Pardini, A.U., & Katzev, R. D. (1984). The effects of strength of commitment on newspaper recycling. *Journal of Environmental Systems* 13, 245-254.
- Simmons, D., & Widmar, R. (1990). Participation in household solid waste reduction activities: The need for public education. *Journal of Environmental Systems* 19, 323-330.
- Stern, P. C., Dietz, T., & Black, J. S. (1986). Support for environmental protection: The role of moral norms. *Population and Environment* 8, 204-222.
- U.S. Environmental Protection Agency, Office of Solid Waste. (1976). *Report to Congress: Minimization of hazardous waste*. Washington, DC: U.S. Environmental Protection Agency, Office of Solid Waste.
- Vining, J., & Ebreo, A. (1989). What makes a recycler? A comparison of recyclers and nonrecyclers. *Environment and Behavior* 22, 55-73.
- Wang, T. H., & Katzev, R. D. (1990). Group commitment and resource conservation: Two field experiments on promoting recycling. *Journal of Applied Social Psychology* 20, 265-275.
- Weigel, R. H. (1983). Environmental attitudes and the prediction of behavior. In N. R. Feimer and E. S. Geller (Eds.), *Environmental psychology: Directions and perspectives*. New York: Praeger.