

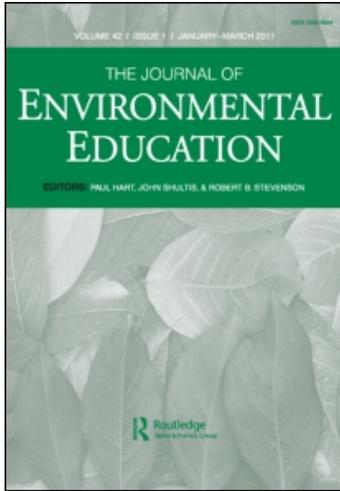
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### Variation in Environmentalism Among University Students: Majoring in Outdoor Recreation, Parks, and Tourism Predicts Environmental Concerns and Behaviors

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## EMPIRICAL RESEARCH

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# Variation in Environmentalism Among University Students: Majoring in Outdoor Recreation, Parks, and Tourism Predicts Environmental Concerns and Behaviors

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In a survey of Canadian university students ( $N = 205$ ), the relationship between majoring in an outdoor recreation university program and environmental concern, cooperation, and behavior were examined. Stepwise linear regression indicated that enrollment in outdoor recreation was predictive of environmental behavior and ecological cooperation; and these results held independently of age and gender. We then examined the possibility that environmental concern may mediate these relationships. Inclusion of ecocentrism as a mediating variable indicated that environmental concern partially accounted for the relation between outdoor recreation and self-reported environmental behavior, and fully mediated (reduced to nonsignificance) the relationship between outdoor recreation and ecological cooperation. Results are discussed in the context of education, and more specifically experiential outdoor education as promoting environmental behavior through greater concern for the ecosystem.

**Keywords** *education, environmental behaviour, environmental concern*

Research aimed at understanding individual differences in environmentalism has recognized the role of education (usually quantified as the level of formal schooling received by an individual) in predicting environmental attitudes and behaviors (e.g., Buttel, 1979; Du Nann Winter, 2000; Ewert & Baker, 2001; Wall, 1995; Kolmuss & Agyeman, 2002; Mohai & Twight, 1987; Poortinga, Steg, & Vlek, 2004). In attempting to understand this relationship we must first and foremost acknowledge that highly educated individuals tend to be of greater socioeconomic status, which is also strongly related to environmental concerns, attitudes, and initiatives (Ewert & Baker, 2001;

Kolmuss & Agyeman, 2002). However, it is unlikely that the relationship between education and environmentalism is merely an artifact of socioeconomic status. For example, controlling for household income, Poortinga et al. (2004) found that level of education predicted lower household energy use. Beyond links to socioeconomic status, the relationship between educational attainment and environmentalism might be due to the dissemination of environmentally relevant knowledge, increasing one's ability to understand comprehensive global issues allowing students to develop a worldview regarding the human relationship with nature (Hines, Hungerford, & Tomera, 1987; Milbrath, 1989; Norton, 1991; Tomsen & Disinger, 1998).

While empirical findings have highlighted the importance of formal education strategies in promoting environmental concern, very few have acknowledged or addressed the degree of variability in environmentalism that exists between subgroups of educated individuals, such as university students. Longer education is associated with knowledge of environmental issues (Kolmuss & Agyeman, 2002), yet this relationship is likely to vary as a function of the specific type of education received. The present study addressed this gap in knowledge by suggesting there may be fundamental differences between those who major in environment-oriented majors, such as an outdoor recreation, parks, and tourism (ORPT) program during their post-secondary education, and those who enroll in more traditional streams (i.e., psychology, business, etc.). Exploring individual differences among students is of considerable interest because understanding "how different groups of professionals from various academic backgrounds perceive environmental issues might improve society's ability to reach consensus with a variety of the environmentally related issues that it faces" (Ewert & Baker, 2001, p. 703). Considering the potential value of university education in promoting an environmentally mindful public, it is important to understand the role of one's university major as a factor that might predict the level of environmental concern and behavior expressed by the individual. The present study sought to replicate preliminary findings (Ewert & Baker, 2001) of increased environmental concern and self-reported behaviors among students in natural resource oriented majors—in this case an ORPT undergraduate program. We also tested the potential mediating role of environmental concern to the relationship between university program and self-reported environmental behaviors as well as willingness to cooperate in sharing ecological resources.

Ewert and Baker (2001) found that university students majoring in appreciative natural resource fields were significantly more likely to endorse pro-environmental concerns and behaviors compared to forestry students and those in more traditional programs (e.g., English, business administration). Further, Smith-Sebasto (1995) examined the influence of an environmental studies course on pro-environmental behavior. It was found that the students' locus of control for environmentally responsible behavior was significantly increased upon completion of the course. Those who completed the course reported greater levels of pro-environmental behavior than those who did not. These findings suggest that beyond the level of education attained, differences in environmentalism might exist between those who are enrolled in an ORPT program and those enrolled in other programs.

### THE ROLE OF UNIVERSITY MAJOR IN PROMOTING ENVIRONMENTAL CONCERN

Why might outdoor recreation students express greater levels of environmental concern? One possible answer is that individuals elect to participate in an ORPT program based on their

existing belief system regarding the natural environment (Ewert & Baker, 2001). Indeed, De Young (1996) suggested that individuals choose their academic discipline, in part, based upon their existing belief system and psychological makeup. Prospective students who are attracted to an ORPT program might already value the environment and the related pleasurable activities that it provides and might therefore act to protect the ecosystem to a larger degree than non-ORPT students. According to Bjerke, Thrane, and Kleiven (2006), the cognitive hierarchy model suggests that the choice to partake in particular outdoor activities, which are a fundamental part of an ORPT program, should also be affected by the individual's environmental values (e.g., Knopp & Tyger, 1973).

Existing research on the relationship between university major and environmentalism suggests that the dissemination of environmentally relevant information present in an ORPT program might also play a key role in influencing environmental concern. Education is an important aspect of social change, where ideas and worldviews can be circulated and legitimized (Cleland 2001; Thornton, 2005). However, as Pascarella and Terenzini (2005) have noted, educational experiences vary considerably between students. This has led authors to speculate about the relationship between university major and values that may be important to environmentalism. Chan (1996) noted that school can be one of the most fundamental sources of environmental information for students. Further, programs and majors lacking this provision of environmental information may negatively relate to environmental concerns (Gamba & Oskamp, 1994; Oskamp et al., 1991). One notable study on the effects of college major on values utilized growth curve analysis to estimate effects of various majors (Mitchell, Kimball, Thornton, & Young-DeMarco, 2008). The authors found that attending college (especially in a nonbusiness major) related to greater valuation of making contributions to society. Given the variation between educational streams in worldviews, philosophies, and information provided to students, we expect those students majoring in ORPT to express greater ecocentric concern.

## UNIVERSITY MAJOR AND PRO-ENVIRONMENTAL BEHAVIOR

Differences in *environmental behavior* might also exist between those choosing to major in an ORPT program versus individuals in other majors. Ewert and Baker (2001) found that students educated in outdoor recreation expressed greater levels of both environmental concern and behavior. Further, Arnocky, Stroink, and Decicco (2007) showed that in a sample of university students, environmental concern was related to individuals' self-reported willingness to both cooperate in sharing valuable ecological resources and to engage more frequently in direct forms of environmental behavior (e.g., recycling, turning off lights). If students majoring in ORPT report greater concern for the ecosystem, then it is also likely that they will report a willingness to behave in a pro-environmental manner, including cooperation in sharing resources and in actively pursuing behaviors considered to be "pro-environmental." In the current study, we sought to extend these findings by examining differences in ORPT and non-ORPT students in self-reported cooperation and competition when sharing ecological resources in a commons dilemma situation.

Cooperation in the sharing of resources is often assessed using a social dilemma such as a commons dilemma. A commons dilemma is a measure of cooperation/competition in sharing desirable resources. In a commons dilemma situation one must either compete or cooperate with others by "harvesting" an optional amount of resources on each turn (Hardin, 1968). If every

participant harvests a reduced amount of resources on each turn there is a greater renewal of the common resources, and the final accumulation of resources for each player is greater (and the accumulated stress on the ecosystem is less) than if all participants were to compete with one another by harvesting the largest possible amount (Hardin, 1968). The present study focused on the environmental attitudes and beliefs of students, where we expected that ORPT students would self-report greater willingness to cooperate in sharing ecological resources than non-ORPT students.

The present study also explored the hypothesis that environmental concerns mediate the link between majoring in ORPT and environmental cooperation and behaviors. Studies have found a positive link between environmental concern and various representations of pro-environmental behavior (e.g., Arnocky et al., 2007; Kaiser, Wolfing, & Fuhrer, 1999), although it should be noted that a number of studies have reported only modest findings (Buttel, 1987; Tarrant & Green, 1999; Van Liere & Dunlap, 1981). The present study tests the hypothesis that environmental concern mediates the relationship between majoring in ORPT and two self-report indicators of environmentalism: (a) conservation/pro-environmental behaviors and (b) cooperation in sharing natural resources in a commons dilemma scenario.

## Hypotheses

The goal of the present study was to evaluate differences in environmental concern, cooperation, and behavior between students majoring in an ORPT program and students in other programs. Specifically, we tested the following hypotheses:

*Hypothesis 1:* University major will predict environmental concern. Specifically, participation in the ORPT program will positively relate to ecocentrism and negatively relate to anthropocentrism.

*Hypothesis 2:* University major will predict self reported pro-environmental behaviors.

*Hypothesis 3:* University major will predict cooperation for the sake of the ecosystem in a self-report commons dilemma situation.

*Hypothesis 4:* The relationships proposed in H2 and H3 will be accounted for primarily by increased levels of environmental concern in those enrolled in ORPT, and thus the relationship between university major and general ecological behavior and ecological cooperation will be mediated by environmental concern (H4a and H4b respectively; see Hartig, Kaiser, & Strumse, 2007).

## METHOD

### Participants

Participants were second-year students in the department of ORPT and introductory psychology students at a mid-sized Canadian university ( $N = 205$ ). Participants ranged in age from 17 to 52 ( $M = 20.42$ ,  $SD = 5.83$ ). The sample consisted of 142 females and 63 males. Of the 205 participants, 28 were in the ORPT program and 177 were from other programs. Participants were coded as 1 if they were majoring in ORPT and as 0 if they were not majoring in ORPT. We grouped students who were not majoring in ORPT together because the cell sizes for other

specific majors were too small to be coded independently (e.g., nursing, psychology, political science, education). Importantly, the two groups did not significantly differ on mean age,  $t(203) = 1.58, p > .05$ , as age has been shown to positively relate to environmentalism.

## Procedures

Participants provided informed consent, and participants under the age of 18 also obtained parental consent. Participants then completed measures of demographic information, environmental concern, cooperation, and pro-environmental behavior. Questionnaire packages were returned anonymously via a box located in a common area. For the present study, two introductory psychology and two outdoor recreation classes were recruited for the study. The response rate for the total sample was 82%.

## Environmental Concern

Ecocentric and anthropocentric environmental attitude motivations were assessed using a measure developed by Thompson and Barton (1994). Ecocentrism is a valuation of nature for its own sake and was measured with a 5-point Likert-scale (anchors: *strongly disagree* to *strongly agree*) consisting of 12 items such as “I prefer wildlife reserves to zoos” and “sometimes it makes me sad to see forests cleared for agriculture.” The scale was internally consistent at  $\alpha = 0.76$ . Anthropocentrism, by contrast, is a valuation of the ecosystem based on the material benefits to humanity. Anthropocentrism was measured using the 12 items from the Thompson and Barton (1994) measure across a 5-point Likert-scale (anchors: *strongly disagree* to *strongly agree*) and was internally consistent ( $\alpha = 0.74$ ). Examples of anthropocentric items are “The most important reason for conservation is human survival” and “One of the best things about recycling is that it saves money.”

## Self-Reported Commons Dilemma

The self-report commons dilemma (Arnocky et al., 2007) is a hypothetical commons dilemma situation in which participants imagined they were a cattle farmer sharing common grazing land with other farmers. They were told that they share the commons with in-group (Canadian) and out-group (American) farmers. Each “farmer” has 10 cattle grazing on the land and at these feeding rates the land is self-sustaining (zero depletion). The participants then read that they can add five more cattle without repercussions from the other farmers, but if every farmer were to do so, the land would deplete. They were then given the opportunity to either compete (add 5 cattle), to cooperate by not adding additional cattle for the well-being of the other farmers or to cooperate for the well-being of the ecosystem. The measure employs a 5-point scale Likert-scale anchored at strongly disagree and strongly agree. Although the self-report commons dilemma offers a variety of cooperation subscales, we were primarily interested in the ecological cooperation subscale where individuals chose to cooperate with others for the sake of the ecosystem. The ecological cooperation subscale consisted of 5 items. Internal consistency for the ecological cooperation subscale was  $\alpha = 0.76$ . For further information regarding the development of this measure see Arnocky et al. (2007).

## Pro-Environmental Behavior

Self-reported environmental behavior was measured with a 15-item scale regarding self-reported conservation behavior (Schultz et al., 2005; Arnocky et al., 2007). The measure employed a 5-point Likert scale with anchors never and very often. In the present study, this measure of environmental behavior was internally consistent ( $\alpha = 0.81$ ). Behavioral examples included in the measure are “looked for ways to reuse things,” “composted food scraps,” “picked up litter that was not my own,” and “turned off the TV when leaving the room.”

## RESULTS

### Analyses

A stepwise multiple regression procedure was employed to examine the relationship between university major and both self-reported environmental behavior and ecological cooperation in a commons dilemma situation. This procedure is less sensitive to variation in cell size compared to alternative procedures and allows for simple tests of mediation using the unstandardized regression coefficients. Missing values were minimal in this data set, and the default listwise deletion process was implemented. We tested for multivariate outliers using the Mahalanobis distance procedure; none of the distance values equaled or exceeded the chi-square criterion suggesting that there were no multivariate outliers in the data set.

We examined environmental concern (ecocentrism and anthropocentrism) as a potential mediating variable in the relationship between enrollment in ORPT and both criterion variables. A standard multiple regression technique was employed in order to account for the relation between predictor and mediator (Baron & Kenny, 1986). Thus, in testing for mediation, the criterion was regressed hierarchically on the predictor (block 2) and mediator (block 3) after controlling for sociodemographic variables (age and gender—block 1).

### Descriptive Findings

The two groups were compared for potential gender differences across major, and it was found that there were a greater proportion of females in the combined “other” major compared to the ORPT major ( $\chi^2(1) = 5.66, p < .05$ ). Table 1 provides descriptive statistics for each measure, and Table 2 provides inter-correlations between measures.

### University Major and Environmental Concern

Standard multiple regression procedures were then used to examine the relationship between university major (0 = not enrolled in ORPT, 1 = enrolled in ORPT) and environmental concern (ecocentrism and anthropocentrism) while controlling for age and gender. We found enrollment in ORPT significantly predicted ecocentric attitudes,  $\beta = 0.189, p < .01$ , and negatively predicted anthropocentrism,  $\beta = -0.23, p < .01$ .

TABLE 1  
Descriptive Statistics for Environmental Concern, Self-Report Commons Dilemma, and Environmental Behavior

	N	Mean	Range	Std. Deviation
Ecocentrism	205	4.19	2.71	0.53
Anthropocentrism	205	3.13	3.71	0.69
Competitive	205	2.49	3.33	0.73
Cooperative	205	3.70	4.00	0.62
Ecological cooperative	205	4.16	3.00	0.63
Environmental behavior	205	3.31	3.27	0.60

### Outdoor Recreation and General Ecological Behavior

In the first step of the stepwise regression analysis, sociodemographic characteristics (age and gender) did not explain a significant amount of variance for general ecological behavior ( $\beta$ s = 0.009 to  $-0.012$ , *ns*; see Table 3). University major was then entered in the second block of the stepwise procedure. As expected after adjusting for sociodemographic variables, university major contributed 7.2% of the variance in self-reported ecological behavior,  $\beta = 0.276$ ,  $p < .001$ . At the third step, environmental concern predicted ecological behavior (ecocentrism,  $\beta = 0.445$ ,  $p < .001$ ; anthropocentrism,  $\beta = -0.085$ ,  $p > .05$ ). The inclusion of environmental concern into step 3 of the model contributed to the model,  $\Delta R^2 = 0.208$ ,  $p < .05$  (for a total explained variance of 27.3% in ecological behavior).

With ecocentrism and anthropocentrism entered on step 3, the relationship between course and ecological behavior decreased from  $\beta = 0.276$ ,  $p < .01$  to  $\beta = 0.180$ ,  $p < .01$ , which is an indication that environmental concern partially mediated the relationship between major and behavior (Figure 1). A Sobel test was employed to determine the strength of the indirect effect of the mediator by testing the hypothesis of zero difference between the total effect and the direct effect. The Sobel test required the unstandardized regression coefficient and standard error for

TABLE 2  
Bivariate Intercorrelations among Age, Gender, Environmental Concern, Commons Dilemma Responses, and Pro-environmental Behavior

	1	2	3	4	5	6	7	8
1. Age	1							
2. Gender	.05	1						
3. Major	-.11	-.17**	1					
4. Ecocentrism	.01	.04	.18**	1				
5. Anthropocentrism	.07	-.10	-.21**	-.15*	1			
6. Competition	-.01	-.18**	-.06	-.28**	.34**	1		
7. Cooperation for humans	.12	.06	-.01	.29**	.01	-.41**	1	
8. Ecological cooperation	.06	.16*	.12*	.59**	-.24**	-.40**	.49**	1
9. Environmental behavior	.09	-.01	.28**	.49**	-.19**	-.39**	.30**	.47**

\* $p < .05$  (two-tailed) \*\* $p < .01$  (two-tailed).

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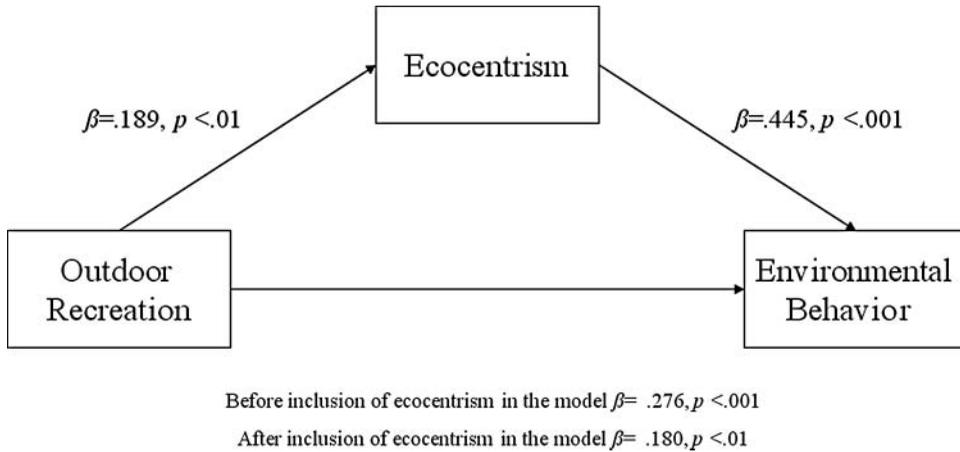


FIGURE 1 Stepwise linear regression model; environmental concern as a partial mediator of the relationship between enrollment in an outdoor recreation university program and environmental behavior (control for participant age and sex not depicted).

both the relationship between predictor (major) and mediator (ecocentrism) and the mediator and criterion (behavior) when the predictor is included in the model. According to the Sobel test, ecocentrism partially mediated the relationship between university major and ecological behavior,  $z = 2.51, p < .05$ .

College Major and Self-Reported Commons Dilemma Behavior

Age and gender were again entered into block 1 of the stepwise regression and accounted for 2% of variance in ecological cooperation (see Table 4). When university major was entered

TABLE 3  
 Summary of Stepwise Regression Analysis With Ecocentrism and Anthropocentrism as Potential Mediators of the Relationship Between Outdoor Recreation Enrollment and Ecological Behavior

Predictor	Step 1			Step 2			Step 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Age	.01	.01	.09			.12			.11
Gender	-.01	.09	-.01			.04			.00
Major				.48	.12	.28***	.31	.12	.18**
Ecocentrism							.50	.07	.45***
Anthropocentrism							-.07	.05	-.09
$\Delta R^2$	.01			.08			.21		
$R^2_{adj}$	-.01			.07			.27		

B = unstandardized regression coefficient, SE B = standard error of regression coefficient,  $\beta$  = standardized regression coefficient.

\*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

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TABLE 4  
 Summary of Stepwise Regression Analysis with Ecocentrism and Anthropocentrism as Potential Mediators of the Relationship Between Outdoor Recreation Enrollment and Ecological Cooperation in a Hypothetical Commons Situation

Predictor	Step 1			Step 2			Step 3		
	B	SE B	$\beta$	B	SE B	$\beta$	B	SE B	$\beta$
Age			.05			.06			.06
Gender	.21	.09	.16*	.245	.09	.18*	.17	.08	.12*
Major				.266	.13	.15*	.02	.11	.01
Ecocentrism							.66	.07	.57***
Anthropocentrism							-.13	.05	-.14
$\Delta R^2$	.03			.02			.34		
$R^2_{adj}$	.02			.04			.38		

B = unstandardized regression coefficient, SE B = standard error of regression coefficient,  $\beta$  = standardized regression coefficient.

$p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

into block 2 ( $R^2_{adj} = 0.036$ ), gender ( $\beta = 0.18$ ,  $p < .01$ ) and major ( $\beta = 0.15$ ,  $p < .05$ ) significantly predicted ecological cooperation in the self-reported commons dilemma (supporting hypothesis 3). Environmental concern was then entered into block 3. Including ecocentrism and anthropocentrism in the model yielded an  $\Delta R^2 = 0.34$ ,  $p < .01$  for a total explained variance of  $R^2_{adj} = 0.38$ . The majority of explained variance was attributable to environmental concern. In the final model, ecological cooperation was significantly predicted by gender,  $\beta = 0.12$ ,  $p < .05$ , ecocentrism,  $\beta = 0.57$ ,  $p < .01$ , and anthropocentrism (negatively),  $\beta = -0.14$ ,  $p < .05$ , whereas the previously significant effect of major was reduced to nonsignificance,  $\beta = 0.019$ ,  $p > .05$  (Figure 2). As expected, ecocentrism partially mediated the relationship between university major and ecological cooperation,  $z = 2.59$ ,  $p < .01$ .

## DISCUSSION

Previous work has shown that level of education is positively related to environmentalism. The current research addressed potential variation in this relationship by highlighting the fact that certain university majors, such as an ORPT program are more likely to contain students high in environmentalism than are others. Participant gender was predictive of ecological cooperation (greater mean female cooperation) but not environmental behavior or concern. Age was not predictive of any of the variables included in our analyses; this finding could possibly be due to a restricted age range characteristic of studies sampling university students.

Although the level of education achieved is a known predictor of environmental concern and behavior, it is necessary to consider the heterogeneity between individuals in their academic pursuits. Thus, key differences in environmentalism likely exist based upon the focus of one's post-secondary education (i.e., university program). For instance, although education is associated with environmental concern, it may be that ORPT students and non-ORPT students differ markedly in their levels of concern for the environment. Ewert and Baker's (2001) work supported this

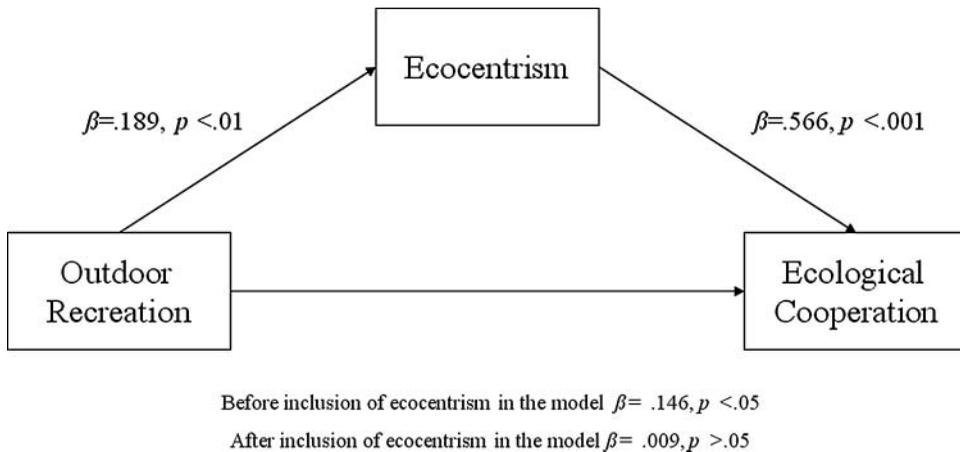


FIGURE 2 Stepwise linear regression model: Environmental concern as mediating the relationship between enrollment in an outdoor recreation university program and cooperation in a self-report commons dilemma (control for participant age and sex not depicted).

hypothesis by demonstrating that enrollment in an ORPT major (termed resource recreation and tourism) was a better predictor of both concern and behavior compared to enrollment in both forestry and non-natural resource fields. The present study replicated and extended this finding with a focus on ORPT enrollment in relation to environmental concern, cooperation, competition, and self-reported conservation behavior.

Considering the implications of these findings for environmental organizations and experiential educators, it was important to first replicate the initial relationship between university major and environmental concern and behavior (Ewert & Baker, 2001). Specifically, our results indicated that individuals enrolled in an ORPT program expressed significantly greater levels of environmental concern and self-reported pro-environmental behavior than students who were not enrolled in this program.

We extended previous findings by examining ecological cooperation in a self-report commons dilemma. First, we found that gender but not age had a significant effect on whether the student reported a willingness to cooperate; females were more cooperative than their male counterparts. Second, students majoring in ORPT reported significantly greater mean levels of cooperation than students in non-nature disciplines. This finding seems intuitive as students who are concerned for the ecosystem and who are willing to behave in a pro-environmental manner should also be willing to cooperate in sharing and rationing ecological resources. Concern for the ecosystem and a willingness to behave in a pro-environmental, ecologically cooperative manner may be a product of strong commitment to an outdoor recreation university program (e.g., Gale, 1972).

The current study also tested the role of environmental concern as a mediator to these relationships. We found that the link between university major and environmental behavior was largely a function of the regression of behavior onto ecocentrism (environmental concern). Specifically, the effect of university major in predicting pro-environmental behavior was significantly reduced when ecocentrism was entered into block 3 of the model (although the effect between university

major and behavior remained significant, implying partial mediation). In examining the mediating role of ecocentrism to the relationship between university major and ecological cooperation, we found that the relationship between university major and ecological-cooperation was reduced to nonsignificance when ecocentrism was entered into the model. This finding supported the hypothesis that the increased level of environmental concern is crucial to the relationship between a committed involvement in outdoor recreation and both cooperation in a self-report commons situation and pro-environmental behavior. This finding is similar to that of Hartig et al. (2007), who examined participation in outdoor recreation activities rather than university major. Of particular interest, this finding also offers insight into gender differences that are often reported between men and women on pro-environmental variables. Future research would benefit by considering the potential role that an ORPT program might play in promoting or facilitating these behaviors.

Taken together, these findings support the contention that students who major in an ORPT university program are generally more concerned for the ecosystem, and this concern, in part, facilitates environmental cooperation and conservation behavior. These findings offer insight into the differences that exist pertaining to environmental concern, cooperation, and conservation behavior between university students and, by extension, future professionals in various fields. Beyond this, we speculate that an ORPT education might also aid in the promotion of environmentalism. However, the cross sectional nature of the current data precludes any directional statement; experimental or longitudinal work in this area is required.

### Limitations/Future Directions

Certainly the most obvious limitation to the current study and to most examinations of education as a factor relating to environmental concern and behavior is the correlational nature of the design. For instance, the relationships between majoring in ORPT and environmental concern, cooperation, and behavior may be due to (a) a pre-existing belief system that makes such a university program more appealing, (b) the effects of experiential outdoor education (being exposed to nature), (c) the knowledge gained in this program regarding the importance of the ecosystem, or (d) a combination of these factors. Although the purpose of the present study was to determine the nature of the differences in environmental concern, cooperation, and behavior between ORPT and non-ORPT students, and not to infer causal direction, information regarding the efficacy of outdoor recreation programs in promoting such behaviors is certainly important to the field of environmental education. It would be advantageous to know if studying ORPT indeed influences environmental concerns/behaviors or whether environmental concern/behaviors influences the decision to study outdoor recreation. This hypothesis is feasible given that recent longitudinal work has illustrated that values can be influenced by receiving post-secondary education, and that the specific program or major can affect this relationship (Mitchell et al., 2008). If an effect of majoring in an ORPT program can be established through longitudinal or experimental design, the most obvious follow-up question is whether it is the content and/or activities relating to outdoor recreation, the parks/conservation content or the nature-based tourism content, or a combination of the above that might influence environmental concern and behavior. Thus, the relative effects of exposure to outdoor recreation and provision of information regarding

the preservation of ecological resources (both of which are present in ORPT programs) should be identified.

It might be that environmental concerns are increased during exposure to outdoor recreation and to relevant information in the learning environment. While participation in outdoor recreation was not directly assessed in this study, it may be that the outdoor recreation activities included in the curriculum of ORPT major had an impact on their environmental concern. Indeed, the ORPT program examined in this study emphasizes experiential learning, and at the time of sampling, all participants had been exposed to some degree of nature-based outdoor recreation. Examples of such activities available in the program are overnight camping trips, winter camping, and various wilderness based certification courses.

Previous research on this topic (e.g., Bright & Porter, 2001; Geisler, 1977; Jackson, 1986; Nord, Luloff, & Bridger, 1998; Peterson, Hull, Mertig, & Liu, 2008; Tarrant & Green, 1999; Theodori, Luloff, & Willits, 1998) has provided mixed results suggesting that certain types of outdoor recreation, such as appreciative, nonenvironmentally destructive activities may relate to greater environmental concern for the individual who partakes in these activities as well as in household members (e.g., Peterson et al., 2008). Indeed, the learning environment is a necessary component of education strategies aimed at increasing environmental concern and behavior in students. As Hungerford and Volk (1990) suggested, facilitating learners to have contact with pristine natural environments may lead to increased environmental concern which can act as a precursor to environmental behavior (Hungerford & Volk, 1990; Peters-Grant, 1987; Scholl, 1983; Tanner, 1980). It has often been noted that environmentally concerned individuals report 'the outdoors' as being a fundamental determinant of their environmental concerns (Tanner, 1980). For example, Dunlap and Heffernan (1975) found that outdoor recreation is moderately predictive of greater concern for the ecosystem (see also Nord, Luloff, & Bridger, 1998; Teisl & O'Brien, 2003).

One could address the issue of whether type of education actually influences environmental concern, cooperation, and behavior by conducting a longitudinal examination following new students throughout their university career to determine if the criterion variables increase with exposure to an education in ORPT compared to an education in other majors. It would also be interesting to determine if the environmental attitudes of those who remain in the program until completion differ from those who may begin in the ORPT program and change majors after the first year.

It is also feasible to examine the environmental attitudes and behaviors of those who choose to pursue university degrees in 'environmental' (e.g., environmental studies, outdoor recreation and tourism) and 'extractive' degree programs (forestry, mining, engineering). For instance, although forestry students likely enjoy the outdoors, are educated about the environment, and spend time in nature during their program, preliminary findings suggest that forestry students may be less environmentally concerned and hold greater anthropocentric attitudes compared to their counterparts in other university programs (Ewert & Baker, 2001). Thus it would be quite interesting to re-examine any potential differences in environmental concerns, level of cooperation, and behaviors held by students in forestry programs.

Between 1997 and 2007, enrollment in college and university programs increased at a rate of 26% in the United States, increasing from 14.5 million to 18.2 million students (Snyder, Dillow, & Hoffman, 2009). Between 2001 and 2007, enrollment in ORPT programs increased by approximately 45% in the United States (Snyder et al., 2009). By increasing accessibility to such

programming in Canada, universities might help to promote (or at the very least, facilitate) environmentalism in students—either by providing an educational and experiential outlet for those who are environmentally concerned or by promoting such concerns through pro-environmental learning and participation in outdoor recreation activities. We speculate that this type of program might also be an interesting avenue to facilitate environmental concern, cooperation, and conservation behavior in male populations, which are typically reported as being lower than with females (Zelezny, Chua, & Aldrich, 2000). Further, individuals involved in the structure and implementation of such programs should consider the importance of offering forms of experiential outdoor education toward the maintenance and possible promotion of pro-environmental concerns, cooperation, and behavior. This education might be especially important for students who become involved in resource-management professions, as participating in an ORPT program might aid in promoting cooperation for the sake of the ecosystem when dealing with ecological resources. Further effort to offer courses that might aid in the development, maintenance, or expression of environmental attitudes in students should be made accessible to individuals who are not enrolled in an ORPT program.

Finally, as Pooley and O'Connor (2000) noted, the current goal of environmental education is to assess environmental problems, find logical and attainable solutions to any issues that are identified, and to ultimately invoke pro-environmental behavior (e.g., Magnus, Martinez, & Pedauye, 1997). The findings of the current study contributed to this framework by suggesting that concern plays an important role in participation in both cooperative resource sharing and in pro-environmental behaviors. Thus, in order to promote pro-environmental behavior through experiential outdoor recreation, environmental educators should promote an affective response or degree of concern for the natural environment. Further study seems warranted regarding the specific mechanisms potentially associated with experiential outdoor education programs that might aid in promoting such concern.

## REFERENCES

- Arnocky, S., Stroink, M., & DeCicco, T. (2007). Self-construal predicts environmental concern, conservation, and cooperation. *Journal of Environmental Psychology, 27*, 255–264.
- Baron, R., & Kenny, D. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*, 1173–1182.
- Bright, A., & Porter, R. (2001). Wildlife-related recreation, meaning, and environmental concern. *Human Dimensions of Wildlife, 6*, 259–276.
- Bjerke, T., Thrane, C., & Kleiven, J. (2006). Outdoor recreation interests and environmental attitudes in Norway. *Managing Leisure, 11*, 116–128.
- Buttel, F. (1979). Age and environmental concern: A multivariate analysis. *Youth and Society, 10*, 237–256.
- Buttel, F. H. (1987). New directions in environmental sociology. *Annual Review of Sociology, 13*, 465–488.
- Chan, K. (1996). Environmental attitudes and behavior of secondary school students in Hong Kong. *The Environmentalist, 16*, 297–306.
- Cleland, J. (2001). Potatoes and pills: An overview of innovation—diffusion contributions to explanations of fertility decline. In J. B. Casterline (Ed.), *Diffusion processes and fertility transition* (pp. 39–65). Washington, DC: National Academy Press.
- De Young, R. (1996). Some psychological aspects of reduced consumption behavior: The role of intrinsic satisfaction and competence motivation. *Environment and Behavior, 28*, 358–409.
- Du Nann Winter, D. (2000). Some big ideas for some big problems. *American Psychologist, 55*, 516–522.

- Dunlap, R. E., & Heffernan, R. B. (1975). Outdoor recreation and environmental concern: An empirical examination. *Rural Sociology, 40*, 18–30.
- Ewert, A., & Baker, D. (2001). Standing for where you sit: An exploratory analysis of the relationship between academic major and environmental beliefs. *Environment and Behavior, 33*, 687–707.
- Gale, R. P. (1972). From sit-in to hike-in: A comparison of the civil rights and environmental rights movements. In W. R. Burch, N. Cheek, & L. Taylor (Eds.), *Social behavior, natural resources, and the environment* (pp. 280–305). New York, NY: Harper and Row.
- Gamba, R., & Oskamp, S. (1994). Factors influencing community residents' participation in commingled curbside recycling programs. *Environment and Behavior, 26*, 587–612.
- Geisler, Charles C. (1977). Outdoor recreation and environmental concern: A restudy. *Rural Sociology, 42*, 241–249.
- Hardin, G. (1968). The tragedy of the commons. *Science, 162*, 1243–1248.
- Hartig, T., Kaiser, F. G., & Strumse, E. (2007). Psychological restoration in nature as a source of motivation for ecological behavior. *Environmental Conservation, 34*, 291–299.
- Hines, J., Hungerford, H., & Tomera, A. (1987). Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education, 18*, 1–8.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education, 21*, 8–21.
- Jackson, E. (1986). Outdoor recreation participation and attitudes to the environment. *Leisure Studies, 5*, 1–23.
- Kaiser, F. G., Wolfing, S., & Fuhrer, U. (1999). Environmental attitude and ecological behavior. *Journal of Environmental Psychology, 19*, 1–19.
- Kolmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*, 239–260.
- Knopp, T. B., & Tyger, J. D. (1973). Study of conflict in recreational land use: Snowmobiling vs. ski-touring. *Journal of Leisure Research, 5*, 6–17.
- Magnus, V. J., Martinez, P., & Pedayue, R. (1997). Analysis of environmental concepts and attitudes among biology degree students. *Journal of Environmental Education, 29*, 28–33.
- Milbrath, L. W. (1989). *Curriculum: Perspectives and practice*. Toronto, Canada: Copp Clark Pitman.
- Mitchell, C., Kimball, M., Thornton, A., & Young-DeMarco, L. (2008). The reciprocal relationship between college major and values: Family, careers, and society. Unpublished manuscript. Department of Sociology and Institute for Social Research, The University of Michigan, Ann Arbor, MI.
- Mohai, P., & Twhight, B. (1987). Age and environmentalism: An elaboration of the Buttel model using national survey evidence. *Social Science Quarterly, 68*, 798–815.
- Nord, M., Luloff, A. E., & Bridger, J. C. (1998). The association of forest recreation with environmentalism. *Environment and Behavior, 30*, 235–246.
- Norton, B. (1991). *Toward unity among environmentalists*. New York, NY: Oxford University Press.
- Oskamp, S., Harrington, M., Edwards, J., Sherwood, D., Okunda, S., & Swanson, D. (1991). Factors influencing household recycling behavior. *Environment and Behavior, 23*, 494–519.
- Pascarella, E. T., & Terenzini, P. T. (2005). *How college affects students. Volume 2: A third decade of research*. San Francisco, CA: Jossey-Bass.
- Peters-Grant, V. M. (1987). The influence of life experiences in the vocational interests of volunteer environmental workers. *Dissertation Abstracts International, 47*, 3744–3745.
- Peterson, M., Hull, V., Mertig, A., & Liu, J. (2008). Evaluating household-level relationships between environmental views and outdoor recreation: The Teton Valley case. *Leisure Sciences, 30*, 293–305.
- Pooley, J. M., & O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs is what is needed. *Environment and Behavior, 32*, 711–723.
- Poortinga, W., Steg, L., & Vlek, C. (2004). Values, environmental concern, and environmental behavior: A study into household energy use. *Environment and Behavior, 36*, 70–93.
- Scholl, M. (1983, September–October). A survey of significant childhood learning experiences of suburban/urban environmentalists. Paper presented at the 12th Annual Conference of the North American Association for Environmental Education, Ypsilanti, Michigan.
- Schultz, W., Gouveia, V., Cameron, L., Tankha, G., Schmuk, P., & Franek, M. (2005). Values and their relationship to environmental concern and conservation behavior. *Journal of Cross Cultural Psychology, 36*, 455–475.

- Smith-Sebasto, N. J. (1995). The effects of an environmental studies course on selected variables related to environmentally responsible behavior. *Journal of Environmental Education*, 26, 30–33.
- Snyder, T. D., Dillow, S. A., & Hoffman, C. M. (2009). *Digest of Education Statistics* (NCES 2009-020). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics.
- Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *Journal of Environmental Education*, 11, 20–24.
- Tarrant, M., & Green, G. (1999). Outdoor recreation and the predictive validity of environmental attitudes. *Leisure Sciences*, 21, 17–30.
- Teisl, M. F. & O'Brien, K. (2003). Who cares and who acts? Outdoor recreationists exhibit different levels of environmental concern and behavior. *Environment and Behavior*, 35, 506–522.
- Theodori, G. L., Luloff, A. E., Willits, F. K. (1998). The association of outdoor recreation and environmental concern: Reexamining the Dunlap-Heffernan thesis. *Rural Sociology*, 63, 94–108.
- Thompson, S. C., & Barton, M. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, 14, 149–157.
- Thornton, A. (2005). *Reading history sideways: The fallacy and enduring impact of the developmental paradigm on family life*. Chicago, IL: The University of Chicago Press.
- Tomsen, J. L., & Disinger, J. (1998). A method for assessing effects of an Introductory Environmental History course on student worldviews. *Journal of Environmental Education*, 29, 11–20.
- Van Liere, K. D., & Dunlap, R. E. (1981). Environmental concern: Does it make a difference how it's measured? *Environment and Behavior*, 13, 651–676.
- Wall, G. (1995). General versus specific environmental concern: A Western Canadian case. *Environment and Behavior*, 27, 294–316.
- Zelezny, L. C., Chua, P. P., & Aldrich, C. (2000). Elaborating on gender differences in environmentalism. *Journal of Social Issues*, 56, 443–457.