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RESPONSIBILITY FOR ENVIRONMENTAL PROBLEMS AND THE CONSEQUENCES OF WASTE REDUCTION: A TEST OF THE NORM-ACTIVATION MODEL*

ANGELA EBREO
University of Illinois, Chicago

JOANNE VINING

SERGIO CRISTANCHO

University of Illinois, Urbana-Champaign

ABSTRACT

The present study uses concepts from Schwartz's norm activation model to predict self-reported waste reduction behavior, and examines whether direct measurement of moral norms can improve the model's predictive ability. Data derived from a survey of residents of three communities in central Illinois were analyzed to examine the relationship between residents' self-reported waste reduction behaviors, their personal and social norms related to waste reduction, ascribed responsibility for waste-related problems, and perceptions of the consequences of waste-related behaviors. Differences in the communities' solid waste infrastructures provided the opportunity to examine the effects of external conditions on norms and other concepts of the norm activation model. Survey results provided no evidence that infrastructure differences affected respondents' personal norms, and level of awareness of consequences for waste related problems. The data did reveal that ascriptions of responsibility and its interaction with personal norms were important predictors of respondents' reported behaviors.

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Managing the large amount of solid waste generated by residents is an ongoing problem for communities across the United States and in other countries as well. The problem of controlling the amount of waste that must be landfilled or otherwise disposed of is particularly problematic in developed nations that have access to non-recyclable, single-use consumer goods and in which consumption of these goods is encouraged.

Over the past decade governments and researchers have begun to address the importance of encouraging persons to consume less in order to reduce the amount of waste that enters the waste stream. The U.S. Environmental Protection Agency [1], for instance, has placed waste minimization and source reduction at the top of its preferred alternatives for managing solid waste. It is acknowledged, however, that this is a task that may prove somewhat difficult, as the type of behaviors to be adopted entail some degree of change in lifestyle [2]. As DeYoung and other researchers recommend (for a review see [3]), it is necessary for us to understand the conditions that govern the development of the appropriate individual and societal norms that facilitate these lifestyle changes.

The intent of this study was to examine the usefulness of the norm activation model of altruistic behavior in predicting self-reported household waste reduction behavior. In addition, the study examined how external conditions, in the form of differences in solid waste management infrastructure, might affect people's norms and attitudes. More specifically, the responses of residents of various communities in central Illinois were compared to determine if their experience with unit-based pricing systems influences these responses.

NORM ACTIVATION MODEL OF BEHAVIOR

Schwartz's norm activation model was developed to describe factors that influence helping behavior that is performed altruistically; that is, to explain the conditions under which people act on others' behalf without expecting any personal gain or benefit [4, 5]. According to Schwartz, behaviors reflect a person's underlying value system, and particular behaviors are performed when situations are conducive to the activation of these values and norms. The norm activation model posits that people are more likely to display altruistic helping behaviors when they are aware of the consequences of their actions and when they ascribe responsibility for these consequences to themselves. When these two conditions are met, people feel a moral obligation to act in ways that benefit others.

Pro-environmental behaviors can be conceptualized as being altruistic, in the sense that persons who perform these behaviors are doing them to protect the natural environment and society as a whole, often with little thought for the costs or rewards of these behaviors to themselves. In addition, people who engage in pro-environmental behaviors are motivated to do so by intrinsic rather than extrinsic reasons [e.g., 2, 6, 7].

Several studies have demonstrated the usefulness of the norm activation model in predicting pro-environmental behaviors [8-13]. One of the earliest applications of the model appeared in VanLiere and Dunlap's study of yard waste burning [13]. Consistent with the model's predictions, those persons who were aware of negative health effects of yard waste burning and who felt responsible for these effects were the least likely among VanLiere and Dunlap's respondents to report that they had burned yard waste.

Stern, Dietz, and Black examined the applicability of an extended norm activation model to the prediction of people's commitments to take actions directed toward industry and government [14]. In their extended model, Stern et al. examined whether or not ascriptions of responsibility for environmental problems to other entities (i.e., government or industry) and personal norms about the environmentally responsible actions taken by these entities would be predictive of people's commitments. Interestingly, Stern et al. found that people's moral judgments of government and industry differed. While their judgments of industry depended both on awareness of consequences and ascriptions of responsibility to industry, their judgments of government depended solely on respondents' level of awareness of consequences. In other words, research participants felt that government had a moral obligation to respond to environmental problems regardless of whether or not they were deemed responsible for the problems.

Steinheider et al. used the norm activation model concepts as predictors of ecological behavior [12]. They found that social norms were the best predictors of self-reported garbage avoidance, garbage separation, environmental commitment, saving of resources and handling of toxic substances. In fact, they found that social norms had more influence on such behaviors than attitudes thus challenging the applicability of the Theory of Reasoned Action for predicting ecological behavior. Based on these findings they suggested that environmental education should target groups rather than individuals.

The norm activation model has also been used to predict recycling behaviors. Hopper and Nielsen included social as well as personal norms in their test of the model, and found that social norms affected personal norms related to recycling and that their respondents' behaviors were in agreement with their personal norms only when they were aware of consequences related to the effects of recycling [15]. Vining and Ebreo found that social rather than personal norms were related to people's self-reported recycling behavior but that personal norms had both a direct and multiplicative effect (with awareness of consequences) [16].

The findings from these studies suggest that people may feel morally obligated to recycle when they are motivated by social or personal norms and are aware of the effects of recycling and not recycling, but this finding has not always been replicated in other research. Guagnano, Stern, and Dietz, in a study of curbside recycling, found that inclusion of personal costs of recycling and an extrinsic condition (i.e., having or not have a recycling bin) affects the relationship between the concepts of the norm activation model and behavior [17]. When these variables

were considered, ascription of responsibility, not having a bin, and the multiplicative effect of these two variables were found to be related to curbside recycling behavior. In fact, the norm activation model was most useful at predicting the behavior of persons who lived in households without a bin. The authors' explanation for this result was that the presence of a bin decreases the personal cost of recycling (i.e., makes recycling easier to accomplish) and also increases awareness in the household. This heightened awareness in households with bins would be sufficient means for activating the social and personal norms of household members. This explanation is consistent with the findings of other studies [e.g., 6, 18] that have found that recycling participation increases when programs become more convenient and accessible.

Guagnano et al.'s study demonstrated one of the boundary conditions for the norm activation model. They suggest that existing social norms and prevailing attitudes of communities serve as a "starting point" from which extrinsic conditions can facilitate residents' acting in accordance with these norms and attitudes. In addition, one can consider how the norm activation model may be limited in circumstances where the behaviors of interest are innovative and are being initially introduced to a community or where the performance of these behaviors are not yet widespread. In such instances, social norms regarding these behaviors might not exist and some sort of external stimulus may be needed to raise people's awareness and feelings of responsibility. Waste reduction (also called source reduction) behaviors constitute a category of behaviors that illustrate this situation.

WASTE REDUCTION BEHAVIOR AND ITS CORRELATES

Although waste reduction is not a new concept, there is evidence to suggest that these behaviors are unfamiliar to people [e.g., 19], and that they are not performed to the same extent or with the same frequency as recycling has been performed [e.g., 20, 21]. Waste reduction is an important category of behaviors to consider. Practically, it is more efficient and economical to decrease the amount of waste that enters the waste stream rather than dealing with materials after they are discarded. Waste reduction offers people an additional means, other than recycling, of helping the environment.

Waste reduction behavior has received increasing attention from researchers over the past few years. The majority of the studies in the existing literature have attempted to describe factors, which are related to the performance of waste reduction behaviors. Some of the factors which have been shown to facilitate waste reduction behavior, are attitudes and motives [e.g., 22-25], social norms (e.g., 26], lifestyle choices [e.g., 27], and beliefs about consumer products [e.g., 28]. In addition, several researchers [e.g., 29-32] have argued have argued that people who value voluntary simplicity (the choice to willfully reduce expenditures and to find non-materialistic satisfactions) engage in conservation behaviors to

a much greater extent than people who hold values related to conspicuous consumption.

Although these studies have documented relationships between various psychological variables and self-reported waste reduction, this work has primarily been descriptive in nature and not theory driven. In contrast, the present research applies the norm activation model to the prediction of waste reduction behavior. In addition, the study examines additional boundary conditions for the model by considering existing community infrastructures as a possible means of increasing the salience of the model concepts among study participants.

STUDY CONTEXT

The data used in testing the norm activation model were obtained during a survey of residents of three communities in downstate Illinois. At the time the survey was being conducted, one of the communities had implemented a unit-based fee structure for its garbage collection services. Under volume-based systems, households that produce larger amounts of waste that must be disposed of by haulers are charged more for this service than households that produce smaller amounts of waste. We expected that individuals who lived in the community with unit-based pricing, in comparison to those individuals living in the other communities, would be more aware of the amount of waste they produce as a consequence of being reminded of the amount when they receive their charges. The amount of waste generated by individuals living in the other communities was expected to be less salient because they receive no similar reminder. Due to the increased salience of the amount of waste they generate individuals in the unit-based pricing community, in contrast to residents of the other communities, were expected to be more aware of the consequences of waste reduction and more likely to state that they are responsible for doing something about waste management problems in their community.

PURPOSE OF THE STUDY

Based on the results of interview studies and existing research, questionnaire items were developed to assess the concepts of interest [33]. The study questionnaire also included a pilot measure of environmental morality. Thus, the study provided some preliminary data regarding the relationship between the norm activation model concepts, waste reduction behavior, and this direct measure of environmental morality.

Based on existing studies which have applied the norm activation model to resource conservation, we expected that perceived consequences would be positively related to waste reduction behavior in all three communities, and that ascription of responsibility, personal norms, and social norms would be positively related to waste reduction in the unit-based community. In addition, we expected

that the multiplicative effects of personal norms and perceived consequences and ascribed responsibility would be statistically significant predictors of behavior in the unit-based community as well. Despite the exploratory nature of the other two goals of the study, we expected that the direct measure of environmental morality would be positively related to the concepts of the norm activation model and to waste reduction behavior.

Method

As part of a larger research project on consumers' reactions to recycling and waste reduction related issues, we designed a mail survey to gather information related to their norms and self-reported behaviors. As research on waste reduction and unit-based pricing was sparse at the time the study was conducted, we adapted materials from previous studies of recycling behavior. Measures were selected with the following goals in mind: a) assessment of the self-reported frequency of waste reduction behavior, and b) identification of attitudes and beliefs related to unit-based pricing systems and solid waste management in general.[1]

Participants

The three communities of Champaign, Urbana, and Springfield were selected as the research sites. The latter community, located in downstate Illinois, is the state capital and was included in the study because it had implemented a unit-based pricing system for garbage collection. The other two communities are contiguous cities located about 90 miles east of Springfield and were selected as comparison locations; both communities have flat-fee based pricing systems for garbage collection. All three communities are sites of state universities and several industries.

A sufficient number of names, using a systematic sampling method, was selected from the local telephone directories to result in a total of at least 36 respondents, assuming a 50% non-response rate within each community. The total sample consisted of 63 persons: 23 residents of Champaign, 24 residents of Urbana, and 16 residents of Springfield. Twenty-five of the respondents were male while 38 were female. The majority (66.7%) indicated that they lived in a house rather than in an apartment (28.6%) or other type of dwelling (4.8%). The average size of respondents' households was 2 persons. Respondents represented a wide range of educational levels, from grade school to post-baccalaureate training. The majority of respondents (47.6%) had attended college for 1-4 years. A sizeable percentage (31.7%) had some post-baccalaureate training. Respondents also represented a wide age range, from 20 to 91. The average age of the respondents was 44. The majority of the respondents (69.8%) categorized themselves as white rather than as a member of an ethnic minority group (6.4%). However, quite a few respondents (23.8%) declined to answer the question pertaining to ethnicity.

Measures

Norm-activation model concepts—Respondents' specific attitudes concerning recycling were measured by items based on the Schwartz model of moral norms [5] and by items used in previous research on conservation behavior. Respondents indicated the degree to which they agreed with a set of items, using a 4-point Likert scale ranging from "1" strongly disagree to "4" strongly agree.

Waste reduction behavior—Two sets of items were designed to examine waste reduction behavior. Respondents were first presented with five broad categories of waste reduction behavior and asked to indicate whether or not they participated in them. Respondents were presented with a more extensive list of 25 environment-related behaviors and asked to indicate how often they had performed the behavior in the past year. Several of these items were identical to items that were given by respondents in a previous study, which collected data from telephone interviews with Illinois residents. Respondents used a 5-point scale, ranging from "1" less than once a year to "5" at least weekly. Embedded within this list were several waste reduction items.

Other items—Additional items were placed on the questionnaire to assess the background characteristics of the respondents. Three other items were included as a direct measure of "environmental morality."

Sampling Procedure

Names were selected from the latest editions of the telephone directories for the Champaign-Urbana and Springfield area. All entries selected in this manner were screened such that businesses and professional offices were deleted from the sample. A list of 45 names in each community was included in the research sample of 135 names.

The initial mailing for the sample was conducted during the third week of April 1995. This mailing consisted of a copy of the questionnaire, a postage-paid return envelope, and a cover letter signed by one of the investigators. The cover letter informed addressees of the purpose of the study, ensured them of the confidentiality of their responses, and stressed the importance of their participation. The cover letter also described the incentive used to encourage participation, entry of respondents' names into a drawing for a $50 reward. Respondents became eligible for the drawing by returning a signed form, which contained their name and address, with the questionnaire. Confidentiality was maintained by separating the form from the questionnaires immediately upon their receipt.

A week later, reminder postcards were mailed to remind respondents to return the questionnaire. A second mailing was sent about 10 days later to all persons who had not yet responded and whose materials had not been returned unopened. This follow-up mailing included a second copy of the questionnaire, another postage-paid return envelope, and a different cover letter that reemphasized the

importance of each respondent to the survey's success. The overall response rate, including those questionnaires that were returned unopened (due to the addressee moving out of the area) was 46.7%.

Results

Chi-square analyses and analyses of variance were performed to determine if the demographics of the respondents from the three communities were significantly different. These analyses revealed that the respondents in the three communities did not differ in terms of their demographic characteristics. Table 1 shows demographic summaries of the respondents in each community.

As a preliminary step to the investigation of possible community differences and the testing of the model across the entire sample, we conducted analyses to determine if demographic variables affected the variables of interest. In general, these analyses indicated that demographics were not strongly related to the moral norm concepts and that only a few variables (e.g., gender, household size, employment status, and occupation) were related to recycling and waste reduction behavior. Readers interested in the details of these analyses are referred to the authors' note.[2]

Community Differences

Norm-Activation Model Concepts—Individual items representing each of the measures of the norm activation concepts were averaged, and Cronbach's alpha coefficient, which measures the internal consistency reliability of items on a scale, was computed for each of these composite scores. The composite scores for residents of each community are presented in Table 2. The scales exhibited adequate levels of reliability with alphas equal to .70, .69, .65, .62 for the social norms, ascribed responsibility, personal norm, and perceived consequences scales respectively.

As can be seen in Table 2, respondents generally agreed with many of these items. Note that respondents were most likely to agree with statements concerning the environmentally beneficial effects of individual conservation behaviors. The next most frequently endorsed statements were those that pertained to the moral correctness of waste reduction. Respondents were least likely to agree with statements about the social pressures to engage in waste reduction behavior.

One-way analyses of variance, using the ratings of the individual items as the dependent variables and city of residence as the independent variable, were performed to determine if residents of the three communities differed in their scores on the composite scales. The results indicated that respondents' place of residence did not affect their scores on the social norms ($F(2, 58) = 1.17$, ns), ascribed responsibility ($F(2, 59) = .79$, ns), personal norm ($F(2, 59) = 2.34$, ns), and perceived consequences scale ($F(2, 60) = 1.14$, ns). Thus it appears that

Table 1. Demographic Characteristics of Communities

Demographic variable	Champaign	Urbana	Springfield	Combined
Size of household				
1 person	30.4	25.0	25.0	27.0
2 people	52.2	37.5	31.3	41.3
3 or more people	17.4	37.5	43.8	31.7
Type of dwelling				
House	60.9	58.3	87.5	66.7
Duplex	34.8	33.3	12.5	28.6
Other	4.3	8.3	0.0	4.8
Educational level				
High school	17.4	13.0	26.7	18.0
College graduate	56.5	39.1	53.3	49.2
Post-BA/BS	26.1	47.8	20.0	32.8
Occupation				
Professional	50.0	57.9	55.6	54.5
Managerial	18.8	31.6	11.1	22.7
Clerical	12.5	5.3	22.2	11.4
Blue collar	18.8	5.3	11.1	11.4
Employed	82.6	91.3	68.8	82.3
Race				
Black	0.0	0.0	9.1	2.1
Asian	15.0	0.0	0.0	6.3
White	85.0	100.0	90.9	91.7
Gender				
Male	43.5	51.7	31.3	39.7
Female	56.5	58.3	68.8	60.3
Age	44.6	41.3	48.4	44.3
Years living in community	24.0	13.7	22.8	19.8

Note: Numbers in table (other than for age and years living in community) represent percentages. Numbers for age and years in community represent means.

Table 2. Average Levels of Agreement with Norm Activation Model and Environmental Morality Items

Item	Champaign	Urbana	Springfield	Combined
Environmental morality	3.65	3.40	3.25	3.45
Reducing waste is the right thing to do	3.65	3.48	3.12	3.45
Reducing waste is the morally correct thing to do	3.65	3.29	3.38	3.44
Perceived consequences	3.42	3.22	3.17	3.28
My and my household's efforts at reducing waste benefit the environment	3.65	3.42	3.38	3.49
The behaviors and choices of individual consumers have a great effect on the environment	3.65	3.38	3.38	3.48
Reducing waste is more helpful to the environment than recycling	2.96	2.88	2.73	2.87
Personal norm	3.09	2.98	2.53	2.91
I feel a strong personal obligation to reduce the amount of waste my household generates	3.43	3.25	2.93	3.24
I would recycle household materials even if a fee was charged for it	2.74	2.65	2.13	2.56
Ascribed responsibility	2.28	2.37	2.56	2.38
Households like mine produce very little of the material that is disposed of in local landfills	2.04	2.48	2.69	2.37
Households like mine are responsible for a large part of the material disposed of in landfills here	2.22	2.22	2.20	2.21
I feel bothered by the amount of material my household throws away	2.56	2.39	2.87	2.57

Table 2. (Cont'd.)

Item	Champaign	Urbana	Springfield	Combined
Social norm	2.44	2.39	2.09	2.34
My family members expect my household to reduce the amount of waste we generate	2.91	2.68	2.40	2.69
My neighbors expect my household to reduce the amount of waste we generate	2.27	2.17	1.93	2.15
My friends expect my household to reduce the amount of waste we generate	2.13	2.18	1.93	2.10

Average Levels of Agreement with Activation Model Items by Educational Level

Item	High school and below	College	Graduate and above
My and my household's efforts at reducing waste benefit the environment	3.90	3.38	3.41
I feel strong personal obligation to reduce the amount of waste my household generates	3.50	2.96	3.59
I would recycle household materials even if a fee was charged for it	3.40	2.23	2.59

Response scale: 1 = strong disagreement, 4 = strong agreement.
Note: Item recoded so that higher numbers represent pro-environmental responses.

unit-based pricing in the city of Springfield had little effect on residents' attitudes toward waste reduction, as residents of this community had attitudes that were similar to residents of the communities without unit-based pricing. Note, however, that we obtained powers of .57, .44, .87, and .89 respectively for these tests, which means that the assertion regarding the lack of association can only be applied with enough statistical confidence to the relationship between our independent variable and both personal norms and perceived consequences (power > .80). Results allow the possibility that unit-based pricing could have certain effects on social norms and ascribed responsibility but this assertion cannot be tested with confidence

given our sample size. Although we had expected that the presence of unit-based pricing would result in higher levels of awareness and ascribed responsibility in Springfield than the other two communities this assertion still cannot be supported by our data. Note, however, that awareness of consequences was relatively high in all three communities, indicating a possible ceiling effect.

Waste reduction behavior—A major purpose of the project was to determine the extent to which people perform various waste reduction behaviors. Two sets of items were designed to examine waste reduction behavior. Respondents were first presented with five broad categories of waste reduction behavior and asked to indicate whether or not they participated in them. Table 3 presents the percentage of respondents who indicated they had engaged in each of the behaviors.

As can be seen in Table 3, the most frequently reported behavior was "reusing items" followed by "donation of items." Slightly more than half of the respondents reported using a garbage disposal or reusing packaging of consumer items. In line with earlier research on consumer behavior, a simple majority of respondents reported that they paid attention to the products they purchase.

Table 4 presents the percentage of respondents who reported performing each behavior. Note that the most frequently reported waste reduction behavior was the purchase of products made from recyclable materials. We conducted a one-way multivariate analysis of variance, using the ratings of the individual items as the dependent variables and city of residence as the independent variable to determine if residents of the three communities differed in their endorsement of these items. The results indicated that respondents' place of residence did affect their levels of endorsement (Wilks lambda = .27, $F(36, 62) = 1.61$, $p < .05$), however, none of the univariate statistical tests were significant. We conclude that the existence of unit-based pricing in the city of Springfield had little effect on residents' waste reduction behavior.

Table 3. Percentage of Respondents Reporting Participation in Waste Reduction Activities

Item	Champaign	Urbana	Springfield	Combined
Reused items	77.3	82.6	62.5	75.4
Donated items	72.7	56.5	81.3	68.9
Paid attention to what they bought	71.4	58.3	40.0	58.3
Reused item packaging	54.5	56.5	50.0	54.1
Used a garbage disposal	50.0	39.1	75.0	52.5

Norm-Activation Concepts as Predictors of Waste Reduction Behavior

Original model—A major goal of the present research was to examine the usefulness of the moral norm model in predicting waste reduction behaviors. For purposes of this and subsequent analyses, a waste reduction behavior index representing the number of types of activities performed by residents was computed by summing the responses for the 12 waste reduction behaviors. This index could theoretically range from 12 to 60.

Included in Table 5 are the correlations between environmental morality, the moral norm concepts, and the waste reduction index. Because several correlations were calculated, we performed Bonferroni corrections yielding a maximum alpha of .003 for each correlation. Note that environmental morality is unrelated to waste reduction behavior and ascriptions of responsibility, but positively related to the other concepts of the moral norm model, suggesting that it may be an important mediating variable.

The usefulness of the norm activation model in predicting residents' self-reported waste reduction behavior was examined by using multiple regression analysis, in which the concepts of the norm activation model and city (coded 1 if unit-based pricing existed within it, 0 if not) were simultaneously entered as predictors of the waste reduction behavior index.

The results of the regression analysis are presented in Table 6. At the final step, 25.2% of the variance in waste reduction is accounted for by all six of the norm activation model concepts ($F(7, 52 = 2.50, p < .05$). Examination of the *F*-tests for the set of predictors reveals that when all variables are in the equation, only ascribed responsibility and personal norm × ascribed responsibility were significant predictors of behavior. Note that social norms, perceived consequences, and the presence of unit-based pricing were unrelated to waste reduction behavior.

Environmental morality model—Interestingly, the majority of studies testing the norm activation model do not assess general moral norms, opting for inclusion of personal and social norms instead. A secondary purpose of the present research was to determine if a direct measure of environmental morality would improve prediction of waste reduction behavior. The two items comprising our measure of environmental morality are presented in Table 2. The correlation between these items was 0.59.

Two models including the environmental morality construct were investigated: 1) environmental morality replaces personal norm as a predictor, while retaining perceived consequences, ascriptions of responsibility, and social norm in the model; and 2) environmental morality is included as an additional predictor, retaining all of the original predictors in the moral norm model. As the recoded city variable was not shown to be a significant predictor of waste behavior in the test of the original model, we did not include it in the revised models.

Again we used regression procedures to test the models. The results of the regression for the first model are presented in Table 7. At the final step, 16% of the

Table 4. Participation Levels in Various Waste Reduction Behaviors

Behavior	Champaign	Urbana	Springfield	Combined
Bought items made of recycled materials				
< once a year	0.0	8.7	6.7	5.0
1-2 times a year	4.5	13.0	13.3	10.0
Monthly	36.4	47.8	13.3	35.0
Biweekly	27.3	13.0	40.0	25.0
At least weekly	31.8	17.4	26.7	25.0
Bought items packaged in recyclable containers				
< once a year	8.7	4.5	6.7	6.7
1-2 times a year	21.7	22.7	20.0	21.7
Monthly	39.1	36.4	26.7	35.0
Biweekly	21.7	9.1	13.3	15.0
At least weekly	8.7	27.3	33.3	21.7
Bought items with refillable or reusable containers				
< once a year	9.1	9.1	13.3	10.2
1-2 times a year	18.2	22.7	20.0	20.3
Monthly	40.9	45.5	33.3	40.7
Biweekly	18.2	13.6	26.7	18.6
At least weekly	13.6	9.10	6.73	10.2
Used a reusable bag or brought bags back to stores				
< once a year	0.0	25.0	21.4	15.0
1-2 times a year	18.2	12.5	14.3	15.0
Monthly	27.3	29.2	28.6	28.3
Biweekly	22.7	16.7	21.4	20.0
At least weekly	31.8	16.7	14.3	21.7
Sold or donated used items such as clothing, magazines, or toys				
< once a year	4.8	25.0	20.0	16.7
1-2 times a year	71.4	54.2	80.0	66.7
Monthly	23.8	20.8	0.0	16.7
Biweekly	0.0	0.0	0.0	0.0
At least weekly	0.0	0.0	0.0	0.0

Table 4. (Cont'd.)

Behavior	Champaign	Urbana	Springfield	Combined
Bought products in bulk sizes				
< once a year	21.7	29.2	18.8	23.8
1-2 times a year	26.1	16.7	25.0	22.2
Monthly	30.4	37.5	43.8	36.5
Biweekly	13.0	4.2	12.5	9.5
At least weekly	8.7	12.5	0.0	7.9
Avoided items with excessive packaging				
< once a year	13.6	36.4	50.0	31.0
1-2 times a year	22.7	4.5	14.3	13.8
Monthly	36.4	36.4	21.4	32.8
Biweekly	9.1	9.1	14.3	10.3
At least weekly	18.2	13.6	0.06	12.1
Avoided single use items				
< once a year	19.0	40.9	57.1	36.8
1-2 times a year	23.8	13.6	7.1	15.8
Monthly	42.9	18.2	7.1	24.6
Biweekly	0.0	13.6	7.1	7.0
At least weekly	14.3	13.6	21.4	15.8
Specifically avoided buying a product because it was not recyclable				
< once a year	40.9	59.1	60.0	52.5
1-2 times a year	9.1	4.5	6.7	6.8
Monthly	31.8	27.3	13.3	25.4
Biweekly	13.6	4.5	6.7	8.5
At least weekly	4.5	4.5	13.3	6.8
Composted organic waste				
< once a year	59.1	45.8	64.3	55.0
1-2 times a year	9.1	12.5	28.6	15.0
Monthly	18.2	20.8	0.0	15.0
Biweekly	0.0	0.0	7.1	1.7
At least weekly	13.6	20.8	0.0	13.3

Table 4. (Cont'd.)

Behavior	Champaign	Urbana	Springfield	Combined
Avoided restaurants using styrofoam containers				
< once a year	50.0	60.9	62.5	57.4
1-2 times a year	27.3	8.7	0.0	13.1
Monthly	13.6	4.3	6.3	8.2
Biweekly	4.5	13.0	0.0	6.6
At least weekly	4.5	13.0	31.3	14.8
Used cloth rather than disposable diapers				
< once a year	93.3	94.1	90.9	93.0
1-2 times a year	6.7	0.0	9.1	4.7
Monthly	0.0	5.9	0.0	2.3
Biweekly	0.0	0.0	0.0	0.0
At least weekly	0.0	0.0	0.0	0.0

Table 5. Pearson Product Moment Correlations among Moral Norm Model Concepts, Environmental Morality, and the Waste Reduction Behavior Index

	1	2	3	4	5
1 Waste behavior index					
2 Environmental morality	.01				
3 Perceived consequences	–.11	.76*			
4 Ascribed responsibility	.17	–.01	.08		
5 Personal norm	–.06	.69*	.61*	.03	
6 Social norm	–.16	.32	.39	.04	.48*

*$p < .003$ (significance level determined after Bonferroni corrections).

variance in waste reduction is accounted for the six predictors ($F(6, 53) = 1.69$, ns). Although this is not a statistically significant amount of variance, examination of the *t*-tests for the set of predictors reveals that when all variables are in the equation, only ascribed responsibility and environmental morality × ascribed responsibility were related to waste reduction behavior. This finding is similar to that obtained in the original model, and suggests that environmental morality as a general measure of moral norms operates in a manner similar to the more specific personal norm measure.

Table 6. Moderated Regression of the Norm Activation Concepts on Waste Reduction Behavior

Predictor	b	Beta	R^2	R^2_{adj}
Unit-based pricing	–.66	–.19	.25	.15
Personal norm	–.97	–.52		
Social norm	–.10	–.05		
Perceived consequences	.22	.08		
Ascribed responsibility	–2.63	–1.23		
PC × PN	–.30	–.73		
AR × PN	.97	1.94		

Table 7. Moderated Regression of the Norm Activation Model Concepts on Waste Reduction Behavior, Environmental Morality Substituted for Personal Norm

Predictor	b	Beta	R^2	R^2_{adj}
Moral norm	–1.14	–.48	.16	.06
Social norm	.03	.02		
Perceived consequences	2.19	.82		
Ascribed responsibility	–5.73	–1.78		
PC × MN	–.88	–2.03		
AR × MN	1.79	2.99		

Combined model—The results of the regression for the second model are presented in Table 8. At the final step, 18.2% of the variance in waste reduction is accounted for by the six predictors ($F(9, 50) = 1.24$, ns). Although this is not a statistically significant amount of variance, examination of the *t*-tests for the set of predictors reveals that when all variables are in the equation, only ascribed responsibility was related to waste reduction behavior.

We conducted additional tests of the norm activation model by performing analyses that show that the constructs are successively related to each other in the predicted manner. We did this by regressing variables on their theoretically proposed antecedents. We expected perceived consequences to predict ascriptions of responsibility and social norms to predict personal norms and environmental morality. The results of these analyses are presented in Table 9.

Table 8. Moderated Regression of the Revised Norm Activation Model Concepts on Waste Reduction Behavior, Environmental Morality Added to the Model

Predictor	b	Beta	R^2	R^2_{adj}
Personal norm	–2.31	–1.35	.18	.04
Moral norm	.88	.36		
Social norm	.08	.04		
Perceived consequences	1.85	.69		
Ascribed responsibility	–5.52	–1.71		
PC × PN	.21	.55		
AR × PN	.70	1.30		
PC × MN	–1.01	–2.32		
AR × MN	1.15	1.92		

Table 9. Regression Models Representing Tests of Antecedent Variables

	Dependent variable		
Predictor	Environmental morality	Personal norm	Ascribed responsibility
Social norm	.04	.28*	
Ascribed responsibility	–.07	–.02	
Perceived consequences	.74**	.50**	.08
R^2	.57	.42	.01

Note: Numbers in table represent standardized coefficients.
*$p < .05$. **$p < .001$.

Consistent with the predictions of the norm activation model, perceptions of the consequences of one's actions was found to be positively related to both the personal norm and to the measure of environmental morality. People who were aware of the consequences of engaging in conservation behaviors were likely to feel a personal obligation to act and to believe that acting on the behalf of the environment is morally correct. Also consistent with previous research, social norms were found to be positively related to personal norms. Social norms were not found to be related to environmental morality, nor was ascribed responsibility

related to personal norms or environmental morality. Note that perceived consequences was not predictive of ascribed responsibility, lending some support for the notion that these factors operate in a parallel manner.

DISCUSSION

Because of the economic and environmental advantages of waste reduction behavior over other waste management behaviors, it is important for psychologists to develop scientific approaches to ensure adequate understanding. The literature on waste reduction behavior is small and lacks useful theoretical models to explain waste reduction behaviors. Our study is an initial attempt to examine the usefulness of a theoretical model to explain and predict waste reduction behavior and perhaps other conservation behaviors as well.

The main goal of this study was to test the efficacy of the norm activation model in predicting waste reduction behavior. We found that the model, as a whole, did not account significantly for the variance in this behavior. However, we found one of its components to be an effective predictor. Ascribed responsibility was a statistically significant predictor of waste reduction behavior, controlling for all the other norm activation concepts and environmental morality. In other words, people who assign responsibility to themselves for the consequences of their actions are more likely to engage in waste reduction behaviors.

Attribution theories have shown that people who make this kind of dispositional attributions are likely to be more aware of the consequences of their social behaviors [e.g., 34]. This study supports the applicability of attribution theories to waste reduction behavior as well. In order to further explore this assertion, future studies might compare dispositionally vs. situationally-oriented individuals (and groups) in their waste reduction behavior. We also believe that it is important to assess differences in a person's waste reduction behavior depending on whether she tends to ascribe responsibility for the immediate or for the distant outcomes of her behavior (as suggested by Strathman et al. [35]). In this study we measured ascribed responsibility regarding immediate to medium term outcomes (e.g., consequences for the landfill) because the literature suggests that they would be better predictors of behavior. However, future research might profitably assess the construct when referring to distant outcomes such as the global depletion of natural resources, the greenhouse effect, and the like.

One of the most interesting outcomes of this study is the significant association between some norm activation model components and environmental morality, the latter having been included initially as an exploratory variable. Specifically, perceived consequences and personal norms were positively associated with moral norms of behavior. That is, respondents who foresaw the consequences of their actions and those who felt a strong obligation to perform waste reduction behaviors were more likely to show higher levels of environmental morality. This suggests that environmental education efforts should be aimed at making people

aware of the implications of their actions or the lack thereof. For example, educational materials incorporating images or scenarios that result from the failure to reduce waste in family and community settings might lead targeted individuals to 1) increase awareness about the consequences of his or her behavior, and 2) feel a strong commitment to implement waste reduction behaviors. A person with these characteristics would be more prone to actually show waste reduction behaviors.

Moreover, personal norms were also correlated with perceived consequences, suggesting that perceived consequences may be operating as a mediating variable between environmental morality and subjective norms of waste behavior. Personal norms, in fact, were significantly associated with social norms, perceived consequences and environmental morality. It could be that subjective norms have, in turn, both direct and indirect effects on environmental morality. In Figures 1 and 2 we illustrate the associations found and propose some possible operating mechanisms. Structural equation modeling techniques could be used in order to explore each possible operating mechanism suggested here.

Another relationship worth exploring is how ascribed responsibility relates to environmental morality and the remaining norm activation model concepts as predictors of waste reduction behavior. Vining and Ebreo showed that both

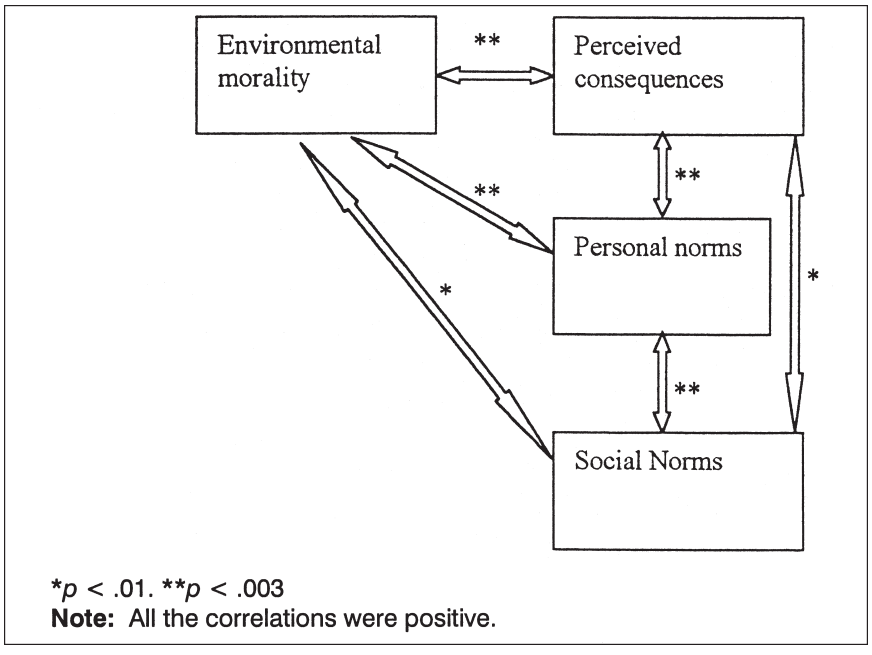

Figure 1. Associations between some norm activation model concepts and environmental morality.

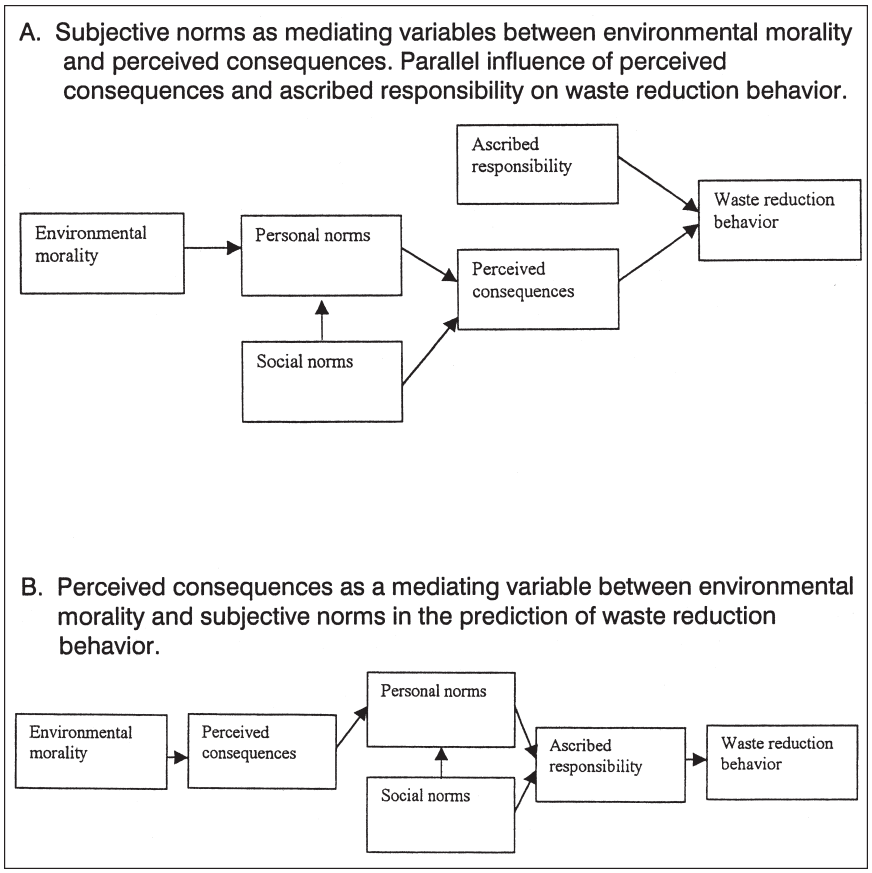

Figure 2. Possible operating models of the relationship between environmental morality and waste reduction behavior using the norm activation model components.

personal and social norms are related to recycling behaviors and that perceived consequences multiplied their effects [16]. This study presents support for this idea as applied to waste reduction behavior. It is not clear, however, how this psychological process occurs. Figure 2 outlines some possible operating mechanisms derived from our findings that need to be empirically tested. The question still remains as to how waste reduction behavior (as predicted by ascribed responsibility) relates to a person's moral and normative systems. When environmental morality was substituted for personal norm in the regression model, there was a 9% decrease in the predictive power of the model. This implies that, compared to personal norms, moral beliefs are more related to waste reduction behavior.

However, this relationship may not be direct. Cognitive, emotional, and attitudinal processes taking place in between the two variables may make this relationship difficult to trace.

Another goal of this study was to examine boundary conditions of the norm activation model by studying the effects of external stimuli. We assessed the effect that an existing community infrastructure (unit-based pricing) had on the model's usefulness for predicting waste reduction. Results showed that there were no differences either for personal norms or for perceived consequences between communities with volume-based incentives to reduce waste and those that relied on the flat-rate waste disposal fee. In future studies, a larger sample size might convey greater power to determine whether this lack of statistical association also applies to the relationship between community infrastructure and the remaining norm activation concepts, namely, social norms and ascribed responsibility. Based on the results of the regression analysis, where ascribed responsibility was a statistically significant predictor of waste reduction behavior, we believe that with a larger sample, the relationship between both norm activation concepts and waste reduction behavior and community infrastructure could emerge. Furthermore, the experimental or post hoc manipulation of waste reduction cues other than unit-based pricing may be useful in explaining the role of external stimuli on waste reduction behavior. Future research can explore these hypotheses by including a larger number of respondents in each condition.

Overall, we believe that this study provided insight in the attempt to use a theoretical model to predict waste reduction behavior. Moreover, we found interesting associations of environmental morality with other variables that have promising theoretical and practical applications. Our inclusion of an exploratory measure of morality proved effective in better understanding the associations that we found in this study. Therefore, it is important that future studies include a more comprehensive measurement of environmental morality. For instance, it would be interesting to see if different types of moral tendencies, namely, *justice, caring,* and *divinity* [36, 37] would have different effects on waste reduction behavior or if they would have different implications for the applicability of the norm activation model. A further step in getting a much wider perspective on this issue would be to explore the associations between voluntary simplicity values [32], morality tendencies, ascribed responsibility and waste reduction behavior.

Given the potential implications of waste reduction behavior in environmental and economic terms, there is much to be learned about the operating mechanisms of its psychological antecedents. Overall, we highlight the value of using norm, morality, value, and cognitive models for understanding the psychological processes that lead to waste reduction behavior. These models shed light in and of themselves and they also offer potential for future research to test operating mechanisms validated in other behavioral contexts.

AUTHORS' NOTES

1. Other data from the same survey have been analyzed and published. However, the data presented herein were analyzed according to a different theoretical framework and are not redundant with those studies. The only redundancies are in the reported demographic descriptions of the communities and in the self-reported behaviors of the respondents.
2. The usefulness of the sociodemographic variables as predictors of respondents' responses to the norm activation model items was examined by performing several two-way multivariate analyses of variance, using the respondents' ratings of these items as the dependent variables and each of the sociodemographic variables as the independent variables. These analyses revealed that, in general, the sociodemographic variables were poor predictors of respondents' attitudes. No differences in importance ratings of these motives were found for respondents in the different gender, housing, employment, occupation, and ethnic group categories. However, respondents' level of education did influence the ratings, (Wilks lambda = .16, $F(48, 54) = 1.67$, $p < .05$). A second set of chi-square tests, one on each recycling behavior, was conducted to determine if the sociodemographic variables were related to respondents' self-reported waste reduction behavior. These results indicated that with the exception of gender and ethnicity, the sociodemographic variables were not predictive of respondents' behaviors. No differences in waste reduction behavior were reported for respondents in the different educational, housing, ethnic, or employment categories. However, a greater percentage of females (66.7%) than males (40.0%) reported that they paid attention to what they buy, ($\chi^2(1) = 4.25$, $p < .04$). The results also showed that a greater percentage of clerical (80.0%) and blue-collar workers (100.0%) than professionals (58.3%) and managers (30.0%) reported that they reuse item packaging, ($\chi^2(3) = 7.87$, $p < .05$). A third set of chi-square tests were conducted to determine if the sociodemographic variables were related to respondents' self-reported waste reduction behavior. These results indicated that educational level was not a useful predictor of respondents' behavior. However, employment status, occupation, gender, and type of housing did influence recycling behavior. Although the analyses pertaining to ethnic group yielded statistically significant results, we do not report these results because of the large number of empty cells in the cross-tabulation tables. Interpretation of such results is problematic and should only be done with some degree of caution. These analyses first revealed that a higher percentage of employed respondents (97.1%) than unemployed respondents (75.0%) stated that did not use cloth diapers, ($\chi^2(2) = 6.02$, $p < .05$). In addition, the analyses revealed that a smaller percentage of larger households (30.0%) than single person households (62.5%) and couples (70.8%) stated that they rarely composted organic waste, ($\chi^2(8) = 16;18$, $p < .04$). The analyses showed that persons in clerical and blue-collar positions were more likely to engage in some waste reduction behaviors than others. A larger percentage of clerical workers (40.0%) than blue-collar workers (20.0%), professionals (8.3%), and managers (0.0%) stated that they buy bulk items at least weekly, ($\chi^2(12) = 21.26$, $p < .05$).

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Direct reprint requests to:

Angela Ebreo
University of Illinois IRRPP
412 S. Peoria St., Suite 324
Chicago, IL 60607
e-mail: aebreo@uic.edu