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Why Are You Doing Things for the Environment? The Motivation Toward the Environment Scale (MTES)[1]

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This paper presents 4 studies which were conducted for the purpose of constructing and validating a new measure of people's motivation for environmental behaviors, namely the Motivation Toward the Environment Scale (MTES). The MTES consists of subscales that measure an individual's level of intrinsic, extrinsic, and a motivation for environmental behaviors. These subscales correspond to the different forms of motivation identified by Deci and Ryan in their self determination theory (SDT, 1985, 1991) Results from the first study supported the factor structure of the scale and revealed a satisfactory level of internal consistency Consistent with the SDT, the more self-determined forms of motivation were associated with more positive responses on the related variables Implications for the manner in which the public could be encouraged to do environmental behaviors are discussed.

Worsening of the environmental situation is a contemporary problem of increasing magnitude. Indeed, consequences of years of environmental neglect threaten our well-being at a variety of levels. The water we drink and the air we breathe are contaminated by toxic agents. Natural resources are slowly being depleted. Damage to wildlife and flora are reaching epidemic proportions.

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The deterioration of the ozone layer exposes the planet to increasingly dangerous levels of ultraviolet radiation. These are but a few examples from a frighteningly extensive list (see Environment Canada, 1991, for a literature review).

Our physical and psychological well-being and our collective future depend on restoring and preserving the quality of the environment. However, this endeavor is not the exclusive responsibility of government institutions and ecological groups. The average citizen is also in a position to perform a variety of helpful behaviors, such as recycling, conserving energy, purchasing environmentally friendly products, and so forth. Unfortunately, surveys indicate that people are relatively inactive with respect to environmental behaviors (De Young, 1989; Forester, 1988). People's inertia regarding environmental issues has been a major concern for environmentalists, and different research avenues were explored in the hope of gaining a better understanding of the factors related to environmentally responsible behaviors. The study of environmental knowledge and attitudes, as well as behavioral intervention strategies, emerged as main trends within this pursuit.

Environmental Knowledge

Environmental knowledge consists of the factual information people possess on the state of the environment and the influence of human actions on this environment (Arcury & Johnson, 1987). Knowledge regarding beneficial and harmful environmental behaviors is an obvious prerequisite for environmentally conscious action. To this day, numerous environmental programs endeavor mainly to provide the public with relevant information. Environmental knowledge is taught in the schools and broadcast in the media. There is an abundance of free pamphlets and brochures provided by ecological groups and by municipal or federal institutions. Popular as well as scholarly books are easily available. Yet, in spite of all these efforts, it seems that the level of environmental knowledge of most people remains painfully low (Arcury & Johnson, 1987; Brothers, Fortner, & Mayer, 1991; Gigliotti, 1990). Thus, lack of environmental knowledge appears compounded by an apparent lack of desire, in the general public, to acquire such knowledge.

While low levels of environmental knowledge are problematic in and of themselves, an important question remains to be asked: Is environmental information sufficient to ensure proenvironmental action? Surprisingly, this basic question is scarcely documented. And what little data there are on the topic offer no support to the presumed relationship between ecological knowledge and behavior (Maloney & Ward, 1973; Maloney, Ward, & Braucht, 1975). It could be argued that the absence of a significant relationship between environmental knowledge and behaviors results from low levels of environmental knowledge. However, studies in the field of energy conservation (e.g., Seligman, 1985) report that even well-informed people often fail to act on their knowledge. While environmental knowledge is a necessary condition for environmental action, it does not appear to be sufficient. Mediating variables, such as environmental attitudes, were proposed in an attempt to bridge the gap in the relationship between environmental knowledge and action.

Environmental Attitudes

The assessment of environmental concern and attitudes has been a popular research field. Environmental issues have received a high degree of exposure and publicity for the past 3 decades, and the subsequent evolution of environmental attitudes has been closely monitored. Public concern regarding the state of the environment arose in the 1960s, peaked in the 1970s, and remained high thereafter (Dunlap, 1987). A great deal of energy has been devoted to the assessment of environmental concern (e.g., Van Liere & Dunlap, 1980; Weigel & Weigel, 1978). While the dimensionality of environmental attitudes is still a point of debate (Geller, & Lashley, 1985; Kuhn & Jackson, 1989; Noe & Snow, 1990), authors agree on the implied level of environmental concern: It is undoubtedly high (e.g., Shetzer, Stackman, & Moore, 1991). Yet, one may ask: Does this worry translate into action?

Like environmental knowledge, environmental attitudes have been widely assumed to lead to environmentally conscious behaviors (Ramsey & Rickson, 1976). Unfortunately, support for this contention is mixed. While numerous research results offer support for the alleged relationship between environmental attitudes and practices (e.g., Arbuthnot, 1977; Hines, Hungerford, & Tomera, 1987; Vining & Ebreo, 1990), many more failed to do so (e.g., Gill, Crosby, & Taylor, 1986; Oskamp et al., 1991; Weigel, 1985). Research results regarding the relationship between attitudes and behavior are notoriously inconsistent (see Chaiken & Stangor, 1987; Wicker, 1969, for literature reviews). The general consensus is that several situational and personal variables affect this relationship. Yet, validity and measurement issues related to attitudinal research are still the focus of much debate (Chaiken & Stangor, 1987).

The data generated by research on environmental attitudes are interesting because they describe a social phenomenon: the awakening of environmental concern. However, considering the current controversies related to the presumed relationship between attitudes and behavior, it may be some time before the conclusions drawn from this research field can be transformed into efficient guidelines for intervention programs.

Behavioral Intervention Strategies

Research regarding strategies for the promotion of environmentally responsible behaviors arose as an applied counterpart to the theoretical research on environmental knowledge and attitudes. Such research was generally conducted according to behavioral paradigms (see Dwyer, Leeming, Cobern, Porter, & Jackson, 1993; Geller, 1989; Oskamp, 1983, for literature reviews). For instance, strategies such as reinforcement, modeling, and feedback have been extensively studied (e.g., Levitt & Leventhal, 1986; Winett et al., 1982; Winett, Leckliter, Chinn, Stahl, & Love, 1985; Yu & Martin, 1987). Results yielded by these studies are generally significant on a short-term basis, yet the long-term impact of behavioral strategies is at best unknown. The few existing studies involving long-term follow-ups report that behavioral strategies almost systematically failed to induce enduring changes in environmental behaviors (Geller, Winett, & Everett, 1982; Katzev & Johnson, 1984; Winett et al., 1985; Witmer & Geller, 1976). Thus, occurrence of ecological behavior does not seem to outlast withdrawal of behavioral incentives (Aronson & Gonzales, 1990; De Young, 1986a). This is not surprising, since behavioral theory predicts that the removal of antecedent conditions leads to the extinction of the reinforced behavior. Because of this, behavioral programs are not cost effective (Jacobs & Bailey, 1982; Katzev & Pardini, 1987).

Motivation

Environmental behaviors have been studied from a number of different perspectives. Environmental knowledge and attitudes have been proposed as correlates of environmental behaviors. The impact of behavioral strategies on environmentally conscious actions has also been assessed. Unfortunately, the impact of factors such as environmental knowledge and attitudes does not appear to be sufficient to foster environmentally conscious behaviors. Moreover, the presumed relationships between these factors and environmental behavior are still the focus of much controversy. Alternatively, behavioral strategies are efficient in the short run. However, in the long run, continual contingencies are needed to support the behavior. Behaviors are extinguished if the contingencies are removed, and providing continual rewards is costly.

In an attempt to address this problem, the study of motivation was proposed as a means to gain insight with respect to variates of behavioral persistence (Aronson & Gonzales, 1990; De Young, 1986b). Of particular interest is the study of self-determined motivation (Deci & Ryan, 1985). It seems plausible to speculate that self-determined behaviors would be maintained in the absence of external incentives such as reinforcements. As a theoretical model,

self-determination theory (Deci & Ryan, 1985, 1991) has received empirical support in a number of life domains such as education (Deci, Vallerand, Pelletier, & Ryan, 1991; Vallerand et al., 1992), interpersonal relationships (Blais, Sabourin, Boucher, & Vallerand, 1990), leisure (Pelletier, Vallerand, Green-Demers, Blais, & Brière, 1995), and sports (Pelletier, Fortier, et al., 1996). In these various domains, Deci and Ryan's motivational taxonomy was successfully employed in order to predict people's behavior. Antecedent variables influencing self-determination in positive and negative ways have also been identified. Thus, by acting on the antecedents of self-determination, it could be possible to change self-determination and behavioral outcomes (Deci & Ryan, 1985). By creating an instrument designed to measure Deci and Ryan's motivational constructs in the environmental context, our hope is to lay the foundation for similar work in the environmental domain. Thus, the goal of the current studies is to construct and validate a measure of environmental motivation: the Motivation Toward the Environment Scale (MTES). In order to provide the reader with the conceptual rationale underlying the construction of the MTES, Deci and Ryan's self-determination theory will first be briefly discussed.

Self-Determination Theory (SDT)

According to SDT (Deci & Ryan, 1985, 1991), different types of motivation could be distinguished with respect to the level of self-determination underlying the behavior. These motivational subtypes could be classified into three broad categories: intrinsic motivation, extrinsic motivation, and amotivation.

Intrinsic motivation is defined as the innate tendency to engage in an activity for the sole pleasure and satisfaction derived from its practice. An intrinsically motivated individual acts out of personal choice and interest. The behavior is an end in itself.

Extrinsic motivation underlies instrumental behaviors (Deci, 1975). The individual is not interested in the activity for its own sake. The goal of the behavior is to bring about positive consequences or to avoid negative ones. Yet, it is important to emphasize that extrinsic motivation does not necessarily imply the sacrifice of self-determination. Indeed, according to Deci, Ryan, and their colleagues (Deci & Ryan, 1985; Ryan & Connell, 1989; Ryan, Connell, & Grolnick, 1992), extrinsic motivational subtypes would coexist on a self-determination continuum. Behavior motivated by external regulation is governed by sources of control originating from the individual's environment (e.g., reward or punishment). In the instance of introjected regulation, the individual is beginning to internalize the control of his behavior. Reinforcement therefore originates from emotions related to self-esteem and punishment from internal

pressures, such as guilt or anxiety. When a behavior gains enough importance in the individual's mind to be valued in itself, it becomes regulated by identification. The behavior is still instrumental, but external motives have been sufficiently internalized to induce the individual to identify with the activity. The individual thus performs the activity by personal choice in order to attain his or her goals. Integrated regulation occurs when an instrumental behavior has been valorized to an extent such that it becomes part of the person's self-definition. Such a behavior has been assimilated by the person, and it grows into an integral part of his or her self-concept.

Amotivation is an experience of lack of control and alienation which has been compared to learned helplessness (Abramson, Seligman, & Teasdale, 1978). An amotivated individual is incapable of foreseeing the consequences of his behavior. He is therefore unable to perceive the motives underlying it. Amotivated actions are mechanical and meaningless. The individual is thus likely to give them up eventually.

Self-Determination Continuum

According to Deci and Ryan (1985, 1991), all motivational types and subtypes described above could be ordered on a continuum with respect to their implied level of self-determination. Intrinsic motivation represents the highest level of self-determination since it underlies behaviors emitted out of pleasure and freedom. Amotivation represents the lowest level of self-determination since it is characterized by loss of personal control. The different subtypes of extrinsic motivation coexist between these poles. Integration sits right below intrinsic motivation, while external regulation sits just above amotivation. Finally, introjection and identification occupy the middle points of the continuum: introjection is posited above external regulation, while identification is posited below integration. One of the most useful features of SDT is that self-determination can generally be linked to predictable antecedent and consequent variables.

Antecedents and Consequences Associated With Self-Determination

Deci and Ryan (1985) contend that people's motivation is affected by their perceived levels of competence and agency. Events that boost these feelings are hypothesized to lead to gains in self-determination, while events that undermine these feelings are expected to thwart self-determination. Substantial research results support these theoretical postulates regarding motivational antecedents (see Deci & Ryan, 1987, 1991, for literature reviews). For example, the support of one's autonomy and the provision of constructive feedback have been consistently associated with increases in self-determination (Deci, Eghari, Patrick, & Leone, 1994; Deci & Ryan, 1987). Conversely, feedback that promotes feelings of incompetence, threats, and surveillance have systematically been related to losses in self-determination (Deci & Ryan, 1987).

Since motivational subtypes coexist on a self-determination continuum, the consequences associated with these different subtypes are expected to vary as a function of their implied level of self-determination. Specifically, highly self-determined motivational subtypes are expected to lead to positive psychological and behavioral consequences. Conversely, low levels of self-determination are said to relate to negative psychological and behavioral consequences. Several studies, using different methodological strategies and performed in a variety of domains, offer support for this proposition (see Deci, 1992; Deci & Ryan, 1991, for literature reviews). For instance, self-determined motivation has been associated with greater interest (Deci, 1992), positive emotions (Briere & Vallerand, 1990), higher psychological well-being (Pelletier et al., 1995; Stewart, Green-Demers, & Pelletier, 1995), and stronger behavioral persistence (Green-Demers, Pelletier, & Legault, 1992; Vallerand & Bissonnette, 1992).

Since self-determination can be related to both antecedent and consequent variables, it is a key variable which lends itself particularly well to the elaboration of theoretical models designed to create intervention programs. While the current evidence for the applied usefulness of SDT issues from other fields than ecology, it is our hope that the construction of the MTES will permit similar successful endeavors in the environmental field.

Overview of Studies

Three studies were conducted for the purpose of constructing and validating a new measure of people's motivation for environmental behaviors based on the tenets of the theory proposed by Deci and Ryan (1985). The factorial structure of the MTES and the internal consistency of its subscales were assessed in Study 1. In Study 2, a confirmatory factor analysis was performed on the improved version of the MTES, and the pattern of correlations between the MTES subscales was examined. In Study 3, construct validity was further investigated through the evaluation of correlations between MTES subscales and related constructs, both psychological and environmentally specific. Psychological constructs are included because, regardless of the life domain for which motivation is considered, higher levels of self-determination are theorized to relate to better psychological functioning. In addition, the influence of a response bias factor, social desirability, was assessed. Temporal stability of the MTES was finally evaluated in Study 4.

It is hypothesized that the factor analyses will yield a structure of six factors corresponding to the six motivational constructs proposed by Deci and Ryan

(1985). The correlations between the subscales are theorized to take the form of a simplex pattern (Guttman, 1954) because the motivational types and subtypes lie on a self-determination continuum. That is, each subscale should display positive correlations with the subscales representing the motivational types adjacent to itself on the continuum. The magnitude of the correlations between a particular subscale and the others is expected to decrease progressively and, eventually, to grow negative as a function of the distance separating the subscales on the continuum. The correlations between the MTES subscales and the related constructs are also expected to reflect the simplex pattern. Specifically, high self- determination is supposed to relate positively to desirable variables and negatively to undesirable ones. The magnitude of these correlations is expected to decrease as a function of the level of self-determination of the motivational types. Finally, it is anticipated that the MTES subscales will display satisfactory reliability (i.e., high internal consistency indexes and test–retest correlations).

Study 1

The goal of this study was to generate items designed to measure the motivational constructs proposed by Deci and Ryan's SDT (1985). Thus, the intent was to create six subscales apt to measure intrinsic motivation, integration, identification, introjection, external regulation, and amotivation.

Method

Participants

Data were collected from 431 university students aged 17 to 59 ($M = 23$). Nineteen questionnaires with missing data on the MTES subscales were eliminated from the analyses. Of the final sample ($n = 412$), 205 were women and 80 were men; 127 participants did not indicate their gender.[3] The students completed the research questionnaire during class.

Procedure

Interviews were conducted with individuals of varying backgrounds to generate an initial pool of reasons as to why people engage in environmentally conscious behaviors. The most frequently reported reasons were then formulated into items that corresponded to the six types of motivation identified by Deci and Ryan (1985). These items comprised the initial version of the MTES, which contained 10 items per subscale, totaling 60 items. Items are in random order and represent possible responses to the question, "Why are you doing things for the environment?" Subjects are asked to indicate the extent to which each item corresponds to their personal motives for engaging in environmental behaviors by circling the appropriate number on a 7-point scale ranging from 1 (*does not correspond at all*) through 4 (*corresponds moderately*) to 7 (*corresponds exactly*).

[3]There were no significant differences between the mean scores of men and women for each of the MTES subscales, $F(1, 283) = 1.17$, $p = .281$.

Results and Discussion

Preliminary analyses were performed in order to assess departures from basic assumptions. Values of kurtosis and skewness were first examined. Albeit six items revealed kurtosis and/or skewness values above 111, the univariate distribution of the items was deemed acceptable since the mean kurtosis ($M = 0.73$) and mean skewness ($M = 0.24$) were inferior to 111 (Mùthen & Kaplan, 1985). A bogus regression including all items was performed to assess deviations with respect to multivariate normality. The distribution of standardized residuals displayed no obvious cues of nonnormality. Also, bivariate scatterplots showed no evidence of nonnormality, heteroscedasticity, or nonlinearity. Finally, casewise statistics (standardized scores of residuals and Mahalanobis distances) did not reveal any multivariate outliers.

An exploratory factor analysis using maximum likelihood extraction with oblique rotation was performed on the MTES as a preliminary analysis of the scale's structure, with the specific purpose of reducing the number of subscale items from 10 to 4. In addition, the internal consistency of the six subscales was examined using Cronbach's alpha. Results are presented in Table 1.

It was possible to obtain a clean factorial solution that offered support for the proposed subscales. Specifically, six factors had eigenvalues superior to 1, and explained 72.2% of the sample variance. It was possible to identity four items displaying significant loadings ($L > .30$; Stevens, 1986) on their target factor for all subscales, except introjected regulation. Only three items were deemed satisfactory for this subscale. Also, all retained items loaded exclusively on their target factor. Finally, all subscales revealed adequate levels of internal consistency ($.71 <$ Cronbach's $\alpha < .92$).

Study 2

The purpose of the second study was threefold. The first goal was to verify the factorial structure of the MTES on a second sample of subjects using

Table 1

Exploratory Factor Analysis of the Motivation Toward the Environment Scale

Items[a]	Intrinsic motivation (α = .89)	Integrated regulation (α = .92)	Identified regulation (α = .89)	Introjected regulation (α = .71)	External regulation (α = .81)	Amotivation (α = .83)
8. Pleasure in mastering new ways to help	.89					
9. Pleasure in improving quality of environment	.91					
11. Like feeling when doing things for environment	.54					
23. Pleasure in contributing to environment	.54					
34. An integral part of my life		.63				
37. Seems that taking care of myself and environment are inseparable		.66				
50. Has become a fundamental part of who I am		.97				
51. Part of the way I've chosen to live my life		.92				
25. Is a sensible thing to do			.82			
27. A way I've chosen to contribute			.81			
32. Is a reasonable thing to do			.70			
53. A good idea to do something about environment			.68			
28. I'd regret not doing something				.36		
38. Would feel guilty if I didn't				.85		
43. Would feel bad if I didn't do anything				.62		
9. Other people will be upset if I don't					.81	
31. For the recognition I get from others					.58	
35. Because my friends insist that I do					.66	
59. To avoid being criticized					.70	
21. I wonder why; the situation isn't improving						.67
57. Don't know; have impression I'm wasting time						.70
60. Don't know, can't see how my efforts are helping						.88
17. Don't know; can't see what I'm getting out of it						.53

[a]Because of space constraints, items are presented in abridged format.

confirmatory factor analysis. The second goal was to evaluate the pattern of correlations between the MTES subscales. The third goal was to reassess the internal consistency of the subscales.

Method

A questionnaire package containing a revised version of the MTES was mailed to a random selection of 3,000 persons chosen from the phone directory of the Cornwall area, in the province of Ontario, Canada. The only modification included in the questionnaire consisted of the addition of a fourth item to the introjected regulation subscale (i.e., "Because I would feel ashamed of myself if I was doing nothing to help the environment."). Participants received the research questionnaire, along with an introduction letter explaining the purpose of the study and containing instructions for questionnaire completion. A preaddressed return envelope with prepaid postage was also included. Participants were asked to return the questionnaire within the following 2 weeks. A reminder was sent 2 weeks after the initial package to encourage participants to complete and return the questionnaire, if they had not already done so. The return rate was approximately 25% (750 questionnaires). Unfortunately, several questionnaires with missing data had to be removed from the analyses. Two hundred sixteen questionnaires were deleted, which yielded a final sample of 544 participants. The sample was comprised of 349 men, 188 women, and 7 participants who failed to report their gender.[4] The participants' ages ranged between 17 and 84 years (M = 48.6 years), and their household income varied between less than $1000 to more than $100,000 ($M$ = $29,999).[5] The participants' level of education was distributed in the following categories: high school or less (197), community college (151), some university (74), university degree (68), and postgraduate degree (27); 27 participants did not report their level of education.[6]

[4]A significant difference was found between the mean scores of men and women for the MTES subscales, $F(1, 535) = 4.91$, $p = .030$. Post-hoc comparisons using Tukey's method for unequal cells revealed that women scored slightly higher than did men on two subscales: integration (M_{women} = 5.26, M_{men} = 4.82), $q(2, 535) = 3.67$, $p < .01$; and introjection (M_{women} = 5.13, M_{men} = 4.72), $q(2, 535) = 3.42$, $p < .05$.

[5]Reported household income values were clustered into five groups: (a) $0-$11,999, (b) $12,000-$19,999, (c) $20,000-$39,999, (d) $40,000-$59,999, and (e) more than $60,000. No significant differences were identified between MTES subscale scores for the five income levels

[6]It was possible to identify significant differences in the means of the MTES subscales between levels of education, $F(4, 509) = 3.19$, $p = .013$. Specifically, post-hoc comparisons using Tukey's method for unequal cells indicated that the mean level of amotivation of the participants with a university degree (M = 1.76) was lower than the mean level of amotivation of the participants with a high school education (M = 2.36), $q(2, 509) = 3.33$, $p < .05$, or a college education (M = 2.32), $q(2, 509) = 3.11$, $p < .05$.

Results and Discussion

Using procedures identical to those described in Study 1, preliminary analyses were first conducted to assess potential departures from univariate and multivariate normality, linearity, and homoscedasticity. Eight items revealed kurtosis and/or skewness values above 1|1. However, the univariate distribution of the items was deemed acceptable since the mean kurtosis (M = 0.97) and mean skewness (M = 0.17) were inferior to 1|1 (Muthen & Kaplan, 1985). Results revealed no indication that the data departed from multivariate normality, linearity, or homoscedasticity. The means and standard deviations of the MTES items and subscales are presented in Table 2.

Second, a confirmatory factor analysis was performed using LISREL VII. A six-factor model was designed and assessed. The initial model included the estimation of the 24 target loadings, 6 factor variances, correlations between all 6 factors, as well as uniqueness values for all 24 items (i.e., error variance). All cross loadings and error covariances were constrained to zero. Model fit was assessed by the means of multiple statistical and practical fit indexes: the chi-square likelihood ratio (χ^2), the goodness-of-fit index (GFI; Jöreskog & Sörbom, 1989), the adjusted goodness-of-fit index (AGFI; Jöreskog & Sörbom, 1989), the comparative fit index (CFI; Bentler, 1990), the Tucker-Lewis fit index (TLI; Tucker & Lewis, 1973), and the parsimony comparative fit index (PCFI; Byrne, 1994a). The use of such multiple fit criteria is recommended in light of the current debate concerning the assessment of model fit in covariance structure analyses. When model fit is adequate, the (χ^2 is nonsignificant. However, because the (χ^2 is notoriously oversensitive to sample size (Byrne, 1989), alternative fit indexes, such as the GFI, AGFI, CFI, TLI, and PCFI, are generally assessed. The possible values for these indexes range between 0 and 1. The GFI, AGFI, CFI, and TLI values are considered satisfactory when they are above .90, while the PCFI is acceptable above .80. Further information concerning fit indexes can be obtained in specialized documents (Byrne, 1994b; Marsh, Balla, & McDonald, 1988; Mulaik et al., 1989).

Results revealed a minimally adequate fit for the hypothesized model, $\chi^2(237, N = 534) = 610.13$, $p < .001$, GFI = .91, AGFI = .89, CFI = .94, TLI = .93, PCFI = .80. On the basis of substantive and statistical considerations, post-hoc models were assessed. The estimation of three item covariances significantly improved model fit, $\chi^2(234, N = 534) = 502.59$, $p < .001$, GFI = .93, AGFI = .91, CFI = .95, TLI = .95, PCFI = .81. Moreover, all estimated parameters were significant ($p < .01$) and of satisfactory magnitudes. Confirmatory factor analysis is a very stringent test of the factorial structure of a measurement instrument. The fact that the MTES withstood this test successfully offers promising support for its construct validity. The final model is depicted in

Table 2

Means and Standard Deviations of the MTES Items and Subscales

	M	*SD*
Intrinsic motivation (IM)	4.84	1.43
IM1	4.27	1.74
IM2	4.61	1.69
IM3	5.45	1.57
IM4	5.02	1.71
Integration (INTEG)	4.97	1.52
INTEG1	4.97	1.74
INTEG2	5.08	1.78
INTEG3	4.91	1.78
INTEG4	4.93	1.72
Identification (IDEN)	6.07	0.93
IDEN1	6.17	1.07
IDEN2	6.18	1.10
IDEN3	5.79	1.36
IDEN4	6.16	1.13
Introjection (INTRO)	4.87	1.52
INTRO1	5.50	1.73
INTRO2	5.16	1.89
INTRO3	4.13	2.11
INTRO4	4.69	1.97
External regulation (ER)	1.61	0.97
ER1	1.78	1.37
ER2	1.64	1.21
ER3	1.41	1.01
ER4	1.62	1.28
Amotivation (AMO)	2.23	1.38
AMO1	2.09	1.61
AMO2	1.99	1.60
AMO3	2.62	1.79
AMO4	2.21	1.72

Note. The theoretical range for each scale and each subscale is 1 to 7.

Table 3

Correlations Between the MTES Subscales

	Intrinsic motivation (α = .88)	Integrated regulation (α = .89)	Identified regulation (α = .81)	Introjected regulation (α = .79)	External regulation (α = .82)	Amotivation (α = .84)
Intrinsic motivation	—	.59**	.52**	.48**	.08	-.15**
Integrated regulation	.71**	—	.59**	.57**	.09*	-.24**
Identified regulation	.72**	.71**	—	.53*	-.09*	-.28**
Introjected regulation	.71**	.71**	.71**	—	.17**	-.08
External regulation	.19**	.16**	.01	.26**	—	.43**
Amotivation	-.05	-.16**	-.15**	.01	.56**	—

Note. Pearson correlations are presented above the diagonal and phi values (correlations between the latent constructs of the confirmatory factor analysis) below the diagonal. *$p < .05$. **$p < .01$.

Figure 1. For clarity purposes, the correlations between the latent factors are presented in Table 3, along with Pearson correlations between the observed scores on the MTES subscales.

The phi correlations between the latent constructs and the Pearson correlations approximate a simplex structure. The correlations between contiguous subscales on the self-determination continuum display the highest positive values. The magnitude of the correlations generally decreases progressively as a function of the distance between the subscales on the continuum. Eventually, as the distance between motivational types increases further, the correlations between the subscales grow negative. Although some breaks in the simplex pattern can be observed, the correlations between the MTES subscales globally support the hypothesized influence of the self-determination continuum. Finally, the internal consistency of the MTES subscales appears adequate (.79 < Cronbach's α < .89).

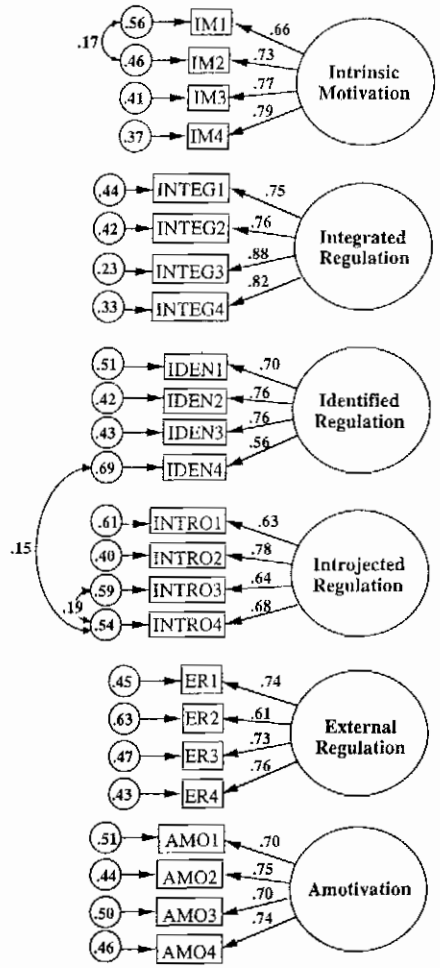

Figure 1. Confirmatory factor analysis of the MTES. All estimates are standardized and significant at the .01 level.

Study 3

The third study endeavored to further substantiate the construct validity of the MTES by assessing relationships between its subscales and various related environmental and psychological constructs. This study also aimed to evaluate the MTES susceptibility to a response bias factor, social desirability.

Method

Participants and Procedure

A questionnaire package containing the MTES, along with measures of related constructs, was administered to 310 university students aged 18 to 55 years (M = 25 years) during summer classes. Twenty questionnaires containing missing data were deleted from the analyses. Of the final sample (n = 290), 173 were women and 53 were men[7]; 64 participants did not indicate their gender.

Instruments

Participants completed measures of various psychological constructs, both psychologically and environmentally specific. In addition to the MTES, the following scales were included in the questionnaire package:

Internality, powerful others, and chance scales (IPC; Levenson, 1981). As indicated by its name, this instrument is composed of three subscales (8 items/subscale). The *internality* subscale is designed to assess the control people believe they possess over the events of their lives. The *powerful others* subscale measures the extent of other people's perceived impact on one's experiences. The *chance* subscale evaluates the perceived role played by luck (and lack thereof) in one's life. The IPC has demonstrated satisfying convergent and discriminant validity. Also, its subscales have shown adequate test -retest reliability and internal consistency. For the purposes of the current study, participants rated the items on a 7-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). The item scores were averaged to create a global score for each subscale.

Self-Esteem Scale (SES; Rosenberg, 1965). This unidimensional self-esteem measure is comprised of 10 items. Its reliability and validity are well established. The convergent and discriminant validity of the SES have been documented by a considerable number of studies. In terms of reliability, the SES has revealed satisfying internal consistency and temporal stability. In the current study, participants indicated their responses on a 4-point Likert scale ranging from 1 (*does not correspond at all*) to 4 (*corresponds exactly*). The individual item scores were averaged to yield a global self-esteem index.

Perceived Stress Scale (PSS; Cohen, Kamarck, & Mermelstein, 1983). The PSS assesses the global level of perceived stress in people's lives. It is a

[7]There were no significant differences between the mean scores of men and women for each of the MTES subscales, $F(1, 224) = 0.00$, $p = .987$.

unidimensional scale composed of 14 items. The PSS concurrent, discriminant, and predictive validity have been successfully established for three independent samples. Also, the PSS demonstrated high internal consistency and acceptable temporal stability. Participants are asked to rate, on a 5-point Likert scale, how often they experienced the thoughts described by the items during the previous month, 0 (*never*) to 4 (*very often*). Global stress scores were obtained by averaging the PSS items.

Environmental Attitudes Scale (EAS; Pettus & Giles, 1987). The EAS is comprised of 30 items representing environmental responsibility, rights, and restrictions for environmental quality, and social and governmental actions for environmental quality. Its construct validity has been supported by an exploratory factor analysis, and the EAS displayed adequate internal consistency. Because of space constraints, it was not possible to use the totality of the EAS items in the current study. Hence, 12 items were randomly selected. Items were rated on a 7-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). A global environmental attitude index was obtained by computing the average of all the items ($\alpha = .80$).

Environmental Satisfaction Scale (ESS; Pelletier, Legault, & Tuson, 1996). The ESS is comprised of two subscales (four items/subscale) assessing the level of environmental satisfaction and the level of satisfaction regarding the government's environmental policies. Only the first of these subscales was included in the current study. The ESS factorial structure has been supported by both exploratory and confirmatory factor analyses. Also, the ESS subscales have shown satisfactory construct validity, internal consistency, and temporal stability. Items are rated on a 7-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*). Items were averaged to generate a global environmental satisfaction score.

Perceived importance of environmental problems and perceived competence for environmental behaviors. These two scales were developed specifically for the goals of the current study. The importance scale (four items) is designed to assess the perceived seriousness of the environment's condition (e.g., "I am very concerned about the impact that the present environmental problems might have on future generations"), while the competence scale (six items) targets feelings of personal proficiency regarding environmental behaviors (e.g., "I think I can effectively do things to help the environment"). Participants are asked to rate, on a 7-point Likert scale ranging from 1 (*does not correspond at all*) to 7 (*corresponds exactly*), the extent of the correspondence between the items and their personal feelings. Both scales displayed adequate internal consistency (perceived importance, $\alpha = .79$; perceived competence, $\alpha = .84$). Global importance and competence indices were obtained by computing the average for each scale.

Table 4

Correlations Between MTES Subscales and Related Constructs

	Intrinsic motivation ($\alpha = .87$)	Integrated regulation ($\alpha = .89$)	Identified regulation ($\alpha = .86$)	Introjected regulation ($\alpha = .79$)	External regulation ($\alpha = .84$)	Amotivation ($\alpha = .82$)
Psychological constructs						
Locus of control						
Internality	.35**	.36**	.37**	.32**	.02	.02
Powerful others	-.04	-.07	-.08	.05	.16**	.10
Chance	.06	.02	-.02	.06	.26**	.23**
Self-esteem	.15*	.16**	.13*	.05	-.02	.03
Perceived stress	.03	-.11*	-.02	.13*	.27**	.07
Environmental constructs						
Environmental attitudes	.39**	.50**	.48**	.33**	-.09*	-.17**
Environmental satisfaction	-.10*	-.20**	-.04	-.13*	.16**	.18**
Perceived competence	.53**	.48**	.46**	.25**	-.01	-.30**
Perceived importance	.40**	.39**	.38**	.33**	-.25**	-.47**
Social desirability						
Self-deception	.06	-.05	.03	.02	-.05	.04
Impression management	-.01	-.05	.05	-.04	-.05	-.06

*$p < .05$. **$p < .01$.

Table 5

Correlations Between MTES Subscales and Environmental Behaviors

	Intrinsic motivation	Integrated regulation	Identified regulation	Introjected regulation	External regulation	Amotivation
Reuse						
Reuse the unused side of paper	.17**	.23**	.17**	.08	-.02	-.02
Purchase things designed/built to last	.18**	.24**	.31**	.09	-.07	-.18**
Reuse paper lunch or grocery bags	.21**	.28**	.24**	.19**	-.15*	-.25**
Hand down clothing to other people	.14*	.20**	.15*	.19**	-.03	-.16**
Throw away leftovers from meals (reverse scored)	.04	.12*	-.02	.04	-.02	-.09
Save jars and containers for storing things in	.24**	.31**	.14*	.16**	-.12*	-.19**
Recycle						
Recycle nondeposit glass jars and bottles	.15*	.28**	.23**	.11*	-.05	-.20**
Encourage friends to recycle	.41**	.48**	.35**	.33**	.02	-.20**
Recycle nondeposit aluminum cans	.24**	.32**	.26**	.14*	-.05	-.20**
Return deposit beverage containers to store	.11	.15*	.14*	.10*	.00	-.03
Recycle newspapers	.19**	.31**	.26**	.17**	.00	-.17**
Purchasing behaviors						
Buy biodegradable products	.30**	.36**	.24**	.26**	-.03	-.20**
Buy in bulk whenever possible	.20**	.31**	.14*	.15*	.06	-.11*
Energy conservation						
Use environmentally friendly forms of transportation	.12*	.05	.13*	.00	-.04	-.12*
Additional fees	.26**	.18**	.18**	.26**	-.07	-.24**
Activism	.17**	.16**	.13*	.08	-.10*	-.11*

*$p < .05$. **$p < .01$.

Frequency of environmental behaviors (adapted from De Young, 1986b). The behavior scales designed by De Young (1986b) measure two dimensions of environmental behavior: recycling (seven items) and reusing (four items). For the purposes of the current study, four items were retained from the reusing subscale and three items from the recycling subscale. Two new items were created and incorporated into these two subscales. Additional items measuring energy conservation (e.g., "use environmentally friendly forms of transportation") and environmentally conscious purchasing behaviors (e.g., "buy biodegradable products") were also included in the questionnaire. Participants were asked to rate how frequently they performed the environmental behaviors on a 7-point Likert scale ranging from 1 (*never*) to 7 (*always*).

Other related behavioral constructs. Two additional questions were included in the questionnaire package to further evaluate participants' commitment to the environment. The first question asked participants if they would be willing to pay additional fees to the university to support the implementation of an intensive recycling program, and the second question asked participants if they were a member of an environmental group (i.e., activists).

Balanced inventory of desirable responding (Paulhus, 1984). This instrument is comprised of two subscales of 20 items each. The self-deception subscale (SD) measures people's propensity to exaggerated claims of desirable characteristics. Alternatively, the impression management subscale (IM) assesses the tendency to overreport positive behaviors and to underreport undesirable ones. Agreement with the items is rated on a 7-point Likert scale ranging from 1 (*not true*) to 7 (*very true*). Both subscales have been shown to possess good convergent and discriminant validity, as well as adequate internal consistency and temporal stability. For the purposes of the current study, the items of each subscale were averaged to obtain global SD and IM scores.

Results and Discussion

Correlations between the MTES subscales and the related psychological and environmental constructs, as well as between the MTES subscales and social desirability, were computed. Results are presented in Tables 4 and 5.

First, desirable psychological variables, namely internality of locus of control and self-esteem, were positively correlated with the self-determined motivational subtypes (i.e., intrinsic motivation, integrated and identified regulation), while they were generally negatively related or unrelated to non-self-determined motivational subtypes (i.e., introjected and external regulation, amotivation). The perceived influence of chance, powerful others, and perceived stress displayed a reverse pattern of correlations. These factors were largely negatively related, or unrelated, to self-determined motives. Con-

versely, these factors were mostly positively related to non-self-determined motives. Second, environmental attitudes, perceived environmental competence, and perceived importance of environmental issues were positively related to self-determined motivational types. The magnitude of these correlations lessened for the non-self-determined motivational types. Eventually, the correlations grew negative for the least self-determined types (external regulation and amotivation). Third, self-determined motives related negatively to environmental satisfaction, while non-self-determined motives displayed positive correlations with this construct. Fourth, correlations between the MTES subscales and both social desirability subscales, namely self-deception and impression management, were all nonsignificant ($-.05 < r < .06$). Thus, the MTES appears to be independent of this response bias. Fifth, as reported in Table 5, self-determined forms of motivation (intrinsic motivation, integrated and identified regulation) were generally significantly related to environmental behaviors. Although a number of correlations between introjected regulation and environmental behaviors were significant, the correlations between non-self-determined subscales and environmental behaviors were generally nonsignificant or negative. A similar pattern can be observed for the correlations between willingness to pay additional fees to sponsor a recycling program, activism, and the MTES subscales. Specifically, the self-determined motivational subscales were correlated with willingness to pay additional fees, as well as with involvement in an environmental group. Negative correlations were observed between these variables and the least self-determined motives. In sum, the correlations between the MTES subscales and the related constructs generally reflected the simplex pattern. Specifically, high self-determination appears to relate positively to desirable variables and negatively to undesirable ones. Conversely, low self-determination appears to relate positively to undesirable factors and negatively to desirable ones. Finally, consistent with the results of Study 1 and Study 2, the MTES subscales displayed adequate internal consistency ($.79 < \alpha < .89$).

Study 4

Finally, the purpose of the fourth study was to examine the test retest reliability of the MTES. A sample of university students completed the MTES on one occasion and then completed the scale again 5 weeks later.

Method

A sample of 66 university students who participated in Study 3 were asked to complete the MTES for a second time, 5 weeks following their initial responses. On both occasions, the MTES was administered to groups of students in class.

Table 6

Internal Consistency and Test–Retest Correlations for the MTES Subscales

	Cronbach's α Time 1	Cronbach's α Time 2	Test–retest correlations
Intrinsic motivation	.93	.96	.73**
Integrated regulation	.90	.94	.74**
Identified regulation	.89	.92	.68**
Introjected regulation	.78	.90	.63**
External regulation	.87	.91	.79**
Amotivation	.78	.88	.66**

**$p < .01$.

Results and Discussion

To verify the test–retest reliability of the MTES, correlations between mean scores on the MTES subscales for Time 1 and Time 2 were calculated. In addition, the internal consistency of the subscales was compared through examination of their Cronbach's alpha values for each testing session. Results are presented in Table 6.

The MTES subscales displayed adequate test retest correlations. The values ranged from .63 to .79. Moreover, internal consistency values ranged between .78 and .96, and were thus deemed satisfactory, both at Time 1 and Time 2.

General Discussion

Together, the results of the four studies demonstrate that the MTES possesses very acceptable levels of reliability and validity. In terms of reliability, results indicate that all of the MTES subscales had high levels of internal consistency and satisfactory test–retest reliability over a 5-week period. In terms of validity, results of both exploratory and confirmatory factor analyses supported the six-factor structure of the scale. In general, correlations between the MTES subscales form a simplex pattern that provides support for the theoretical

influence of the self-determination continuum (Deci & Ryan, 1985). In addition, correlations between the MTES subscales and the related psychological constructs provide a pattern of results globally supportive of our predictions derived from Deci and Ryan's (1985, 1991) theory. For instance, the higher forms of self-determination (intrinsic motivation, integrated, and identified regulation) were associated with the internal locus of control subscale, whereas the powerful others subscale was associated with the lowest forms of motivation on the self-determination continuum (external regulation and amotivation), and the chance subscale was associated with the amotivation subscale. Finally, the MTES appears to be unaffected by social desirability biases.

Examination of the means for the different subscales of the MTES revealed that people are behaving in an environmentally conscious way for different reasons. For example, some people indicated that they engage in environmentally conscious behaviors for the pleasure and satisfaction they derive from doing so, while others expressed that they do such behaviors largely for instrumental reasons (e.g., to obtain rewards such as recognition from others, or to avoid self-imposed punishments such as feelings of guilt).

Not only are people engaging in environmentally conscious behaviors for different reasons, but it appears that these reasons are differentially related to various consequences. Consistent with the theory of Deci and Ryan (1985, 1991), self-determined individuals generally indicated that they are dissatisfied with the state of the environment, that the environmental problem is an important one, that they feel competent to do something about it, and that they engage in more activities to help solve the problem. Conversely, non-self-determined individuals, for the most part, reported that the environmental situation is satisfying and of no importance, that they lack a sense of competence toward it, and that they are less likely to engage in environmental behaviors. It is interesting to note that the relationship between satisfaction and self-determined forms of motivation is negative, since this relationship is generally positive in other domains such as education (Vallerand et al., 1992) or sports (Pelletier, Fortier, et al., 1996). In our opinion, this difference can be attributed to the fact that, in the environmental domain, the level of satisfaction is an antecedent of motivation. Pelletier, Legault, and Tuson (1996), in agreement with Prester, Rohmann, and Schellhammer (1987), have proposed that people evaluate the state of their environment to determine the extent of their satisfaction with the perceived environmental conditions. Following a negative evaluation, individuals would identify goals representing desired changes in environmental conditions. These goals would motivate people to try to improve the condition of their environment. More studies are necessary to verify the validity of this proposition and to better understand the factors leading people to behave in an environmentally conscious manner.

Although preliminary in nature, these findings hold some potentially important implications for policymakers. It would seem that concern should not be confined merely to encouraging the public to behave in an environmentally-conscious way but, more importantly, people should be encouraged to do so for self-determined reasons (De Young et al., 1993). Future research should aim to identify strategies that could foster self-determination toward environmental behaviors. Such research could be guided by the growing body of research addressing the determinants of motivational orientations.

Recent studies in the field of human motivation and self-determination (Deci & Ryan, 1985, 1987) suggest that people's levels of self-determination can be enhanced or undermined by three characteristics of the social environment: autonomy support (the degree to which friends, relatives, or policymakers encourage people to initiate and make their own choices rather than apply pressure to control their behavior), provision of competence feedback (the degree to which they provide constructive feedback about one's competence), and involvement (the extent to which they show genuine interest in relating to them). Along these lines, research on management and conservation behaviors (De Young et al., 1993) has shown that helping people to understand the nature of environmental problems, as opposed to using coercive techniques (e.g., social pressure, punishment, or taxes), helps them to carry out these environmental behaviors.

However, a complete assessment of the psychometric properties of the MTES will necessitate additional research, particularly in terms of establishing its external validity. One important issue that would need to be addressed by future research includes further assessing individuals' self-determination as a reliable predictor of environmental behaviors (e.g., recycling, energy conservation, activism). Green-Demers, Pelletier, and Menard (1997) have suggested that the frequency of environmental behaviors varies with the degree of behavioral difficulty. As behaviors become more difficult, individuals may need more self-determination to achieve them. For example, recycling at home (e.g., curbside recycling) may be easier to do than buying biodegradable products. These behaviors, in turn, should be easier to achieve than reading books on the environment. A low level of self-determination may be sufficient for recycling to take place at home. However, higher levels of self-determination may be necessary for recycling to take place when a person is away from home or does not have access to recycling bins.

The MTES could also be used at different points in time in order to better understand the motivational changes produced by the provision of new government policies and by the way these policies are implemented. In a first step, the effects of actual governmental strategies (e.g., relying on material incentives, social pressure, information, or providing access to recycling facilities) on

self-determination could be assessed. In a second step, changes in self-determination levels could be linked to the integration and maintenance of environmental behaviors into people's lifestyles. Further research on these issues is needed to augment our knowledge of the relationships between motivational orientation and the maintenance of environmental behaviors.

Finally, in our view, one of the most important aspects of self-determination theory to consider is its conceptualization of the internalization of behavioral regulation (Rigby, Deci, Patrick, & Ryan, 1992; Ryan & Connell, 1989). While the determinants of self-determination, discussed previously, delineate the conditions that may facilitate or inhibit this process, the internalization of self-determination depicts how people come to integrate the regulation of their extrinsic behaviors. Internalization refers to the process by which an individual acquires an attitude, belief, or behavior from the social environment. This encompasses all of the behaviors that do not occur spontaneously but are rather required by the social world. It is the developmental process by which the demands and values of the socializing environment gain value for oneself and are transformed into personal purposes (Deci & Ryan, 1991; Ryan & Connell, 1989). Internalization is an innate, dynamic, and proactive process. By successfully transforming outer regulation into inner regulation, the person evolves toward greater autonomy and more effective functioning. The four levels of extrinsic motivation identified in the MTES (external, introjected, identified, and integrated regulation) represent the different levels of internalization of external contingencies, as well as the relative success of the internalization process. Prior to SDT, researchers in the field of environmental psychology considered intrinsic motivation as the unique source of internal motivation (e.g., De Young, 1986b). By distinguishing between intrinsic motivation and different forms of self-determined extrinsic motivation (i.e., integrated and identified regulation), SDT goes one step further and expands the study of behavioral self-regulation and self-determination to extrinsic behaviors.

Thus, SDT (Deci & Ryan, 1985, 1991) holds some potentially interesting implications for environmental applied interventions since it contributes to a better understanding of autonomous motives and of the factors likely to facilitate or inhibit their development. Through the proper implementation of external contingencies, one could encourage people to participate in environmentally conscious activities. Provided that the characteristics of the interpersonal environment are favorable, soon the process of internalization will take over and people will accept as their own motives that were originally foreign. Once this process is successfully completed, external contingencies would no longer be necessary, because engagement in environmentally conscious activities would have become self-determined. Further research on this issue is needed. It is our hope that the development of the MTES will one day contribute to a better comprehension of the interaction between real-life environments, motivation, and the integration of environmentally conscious behaviors into people's lifestyles.

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