

## RELATIONSHIPS AMONG ECOLOGICALLY RESPONSIBLE BEHAVIORS

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### ABSTRACT

A telephone survey of ninety-six randomly selected adults of a Southern California community asked about their participation in ecologically responsible behaviors. Fifteen different behaviors were analyzed in terms of: the extent of individual participation in each; the extent to which behaviors within conceptual categories were related; the extent to which all of the behaviors were related; and the extent to which participation in each was related to attitudes about energy conservation. The extent of participation in most of the behaviors was low; only recycling and consuming behaviors were significantly correlated within their respective categories; there was no single factor underlying all of the behaviors; and the attitude-behavior relationship was significant for only six of the behaviors. Implications for further research and conservation efforts are discussed.

The Arab oil boycott of 1973-74 and the cutoff of Iranian oil in 1979 have called urgent attention to the uncertainty of the world's oil supply [1], and drastic increases in the price of oil, natural gas, and electricity have emphasized the need for energy conservation, which is in essence a new and largely untapped source of energy [2]. As a result, it is important to determine what is being done in a variety of communities in the way of energy conservation. To date, social scientists have focused largely on the attitudinal aspects of energy conservation, with relatively little emphasis on the diversity of the behavioral aspects. Several scientists point out that maladaptive human behavior is at the root of the current energy and ecological crises, and an understanding of such behavior would be invaluable for both research and application [2-4].

Very little research has been done on the large variety of energy-efficient and ecologically responsible behaviors (the term "ecologically responsible behavior" was coined by Lipsey in 1977 and refers to actions which retard the degradation of the environment, including those which slow the depletion of

resources [4]). The typical assumption appears to be that all of these diverse behaviors (e.g., recycling, using cold water for laundry, line-drying clothes, turning down thermostat, carpooling, etc.) originate from some common underlying characteristic (e.g., conservationism), and that each behavior is relatively interchangeable as an index to this underlying characteristic. Lipsey lists over fifty different behaviors, few of which have been included in research to date [5].

Because of the limited study of the broad range of ecologically responsible behaviors, attitude-behavior relationship studies have also been limited. In the past, psychologists have often had difficulty in establishing strong linkages between an individual's attitudes and behaviors [6-10]. Similar findings have been reported in regard to environmentally oriented behavior [3, 11-13]. Furthermore, although attitudes themselves are correlated with education, knowledge, age, and income [14-16], these attitudes do not appear to be systematically translated into behavior.

It is possible that rather than a single attitude or dimension, there exist several dimensions or underlying characteristics to ecologically responsible behaviors, each of which affects different behaviors differently. If this is true, then research which is conducted with the assumption that any ecologically responsible behavior may be generalized to any other is likely to be misleading. Understanding the interrelationships of the entire spectrum of ecologically responsible behaviors can lead to knowledge about the underlying dimensions of these behaviors.

A few research efforts have been directed at the creation of ecological behavior scales. Weigel and Newman developed an environmental attitude scale which demonstrated only modest success in predicting fourteen individual ecological behaviors (mean  $r = .29, p < .01$ ), but obtained a more pronounced correlation ( $r = .62, p < .001$ ) when the behaviors were combined into a comprehensive behavioral index [17]. Maloney, Ward, and Braucht used item analysis and professionals' opinions to construct an ecological scale composed of four sub-scales, one of which attempted to measure actual commitment to ecological action (self-reported activity) [18]. This subscale, however, contained a small number of items (10) and has a limited content range (mainly purchasing behavior and political involvement).

At present, the author knows of only two studies which have employed techniques such as factor analysis to explore the underlying dimensions of a large body of ecologically responsible behaviors as part of a systematic approach to the development of such scales [19, 20]. The purpose of those studies was to uncover the structure and organization of a sample of ecologically responsible behaviors. Geirland found that there appeared to be no single generalized factor of ecologically responsible behavior; rather, there were numerous factors. He sorted items into six conceptual groupings: household space heating; other household conservation behaviors; energy conservation outside the home; solid

waste disposal; water conservation; and collective ecological action. He found that items within particular clusters were not more similar to each other than items in other clusters. In other words, even within small conceptually related categories, ecologically responsible behaviors are not interchangeable due to some common underlying characteristic, and they should not be treated as such. Studies which use different behavioral criteria of conservation may not be measuring the same construct.

Attar, in a related study, distinguished between three types of ecologically responsible behavior: repetitive actions involving curtailment, repetitive actions involving greater efficiency in resource usage, and one-shot efficiency actions. Repetitive curtailment actions include those behaviors in which participants must decrease their use of an already existing energy system (suggesting sacrifice, hardship, or inconvenience). Furthermore, they must do so on a continuous basis rather than only once. Repetitive efficiency actions refer to behaviors that provide more benefits or require less energy usage or expense (e.g., saving aluminum cans and turning them in for money rather than throwing them away, using cold water for laundry, or closing off unused rooms that do not need to be heated). Finally, one-shot efficiency behaviors are those which need to be done only once, as in the installation of solar heating. Attar found definite differences in how willing people were to participate in these different types of behavior. People were much more likely to be willing to participate in one-shot efficiency and repetitive efficiency actions than in repetitive curtailment actions. These findings suggest that there may be at least three underlying dimensions to ecologically responsible behavior.

The present study was designed to answer four questions. The first goal was to determine the extent of individual and household participation in ecologically responsible behavior. The community studied is unusual in that it is a university community and the residents have more formal education, more residential stability, and higher incomes than the national average (based on the findings of a special census in 1975). The research examining correlations between these factors and environmentally responsible behavior, however, is somewhat contradictory. Some studies have found that higher income and higher education are correlated with participation in ecology projects [21] and with recycling behavior [14]; but others have found no correlation between education and income and recycling or consumer behaviors [22]. Thus, although the community is high on these socioeconomic dimensions, the studied behaviors may be relatively unaffected (independent).

The second goal of this research was to determine whether or not the behaviors studied were consistent within the conceptual categories (determined *a priori* by group consensus) of: Home Maintenance, Transportation, Recycling, and Consuming/Environmental Protection. That is, were behaviors within each of these categories positively related (i.e., if a person recycles aluminum cans, does he/she also recycle glass containers and newspapers)?

The third question concerned the existence of a general relationship among all of the behaviors studied. If there is a single, underlying dimension of ecologically responsible behavior, then the behaviors should be quite highly correlated overall, and they should load on a general factor.

Finally, the relationship between attitudes and behavior was explored by studying whether attitudes of concern for energy conservation correlated with reported behavior patterns.

## METHOD

### Subjects

During October of 1981, ninety-six randomly selected residents of a Los Angeles area suburban community were interviewed: thirty-five males (36%), and sixty-one females (64%). Of these respondents, seventy (72%) owned their residences, and twenty-six (28%) were renters; fourteen (15%) lived alone, thirty-one (32%) lived with one other person, seventeen (18%) lived with two others, twenty-four (25%) lived with three others, and the remaining eight (9%) lived with four or more others. Sixteen (17%) of the respondents were educated beyond the college level, twenty-six (27%) had completed four years of college, sixteen (17%) two years of college, and eighteen (19%) had completed high school. The remaining twenty respondents (20%) had not completed high school. The mean age was forty-two (ranging from 15 to 89) with respondents distributed fairly evenly across the entire range (median age was 41). Only two respondents refused to report total household income, and six did not know what it was. Of the remaining eighty-eight: 16 percent reported less than \$10,000; 16 percent reported \$10–20,000; 15 percent reported \$20–30,000; 17 percent reported \$30–40,000; 17 percent reported \$40–50,000; and 19 percent reported over \$50,000.

### Telephone Interview

A telephone interview was used. All subjects were told that the study was a research project on housing and energy done by Claremont Graduate School. More detailed information (i.e., “We’re attempting to determine what people are doing in terms of energy conservation”) was provided upon request.

The questionnaire included demographic items, behavioral items, and an attitude scale. The behavioral items were chosen as the most common and feasible ecologically responsible actions in each of four categories. The first of these, Home Maintenance, consisted of five items involving the following one-shot energy-efficient actions: installation of water-heater blanket, ceiling insulation, weather-stripping, caulking, and low-flow shower-heads. The remaining three categories consisted of repetitive energy-efficient behaviors; frequency of participation was reported on a 4-point scale (never, seldom, often, or always).

The first of these categories, Transportation, contained items asking how often the respondent used mass transit systems, drove an economy car, exceeded the 55 m.p.h. speed limit, and rode in a carpool. The second category, Recycling, included saving glass containers, aluminum cans, and newspapers for recycling. The last category, Environmental Protection/Consuming, asked how often respondents avoided buying products in plastic containers and products in aerosol cans, and how often they bought low-phosphate laundry detergent. Finally, the attitude measure regarding energy conservation was: "On a scale of 1 to 10, how would you rate your concern for energy conservation?"

The interview schedule was reviewed by several psychologists and revised accordingly, and a small-scale pilot study identified and modified potential problems with the wording and procedures.

### Procedure

Six psychology graduate students attended a training session where they reviewed general telephone-interview techniques, and were given specific instructions regarding the survey. They familiarized themselves with the questionnaire by reading it over with the group, and then by role-playing interviews with a partner. The interviewers were provided with copies of the final revision of the questionnaire and with a list of sixty previously selected telephone numbers. The numbers were selected by a random-digit dialing procedure which involved the selection of the first two residential phone numbers that fell within the target city on each page of the current telephone directory [16]. The first four digits of these numbers were then coupled with three-digit numbers generated randomly by computer. The interviewers called respondents between 6:30 and 9:00 P.M. on week-nights, and after 10:00 A.M. on weekends. They interviewed only the man or woman of respective households and, if a child answered, they asked for the man in order to insure that a substantial number of males were interviewed. Each phone number was dialed up to four times on different days at different times if no response was obtained on the earlier calls. Though the telephone directory included prefixes for eighteen cities, only households within the target city were included in the interview sample, and calls to non-residential numbers were discontinued.

A total of 312 calls were made, with the majority of actual contacts occurring on the first attempt (62%). Of these calls, 125 (40%) were numbers outside of the target city, and thirty-three (11%) were non-residential numbers (i.e., office buildings); these people were not interviewed. Twenty-nine (9%) of the numbers were unanswered after four attempts and these numbers were dropped from the sample. Only twenty-nine (9%) of the persons contacted refused to participate, of whom it is estimated that nearly half were outside of the target city. This means that the obtained refusal rate may be higher than the actual refusal rate for the target city. Finally, ninety-six completed interviews were made (31% of the total number of calls but 91% of the total number of eligible calls).

Table 1. Percent of Reported Participation in One-shot Behaviors ( $n=96$ )

| <i>Installation</i>    | <i>Yes</i> | <i>No</i> | <i>Don't Know</i> | <i>Not Applicable<sup>a</sup></i> | <i>Missing</i> |
|------------------------|------------|-----------|-------------------|-----------------------------------|----------------|
| 1 Water-heater blanket | 29%        | 47%       | 22%               | 1%                                | 1%             |
| 2 Ceiling insulation   | 54         | 18        | 28                | 0                                 | 0              |
| 3 Weather-stripping    | 40         | 43        | 13                | 0                                 | 4              |
| 4 Caulking             | 32         | 51        | 15                | 0                                 | 2              |
| 5 Low-flow shower head | 40         | 40        | 18                | 0                                 | 2              |

<sup>a</sup>Refers to those people who had a different type of insulation for their water heater.

## RESULTS

The first issue addressed involved the extent of individual and/or household participation in each of the behaviors. Table 1 presents the percentages of reported participation in each of the one-shot behaviors. It is clear that there was considerable room for increase in the amount of participation in each of the one-shot Home Maintenance behaviors. The only such action reported as taken by more than half of the respondents was installation of ceiling insulation, but respondents were asked about the *R* value of their insulation and only eight (9%) knew what it was, so it is possible that many had less than the recommended amount. It is also interesting to note the relatively high percentages of respondents who did not know whether or not their respective households had installed these items. If ignorance about the installation of energy-saving measures is present in this highly-educated community, it is likely that it is even more widespread in average communities.

Table 2 presents the frequencies of participation in each of the repetitive behaviors. It is apparent that there was even less participation in a number of these repetitive behaviors than in the one-shot behaviors. The lowest rate of participation was found in the use of mass-transportation systems—nearly 75 percent of the respondents never used them. This was closely followed by carpooling, in which 63 percent never participated. Only one behavior was reported as always being participated in by a majority of the respondents—driving an economy car (51%). This was closely followed by saving newspaper and aluminum cans; 45 percent and 39 percent, respectively, of the respondents reported always doing so.

Thus, the extent of individual or household participation in a variety of ecologically responsible behaviors was quite limited. There was room for increase in every category, and substantial increases were possible in most.

Table 2. Percent of Reported Participation in Repetitive Behaviors ( $n=96$ )

| <i>Behavior</i><br>( <i>"How often do you:"</i> ) | <i>Never</i> | <i>Seldom</i> | <i>Often</i> | <i>Always</i> | <i>Not</i><br><i>Applicable</i> <sup>a</sup> | <i>Missing</i> |
|---|--------------|---------------|--------------|---------------|--|----------------|
| 6 Use mass transit systems                        | 73%          | 19%           | 3%           | 2%            | 0%   | 3%             |
| 7 Drive an economy car                            | 27           | 4             | 15           | 51            | 1  | 2              |
| 8 Ride in a carpool                               | 63           | 14            | 13           | 4             | 3  | 2              |
| 9 Drive 55 mph on freeway                         | 16           | 35            | 26           | 17            | 4  | 2              |
| 10 Save aluminum cans                             | 31           | 11            | 10           | 39            | 7  | 2              |
| 11 Save newspaper                                 | 31           | 9             | 10           | 45            | 3  | 2              |
| 12 Save glass containers                          | 48           | 14            | 10           | 25            | 1  | 2              |
| 13 Avoid buying aerosol containers                | 20           | 16            | 27           | 29            | 6  | 2              |
| 14 Avoid buying plastic containers                | 54           | 18            | 13           | 6             | 6  | 2              |
| 15 Buy low-phosphate detergent                    | 49           | 18            | 5            | 23            | 9  | 2              |

<sup>a</sup> Refers to those people, for example, who do not drive and thus do not drive an economy car.

The second issue addressed was the degree of internal consistency among the individual behaviors in each of the four conceptual categories. In other words, were the behaviors within each category positively correlated with each other behavior in the category (e.g., was recycling of aluminum correlated with recycling glass and newspaper)? As shown in Table 3, the Home Maintenance and Transportation behaviors were not internally consistent, having alpha coefficients of 0.23 and 0.16 respectively. This indicates that these behaviors are not interchangeable even within conceptual categories. On the other hand, both the Recycling and the Consumer/Environmental Protection behaviors were somewhat consistent with their respective categories, with alphas of 0.58 and 0.67 respectively. This provides some evidence that each behavior can serve as an index to an underlying characteristic, but such generalizations should be limited to only the two other related behaviors. In other words, If a respondent reports avoiding the purchase of plastic containers, it may only be expected that he or she also avoids buying aerosol containers and does purchase low phosphate laundry detergent. However, it cannot be inferred that the respondent participates in any of the behaviors outside of this narrow range.

On the third issue, we wished to determine whether or not there was some general characteristic underlying all of these behaviors. A factor analysis of the correlation matrix in Table 3 was done, and it was clear that there was no general factor which accounted for major variance in all of the various behaviors. The eigenvalues of the first four factors were 2.4, 2.2, 1.5, and 1.4. Further evidence of the lack of a general factor is the low number of significant correlations of behaviors across four categories. Only eleven of these eighty-three

Table 3. Correlations of Ecologically-Responsible Behaviors and Attitudes

| Category                              | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | Attitude | Cronbach's Alpha                   |
|---------------------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----------|------------------------------------|
| I. One-shot Home Maintenance          |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          | Alpha = .23<br>N = 49              |
| 1                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 2                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 3                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 4                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 5                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 6                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 7                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 8                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 9                                     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| II. Transportation                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          | Alpha = .16<br>N = 96              |
| 10                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 11                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 12                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 13                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 14                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 15                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| III. Recycling                        |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          | Alpha = .58<br>N = 96<br>$p < .05$ |
| 10                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 11                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 12                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| IV. Consumer/Environmental Protection |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          | Alpha = .67<br>N = 93<br>$p < .01$ |
| 13                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 14                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |
| 15                                    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |          |                                    |

Note: Decimal points are omitted. Numbers 1 through 15 refer to behaviors listed in Tables 1 and 2. Only significant correlations and intra-category correlations are shown.

\* $p < .05$

\*\* $p < .01$

correlations were significant (and several would be expected to be significant due to chance alone), and they were quite widely spread across the fifteen behaviors (only installation of ceiling insulation and saving glass containers correlated significantly with more than two of the other behaviors outside of their own category). These findings indicate that studies which focus on one or a few behaviors, and attempt to generalize to the entire spectrum of ecologically responsible behaviors, are misleading and possibly invalid. Our study examined only a small portion of the wide variety of ecologically-responsible behaviors, yet even within this small group there was no general underlying factor to link them all together. These behaviors are not interchangeable and should not be treated as such.

The final issue concerned the relationship between attitudes and behavior. That is, are reported concerns for energy conservation translated into actual behavior? Table 3 includes the correlation between respondents' attitudes and reported participation in behaviors. The only behaviors significantly correlated with attitude were driving an economy car, recycling aluminum and newspaper, avoiding buying aerosols and plastics, and buying low-phosphate laundry detergents. Thus, nine of the fifteen behaviors did not correlate significantly with reported concern for energy conservation, and the behaviors which did correlate with it were almost all confined to the two consistent categories of Recycling and Consumer/Environmental Protection. The general lack of relationship to attitude may be due partly to the fact that although the large majority of respondents reported a relatively high concern for energy conservation, these same respondents reported relatively low participation in energy-efficient behaviors. Also, only one general item was used to measure attitude and it should not be expected that it will correlate highly with each of the specific energy conservation behaviors [23].

## DISCUSSION

In view of the importance of energy conservation to U.S. national energy policy [2], there are several implications to be drawn from this study. In terms of public policy and social action, it is clear that public awareness could be considerably higher. The relatively high degree of non-participation and ignorance of ecologically responsible behaviors on the part of the respondents may be due to apathy, but it may also be at least partly due to a basic unawareness of what may be done at the individual and/or household level. Several respondents were surprised by some of the questions (e.g., "How often do you avoid buying products in plastic containers?"), and stated that they had never considered these behaviors in terms of environmental concern. If we are to succeed in conserving energy and preserving the environment, individuals must be made aware of what they can be doing, and of which present behaviors are not ecologically responsible.

On the other hand, it was clear that for many respondents several of the behaviors were simply not feasible. This was especially true of the use of mass transportation systems and carpooling in this suburban area. Other activities, such as purchasing goods in non-plastic containers, are also difficult because some goods are almost exclusively available in plastic containers and cannot be purchased in any other form. These activities would have to be made both more available and more economically feasible in order for significant participation to occur. It must be kept in mind that the determinants of behaviors are not only internal characteristics, but include external factors as well. In order for change to occur, *public policy and funding will need to be directed towards these issues* because in many areas of the country, individuals cannot solve them alone. One way in which this has been done, for example, is through grants financing the purchase of vans for commuter carpools [24]. Another way in which this could be done might be through legislation limiting or eliminating the use of certain plastic containers. In sum, then, not only individuals, but also external factors must be targeted for change.

An important finding of this study was the limited amount of participation in conservation activities in this relatively enlightened and concerned community. If these individuals' personal conservation efforts are so limited, then it is likely that other less-educated and less-involved individuals will do even less. More research needs to be directed at an understanding of ecologically responsible behavior, attitudes, and situational determinants. Because maladaptive human behavior is so much a part of the current energy and ecological crises, understanding and consequent modifications of these behaviors will be important for alleviation of the problems. This study provides an important input for further research by pointing out that various conservation behaviors are not interchangeable and should not be treated as such. The underlying dimensions of ecologically responsible behaviors need to be better understood in order to be successfully utilized in modifying behavior patterns and their determinants.

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