



# Promoting internalized motivation for environmentally responsible behavior: A prospective study of environmental goals

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## Abstract

We used a prospective design and structural equation modeling procedures to examine the processes by which people internalize the doing of new environmental behaviors. As predicted by self-determination theory (Deci & Ryan, 1985: *Intrinsic Motivation and Self-determination in Human Behaviour*, Plenum, New York; Deci & Ryan, 2000: *Psychol. Inquiry* 11, 227), participants who perceived the experimenter as autonomy-supportive evidenced greater internalized motivation regarding a set of self-selected environmental goals. Internalized motivation in turn predicted goal performance during the following week, which in turn predicted intentions to keep on striving after the study was over. Implications for the question of how to motivate people to engage in more environmentally responsible behavior are discussed.

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In order to help offset continuing environmental degradation in the 21st century, humans will have to significantly alter their habits (Howard, 2000; Oskamp, 2000; Winter, 2000). These altered habits cannot consist of merely doing the right thing every now and then; rather, they must be consistent, persistent efforts to move away from inherently wasteful and damaging behaviors and to move towards conservation-oriented or environmentally responsible behaviors (ERB). These changes in behavior will take motivation of a very special kind. This article explores the nature of such “high-quality” motivation, seeking to understand what kinds of motivations can give rise to lasting positive change in peoples’ ERB. We also explore the kind of approach that authorities should take as they try to inspire others to adopt more environmentally responsible behaviors. Thus, the purpose of this article is two-fold: to understand the nature of “high-quality” motivation at a theoretical level and to understand how to promote ERB at a practical level.

Our inquiry is grounded in self-determination theory (SDT; Deci & Ryan, 1985, 1991, 2000), which, for more than 25 years, has been empirically examining optimal motivation and the conditions that support it. This theory began with the concept of intrinsic motivation,

i.e., actions motivated purely by the rewarding qualities of experience that they provide (Deci, 1972). However, many important behaviors cannot be intrinsically motivated. Thus, SDT has expanded to provide a comprehensive theoretical account of the social and intrapersonal processes by which important duties are *internalized* (Deci & Ryan, 2000), such that individuals perform behaviors willingly even when they do not enjoy those behaviors. Clearly, many ERBs, such as sorting recyclables into the correct bins or taking abbreviated showers, fall into this category.

SDT posits that people are more likely to engage in a behavior if they perceive that the motivation to do it comes from within them rather than from an external, controlling agent. In other words, motivation is enhanced when people have an internal perceived locus of causality (I-PLOC) for their behavior. Internalized motivation or I-PLOC is said to exist when people act either because the behavior is enjoyable and challenging (intrinsic motivation) or because they endorse the values underlying the behavior (identified motivation). Non-internalized motivation is said to exist when people act primarily because they expect to receive a reward (external motivation) or because they want to avoid feeling guilty (introjected motivation).

Many prior studies of ERB have focused on the use of external rewards and social obligations to elicit and maintain the desired behaviors (for reviews, see Dwyer,

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Leeming, Cobern, Porter, & Jackson, 1993; Hornik, Cherian, Madansky, & Narayana, 1995; Huffman, Grossnickle, Cope, & Huffman, 1995). However, from the perspective of SDT, such behaviors are usually not internalized and thus will likely cease as soon as the reinforcement contingencies cease. In other words, bribes and guilt do not help to create the type of high-quality motivation that will lead people to take increasing responsibility for their behavior and for the environmental health of the planet as a whole. Other prior studies have focused on environmental attitudes as predictors of ERB. However, attitudes and behaviors do not necessarily correspond (for a discussion of this topic related specifically to ERB, see Schultz, Oskamp, & Mainieri, 1995). Therefore, we decided to focus our study upon environmental motivation, which is more proximally relevant to behavior.

Pelletier and colleagues have already demonstrated the usefulness of SDT for understanding ERB. They developed a scale to measure people's motivations to perform environmental behaviors (Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998) and found that self-determined motivations predicted more frequent enactment of such behaviors (Pelletier et al., 1998; Seguin, Pelletier, & Hunsley, 1999), and also predicted constructs such as environmental satisfaction, environmental responsibility, and self-efficacy for environmental behavior. One objective of the current study is to test SDT again, in the domain of environmental behavior.

Specifically, the present inquiry considerably extends Pelletier and colleagues' findings by taking a different approach to assessing motivation, one based on people's self-selected personal goals. Goals are the stable cognitive representations of motivational impulses (Locke & Latham, 1990), and thus they can have a significant role in prompting and guiding patterns of complex behavior over time. Further, goals have the capacity to initiate entirely new patterns of behavior, thus creating entirely new experiences and discoveries for people (Cantor & Fleeson, 1994). Thus, we reasoned that a goals approach was particularly appropriate for a study of how to motivate people to adopt new ERB. Specifically, we asked participants to select three environmental goals that they could perform over a week's time.

As a second way of extending Pelletier and colleagues' work, the present study attempts to specify the sequence of events that lead to positive changes over time. For example, what initial characteristics of environmental goals lead people to persist in, and finally attain, those goals? And how does attainment, in turn, affect future intentions to act? In particular, we tested the 3-step path model shown in Fig. 1. We explain each step in the model, below.

The first step in our model specifies that participants' perceptions of the autonomy supportiveness of the experimenter predicts their resulting internalized motivation for the environmental goals they choose. Specifically, SDT proposes that the perceived social context has a crucial role in determining the "quality" of motivation (Deci & Ryan, 1987). When authorities are controlling (that is, when they do not provide choice, do not acknowledge the subordinate's perspective, and do not provide a meaningful rationale for the request; Deci, Eghrari, Patrick, & Leone, 1994), the subordinate is unlikely to internalize the request and, consequently, unlikely to comply with it. In contrast, if the request is perceived to be made in a supportive manner that encourages the person to autonomously decide what behaviors are necessary, the person is more likely to develop internalized motivation.

At the second step in the model, we expect that goal internalization will predict greater goal performance, a prediction that conceptually replicates prior studies of personal goals (Sheldon & Elliot, 1998; Sheldon & Houser-Marko, 2001). In other words, when people feel a sense of ownership of the goals they select, they typically try harder and longer.

At the third step, the model specifies that better goal performance in turn promotes stronger intentions to keep on doing the new behaviors in the future. That is, consistent with self-efficacy theory (Bandura, 1998), once people have success at attaining their goals they will develop stronger intentions to continue to perform them. Finally, we specified a direct path from internalized motivation to future intentions, based on the assumption that identifying with a goal should inspire persistent intentions to pursue goals independently of how well one does at the goals during a particular period of time.

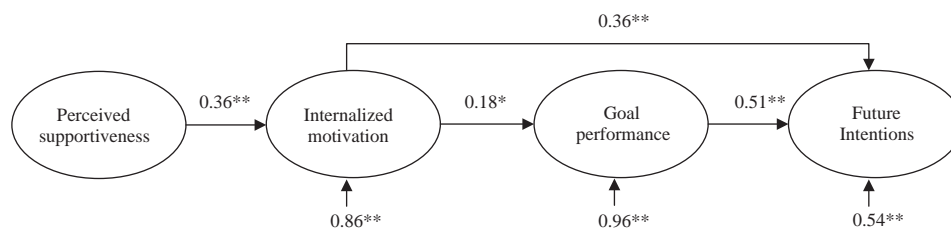


Fig. 1. Path model with standardized coefficients. Note: Unexplained proportions of variance are indicated by arrows without origin. \* $p < 0.05$ . \*\* $p < 0.01$ .

As a set of supplementary analyses we also measured and controlled for several other goal variables besides internalized motivation, including the perceived difficulty of the goals, prior performance of the goals, and expectations of doing well at the goals. We reasoned that a stronger case could be made for the importance of goal internalization if we found that it predicts success above and beyond these other motivationally relevant variables (Sheldon & Kasser, 1998; Sheldon & Houser-Marko, 2001).

## 1. Method

### 1.1. Sample and procedure

One hundred and sixty-two participants took part in the study in exchange for experimental credit in an introductory psychology class. Ninety-nine took part in the fall semester, and 63 took part in the spring semester; however, the design and results of the two studies were not appreciably different, thus we combined the two samples.<sup>1</sup> Of these 162 participants, 103 were women and 59 were men. In the fall, 10 additional participants failed to reply to the daily e-mails and attend the follow-up session; in the spring, there were nine such participants. A one-way ANOVA comparing those who dropped out from those who completed the study did not show any significant differences on any of the variables under consideration.

Groups of eight or fewer participants were scheduled for the introductory laboratory session. When participants arrived at the lab, we first gave them some information on the scope of the problems that humanity faces, in hopes of initially persuading participants that environmental goals are worth pursuing. Participants were then asked to select three environmental goals from a list of nine goals that they could perhaps perform during the next week. Participants made ratings concerning their three goals and also their perceptions of the experimenter and the experimental context. Participants received e-mails seven times during the next week asking them to rate how well they were doing in their three goals (participants' goals were copied into the e-mail messages, and participants were reminded each time that their credit did not depend on doing the goals and that they should just "tell the truth."). Finally, participants returned to the lab at the end of the week where they completed measures of their intentions to keep on doing the behaviors represented by their three goals. They were then debriefed and dismissed.

<sup>1</sup>The experiments also included subtle differences in location that were hypothesized to create a difference in the context of the requests to do the goals, but these manipulations had no effects and will not be discussed further.

### 1.2. Development of the list of goals

In this study, we intended to focus on behaviors that individuals could pursue as part of their regular daily routines such that they could develop better personal habits. Further, we wanted these behaviors to be things that individuals could engage in fairly easily without need of other people, special circumstances, or financial investment. In order to develop a list of goals, we consulted Winter's (1996, pp. 308–311) "101 Ways to Heal the Earth." Starting with these suggestions, we developed 20 environmentally responsible goals that seemed to us to be easy for college students to do. We then pre-tested these goals with a sample of 32 college students by asking them four questions about each goal: (1) To what extent do you already do this? (2) To what extent would you be willing to try harder to do this? (3) How difficult do you think this would be to carry out? and (4) How realistic is it for college students to do this? All four items were answered for each of the 20 goals using a 5-point scale (*not at all* to *very much*). The purpose of this pre-testing was to find goals that participants did not already do, were willing to try to do, did not find difficult, and felt were realistic. After inspecting these ratings, we identified a set of nine goals that pilot participants indicated they would be willing to do, all of which would help the environment (to a greater or lesser extent) if enacted. Some goals that we rejected included "Eat organic food," "Avoid buying newspapers," and "Pick up litter around campus."

Stern (2000) has identified four types of environmentally significant behavior: environmental activism, non-activist behaviors in the public sphere, private-sphere environmentalism, and other environmentally significant behaviors. All of the goals used in this study fall in the domain of private-sphere environmentalism. Further, all of the goals are related to wasting and conserving behaviors.

### 1.3. Measures

#### 1.3.1. Perceived supportiveness

Perceived autonomy support was measured using three items similar to those employed in past studies of this type (Deci, Connell, & Ryan, 1989; Baard, 2002). These three items addressed the three components of autonomy support, namely allowing choice, providing rationale, and acknowledging other's perspective (Deci et al., 1994). Participants rated their agreement on a 5-point scale (*no agreement* to *much agreement*) as to whether the designers of the study allowed them to choose their own level of involvement, provided a clear rationale for what was being asked, and were sensitive to their needs and wishes.

### 1.3.2. Internalized motivation

The PLOC scale (Ryan & Connell, 1989) consists of four “reasons for acting,” two measuring internalized motivation (i.e., intrinsic and identified) and two measuring non-internalized motivation (i.e., external and introjected). Specifically, participants used a 5-point scale (*not at all* to *very much*) to rate why they would be engaging in each of their three environmental goals in terms of each of these four reasons: because you feel you have to do it or must do it (extrinsic), because you feel like you ought to do it or should do it (introjected), because you personally value doing it or think it is important to do it (identified), and because it is interesting to do it and enjoyable to do it (intrinsic). As in past research (Sheldon & Elliot, 1998; Sheldon & Houser-Marko, 2001), an “internalized motivation” score was formed by summing the intrinsic and identified responses and subtracting the external and introjected responses. This enabled us to assess the extent to which participants felt a sense of self-endorsement of the goals, as opposed to feeling that they were imposed by others. Thus, for each of the three goals, each participant had an internalized motivation score.

### 1.3.3. Goal performance

Goal performance was measured on each day of the week for each of the three goals via e-mail. Participants answered “How successful were you in pursuing this goal today?” using a 5-point scale (*not at all* to *very much*), and their responses were averaged across the seven days to form a “goal performance” score for each goal.<sup>2</sup> Within each goal, the alphas for the 7 days were 0.84, 0.77, and 0.85.

### 1.3.4. Future intentions

During the final session, participants’ future intentions were measured for each goal using the question, “To what extent do you intend to keep on trying to meet this goal in the future?” Participants responded on a 5-point scale (*not at all* to *very much*).

### 1.3.5. Control variables

Finally, three alternative motivationally relevant variables were assessed during the initial session: difficulty, expectations, and prior performance. These

<sup>2</sup>For sample 1 (the fall semester), this question was asked with a five point scale ranging from “not at all” to “some” to “very much,” and for sample 2 (the spring semester), it was asked with a six point scale ranging from 1 (“much less than before the experiment”) to 6 (“much more than before the experiment”). The scale was modified in the second semester in an attempt to give greater specificity and variability to participants’ responses. In the analyses reported, we combined the two samples after z-scoring all performance scores with respect to their own sample mean and standard deviation. Results did not differ appreciably across the two samples.

constructs were measured for each of the three goals using the questions, “To what extent is this goal something you already do in your life?”, “How difficult is this goal?”, and “How well do you expect to do on this goal?”. Responses were made on a 5-point scale. Coefficient alpha for these items were 0.81, 0.65, and 0.55, respectively.

### 1.3.6. Latent variable analyses

The data were analysed using a latent variable modeling technique. Following McDonald and Ho’s (2002) terminology, we started with the path model, which is just the four latent variables shown in Fig. 1. Then we constructed the measurement model by attaching three indicator variables to each latent variable. For the perceived supportiveness latent variable, the indicator variables were the three perceived supportiveness items. For the remaining variables—internalized motivation, goal performance, and future intentions—the three indicator variables were the responses for each of the three goals. In accordance with common practice for performing latent variable analyses, each indicator variable was modeled as an endogenous variable with two sources of variance, the latent construct and an error term. Thus, each indicator variable was constrained to load on only one factor, and the factor loadings formed independent clusters (McDonald & Ho, 2002).

## 2. Results

### 2.1. Descriptive statistics

Table 1 presents descriptive statistics for each of the nine goals. Again, participants were asked to choose any three out of the nine goals, and, as can be seen, some goals were more popular than others. Interestingly, the three goals most frequently selected (2, 5, and 9) were among the goals rated as least difficult and were among the goals with the highest expectations to do well. Notably, however, these three were not the goals associated with the highest internalized motivation. Apparently, people do not necessarily identify with or anticipate enjoying the easiest goals.

Table 2 treats participants as the unit of analysis and presents both descriptive statistics and a correlation matrix (below the diagonal) for the 12 latent variables used in the analysis. This table also contains variances of each variable (along the diagonal) and the asymptotically standardized residuals between the actual covariance matrix and the predicted covariance matrix for the measurement model (above the diagonal, discussed further below). Consistent with our hypotheses, the manifest indicators of perceived supportiveness,

Table 1  
Sample means for the nine environmental goals

Goal	<i>n</i>	Internalized motivation	Goal performance	Future intentions	Previous performance	Expectations	Difficulty
1. Avoid take out food or food with excessive packaging	52	-0.17	0.05	3.55	2.23	3.98	2.65
2. Recycle beverage containers and plastic items	81	-0.50	-0.55	3.82	2.27	4.18	1.80
3. Conserve paper or go paperless	32	0.18	-0.14	3.63	2.18	4.12	2.40
4. Cut down on eating meat	27	0.03	0.18	3.86	2.25	4.22	2.44
5. Turn off lights, stereo, etc. when not in use	133	-0.46	0.33	3.63	2.46	4.20	2.02
6. Avoid buying things that you don't really need	41	-0.60	0.04	3.60	2.42	4.04	2.64
7. Avoid taking a bag when you don't need one	41	-0.04	-0.24	3.33	2.11	4.11	1.70
8. Convince your friends or family to recycle more	22	0.04	-0.99	3.09	1.95	3.86	2.68
9. Avoid taking more food than you can eat, or more napkins, etc. than you will use.	111	-0.12	0.23	3.70	2.21	4.19	2.04

Table 2  
Correlations, variances, residuals, and means for manifest variables

Variable	PS 1	PS 2	PS 3	IM 1	IM 2	IM 3	GP 1	GP 2	GP 3	FI 1	FI 2	FI 3
PS 1	0.94	0.76	-0.06	0.43	-1.54	-0.91	2.19	2.02	1.89	1.76	1.53	1.13
PS 2	0.22	0.70	0.69	0.18	-1.13	0.47	1.65	1.51	2.48	1.32	2.48	0.38
PS 3	0.28	0.22	0.41	-0.12	-0.121	-0.21	0.03	0.96	0.37	-1.11	-1.28	-0.09
IM 1	0.22	0.14	0.16	6.31	1.95	-1.11	2.16	-0.73	-1.11	0.68	-0.32	-1.52
IM 2	0.15	0.04	0.22	0.69	4.98	0.09	1.47	-1.88	-2.15	0.71	-1.26	-0.73
IM 3	0.10	0.17	0.17	0.57	0.54	4.36	2.73	0.31	-0.18	0.92	1.60	0.83
GP 1	0.19	0.15	0.01	0.22	0.21	0.27	1.04	1.05	-1.73	0.81	0.55	-0.69
GP 2	0.20	0.15	-0.03	0.08	0.02	0.12	0.53	0.64	0.57	-0.57	-2.16	0.20
GP 3	0.17	0.19	-0.02	0.10	0.04	0.12	0.58	0.57	0.99	-0.73	1.27	0.80
FI 1	0.20	0.21	0.17	0.22	0.22	0.20	0.26	0.19	0.21	0.93	-0.55	-0.04
FI 2	0.20	0.29	0.19	0.24	0.18	0.29	0.30	0.18	0.36	0.39	0.96	0.59
FI 3	0.15	0.12	0.09	0.13	0.16	0.22	0.19	0.24	0.30	0.31	0.41	1.23
Mean	4.24	4.22	4.64	-0.12	-0.37	-0.32	3.73	3.96	3.85	3.70	3.64	3.56

Note. Sample correlations are in lower triangle, variances are in diagonal, asymptotically standardized residuals are in upper triangle, and means are in last row. Abbreviations used in the table are PS = perceived supportiveness, IM = internalized motivation, GP = goal performance, FI = future intentions.

internalized motivation, goal performance, and future intentions are all positively correlated.

## 2.2. Structural equation model

Next, we set out to formally test the model presented in Fig. 1. We used structural equation modeling with latent variables to test the significance of the hypothesized paths while simultaneously controlling for the effects of all variables in the model and correcting for errors of measurement. Recall that this model specifies that the perceived supportiveness of the request influences the quality of participants' motivation. Internalized motivation influences participants' degree of success at performing the goals, and it also influences intentions to keep on doing the goals later. Finally, successful performance influences future intentions.

Our strategy was first to test a measurement model in which all the latent variables were free to covary, second to test a complete structural model with causal relationships as indicated in Fig. 1 and three manifest indicators

for each latent variable, third to test an uncorrelated factors model with the purpose of determining the fit of the theoretical part of the model, and fourth to test a set of alternative models. We report model fit statistics and other parameters according to the recommendations of McDonald and Ho (2002), Hu and Bentler (1999), and Mulaik et al. (1989).

### 2.2.1. Measurement model

The measurement model allows all latent variables to freely covary. Further, each latent variable is hypothesized to be an exogenous variable that underlies each of the three indicators. We constructed the model such that each observed variable loads on only one common factor; this is called the independent clusters condition and ensures the identifiability of the model (McDonald & Ho, 2002, p. 67). The chi-square test for the relationship between the actual and predicted covariance matrices shows that there are no significant differences between the two matrices,  $\chi^2(48) = 48.32$ ,  $p = 0.45$ . The global fit indices for this model are

Bentler's (1990) comparative fit index (CFI)=1.00, Bentler and Bonnett's (1980) non-normed fit index (NNFI)=1.00, and McDonald's (1989) centrality index (CI)=1.00. All of these indices are above the recommended cutoffs of 0.95, 0.95, and 0.90, respectively (Hu & Bentler, 1999), indicating that the model has a good overall fit. The root mean square error of approximation (RMSEA) is 0.006, with a 90% confidence interval ranging from 0.00 to 0.05. Lower values of the RMSEA indicate better fit, and Browne and Cudek (1993) assert that RMSEA values of less than 0.08 indicate reasonable fit and that values of less than 0.05 indicate close fit. For this model, only 5 residuals were greater than 2.00, and the residuals seem to be well scattered. The root mean square residual for this model is 0.09.

### 2.2.2. Structural model

We tested a structural equation model that included directed arcs between the latent variables as indicated in Fig. 1, where each latent variable has three indicator variables. As specified by McDonald and Ho (2002), since there are no non-directed arcs between causally ordered variables and since all disturbances of endogenous variables are uncorrelated, the model is appropriately identified. The chi-square test for the relationship between the actual and predicted covariance matrices shows that there are no significant differences between the two matrices,  $\chi^2(50) = 57.31$ ,  $p = 0.22$ . The global fit indices for this model are CFI=0.98, NNFI=0.98, and CI=0.98. The RMSEA is 0.03, with a 90% confidence interval ranging from 0.00 to 0.06. In terms of individual parameters, only 8 of the standardized residuals have absolute values above 2.00. The standardized residuals are provided above the diagonal in Table 2. The root mean square residual for this model is 0.10.

### 2.2.3. Uncorrelated factors model

A third model was computed in which the correlations between latent variables were set to zero. The chi-square test for this model is  $\chi^2(54) = 112.11$ ,  $p < 0.0001$ . Following from Mulaik et al. (1989), a relative normed fit index (RNFI) can be computed that "allows one to assess the fit of the causal model concerning just the relations between the latent variables of a structural equation" (p. 445). Values of RNFI close to 1.00 indicate that the relations among the latent variables fit the data well. In this case, the RNFI is 0.89. Given the good fit of the overall structural model and the high RNFI, we conclude that the structural model is an acceptable simplification of the data.

Fig. 1 shows the final theoretical model with standardized path coefficients; Table 3 provides the standardized loadings, unstandardized loadings, and standard errors for the relationships between the latent variables and the indicator variables. The individual

Table 3  
Statistics for the indicator variables for the 4-variable model

Variable	Unstandardized loading	Standard error	Standardized loading
PS 1	2.39	0.89	0.68*
PS 2	1.02	0.37	0.37**
PS 3	1.00	—	0.45
IM 1	1.54	0.18	0.87***
IM 2	1.29	0.15	0.81***
IM 3	1.00	—	0.68
GP 1	0.92	0.12	0.72***
GP 2	0.72	0.10	0.70***
GP 3	1.00	—	0.80
FI 1	0.81	0.19	0.52***
FI 2	1.08	0.23	0.68***
FI 3	1.00	—	0.55

Note. Each variable in the table is a manifest variable that is one of the unique indicators of the corresponding latent variable. In order to solve the scaling problem of latent variables, the unstandardized loading of the third indicator was set to 1.00, and as such, no standard error or significance test could be computed for it. Abbreviations used in the table are PS=perceived supportiveness, IM=internalized motivation, GP=goal performance, FI=future intentions.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

\*\*\*  $p < 0.001$ .

paths were tested by dividing the estimated unstandardized path loading by the estimated standard error of the path. In all cases, the corresponding t-statistic was significant at the 0.05 level.

### 2.2.4. Including other possible variables

In order to ensure that the effects of internalized motivation are not reducible to other motivational constructs, three other analyses were also performed. These analyses assessed the robustness of the model while controlling for other possible predictors of goal performance. These other possible predictors included rated prior performance, difficulty, and expectancy of the goals. To test these variables, we added them to the model one at a time. Specifically, we formed a new exogenous latent variable, which had three indicators (one from each goal), that was connected via a direct arc to the goal performance variable. If the model fit indices and parameter estimates improve with the added variable, then the variable may be retained in the model. However, if the indices and parameters do not improve, the variable can be dropped from further consideration.

Adding each of the three variables did not improve the model fit. In all cases, the chi-square test was significant, indicating lack of fit,  $\chi^2(85) = 104.72$ , 218.60, 138.01,  $p < 0.001$  for prior performance, difficulty, and expectations, respectively. Similarly, the global fit indices did not improve, CFI=0.96, 0.80, 0.90, NNFI=0.95, 0.75, 0.88, CI=0.94, 0.65, 0.84, respectively. The number of residuals with absolute

values greater than 2.0 were 12, 18, and 19, respectively. And finally, for prior performance and difficulty, the path to goal attainment was non-significant. For expectations, the path was significant, but given that the chi-square test was significant and the fit indices were below the suggested cut-off values, this model was rejected in favor of the original model. Thus, while there is no way to be sure that other important variables have not been left out of the model, it seems that some of the most likely candidates do not add predictive power or improve the model fit, and thus we retain the model as being the best explanation of the data.

### 3. Discussion

The results of this study support our assumption that internalized (or self-determined) motivation can promote sustained environmental behavior change. Participants who initially identified with their environmental goals and/or anticipated enjoying them performed considerably better than participants who felt put-upon by their goals or complied out of a sense of guilt. According to SDT, such internalized motivation provides access to important motivational resources.

#### 3.1. Causes and effects of internalization

SDT proposes that requests are better internalized when people feel that their autonomy is supported by the requester. That is, people benefit when they feel that their perspective upon the problem is understood, that their right to choose is respected, and that they are being provided with a meaningful rationale when choice is restricted. In the current data, participants' perception of the researchers' autonomy supportiveness indeed had positive effects upon their degree of internalized motivation, a conclusion which is consistent with other work in domains such as industrial-organizational (Deci et al., 1989), school (Deci, Vallerand, Pelletier, & Ryan, 1991), and sports psychology (Frederick & Ryan, 1995).

The practical importance of promoting internalized motivation was also aptly demonstrated in this data. Participants who felt self-determined in their motivations seemed to enter an "upward spiral" of positive change (Sheldon & Houser-Marko, 2001), in that they were then more likely to perform well, which in turn tended to promote intentions to keep on behaving after the study's conclusion. In contrast, those lacking in internalized motivation showed little movement towards more ERB.

Interestingly, although the experimenters were trained to act the same way in every session with every participant, participants nevertheless varied in their disposition to perceive control vs. support in the experimental context. This fact suggests that individuals

bring with them complex developmental histories and different degrees of willingness to accept "duties" placed upon them. Other studies have found that people with autonomy-oriented versus control-oriented personality styles tend to perceive potential authorities very differently (e.g., Williams & Deci, 1996). In this study, we chose to focus on the downstream effects of motivation without considering what personality factors influence motivation. Clearly, future studies should also investigate the effect of personality upon the process of promoting new ERBs.

#### 3.2. Implications for promoting ERB

Our model is based on the underlying assumption that fostering ERB consists of a 3-step process. The first step is for people to *initiate* new behaviors. The second step is for these behaviors to be *maintained* (or performed regularly). The third step is that the specific behaviors be *generalized*, such that they cover a larger range of behaviors within a domain. For example, it is good when someone starts carpooling. It is even better to keep doing it regularly and consistently. Best yet is when the person expands the idea of conserving energy into other domains of conservation, such as setting the thermostat at moderate levels, and furthermore, when he or she communicates this idea to others.

In the current study we fostered the first step, initiating a new behavior, simply by enrolling participants in the experiment. However, the second step, maintaining the change, was most likely to occur for those with internalized motivation. The current study does not provide direct evidence on the issue of whether the behaviors were generalized to other domains. However, we can speculate that at least some of our participants will also take this third step, especially those whose internalized motivation increased over the course of the study.

The SDT framework may be useful for integrating work that has already been done on promoting ERB. Specifically, interventions used in prior studies may be seen as fitting in somewhere along the internalization continuum posited by SDT (from external to introjected to identified to intrinsic). For example, experiments that test the effects of incentives and rewards are obviously trying to use external motivation to promote particular behaviors (for example, see Boyce & Geller, 2001). Experiments employing social norms or guilt are trying to induce introjected motivation in their subjects (Widegren, 1998). Experiments that focus on participants' personal values in the attempt to promote ERB are using identified motivation (Kaiser, Ranney, Hartig, & Bowler, 1999; Schultz & Zelezny, 1999). And finally, experiments that try to make their interventions challenging, interesting, or enjoyable are using intrinsic motivation (De Young, 2000). Of course, SDT would

predict that interventions that encourage internalized motivations should be more effective in producing long-term behavioral change; this hypothesis remains to be tested, perhaps via meta-analysis.

### 3.3. Limitations

As with any research, there were some limitations to our study's design. For one, we relied on self-reports of goal performance. Such measures are subject to the shortcomings of demand characteristics and self-enhancement biases; of course, the data would be stronger if we could have directly and objectively measured goal performance, perhaps using peer reports or a goal-attainment scaling procedure (Kiresuk, Smith, & Cardillo, 1994). Another limitation of the design is that we did not experimentally manipulate participant's initial perceptions of the request; instead, we only measured them. Future research will seek to discover means of affecting these perceptions directly (Deci et al., 1994). Finally, future research of this type should endeavor to use community samples and to explore the dynamics of environmental goal setting in more real-life contexts, such as schools, homes, and work-places.

There are also limitations to the conclusions that we can draw from these results. First, effects were quite modest; our predictors did not account for a large portion of the variance in ERB. One possible reason for this is that the nature of the experiment as part of a course requirement makes it difficult to create a context that can be supportive as opposed to controlling. Our effects could be modest simply because we could not create a strong sense of perceived supportiveness. The average scores for internalized motivation were all negative, indicating that participants felt more pressure and coercion than support. Second, we used a limited selection of nine environmental goals; it is not clear that results would generalize to other, perhaps more consequential environmental behaviors. Third, not all participants pursued the same goals, perhaps reducing comparability between participants. Fourth, participants may have had other motives for engaging in some of the goals besides environmental concern; for example, a participant might have selected the goal "Avoid take-out food" out of a desire to eat healthy food or to lose weight, or may have agreed to "turn off lights when not in use" because this seems like socially appropriate behavior. Still, we would point out the PLOC scale (Ryan & Connell, 1989) is designed to assess an important dimension of motivation that cross-cuts these other reasons for acting. Also, most behavior is multiply determined, thus it would be difficult if not impossible to study "pure" environmental behaviors.

Notably, our design and results also have points in their favor. First, by focusing on everyday behaviors outside of the laboratory, the current study has greater

ecological validity than much experimental research. Participants returned to their normal lives in order to do their goals—the friends they normally talk to, the rooms they normally live in, the cafeterias they normally eat in. Given the many competing demands upon these students' attention, inducing even slightly more ERB may be seen as a significant accomplishment. Second, the prospective design enables important issues of behavioral change to be studied. In particular, we were able to test a longitudinal path model to examine how people may move, over time, towards more ERB. Third, we were able to test SDT, a prominent contemporary theory of motivation, in a new way in a new behavioral domain.

In conclusion, it appears that self-determined (or internalized) environmental motivation may indeed be the kind of "high-quality" motivation that is necessary to minimize environmental problems. Of course, environmental problems are complex and cannot be solved by simply finding ways to help people internalize ERB. There are many other structural and social changes that must be made, and many other disciplines (such as economics, political science, and sociology) can contribute to our understanding of what needs to be done. However, the research described in this report provides insight as to how to make these changes at the individual level, certainly an important part of the puzzle.

### References

- Baard, P. P. (2002). Intrinsic need satisfaction in organizations: A motivational basis of success in for-profit and not-for-profit settings. In E. L. Deci, & R. M. Ryan (Eds.), *Handbook of self-determination research* (pp. 255–275). Rochester NY: University of Rochester Press.
- Bandura (1998). *Self-efficacy: The exercise of control*. New York: W. H. Freeman & Co.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*, 238–246.
- Bentler, P. M., & Bonnett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, *88*, 588–606.
- Boyce, T. E., & Geller, E. S. (2001). Encouraging college students to support pro-environment behavior: Effects of direct versus indirect rewards. *Environment and Behavior*, *33*, 107–125.
- Browne, M. W., & Cudek, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen, & J. S. Long (Eds.), *Testing structural equation models* (pp. 185–249). New York: Plenum.
- Cantor, N., & Fleeson, W. (1994). Social intelligence and intelligent goal pursuit: A cognitive slice of motivation. *Integrative views of motivation, cognition, and emotion. Nebraska Symposium on Motivation*, Vol. 41 (pp. 125–179).
- De Young, R. (2000). Expanding and evaluating motives for environmentally responsible behavior. *Journal of Social Issues*, *56*, 509–526.
- Deci, E. L. (1972). The effects of contingent and noncontingent rewards and controls on intrinsic motivation. *Organizational Behavior and Human Decision Processes*, *8*, 217–229.
- Deci, E. L., Connell, J. P., & Ryan, R. M. (1989). Self-determination in a work organization. *Journal of Applied Psychology*, *74*, 580–590.



- Deci, E. L., Eghrari, H., Patrick, B. C., & Leone, D. R. (1994). Facilitating internalization: The self-determination theory perspective. *Journal of Personality*, *62*, 119–142.
- Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E. L., & Ryan, R. M. (1987). The support of autonomy and the control of behavior. *Journal of Personality and Social Psychology*, *53*, 1024–1037.
- Deci, E.L., & Ryan, R. M. (1991). A motivational approach to self: Integration in personality. *Perspectives on motivation: Current theory and research in motivation. Nebraska symposium on motivation*, Vol. 38 (pp. 237–288).
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, *11*, 227–268.
- Deci, E. L., Vallerand, R. J., Pelletier, L. G., & Ryan, R. M. (1991). Motivation and education: The self-determination perspective. *The Educational Psychologist*, *26*, 325–346.
- Dwyer, W. O., Leeming, F. C., Cobern, M. K., Porter, B. E., & Jackson, J. M. (1993). Critical review of behavioral interventions to preserve the environment. *Environment and Behavior*, *25*, 275–321.
- Frederick, C. M., & Ryan, R. M. (1995). Self-determination in sport: A review using cognitive evaluation theory. *International Journal of Sport Psychology*, *26*, 5–23.
- Hornik, J., Cherian, J., Madansky, M., & Narayana, C. (1995). Determinants of recycling behavior: A synthesis of research results. *Journal of Socio-Economics*, *24*, 105–127.
- Howard, G. S. (2000). Adapting human lifestyles for the 21st Century. *American Psychologist*, *55*, 509–515.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*, 1–55.
- Huffman, K. T., Grossnickle, W. F., Cope, J. G., & Huffman, K. P. (1995). Litter reduction: A review and integration of the literature. *Environment and Behavior*, *27*, 153–183.
- Kaiser, F. G., Ranney, M., Hartig, T., & Bowler, P. A. (1999). Ecological behavior, environmental attitude, and feelings of responsibility for the environment. *European Psychologist*, *4*, 59–74.
- Kiresuk, T., Smith, A., & Cardillo, J. (1994). *Goal attainment scaling: Applications, theory, and measurement*. Hillsdale, N.J.: Lawrence Erlbaum and Associates.
- Locke, E. A., & Latham, G. P. (1990). *A theory of goal-setting and task performance*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- McDonald, R. P. (1989). An index of goodness-of-fit based on noncentrality. *Journal of Classification*, *6*, 97–103.
- McDonald, R. P., & Ho, M-H. R. (2002). Principles and practice in reporting structural equation analyses. *Psychological Methods*, *7*, 64–82.
- Mulaik, S. A., James, L. R., van Alstine, J., Bennett, N., Lind, S., & Stilwell, C. D. (1989). Evaluation of goodness-of-fit indices for structural models. *Psychological Bulletin*, *105*, 430–445.
- Oskamp, S. (2000). A sustainable future for humanity? *American Psychologist*, *55*, 496–508.
- Pelletier, L. G., Tuson, K. M., Green-Demers, I., Noels, K., & Beaton, A. M. (1998). Why are you doing things for the environment? The Motivation Toward the Environment Scale. *Journal of Applied Social Psychology*, *28*, 437–468.
- Ryan, R. M., & Connell, J. P. (1989). Perceived locus of causality and internalization: Examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, *57*, 749–761.
- Schultz, P. W., Oskamp, S., & Mainieri, T. (1995). Who recycles and when? A review of personal and situational factors. *Journal of Environmental Psychology*, *15*, 105–121.
- Schultz, P. W., & Zelezny, L. (1999). Values as predictors of environmental attitudes: Evidence for consistency across 14 countries. *Journal of Environmental Psychology*, *19*, 255–265.
- Seguin, C., Pelletier, L. G., & Hunsley, J. (1999). Predicting environmental behaviors: The influence of self-determined motivation and information about perceived environmental health risks. *Journal of Applied Social Psychology*, *29*, 1582–1604.
- Sheldon, K. M., & Elliot, A. J. (1998). Not all personal goals are personal: Comparing autonomous and controlled reasons as predictors of effort and attainment. *Personality and Social Psychology Bulletin*, *24*, 546–557.
- Sheldon, K. M., & Houser-Marko, L. (2001). Self-concordance, goal-attainment, and the pursuit of happiness: Can there be an upward spiral? *Journal of Personality and Social Psychology*, *80*, 152–165.
- Sheldon, K. M., & Kasser, T. (1998). Pursuing personal goals: Skills enable progress, but not all progress is beneficial. *Personality and Social Psychology Bulletin*, *24*, 1319–1331.
- Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*, 407–424.
- Widegren, O. (1998). The new environmental paradigm and personal norms. *Environment and Behavior*, *30*, 75–100.
- Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology*, *70*, 767–779.
- Winter, D. D. (1996). *Ecological psychology: Healing the split between planet and self*. New York: Harper Collins.
- Winter, D. D. (2000). Some big ideas for some big problems. *American Psychologist*, *55*, 516–522.