

# BEHAVIORAL INTENTIONS WITHIN OFF-HIGHWAY VEHICLE COMMUNITIES IN THE NORTHEASTERN U.S.: AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR

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**Abstract.**—The increasing use of off-highway vehicles (OHV) in the northeastern United States suggests the need for more effective recreation management strategies in public forest areas. This study employed the Theory of Planned Behavior (TPB) (Ajzen 1991) to examine the attitudes and perceptions of OHV operators. Hypotheses were tested regarding differences in attitudes toward intentions to engage in a behavior (i.e., the creation and use of unauthorized trails). The relationship between attitudes and behavioral intentions was tested. The study attempted to identify the most effective management mechanism for communicating with OHV riders and to clarify views concerning depreciative behaviors within the riding community. It found weak but positive preferences for specific direct and indirect management actions with an overall preference for behavior-specific indirect management. The study supports previous findings about the relationship between attitudes and intentions within the TPB.

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## 1.0 INTRODUCTION

Cordell et al. (2004) report that off-highway vehicle (OHV) (i.e., 4-wheelers, off-highway motorcycles/dirt bikes, 4x4s) use has increased on public lands over

the past decade. In 2003, 37.6 million people 16 years and older participated in off-highway vehicle riding in the United States (Cordell et al. 2004). This trend holds particular significance for public forests in the northeast United States, where the number of people with access to public lands (which is higher than in the west) tends to magnify issues of recreational use. The increasing presence and use of OHVs in the northeastern United States highlight the need to enhance recreation management strategies on public land. OHV operator behaviors such as unauthorized trail creation and use can result in negative social and environmental impacts. Through a mail survey of OHV riders in the Northeast, this study explores the relationships among management techniques (direct and indirect), attitudes towards a behavior (i.e., the creation and use of unauthorized trails by OHV riders), and behavioral intentions of OHV operators.

## 1.1 Theory of Planned Behavior

Human attitudes, intentions, and behaviors are complex issues best organized within a social science-based framework. The Theory of Planned Behavior (TPB) (Ajzen 1991) (Fig. 1) is an established framework for studying the relationships among beliefs and attitudes related to recreation behaviors (Hrubes et al. 2001). Application of the theory in specific recreation populations provides resource managers with the empirical data required to inform policy initiatives. In its simplest form, the TPB suggests that individual behaviors stem from intentions which are formed by a synthesis of attitudes toward the behavior, subjective norms, and a sense of perceived control regarding the behavior.

If the role of management is to influence or prescribe behavior, knowledge of the attitudes that influence specific behaviors may provide a point of intervention. The targeting of certain attitudes would

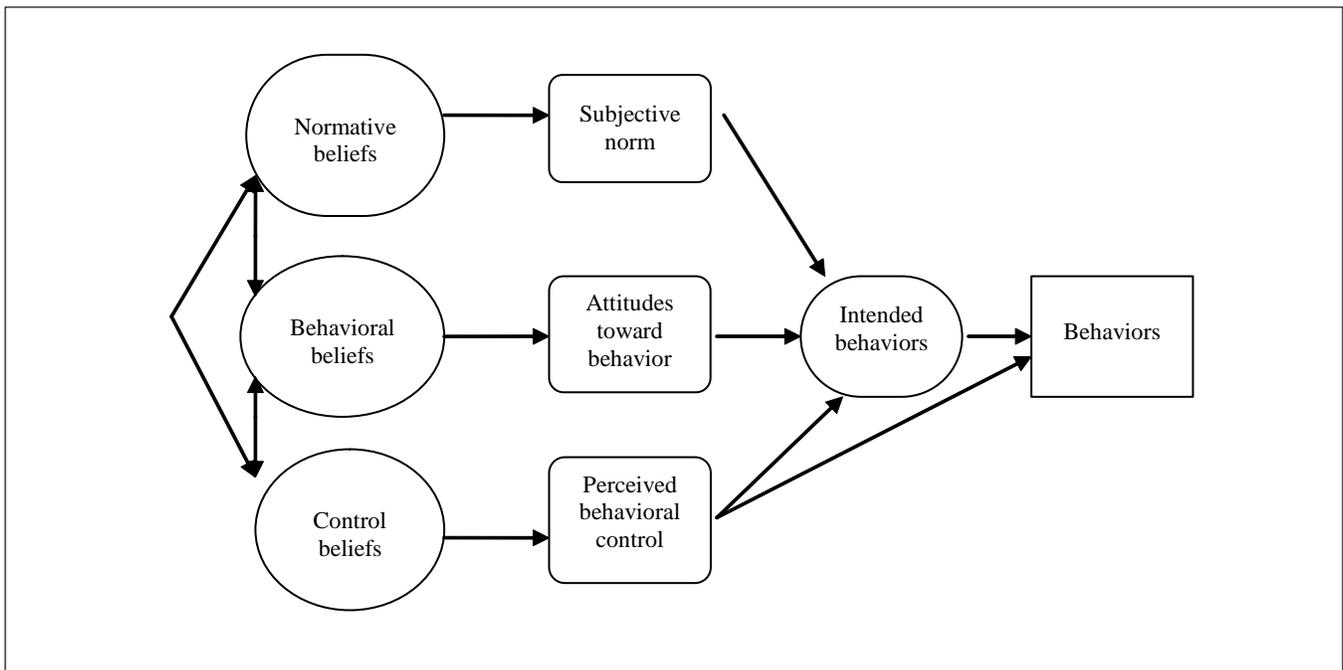


Figure 1.—The Theory of Planned Behavior (Ajzen 1991; redrawn from Hrubes et al. 2001).

then create opportunities to shape desirable behavior (Manfredo et al. 1992). This concept is fundamental to understanding the influence that management techniques might have upon OHV operator behaviors.

## 1.2 Management Strategies

Gramann et al. (1995) suggest that damage to public lands and natural resources often results from recreational pursuits outside of the regulations established for a given area. The term “impact” is often associated with these behaviors. Leung and Marion (2000) consider impacts to be undesirable visitor-related changes to a resource. Managers’ responses to the behaviors and their subsequent impacts are often divided into two general forms: direct and indirect management (Lucas 1982). Direct management addresses behavior by means of overt regulations that are backed by the threat of sanctions for those who choose to violate standards (Namba and Dustin 1982). Indirect management utilizes education and informational techniques to encourage conformity with established standards and regulations (Gramann et al. 1992). Situational requirements often decide which of the two management forms takes precedence, but most

recreational settings call for a mix of the two. Lucas (1982) argues that while there are some instances (e.g., safety issues) that call for strict oversight and enforcement of regulations, direct management can often lead to strained relations between visitors and managers. The limitation of choice interferes with the pleasurable experiences sought by recreationists. This assumption suggests that indirect management or influence upon behavior strikes a valuable balance between visitor enjoyment and resource protection.

Previous OHV studies have called for further research on the subject of operator perceptions and behavior. Baker (2007) studied OHV riders from New York State and reported several examples of interstate travel by those involved with the sport. That study recommends the regional approach taken by this current study. Cordell et al. (2004) suggest that the rise in depreciative behaviors (e.g., unauthorized trail development) correlates to increased OHV activity and that these occurrences have important management implications. This study seeks to examine the relationship between management strategies and OHV rider behavior.

## 2.0 METHODS

This study utilized a mail survey of 818 OHV riders conducted with the assistance of the New England Trail Riders Association (NETRA). Survey questions were created to obtain information germane to the goals of the study and to the constructs adapted from previous research on attitudes and intended behaviors. Individual variables were developed to address the objectives and test the hypothesis of this study. The survey consisted of 112 questions, responses to which could be written, checked, or circled. Question topics included demographics; personal riding experience; riding locations; and perceptions of management strategies, attitudes, and intentions. Questions used to elicit the complex components of attitude and intent were modified from prior works (Hines et al. 1987, Ajzen and Driver 1992, Bright and Manfredi 1996, Ajzen 2001) to reflect the specific characteristics of OHV use and its relationship to natural resource management. Questions referring to indirect and direct management were adapted from Rogers (1985) and Maddux and Rogers (1983).

Preferences for management type (direct, indirect) were gathered with 12 indicator variables using a 5-point scale ranging from -2 (strongly not favored) to 0 (neutral) to 2 (strongly favored). For purposes of analysis, this study divides management type (direct, indirect) into general and specific (i.e., to the behavior) constructs based upon a-priori designations (Maddux and Rogers 1983, Rodgers 1985). Attitude is defined holistically, based upon the concept's development through previous research (Ragheb and Beard 1982, Ajzen and Driver 1992, Bright and Manfredi 1996, Hrubes et al. 2001). As such, individual cognitive, affective, and evaluative constructs of attitude are measured and analyzed to quantify the attitude concept. For this study, the term "attitude" is defined as pertaining to each of these constructs as they are treated individually.

Data from each returned questionnaire were entered into an Excel spreadsheet created for the study and then transferred into SPSS (Chicago, IL) for analysis. Descriptive statistics were calculated and distributions

were checked for normality. Variables were combined into factors. Preferences for indirect and direct management were combined based upon literature-derived a-priori designation (Maddux and Rogers 1983, Rogers 1985). Variables related to intentions were averaged into one factor for analysis (Ajzen and Driver 1992).

A factor analysis using principal components extraction and varimax rotation was performed on the variables related to attitude. A Principle Components Analysis (PCA) procedure was used to identify possible factor structures in the data and to evaluate each to identify the most interpretable and parsimonious solution. Evaluation criteria included evaluating scree plots, eigenvalues greater than one, percent variance greater than 5 percent for any single factor, percent variance greater than 50 percent for the model, and factor loadings greater than 0.4 for a variable. Variables with multiple factor loadings were excluded from further analysis. A Chronbach's reliability coefficient (alpha) of 0.7 was required for a scale to be considered reliable (Tabachnick and Fidell 1996). Indicator variables were averaged to create one factor score.

Multiple regression analyses were used to examine relationships between study constructs. Intended behavior was a single factor comprising six variables. Attitude was composed of three separate components: cognitive, evaluative, and affective. The cognitive component had three subcomponents: symbolic existence beliefs, objective knowledge, and perceptions of outcomes (Bright and Manfredi 1996). The evaluative component of attitude had two subcomponents: attitude toward the object (OHVs) and attitude toward the behavior (Bright and Manfredi 1996). The affective component was a single measure (i.e., emotional response toward the behavior). Multiple regressions included all factors, as identified by PCA, associated with these components. In order to better understand the relationship each individual independent variable had with the dependent variable, this study examined semipartial correlations ( $Sr^2$ ). Squared semipartial correlations express the unique

contribution of a given independent variable to the total variance of a dependent variable; analysis of these aided the interpretations regarding each objective (Tabachnick and Fidell 1996).

### 3.0 RESULTS

The sample population for this study comprised 818 names and addresses (811 supplied by NETRA, and seven volunteer participants from Pennsylvania). Of this total, 384 surveys were returned by participants and 22 surveys were undeliverable, giving a qualified response rate of 48 percent. To examine the potential for bias, a one-page nonresponse survey was sent to 100 of the addresses in the original sample. Twenty-eight surveys were returned from this final mailing.

OHV operators were asked to characterize themselves and their OHV-based recreation histories. When they were asked for the number of years they have been riding OHVs, the mean response was 24.80 years with a standard deviation of 11.93 ( $n = 379$ ). Response to a question asking for the year they were born gave a mean of 1964 with a standard deviation of 10.88 ( $n = 345$ ). More than 97 percent of respondents were male ( $n=370$ ).

#### 3.1 Hypothesis Tests

Twelve hypotheses were tested using statistical procedures appropriate for the data and for the stated goals and objectives of the study. This manuscript looks at two of those twelve.

**Hypothesis 1.** *There is no significant relationship between preference for management strategies and the attitudes of OHV operators regarding the creation and use of unauthorized trails ( $p \leq 0.05$ ).* Five standard regression analyses were conducted to examine the relationship between the independent variables for management preferences regarding the behavior (the creation and use of unauthorized trails) and the five dependent variables comprising the attitude concept as operationalized by this study.

We ran five separate analyses that included the relationship between management preference and

attitude components related to the behavior (creation and use of unauthorized trails). Three regressions examined general attitude factors and two looked at factors specific to the behavior. The first and second general attitude factors, evaluative attitude toward OHVs [ $F(4, 365) = 1.640, p = .164$ ] and cognitive attitude toward OHVs [ $F(4, 362) = 1.640, p = .164$ ], were not significantly related to management preference. The remaining three regressions had significant relationships: cognitive symbolic existence beliefs [ $F(4, 362) = 2.719, p = .030$ ]; the factor combining affect and evaluative attitude toward the behavior [ $F(4, 356) = 25.446, p < .001$ ]; and the cognitive perceptions of behavioral outcome [ $F(4, 363) = 30.408, p < .001$ ]. The null hypothesis is rejected.

We also ran three analyses that included the relationship between preferences for general direct management strategies and attitudes regarding the behavior. The regression for management preference on cognitive symbolic existence beliefs (Table 1) proved significant for direct management [standardized regression coefficient ( $\beta$ ) = .168,  $t = 2.438, p = .015$ ].

Two analyses were run testing the relationship between preferences for specific direct management strategies and attitudes regarding the behavior. The regression for management preference on cognitive perceptions of behavioral outcome (Table 2) proved significant for specific direct management [standardized regression coefficient ( $\beta$ ) = .195,  $t = 3.195, p = .002$ ].

Two analyses were run testing the relationship between preferences for specific indirect management strategies and attitudes regarding the behavior. The regressions for indirect management preference on affect and attitude toward the behavior [Table 3; standardized regression coefficient ( $\beta$ ) = -.386,  $t = -5.654, p < .001$ ]; and cognitive perceptions of behavioral outcome proved significant for specific direct management [Table 2; standardized regression coefficient ( $\beta$ ) = .267,  $t = 3.999, p < .001$ ] are both statistically significant.

**Table 1.—Standard multiple regression of management preference variables on the general attitude component: Cognitive symbolic existence beliefs**

Variables	s.e.	B	Sr <sup>2</sup>	p
Indirect Management General	.058	.030	0.00	.667
Direct Management General	.060	.168	0.01	.015*
Indirect Management Behavior	.046	-.142	0.009	.063
Direct Management Behavior	.036	.066	0.002	.342
R <sup>2</sup>	.030			
F	2.719*			

\*p≤0.05

**Table 2.—Standard multiple regression of management preference variables on the behavior specific attitude component: Cognitive perceptions of outcomes of behavior**

Variables	s.e.	B	Sr <sup>2</sup>	p
Indirect Management General	.087	.043	0.00	.492
Direct Management General	.090	.089	0.004	.141
Indirect Management Behavior	.069	.267	0.03	.000*
Direct Management Behavior	.054	.195	0.02	.002*
R <sup>2</sup>	.254			
F	30.408*			

\*p≤0.05

**Table 3.—Standard multiple regression of management preference variables on the behavior specific attitude component: Affect and evaluative attitude toward the behavior**

Variables	s.e.	β	Sr <sup>2</sup>	p
Indirect Management General	.096	-.019	0.00	.759
Direct Management General	.099	-.057	0.001	.348
Indirect Management Behavior	.075	-.386	0.07	.001*
Direct Management Behavior	.059	-.062	0.002	.328
R <sup>2</sup>	.225			
F	25.446*			

\*p≤0.05

**Hypothesis 2.** *No significant relationship exists between the attitudes and intended behaviors of OHV operators creating and using unauthorized trails ( $p \leq 0.05$ ). One standard multiple regression was performed between intended behavior (dependent variable) and the five attitude factors (three general, two specific) regarding the behavior (the creation and use of unauthorized trails; independent variables). The test of the relationship between attitudes and intended behaviors for using unauthorized trails [F (6, 352) = 31.306,  $p < .001$ ] is statistically significant (Table 4). The null hypothesis is rejected.*

## 4.0 DISCUSSION

The multidimensional definition of attitude allowed for a more detailed understanding of recreationist perceptions. This study's findings regarding the significance of constructs such as affect, symbolic existence beliefs, evaluative attitude toward the behavior, and the cognitive perceptions of behavioral outcome, support previous research (Bright and Manfredi 1996, Giles et al. 2004, Bright and Burtz 2006).

**Table 4.—Standard multiple regression of attitude variables for behavior 2 on intended behavior**

Variables	s.e.	$\beta$	Sr <sup>2</sup>	p
General attitude:				
evaluative attitude toward object	.097	-.096	0.007	.059
cognitive objective knowledge	.089	.100	0.091	.042
cognitive symbolic existence beliefs	.087	.051	0.001	.322
Specific attitude toward behavior 2:				
affect and evaluative attitude toward behavior	.056	-.399	0.09	.000*
cognitive perceptions of behavioral outcome	.061	.215	0.026	.000*
R <sup>2</sup>	.311			
F	31.306*			

\*p≤0.05

OHV operators in this study had a meaningful perception regarding the use of fines and tickets. While most resented what they view as “persecution” and “heavy-handedness” among law enforcement agencies, they do seem influenced by a “fear of being caught” or sanctioned. This finding differs from those of d’Astous et al. (2005), who found that attitudes regarding music piracy were not significantly influenced by the threat of negative consequences. It can be argued, however, that issues of scale exist between onsite interactions with law enforcement officers and the cease and desist emails from record companies.

Evidence also exists to support the findings of Gramann et al. (1995) regarding the preference for and influence of indirect management. OHV operators reported that “cooperation” with agency and law enforcement representatives was something of interest, and that this cooperation contrasted with interactions which resulted in conflict (i.e., fines, tickets, arrest). The potential for conflict can be viewed through the affective lens here as it has been in emotionally charged studies such as the Bright and Manfredo (1996) work on wolf reintroduction and the Hrubes et al. (2001) study on hunters. The significance of behavioral outcome perceptions is reflected in the sentiments of OHV operators, who voiced a preference for “guidelines” and “information” rather than conflict. People prefer to be shown what to do rather than being punished for having done something after the fact.

Precedence already exists for the relationship between attitudes and intentions (Ajzen 1991, Ajzen and Driver

1992, Bright and Manfredo 1996, Hrubes et al. 2001). Despite the use of intentions as surrogates for behavior by this study and others (Bright and Burtz 2006), these findings suggest that public area land managers can affect recreational behavior by influencing attitudes. Hrubes et al. (2001) found that the role of attitudes and intentions within the TPB framework were useful as predictors for the choice between hunting and not hunting.

## 5.0 CONCLUSION

This study’s main goal was to provide natural resource managers with an understanding of the attitudes and perceptions of OHV operators pertaining to intended behaviors. By demonstrating that attitudes are associated with the intention to engage in depreciative behaviors, this study suggests an access point for managerial influence on behavior (Manfredo et al. 1992).

Previous studies employing the TPB (Ajzen and Driver 1992, Bright and Manfredo 1996, Hrubes et al. 2001) have suggested that the relationship between the attitudes of outdoor recreationists and their behavioral intentions provides a point of access for resource managers seeking to influence behavior. This study’s findings support that assertion. Statistically significant relationships between attitudes and preferences for management strategies suggest that management actions can be tailored to maximize their effect. The fact that specific management actions, both direct and indirect, have a greater effect than general actions on

OHV operator attitudes indicates that participants in this study were more influenced by clear and concise direction. This finding bodes well for land managers wishing to reach a specific audience regarding a specific issue and/or behavior.

The second assertion this study makes within the TPB framework is that once influenced, OHV operator attitudes will be related to behavioral intentions. Statistically significant results support this claim. There is a relationship between OHV rider attitudes and their intentions to engage in the behavior specific to this study (i.e., the creation and use of unauthorized trails). It is important to note that, for this study, the specific behavior was not directly measured. Previous work (Bright and Burtz 2006) posits that, in such cases, intentions can act as a surrogate for behavior. That observation is particularly germane to this study as the illegal, emotionally charged, or unauthorized behaviors questioned might have been difficult to measure. Attitudes appear to influence intentions and can provide managers with the basis for intervention.

In addition to this study's utility for managers of public lands, its findings add to the body of work that supports the use of the TPB as a model of the determinants of human behavior (Hrubes et al. 2001). Previous research demonstrating a relationship between attitudes and intended behaviors was replicated by this study. The strength of the affect construct within attitude, as observed among college students by Ajzen and Driver (1992), can also be observed within this population of OHV operators. Similarly, Bright and Manfredi (1996) found that emotional response (affect) had more of an effect on attitude than did more objective measures. This assertion informed the management preference approach used to explore the relationship between management action and attitude in the present study. Bright et al. (1993) used the TPB to recommend that natural resource managers rely on effective communication programs to influence recreational behaviors. This study's findings regarding the preference of OHV operators for indirect management seem to support this approach.

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