THE EFFICACY OF A PANEL STUDY FOR ASSESSING THE TEMPORAL STABILITY OF HUNTING PARTICIPATION AND CONSTRAINTS

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Abstract: The intent of this study of Virginia hunters/non-hunters was to test the efficacy of panel research for assessing the temporal stability of hunting participation and constraints. Findings suggest that participation/non-participation patterns were stable across time periods for the population, yet dynamic at the individual level. Although the structure of perceived constraints appeared stable, the intensity varied significantly over time and distinguished among participation groups. Given that most constraint research is psychologically grounded, it appears more efficacious to employ research designs that allow individual-level analyses.

Introduction

Leisure constraints are "factors that inhibit people's ability to participate in leisure activities, to spend more time doing so, to take advantage of leisure services or to achieve a desired level of satisfaction" (Jackson, 1988, p. 203), and the evolution of this line of research is well documented. Efforts have been primarily directed at empirically identifying and analyzing constraints to leisure engagement and goal attainment. Specifically, researchers have identified barriers, examined the effect of these barriers on leisure preferences and patterns over time and across activity domains, and analyzed the effect of these barriers on leisure choices and experiences of different populations. An implicit assumption in the early constraints literature was the inverse relationship between constraints and participation. One major problem with this approach is that the complete absence of constraints does not necessarily lead to participation; rather, constraints may mediate the degree to which individuals feel they can participate in leisure activities. Research suggests that constraints influence participation either by reducing or eliminating the desire to participate or by removing or impeding perceived opportunities. In most research focusing on the general nature of activity participation, constraints appear dynamic – changing with social, personal or activity-based conditions. To more fully understand the nature of participation and constraints, there is a need for further, more controlled research investigating constraints to participation of both participants and non-participants in a particular activity over time. For purposes of this study, the activity of interest is hunting.

A large body of research has been conducted on outdoor recreation participation in general and hunting in particular. Early studies focused on describing hunters, their motivations to hunt and factors influencing satisfaction. As participation in sport hunting continues to decline in the United, research has been conducted to identify factors (e.g., increased urbanization, changing demographics, increased anti-hunting sentiments, lack of available opportunities, competition with other leisure activities and changing interests) that impact participation. This decline in participation may be problematic for individuals, communities and resource management agencies that will no longer experience the social, economic, and cultural benefits of hunting. Leisure constraints is an area of research with tremendous potential for examining the dynamics of hunting participation/non-participation.

Only a few research efforts have investigated the temporal stability of leisure factors. Allen, Donnelly and Warder (1984) found that certain recreation activity participation factors were stable across seasons. Jackson and Witt (1994) assessed the change and stability of leisure constraints among Canadians over a four-year period (1988-1992) using identical instrumentation and survey administration procedures. The authors found little temporal change in aspects of measured constraints with respect to the unfulfilled desire to start a new activity. The fact that limited research exists investigating constraint stability, in particular, indicates the need for further investigation. Additionally, leisure behavior research in general, and more specifically, leisure constraints research has remained largely cross-sectional in nature. Longitudinal studies are designed to permit observation over an extended period. Whereas trend studies track changes within some general population, and cohort studies examine more specific sub-population changes, panel design studies—the most powerful of longitudinal designs—incorporate analysis of the same sample of respondents over time. The intent of this study was to test the efficacy of panel research for assessing the temporal stability of hunting participation/non-participation and perceived constraints. This investigation was not approached from the perspective of cause and effect, but rather as an initial effort to isolate and explore temporal variation.

Methods

In 1989, a random sample of 3,000 Virginia residents was drawn; half from each of two sampling frames. The first frame consisted of those individuals who had purchased a Virginia state hunting license. To ensure that a sufficient number of persons exhibiting a variety of participation patterns were selected for this study, the second frame consisted of all Virginia residents listed in telephone directories. A modified version of the methods described by Dillman (1978) was employed to collect the data for both phases of the study. After eliminating undeliverable or unusable returns, a total of 1,666 usable responses were received— an overall effective response rate of 66.2

percent. A test of non-response bias was conducted using a telephone interview with a five-percent sample of non-respondents. No significant differences between respondents and non-respondents were found regarding participation/non-participation variables, demographic and lifestyle characteristics, and the initial sampling frame from which they were drawn.

The 1,229 residents who participated in the initial study phase and indicated a willingness to participate in future studies were contacted to participate in the second phase. Identical mail survey methods were employed in 1992. Unfortunately, slightly over 21 percent of those who were contacted in the second phase had moved, were deceased, or returned unusable questionnaires. A total of 594 completed questionnaires were returned, generating an effective response rate of 61.4 percent. Of these, missing values assigned to key variables further reduced the comparative study population to 497 respondents. Respondent mortality is always a concern in paneled research and it certainly influenced the number of respondents utilized in this study. Basing subsequent phases on those most willing to assist is an accepted and common practice in panel research – the attrition is minimized, although a potential for bias remains (Watson, 1998). In this study, for example, hunting may have been a more salient topic to those indicating a willingness to participate in both phases of the study; those who had never hunted in 1989 may therefore have been more likely to begin hunting prior to 1992. However, while attrition reduced the number of participants, the distribution of respondents among participation/ non-participation groups in fact remained surprisingly proportionate: 40 percent of the respondents were categorized as non-hunters; the remaining 60 percent of respondents were distributed across three participation levels.

The survey instruments used in 1989 and 1992 were designed to collect a broad range of data on different aspects of wildlife-associated recreation. Common to both instruments, and serving as the comparative database for this study, were questions about respondents' hunting participation/non-participation and their perceptions of constraints to participation. Participation was assessed using a hierarchical set of three questions: respondents were asked whether they had hunted in the past; whether they had hunted during the most recent hunting season; and, if so, how frequently they had hunted. The second set of questions solicited respondents' level of agreement with statements depicting perceived constraints to hunting participation. Using the three participation questions, each respondent was grouped into one of five participation/non-participation categories for each time period: Non-Hunters – persons who had never hunted; Former Hunters – persons who had hunted previously, but not during the most recent hunting season; Infrequent Hunters – persons who hunted less than 7 days during the most recent hunting season; Moderate Hunters – persons who hunted between 7 and 20 days during the most recent hunting season; and Frequent Hunters – persons who hunted more than 20 days during the most recent hunting season. Changes in participation/non-participation were initially examined by computing and comparing the aggregate percentage of respondents assigned to each of the participation categories in each of the two time periods. Secondly, intra-individual change in participation/non-participation behavior was assessed by pairing the 1989 and 1992 data and partitioning each respondent into one of three participation change groups – "Stable" (i.e., respondents reporting no change in level of participation between 1989 and 1992), "Increasers" (i.e., respondents who began hunting, resumed hunting after a hiatus, or increased the frequency of their participation), and "Decreasers" (i.e., respondents reporting decreased frequency of participation, or no hunting during the most recent season).

The temporal stability of both perceived constraint structure and intensity was assessed. Constraint factor structure stability was determined using statistics generated by the two Principal Component Analyses (with oblique rotation) and Cronbach's alpha test of scale reliability; specifically, (1) the number of factors retained; (2) the strength of factor loadings and order in which individual items loaded into each factor; (3) the amount of variance explained overall; (4) the amount of variance explained by each factor; and (5) the reliability coefficients of each factor were compared. The items retained in each factor were subsequently formed into summated scales, used in turn to determine the intensity of respondents' perceived constraints for each time period. Mean scores on each scale were computed for all respondents and the aggregate differences between time periods calculated. Paired t-Tests (repeated measures) were used to determine temporal stability of perceived constraint intensity. While this aggregate approach allowed the assessment of changes in the intensity of constraints as a population, a disaggregate approach – unique to a repeated measures design – allows for the examination of intra-individual differences. A disaggregate approach to investigating constraint intensity is particularly interesting when data are paired with individual participation/non-participation data. One-way Analyses of Variance with post hoc Scheffé range tests were performed to assess differences between respondents who increased, decreased or remained stable in their level of participation, with regard to the intra-individual change in intensity of perceived constraints.

Results and Discussion

Stability of Participation Patterns – Aggregate Analyses

Review of the aggregate distribution of respondents across participation/non-participation categories for each time period indicated that minor changes had occurred (Table 1). Of all participation categories, the greatest change was seen among "Infrequent" hunters — an overall decrease of 2.6 percent. Smaller percentage changes were found among "Moderate" (+1.2%) and "Frequent" (-0.9%) participants. While the overall number of persons actively hunting decreased by 3.7 percent between 1989 and 1992, a more significant shift in membership was observed between non-participant categories. The group of respondents indicating they had "Never" hunted in 1989 (23.7% of the study population) decreased to 13.5 percent in 1992. Conversely,

a 12.5 percent increase was observed among "Former" hunters. While it is reasonable to assume that the decrease in the proportion of those "Never" hunting and the comparable increase in "Former" participants were more than coincidental, the aggregate nature of this particular analysis limited the ability to draw more specific conclusions about the exact dynamics of hunting participation.

Table 1 Aggregate distribution of respondents among participation/non-participation categories, 1989 and 1992

	Non-Participation		Participation		
	Never	Former	Infrequent	Moderate	Frequent
1989	23.7%	16.3%	13.1%	21.5%	25.4%
1992	13.5%	28.8%	10.5%	22.7%	24.5%
1989-1992 Change	-10.2%	+12.5%	- 2.6%	1.2%	-0.9%

N = 497

Stability of Participation Patterns – Disaggregate Analyses

In order to more fully examine the temporal stability of hunting participation, respondents' participation/non-participation behaviors from each time period were paired to determine the exact nature of the dynamic (Table 2). Overall, slightly less than 60 percent of the 497 respondents remained in the same participation/non-participation category at the end of the three-year period. Of those who had never hunted in 1989 ($\underline{n}$ = 118), for example, 67 remained in that category in 1992. The majority of respondents who began hunting after 1989 ($\underline{n}$ = 118) did not hunt in 1992 ($\underline{n}$ = 46). While some decrease in the ranks of the "Never" category was expected, the large shift in respondents previously categorized as "Never" to the "Former" category was surprising. This finding may represent an anomaly in the data, perhaps attributable to some previously unknown measurement error influenced by interpretation of questions assigning respondents to categories. These respondents were eliminated from subsequent analyses. Respondents who reported being "Former" hunters in 1989 were much more likely to remain in that category in 1992 (84%) than to have resumed some level of participation. Moreover, 20 percent of the "Infrequent" hunters, 11 percent of the "Moderate" hunters and three percent of the "Frequent" hunters in 1989 did not hunt in 1992. As might be expected, those reporting they hunted less than six days per year in 1989 ("Infrequent") were the most tenuous in their activity. Only 37 percent of these "Infrequent" hunters continued to participate at that level in 1992. However, an almost equal number of respondents had increased their participation to the "Moderate" level and a few had even increased to a "Frequent" level. It would appear that "Moderate" and "Frequent" hunters were the most stable in their level of hunting activity, although those hunting between seven and 20 days per year in 1989 ("Moderate") were more likely to decrease their activity than those hunting more frequently. Eleven percent of the "Moderate" hunters had decreased their level of participation in 1992 and an equal number did not hunt at all. Almost 30 percent of these respondents increased their frequency of participation, however, to more than 20 days per year. Again, those hunting most frequently in 1989 were the most temporally stable in their participation (67% continuing at the same level) and demonstrated the lowest propensity not to hunt in 1992 (3%). It is interesting to note that the number of respondents who decreased their participation from "Frequent" to "Moderate" was comparable to the number increasing participation from "Moderate" to "Frequent," suggesting the fluidity of participation among hunters who participate in the activity with greater frequency. Therefore, in contrast to the participation/non-participation stability suggested by the aggregate data (see Table 1), the paired data (see Table 2) suggests that participation/non-participation was much more dynamic.

Stability of Constraint Factor Structure – Aggregate Analyses

Principal Component Analyses performed separately on the 1989 and 1992 data sets each produced factor solutions retaining six factors with Eigen values in excess of 1.0. The first factor, depicting respondents' *Antihunting Attitude and Preference* (or lack thereof) for hunting as a leisure activity, was composed of seven items in 1989 and 1992 (Table 3). Items loading on this factor were remarkably similar between the time periods. This first factor represents both the positive-negative continuum of attitudes toward hunting and the relative priority assigned to hunting as a leisure activity. The second factor in each time period reflected respondents' perceptions associated with the *Costs* of hunting and the third factor described a lack of *Access and Opportunity* to hunt. The only major difference found between the two factor structures (1989 and 1992) was the transposition of the fourth and fifth factors. In the initial phase, concerns over *Family and Work Commitments* produced a larger Eigen value than concerns over the perceptions that hunting on *Public Lands* is

"crowded" and "dangerous." In the second phase, respondents' concerns over *Public Lands* produced a greater Eigen value and explained more variance than their views that *Family and Work Commitments* left little time for hunting. Be that as it may, the strength and direction of the loadings for items assigned to each factor were remarkably stable between time periods. Statements that respondents perceived no barriers to their hunting, or that they were unable to hunt "due to physical disabilities" comprised the final factor in both time periods. This factor, *Physical Effect and No Barriers*, was neither as discernable nor as intuitive as the five previous factors, even though the same items loaded on this factor consistently in both time periods. The amount of variance explained by each model differed slightly between the two time periods; 67 percent of the total variance was explained by the 1989 model, slightly less (62.5%) in 1992. The variance explained by the factors in each time period indicated that most of the loss of explanatory power in the 1992 model was lost in the first factor, *Antihunting Attitude and Preference*. This factor explained almost five percent (4.8%) less variance in 1992 than in 1989. The final factor, *Physical Effect and No Barriers*, showed a 0.2 percent increase between 1989 and 1992. The reliability coefficients reported for each factor were similarly stable. Five of the six factors in each model produced highly reliable alpha statistics (> .70). Moreover, these statistics were consistent across time periods with the largest difference in Cronbach's alpha (.09) found for the third factor. The sixth factor was not deemed reliable in either time period (α = .14 and -.12, respectively). A decision was therefore made to eliminate this factor from additional analyses. With this exception, the factor structure of constraints to hunting was temporally stable in terms of the number of factors, composition, amount of variance explained (overall and by individual factors), and reliability.

Table 2 Disaggregate Distribution of Respondents among Participation/Non-participation Categories, 1989 and 1992 (N = 497)

				1992				
				Non-participation		Participation		
				Never (n = 67)	Former (n = 143)	Infrequent (n = 52)	Moderate (n = 113)	Frequent (n = 122)
1989	Non-participation	Never	(n = 118)	57%	39%	2%	1%	1%
		Former	(n = 81)	0%	84%	7%	7%	2%
	Participation	Infrequent	(n = 65)	0%	20%	37%	38%	5%
		Moderate	(n = 107)	0%	11%	11%	48%	30%
		Frequent	(n = 126)	0%	3%	6%	24%	67%

Note: Values along the diagonal represent "Stable" participation change group members. Values below the diagonal represent "Decreasers" and those above the diagonal, "Increasers".

Table 3 Results of a Principal Components Analysis of Perceived Constraint Factors, 1989 and 1992

Perceived Constraint Factors and Items	Factor Rank	Variance	Eigen value	Cronbach's alpha	Factor Loadings
		1989/1992			
Antihunting Attitude and Preference	1	28.39/23.57	5.94/4.94	.84/.84	
Prefer other leisure					.646/.603
Prefer free time at home					.604/.581
Hunting kills defenseless animals					.908/.900
Embarrassed to tell					.856/.781
No longer need to hunt for food					.899/.883
Game populations too low					.611/623
Require too much effort					.544/.527
Costs	2	12.47/12.20	2.61/2.57	.77/.70	
Equipment costs					.822/.717
License costs					.824/.747
Travel costs					.764/.779
Laws too confusing					.609/.600
Access and Opportunity	3	7.97/7.90	1.671.67/	.81/.72	
No access to private land					-.837/-.788
Do not know where to go					-.831/-.779
No opportunities near home					-.765/-.698
No one to hunt with					-.699/-.652
Family and Work Commitments	4	6.90/6.20	1.44/1.29	.70/.71	
Family commitments					-.844/-.850
Work commitments					-.827/-.787
Public Lands	5	6.40/7.40	1.34/1.54	.77/.77	
Public lands too crowded					.885/.886
Public lands too dangerous					.899/.892
Physical Effect and No Barriers	6	5.10/5.30	1.08/1.11	.14/-.12	
No Barriers					.727/.741
Physical Disability					.569/-.467
Total Variance Explained (%)		67.00/62.50			

Table 4 Aggregate Results of a Paired t-Test of Individual Differences in the Intensity of Perceived Constraints[1], 1989-1992

Perceived Constraints Scale	1989	1992	1989-1992 Change	t	p
Antihunting Attitude and Preference	4.057	3.837	-.201	7.804	.001
Costs	3.445	3.380	-.065	1.611	.108
Access and Opportunity	3.853	3.773	-.080	2.627	.009
Family and Work Commitments	3.207	3.067	-.140	2.983	.003
Public Lands	2.489	2.709	.220	-4.548	.001

[1] Table values represent mean scores for a 5-point Likert scale, where 1 = strongly disagree and 5 = strongly agree.

Stability of Constraint Intensity – Aggregate Analyses

Whereas constraint factor structure was temporally stable, intensity of perceived constraints was dynamic. Based on a paired t-Test (repeated measures), differences between 1989 and 1992 were assessed for each summated constraint scale (Table 4). Significant differences were found between the two phases for the *Antihunting Attitude and Preference, Access and Opportunity, Family and Work Commitments* and *Public Lands* constraint scales. Respondents reported that perceived *Antihunting Attitude and Preference, Access and Opportunity, Family and Work Commitments* constraints decreased between 1989 and 1992. Conversely, perceptions that *Public Lands* were "crowded" and "dangerous" had increased. No significant differences between phases were reported for the *Costs* constraint scale.

Relationship of Participation/Non-Participation and Constraint Intensity

One-way Analyses of Variance with *post hoc* Scheffé range tests were used to assess differences between participation change groups (i.e., "Stable", "Increasers", "Decreasers") with respect to change in intensity of perceived constraints. Significant differences were found between groups for three of the five constraint scales (Table 5). With regard to intensity of the *Antihunting Attitude and Preference* constraints scale, there was a significant difference between participation change groups. Specifically, those respondents that remained stable or experienced a decrease in participation between the two study phases reported an increase in antihunting attitude and a low preference for hunting as a leisure activity, and differed significantly from "Increasers" who experienced a slight decline in the intensity of this constraint. Similarly, there was a significant difference between participation change groups with regard to intensity of the *Costs* constraint scale. "Increasers", differing from those that remained "Stable", perceived the intensity of cost constraints to have lessened over the three-year period. Although all three participation change groups perceived an increased intensity in the *Access and Opportunity* constraints scale, those whose participation decreased over the study period differed significantly from and reported greater constraint intensity than did either those whose participation increased or remained stable. There were no significant differences found between groups with regard to the *Family and Work Commitments* or *Public Lands* constraint scales.

Table 5 Changes in the Intensity of Perceived Constraints to Hunting Participation (1989-1992) between Participation Change Groups

	Participation Change Group				
Perceived Constraints Scale	Increasers"	Stable"	"Decreasers	*F*	p
Antihunting Attitude and Preference	-.038[a]	.184[b]	.302[b]	9.905	.001
Costs	-.131[a]	.141[b]	113[ab]	3.942	.020
Access and Opportunity	.020[a]	.028[a]	.278[b]	4.365	.013
Family and Work Commitments	.000	.163	.215	1.007	.366
Public Lands	-.259	-.200	-.227	0.120	.887

Note: Mean scores (representing change in the intensity of perceived constraints on a 5-point Likert scale, where 1 = strongly disagree and 5 = strongly agree) with different superscripts differ significantly at $p \leq .05$ based on Scheffé range test comparisons.

Conclusions

The purpose of this study was to test the efficacy of a panel study for assessing the temporal stability of perceived constraints and hunting participation/non-participation. Five conclusions can be drawn from this study that further enhance our understanding of methodological implications, hunting participation, constraints, and their interrelationship.

Participation/non-participation patterns were stable for the population, yet dynamic at the individual-level. It can be concluded that to gain a better understanding of the individual nature of recreation and leisure behavior, efforts must be taken to conduct panel research. In this study, the nature of individual participation/non-participation would have mistakenly appeared stable (as was the case for the aggregate, population-level data), had it not been for the study design utilizing identical respondents and allowing individual-level analysis. These data indicate that participation rates were fairly stable at the population-level of analysis. Yet, when data are disaggregated and assessed at the individual level, a dynamic picture of participation/non-participation behavior is gained. This dynamic was masked in aggregate analyses due to mitigating effects of recruitment and desertion among categories.

The factor structure of perceived constraints to hunting participation in Virginia appeared to be stable, but the intensity of perceived constraints varied significantly

between time periods. Constraint factor structures from each time period were remarkably similar in terms of the number of factors, their composition, variance explained and scale reliability. Antihunting *Attitude and Preference* to participate in other activities explained the greatest amount of variance to hunting participation in both time periods. In addition, *Costs* associated with hunting, *Access and Opportunity* to hunt, *Work and Family Commitments*, and perceptions about hunting on *Public Lands* were viewed consistently as constraints by respondents. Whereas constraint factor structure was temporally stable, intensity of perceived constraints was dynamic. Significant differences were found for the *Antihunting Attitude and Preference*, *Access and Opportunity*, *Family and Work Commitments* and *Public Lands* constraint scales. Specifically, constraints decreased between 1989 and 1992 for all constraint scales except *Public Lands*, for which the intensity of constraints had increased. No significant differences between phases were reported for the *Costs* constraint scale.

Intensity of Antihunting Attitude and Preference, Costs, and Access and Opportunity constraints distinguished those who increased, decreased, and remained stable in their participation. "Decreasers" and "Stable" respondents, reporting increased intensity of the *Antihunting Attitude and Preference* constraint scale, were significantly different from "Increasers," who reported a slight decrease in intensity. Decreased intensity of *Costs* among "Increasers" was significantly different from comparable increases in intensity reported by respondents categorized as "Stable." No significant differences were found between either those that increased or remained stable in their participation/non-participation and those who experienced a decrease. This particular constraint appears to have more relevance to those who continue to participate than those who do not. In contrast, increases in the intensity of the *Access and Opportunity* constraint differentiated those who decreased their participation from all others.

Given that most constraint research is psychologically grounded, it appears more appropriate to employ research designs (panel, repeated measures) that allow individual-level analyses. To illustrate this point, consider the *Antihunting Attitude and Preference* constraint that was shown to decrease in intensity at the population-level. When data were analyzed at the individual level, respondents who remained stable or experienced a decrease in participation actually reported an increase in antihunting attitude and low preference for hunting as a leisure activity, differing significantly from "Increasers" who reported a slight decrease in the intensity of this constraint. This disparity in population- and individual-level analyses results suggests that cross-sectional designs may be less suitable for constraints research and that findings of aggregate analyses may be misleading.

The Antihunting Attitude and Preference constraint appears key to understanding behavioral response, but the nature of this constraint deserves a more in-depth examination, focusing on the interrelationships among attitude toward, interest in, and preference for hunting as a leisure activity. Within each of the analyses conducted in this study, the importance of the *Antihunting Attitude and Preference* constraint was consistently demonstrated. A significant decrease in the intensity of this perceived constraint was found when comparing data for 1989 and 1992. Moreover, this constraints scale distinguished between "Increasers" and those who remained "Stable" or decreased their participation These findings also illustrate the duality of the *Antihunting Attitude and Preference* construct and the need for future research.

A fertile area for research is, therefore, an exploration of the interrelationships among attitudes toward, interest in, and preference for hunting as a leisure activity. The ability to isolate, measure and model these constructs (within the context of a leisure activity), in terms of their antecedents, strengths and sustainability, would be invaluable in explaining why people choose to adopt one activity over another, why they continue or discontinue participation, and further explain how each mitigates a person's ability to negotiate constraints.

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