

ANALYZING SOME MOTIVATIONAL FACTORS OF RECYCLING BEHAVIOR IN ZAGREB, CROATIA

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ABSTRACT

The study examines factors that contribute to recycling behavior. In Zagreb, 104 participants, members of households who most often take care of household waste, were classified as recyclers and nonrecyclers based on their self-reports. Although almost all subjects showed proenvironmental orientation, recyclers differed significantly from nonrecyclers in the extent to which they endorsed prorecycling attitudes. Furthermore, compared to nonrecyclers, recyclers perceived recycling as an easier activity, accepted more responsibility for carrying it out, saw solid waste problems as more pronounced, and were more accustomed to recycling. Moreover, recyclers were more altruistically motivated. Recyclers and nonrecyclers were in other respects similar in their perception of the municipal recycling program, and did not differ in their ratings of social support and extrinsic motivation. Stepwise regression analysis indicated that two factors were significant predictors of recycling behavior: perception of collection containers' distance and perception of individual responsibility and effectiveness of individual action. These factors accounted for 31.4 percent of the variance in recycling behavior.

INTRODUCTION

Environmental problems have often been conceptualized as technical and technological problems requiring solutions of the same kind, while it sometimes has been forgotten that most of these problems stem from inappropriate behavior, such as the needless and excessive waste of energy and materials. When looking for optimal solutions for today's environmental problems, social and psychological

aspects of the problems accordingly must be taken into account. Psychology as a science of human behavior can help by revealing the factors that contribute to proenvironmental behavior and by designing effective programs for encouraging such behavior.

The present study examined recycling behavior as one type of proenvironmental behavior. In prior psychological research on recycling, two groups of factors that contribute to the behavior have been studied: personal and situational. If personal factors are examined, an attempt is made to identify characteristics of an individual that are associated with recycling. Such characteristics include environmental attitudes (both general concern for the environment and specific recycling-related attitudes), values, demographic variables, knowledge, habits, and personality constructs (social responsibility, locus of control, and the like).

If situational factors are in focus, the goal is to identify manipulable aspects of a particular environment that facilitate recycling behavior. Two classes of situational factors have been studied: antecedents (prompting, commitment, normative influence, goal setting, and removal of barriers to recycling) and consequences (reward, punishment, and feedback intervention) [1]. Considering that many factors are associated with recycling behavior, the percentage of variance in recycling behavior accounted for by these variables singly is probably small.

When constructing programs for encouraging people's participation in recycling, it must be borne in mind that they should act upon many of the above-mentioned factors. Sometimes attitude change looks like the best way to stimulate recycling behavior. But research into attitudinal predictors of recycling behavior has found that although a positive relationship between attitude and behavior does exist, this relationship is only moderate. Furthermore, precisely because the majority of people today already hold proenvironmental and pro-recycling attitudes, the possibilities of strategies and programs for promoting recycling behavior through attitude change are small and constrictive. Thus, promotion of recycling behavior should be based on some other specific motives and reasons for recycling.

In the study of Howenstine [2], specific beliefs about recycling were examined in 574 Chicago households. Recyclers were asked which materials they recycle. Nonrecyclers were asked to rate each of twelve reasons for not recycling. Factor analysis of the twelve reasons for not recycling revealed three factors that accounted for 54 percent of the variance: nuisance, location, and indifference. Factor "nuisance" included ideas that recycling does not pay, it is too much trouble, it is too messy, and it requires too much space. The second factor, "location" included beliefs that the recycling center was too far away, that not enough trash was generated to make recycling worthwhile, and lack of knowledge about where to take materials. Items "loading" on the third factor, named "indifference," were "never thought about it" and "it makes no difference."

We believe that there are more reasons for not recycling than were reported in Howenstine [2]. We also were interested in studying the reasons which recyclers cite for recycling. The major purpose of the present study was to investigate the factors in which recyclers and nonrecyclers differ in order to conclude why some people recycle and some don't, and to give some suggestions for interventions that could stimulate recycling behavior.

Specifically, we expected, naturally enough, that recyclers would have more positive attitudes toward recycling than nonrecyclers, although both groups would be oriented in prorecycling direction. Second, we expected recyclers and nonrecyclers to differ in their perceptions of certain characteristics of the recycling program: in their perceptions of collection container distances, user friendliness of the system, and program management support. That means that recyclers would, more than nonrecyclers, perceive that containers for recyclable waste are close by and user-friendly (cleaner, easier for use, with well-defined user instructions and information label). Also, we expected that recyclers would perceive great support from organizers of the recycling system. Third, we expected recyclers to perceive greater overall social support. Recyclers would, furthermore, view recycling as an easier activity that doesn't take an extra effort and would be motivated more altruistically, and less extrinsically, than nonrecyclers. Recyclers would probably feel responsible for environmental protection and believe that their individual action makes sense. Additionally, we anticipated recycling to be more of a habit for recyclers than for nonrecyclers and that recyclers would find solid waste problems more pronounced and more urgent.

Nevertheless, in the last analysis, we expected attitude and behavior to be connected only indirectly; i.e., that the effect of recycling attitude on recycling behavior would be mediated by reasons for (not) recycling.

METHOD

Setting

The research reported here focused on the recycling program that was designed in Zagreb in 1988 [3] and had been in effect for approximately seven years. First, containers for collecting paper and glass were placed on the sidewalks. Later, containers for tins and plastic bottles were added. Also, containers for old batteries were distributed in some supermarkets and stores. Residents were asked to hand-sort various waste materials and place them into adequate containers. The content of the containers were (and still are) periodically picked up by a company contracted to manage recycling program.

In Zagreb, there were (and are) a few drop-off locations where people could bring, besides the mentioned waste materials, many other recyclables (metal, textile, cardboard, polyethylene (PE), etc.). For many such materials, people could even receive modest reimbursements.

Participants and Procedure

We concentrated on members of the households who were most involved in the activity of sorting household waste and carrying it out to the containers.

In order to expeditiously gather data from such subjects, questionnaires in envelopes were distributed to students in one of Zagreb's high schools. The author of the study reached students in their psychology class, and asked them to participate in the study. They were requested to take the questionnaires home and to give them to the member of their household who mostly takes care of their household waste. The students were also asked to return completed questionnaires not later than fourteen days after receiving them. Of 200 questionnaires that were sent out, 105 were returned in that term; one questionnaire contained considerable missing data and was excluded. This response rate is within the range that is normally acceptable for mail surveys [4]. One reason why we used the presented strategy for gathering data was the belief that this strategy would increase response rate over the mail surveys rate, but it turned out that this was not the case.

Of the sample, 63.55 percent were females and 33.6 percent were males. Ages ran from thirteen to sixty-five years; the mean age was 31.5. Most of these individuals lived in four-person households; 28.2 percent had university educations. Since there was only one person with (only) primary education and 70.4 percent with (only) high school educations, the sample was somewhat better educated than expected on the basis of census data. In terms of income level, most of the subjects reported earning between 1000-2000 kn (166-300 U.S. dollars) per month per family member.

Instruments

For the purposes of study, two scales were constructed: the Recycling Attitude Scale and the Reasons for (Not) Recycling Scale.

Recycling Attitude Scale

We decided to make this new scale when we realized that none of the existing scales are in concordance with our sociocultural background and the kind of recycling program present in Zagreb. To form the scale, an initial item pool of thirty-nine statements was created. Many of these were new items, others were modifications or translations from existing questionnaires [5, 6]. Recycling Attitude Scale aims at measuring cognitive, affective, and conative components of attitude toward recycling of household waste. To assess some metric characteristics and help construct a final version of the scale, we conducted a preliminary test on thirty people who take care of their waste in their households. After that, the final version of the questionnaire was formulated.

On the basis of item analysis, seventeen statements were retained (those for which discriminative validity indexes exceed 0.5). In the preliminary test, the

internal consistence reliability of this shortened scale version, as calculated by the Cronbach alpha index, was 0.89 and was deemed sufficient for the purpose of this study.

Subjects responded to statements by encircling the number on the scale from 1 (totally disagree with the statement) to 5 (totally agree with the statement) which best reflected their degree of agreement with the statement. The total result for each subject was simply the sum of the encircled numbers. Items were recoded as necessary so that higher values always indicated proenvironmental response. Accordingly, higher total result reflected a more positive attitude toward household waste recycling. The Cronbach alpha reliability index in the full-scale test (104 respondents) was 0.86.

Reasons for (Not) Recycling Scale

This scale was constructed to examine specific reasons and motives for (not) recycling. On the basis of literature review and reflection, we postulated that reasons for (not) recycling mainly depend on:

1. perception of three recycling program characteristics:
 - a) collection containers' distance (e.g., "Containers for recyclables are placed close to my home"),
 - b) user-friendliness of the recycling system (e.g., "I think collection containers are easy to use" or "I know which materials I can recycle"),
 - c) management support (e.g., "It seems to me that [responsible institution] works hard to solve solid waste problems," or "It looks like nobody really cares when waste is going to be taken away");
2. perceived difficult of recycling behavior (e.g., "It's much easier to put all waste in one garbage can," or "I don't have time for sorting waste");
3. social support/pressure (e.g., "My friends are recyclers");
4. perception of individual responsibility and effectiveness of individual action (e.g., "There is not much I can do about environmental problems" or "As a responsible member of the community, I feel an obligation to recycle");
5. extrinsic motivation (e.g., "Recycling of household waste doesn't bring any savings");
6. altruistic motivation (e.g., "Recycling gives me a sense that I've done something good for the community" or "I feel inner satisfaction when recycling");
7. habitual practice (e.g., "I'm used to recycling every day");
8. perceived salience and importance of the solid waste problem (e.g., "The solid waste problem is so big that something must be done immediately" or "Recycling seems unnecessary because there is no real shortage of materials").

In the thirty-subject pilot study, item analyses were made in order to shape a final version of the scales. Eighteen items were eliminated because of their poor metric characteristics. The final version of the Reasons for (Not) Recycling scale had forty-one items presented in random order in the questionnaire. The number of items in each subscale and Cronbach alpha test results are shown in Table 1.

The participants were invited to rate the extent to which the content of each item referred to them on a 5-point scale that ran from 1 (does not refer to me at all) to 5 (completely refers to me). For each respondent, we computed the simple linear combination of scores on each individual item in the scale.

Recycling Behavior

Participants gave self-reports of their recycling behavior. They were asked how many times they put recyclable materials into collection containers (instead of “regular” garbage cans) during the last month. For each material, possible answers were: 1 (never), 2 (once or twice), 3 (many times), 4 (every time I wanted to throw away this material), and 5 (there was no such material in our household waste at all). The list of materials included recyclable materials collected in Zagreb’s recycling program: paper, glass bottles, plastic (PET) bottles, tin cans, and old batteries.

The sequence of questionnaires—Recycling Attitude Scale, Reasons for (Not) Recycling Scale, and questions about recycling behavior reports—was varied in pretest and test by Latin square assignments. The first section of each questionnaire collected demographic information on sex, age, education, income level, and number of household members. Questionnaires were printed on recycled paper and sent in unclosed envelopes with a short letter describing the study and explaining that participation was anonymous and voluntary.

Table 1. Number of Items and Internal Consistency Indices for Reasons for (Not) Recycling Scales

| | Number of Items | Cronbach Alpha |
|---------------------------|-----------------|----------------|
| Perception of distance | 2 | 0,727 |
| User friendliness | 4 | 0,427 |
| Management support | 3 | 0,190 |
| Social support | 5 | 0,566 |
| Recycling difficulty | 6 | 0,613 |
| Individual responsibility | 7 | 0,567 |
| Altruistic motivation | 6 | 0,933 |
| Extrinsic motivation | 2 | 0,424 |
| Habit | 2 | 0,685 |
| Salience of the problem | 4 | 0,557 |

RESULTS

Respondents first were classified as recyclers or nonrecyclers based upon their self-reports on five questions about recycling behavior. Participants were labeled as recyclers if they indicated they had put particular recyclable materials into adequate containers many times or always during the last month. Respondents were labeled as nonrecyclers if they indicated that they had done so never or once or twice. Respondents who answered that there was no such waste material in their household waste were eliminated from further analyses.

Correlation analyses were made to explore the relationship between recycling behavior for various waste materials. Results are presented in Table 2.

It can be seen that recycling of one type of material was moderately or strongly positively related to recycling of all other materials. The correlation coefficients run from 0.29 for glass and tin to 0.61 for tin and batteries. These figures suggest that persons who recycle one waste material are more likely to recycle another.

A general recycling behavior variable was defined as the simple linear combination of answers on each question about recycling frequency. Respondents were then divided into recyclers and nonrecyclers on the basis of median value. *T*-tests were conducted to compare recyclers and nonrecyclers on each element of the Reasons for (Not) Recycling Scale. Table 3 shows the means and standard deviations for each group for each scale element, and the corresponding *T* value and significance level. As can be seen, the two groups do not have significantly different scores for perception of containers' distance, perception of user-friendliness of the system, perception of management support, perception of social support, and extrinsic motivation. Recyclers and nonrecyclers, however, responded statistically differently on recycling attitude, perceived difficulty, perception of individual responsibility, altruistic motivation, "recycling as habit," and perception of salience of the solid waste problem.

Recyclers see recycling as less difficult, accepted more responsibility for it, see the solid waste problem as more urgent, and are more accustomed to recycle than nonrecyclers. Moreover, they report that they recycle because they want to do something good for the environment and the human community, without expecting particular financial or social benefits for themselves.

Table 2. Correlation Analysis of Individual-Material Recycling Behaviors

| | Paper | Glass | Plastic | Tin | Old Batteries |
|---------------|-------|--------|---------|--------|---------------|
| Paper | | 0.488* | 0.440* | 0.308* | 0.375* |
| Glass | | | 0.413* | 0.293* | 0.390* |
| Plastic | | | | 0.578* | 0.398* |
| Tin | | | | | 0.608* |
| Old Batteries | | | | | |

**p* < 0.01

Table 3. Arithmetic Means (M), Standard Deviations (σ), Number of Cases (N) for Groups of Recyclers and Non-Recyclers, and Results of *t*-Tests for Testing Statistical Significance of Differences between Recyclers and Non-Recyclers in Recycling Attitudes and Reasons for (Not) Recycling

| | M_r | σ_r | N_r | M_{non} | σ_{non} | N_{non} | <i>t</i> | <i>p</i> | <i>df</i> |
|---------------------------|-------|------------|-------|-----------|----------------|-----------|--------------|----------|-----------|
| Attitude | 66.18 | 9.599 | 34 | 59.23 | 12.438 | 35 | -2.59 | 0.012 | 67 |
| Perception of distance | 6.03 | 2.965 | 35 | 4.89 | 2.550 | 36 | -1.74 | 0.087 | 69 |
| User friendliness | 15.14 | 3.273 | 35 | 13.83 | 3.185 | 35 | -1.70 | 0.093 | 68 |
| Management support | 8.71 | 3.326 | 34 | 7.79 | 2.805 | 34 | -1.22 | 0.226 | 66 |
| Social support | 14.69 | 3.692 | 35 | 13.03 | 3.815 | 35 | -1.85 | 0.069 | 68 |
| Recycling difficulty | 22.29 | 4.775 | 35 | 19.03 | 5.152 | 36 | -2.76 | 0.007 | 69 |
| Individual responsibility | 25.09 | 4.276 | 32 | 20.88 | 4.884 | 32 | -3.68 | 0.000 | 62 |
| Altruistic motivation | 25.60 | 5.013 | 35 | 22.58 | 5.987 | 36 | -2.30 | 0.025 | 69 |
| Extrinsic motivation | 6.94 | 1.798 | 35 | 6.33 | 2.204 | 36 | -1.27 | 0.207 | 69 |
| Habitat | 7.23 | 1.896 | 35 | 5.53 | 2.145 | 36 | -3.54 | 0.001 | 69 |
| Salience of the problem | 17.41 | 3.046 | 34 | 15.75 | 3.166 | 36 | -2.24 | 0.029 | 68 |

Note: Bold numbers show that statistically significant differences exist.

A similar result was obtained when we examined the relationships between ratings on each part of the Reasons for (Not) Recycling Scale and recycling behavior. More positive recycling attitude, user-friendlier system, less difficult activity, greater individual responsibility, greater social support, more altruistic and less extrinsic motivation, more habitation and perception of solid waste problem as more salient and urgent were related with more recycling. Correlation matrices are shown in Table 4.

Since it was hypothesized that the effect of recycling attitude on recycling behavior would be indirect and mediated by reasons for (not) recycling, a partial correlation between attitude and behavior was calculated. In other words, we expected correlation to fall to value 0 when results on Reasons for (Not) Recycling Scales will be statistically partialized or controlled. In Table 4 it can be seen that attitudes are moderately related to behavior ($r = 0.37$). When we partialized the impact of the reasons for (not) recycling variables, the correlation between attitudes and behavior became non-significant and very small ($r = 0.06$). This result supports the contention that attitude and behavior were connected largely through their relationship to reasons for (not) recycling.

Finally, a multiple regression analysis was made to investigate the utility of “recycling attitude” and “reasons for (not) recycling” in predicting self-reported recycling behavior. Only the perception of individual responsibility ($\beta = 0.46$, $t = 4.03$, $p = 0.000$) and the perception of containers’ distance ($\beta = 0.24$, $t = 2.08$, $p = 0.043$) were significant predictors. They accounted for 31.4 percent of the variance in respondents’ self-reported recyclers’ behavior.

De Young [7] noted that recycling attitudinal data exhibited enough variation to suggest that one might have a group of recyclers with a more positive attitude and another group with a less positive attitude, and similarly for the non-recyclers. This also was found in our study. Respondents were classified into the group with more positive attitude if their scores on the Recycling Attitude Scale were greater than median value $C = 66$, and into the group with less positive attitude if their scores were less than 66. We were interested in whether there were differences on Reasons for (Not) Recycling Scales between nonrecyclers with less and more positive attitude, and between recyclers with less and more positive attitude. The mean scores for the four groups of respondents on the Reasons for (Not) Recycling Scale are shown in Table 5. In an effort to better understand these data, a series of two-way ANOVAs was conducted. Each analysis used the recycler/nonrecycler variable and the less positive/more positive recycling attitude as independent variable, with each of the other scales acting, in turn, as dependent variable.

The main effects of recycling attitude were significant for following scales: social support ($F = 6.817$, $p = 0.011$), perception of individual responsibility ($F = 29.820$, $p = 0.000$), extrinsic motivation ($F = 22.738$, $p = 0.000$), altruistic motivation ($F = 33.664$, $p = 0.000$), recycling as a habit ($F = 7.872$, $p = 0.000$), perceived difficulty of recycling activity ($F = 49.256$, $p = 0.000$), and perceived

Table 4. Correlation Analysis of Recycling Attitudes and Reasons for (Not) Recycling

| | Attitude | Distance | User | Manager | Support | Difficulty | Individ | Extrins | Altruis | Habit | Salience |
|--------------------|----------|----------|---------|---------|---------|------------|---------|---------|---------|---------|----------|
| Attitude | | 0.052 | 0.352** | 0.136 | 0.394** | 0.705** | 0.489 | 0.489** | 0.737** | 0.627** | 0.575** |
| Distance | | | 0.428** | 0.240* | 0.208* | 0.207* | -0.065 | 0.043 | 0.050 | 0.252** | 0.098 |
| User | | | | 0.193 | 0.396 | 0.515 | 0.113 | 0.360** | 0.412** | 0.474** | 0.285** |
| Manager | | | | | 0.164 | 0.095 | 0.021 | 0.133 | -0.112 | -0.025 | -0.036 |
| Support | | | | | | 0.541** | 0.255* | 0.383** | 0.413** | 0.519** | 0.207* |
| Difficulty | | | | | | | 0.487** | 0.535** | 0.627** | 0.676** | 0.545** |
| Individ | | | | | | | | 0.148 | 0.411** | 0.257* | 0.272** |
| Extrins | | | | | | | | | 0.434** | 0.328** | 0.184 |
| Altruis | | | | | | | | | | 0.584** | 0.591** |
| Habit | | | | | | | | | | | 0.445** |
| Salience | | | | | | | | | | | |
| Recycling Behavior | 0.371** | 0.194 | 0.253* | 0.022 | 0.312** | 0.373** | 0.468** | 0.368** | 0.242* | 0.482** | 0.384** |

Note: Attitude = recycling attitude; Distance = perception of collection containers' distance; User = perceived user friendliness of recycling system; Manager = perception of management support; Support = perception of social support; Difficulty = perceived difficulty of recycling behavior; Individ = perception of individual responsibility and effectiveness of individual action; Extrins = extrinsic motivation; Altruis = altruistic motivation; Habit = recycling as a habit; Salience = perceived saliency and importance of solid waste problem.

* $p < 0.05$

** $p < 0.01$

salience of solid waste problem ($F = 24.575, p = 0.000$). The main effects of recycling behavior were significant for the following scales: perception of individual responsibility ($F = 21.995, p = 0.000$), recycling as a habit ($F = 12.820, p = 0.001$), altruistic motivation ($F = 7.010, p = 0.010$), perceived difficulty of recycling activity ($F = 10.466, p = 0.002$), and perceived salience of the solid waste problem ($F = 5.688, p = 0.020$).

In these results, we were especially interested in interaction effects. The only significant interaction effect (the recycler/nonrecycler \times less positive/more positive recycling attitude) was for perception of containers' distance ($F = 10.822, p = 0.002$). In the nonrecyclers' group, there was a statistically significant difference between those with more and less positive recycling attitude: nonrecyclers with more positive attitude perceived that containers were more distant than nonrecyclers with less positive attitude ($t = 3.49, p = 0.001, df = 33$). In the recyclers group, there was no significant difference in perceived containers' distance ($t = -1.49, p = 0.146, df = 32$). Nonrecyclers with a more positive attitude actually perceived containers' distance as greater than did any other group ($t_{\text{pos(r,nonr)}} = -3.69, p = 0.001, df = 29$).

DISCUSSION

As noted by Katzev et al. [8], although the presence of a recycling system may be necessary to ensure a high level of participation, it is not sufficient. Although Zagreb's recycling system has been running for more than seven years, only 3 percent of the waste (by weight) is collected for recycling. Clearly, participation in the recycling program is small and unsatisfactory. Programs to encourage recycling are necessary. To create programs successfully, information on ways in which recyclers and nonrecyclers differ is essential. Yet, in our study, when recyclers and nonrecyclers were so classified on the basis of self-reports, these two groups were no different with respect to their perception of characteristics of the recycling program: both recyclers and nonrecyclers thought that collection containers were relatively distant and unclean, but easy to use. Both groups judged management support as slightly negative or neutral. Recyclers and nonrecyclers also did not differ in their extrinsic motivation and in their perceptions of social support.

Amid this unfavorable and rather negative general perception of the recycling program, some people still recycle. What separates recyclers and nonrecyclers, at least in this study, were personal, internal characteristics: recycling attitudes, perceptions of individual responsibility and effectiveness, adoption of altruistic motives, perceptions of the salience of the solid waste problem, and recycling habituation. Recyclers also believed, more than did nonrecyclers, that recycling is an easy thing to do.

It seems reasonable to stimulate recycling behavior by acting upon factors in which recyclers and nonrecyclers differ. Attitude change seems like one way

Table 5. Arithmetic Means on Reasons for Recycling Scales for the Group of Recyclers and Non-Recyclers with More Positive and More Negative Recycling Attitudes

| | Perception of Distance | | User Friendliness of the System | | Management Support | | Recycling Difficulty | | Social Support | |
|---------------|------------------------------|-----------------|---------------------------------|------------------|--------------------|-----------------|----------------------|------------------|------------------|------------------|
| | More Negative | More Positive | More Negative | More Positive | More Negative | More Positive | More Negative | More Positive | More Negative | More Positive |
| Non-Recyclers | 5.81 (2.316) ^a | 3.21 (1.888) | 13.43 (3.385) | 14.31 (2.955) | 7.35 (2.300) | 8.43 (3.390) | 16.10 (3.807) | 23.17 (3.221) | 12.00 (3.376) | 15.08 (3.707) |
| Recyclers | 5.18 (2.721) | 6.65 (3.020) | 14.12 (3.080) | 15.94 (3.249) | 8.44 (3.010) | 8.59 (3.429) | 19.47 (3.760) | 24.65 (4.030) | 13.76 (3.364) | 15.29 (3.820) |

| | Individual Responsibility | | Extrinsic Motivation | | Altruistic Motivation | | Habit | | Salience of the Problem | |
|---------------|---------------------------|------------------|----------------------|-----------------|-----------------------|------------------|-----------------|-----------------|-------------------------|------------------|
| | More Negative | More Positive | More Negative | More Positive | More Negative | More Positive | More Negative | More Positive | More Negative | More Positive |
| Non-Recyclers | 18.16 (3.716) | 25.08 (3.528) | 5.33 (1.798) | 7.86 (1.994) | 19.57 (5.844) | 27.14 (2.627) | 4.90 (2.256) | 6.71 (1.204) | 14.43 (2.959) | 17.93 (2.235) |
| Recyclers | 23.40 (4.014) | 27.06 (3.642) | 6.12 (1.728) | 7.71 (1.572) | 22.82 (4.377) | 28.24 (4.280) | 6.24 (1.678) | 8.12 (1.654) | 15.81 (3.311) | 18.88 (1.996) |

^aValues in parentheses represent standard deviations.

to induce behavior change. What is problematic with the view that attitude change is the best, indeed inevitable, first step in changing behavior is that, today, nearly everyone claims a proenvironmental orientation and a positive recycling attitude yet many are ready to engage in environmentally unfriendly behaviors. Not only is the relationship between recycling attitude and behavior moderate, but the opportunity for strategies and programs to improve recycling behavior based on attitude change may be limited [7, 9, 10] because there is little room for recycling attitude improvement. In this study, with partialization of reasons for (not) recycling impact, correlation between attitude and behavior falls to value 0.

This suggests that interventions to enhance recycling should be aimed at factors other than recycling attitude, i.e., on lowering the behavior price or making recycling easier. Results show that recyclers believed recycling is easier than nonrecyclers. Since the difference existed in perceived and not actual difficulty for nonrecyclers (equal perception of containers' distance and of user-friendliness of the system), results suggest that perceptions must be changed. Still, real reductions in the effort required for recycling—as by changing some aspects of recycling program—would probably change the perceived difficulty of the task and so help increase recycling. This view can be supported by the results of the comparison between nonrecyclers with less positive recycling attitude and nonrecyclers with more positive attitude with respect to containers' distance. As noted, nonrecyclers with a more positive attitude perceived containers to be more distant than did nonrecyclers with a less positive attitude. It can be argued that nonrecyclers with a more positive attitude had not recycled just because they estimated that containers for collecting recyclable materials were too distant.

Data also suggest that appeals for recycling should stress not only advantages and consequences of recycling but also individual responsibility and the contributions one can make by recycling. Results suggest that nonrecyclers were less prone to believe that they can do something significant and perceptible in alleviating solid waste problems. Because of that, interventions for encouraging participation in recycling programs should tell people in a picturesque way that everybody can save a lot by recycling and that small effects which we individually make become big if everybody else follows suit.

Results also indicate that promoting recycling should include the cultivation of motivations. This in turn may require altering anthropocentric, consumer values into environmentally-friendly conceptions of balance between human activity and nature. Such holistic education may have to begin from an early age in families, kindergartens, and other schools. This education should give clear and whole-systems information about the environment.

As noted, our study also suggests that recyclers, more than nonrecyclers, perceived solid waste problems as important, salient, and urgent. Other authors [11] argued that failure to act in concert with attitudes may be due to a lack of information or knowledge to undergird informed decisions. More information

about solid waste and recycling from mass media and social workers may help in this regard.

Some limitations of this study and its conclusions should be kept in mind. First, the subjects who participated in the study were not a random and representative sample of the general population. Clearly our findings cannot be assumed to be generalizable forthwith to other groups. Attrition of participants is a matter that requires further investigation. Clearly, people who hold more positive recycling attitudes and participated in recycling programs may have been significantly more likely to send their questionnaires back to the authors. Since more than 50 percent of the participants reported recycling glass and 46 percent recycling paper, this supposition seems quite plausible, in light of the fact that only 3 percent of the household waste in Zagreb is processed through recycling [12].

Secondly, our behavioral variables were based on participants' self-reports of their recycling activity. Many authors (see, for example, [13]) found that self-reports are not satisfying measures of recycling behavior because of the social desirability of the behavior, and participants' apprehension about evaluation in the study. In [13], approximately one-sixth of the sample of individuals who reported prerecycling attitudes and behavior actually engaged in the recycling behavior under study [13]. Reliance on a behavior outcome that was self-reported rather than objectively measured, limits the generalizability of the findings and generates the need to investigate them with direct measuring.

Furthermore, because of poor metric characteristics (low Cronbach alpha-indices) of some of the Reasons for (Not) Recycling elements, steps must be made to improve the operationalization of these concepts.

In spite of these caveats, our findings begin to lay the groundwork for a better understanding of recycling in one specific recycling program and socio-cultural background. It is clear that several personal and situational factors govern the likelihood that a subject would sort waste and put it in suitable collection containers. Due to the correlational nature of this study, causal relationships between variables remained unclear and unknown. Therefore, additional research and analyses should try to enlighten these relationships with experimental designs allowing direct control over variables or sets of variables. More effective interventions to encourage participation in recycling programs can then be developed.

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