FACTORS INFLUENCING FISHING PARTICIPATION BY BASS ANGLERS RESIDING IN NEW YORK'S LAKE ONTARIO REGION

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Abstract
This study seeks to provide a comprehensive understanding of the elements influencing bass fishing participation. A case study of resident bass anglers in the seven counties along the Lake Ontario coast in New York was utilized. The survey yielded 681 angler questionnaires, 165 of which were completed by anglers who prefer to fish for either smallmouth or largemouth bass. A confirmatory factor analyses confirmed eight motivations and ten constraints/facilitators. Regression results indicate that one internal motivation (personal achievement), three facilitators (level of commitment, level of interest, social support), and one experiential variable (whether the angler fishes with a child or not) directly influenced fishing participation by bass anglers.

1.0 Introduction
Over the past three decades, non-resident anglers (i.e., anglers who fish, but do not reside, in New York State) have been the focus of motivation and constraint studies in New York's Lake Ontario Region due to their contribution to the coastal economy, even though they comprise a relatively low percentage of all angler-days (18% in 2007; Connelly & Brown, 2009). A 45% drop in out-of-state angler activity in the region between 1988 (441,380 angler days; Connelly, Brown, & Knuth, 1990) and 2006 (241,926 angler days; Connelly & Brown, 2009), however, has made it difficult for businesses that are dependent on non-resident anglers to remain profitable. The objective of this study is to identify the elements that influence fishing participation by a more stable angler market — resident anglers. In particular, resident largemouth and smallmouth bass anglers are studied because of the relatively large percentage of angler days spent fishing for bass in comparison to other species (23% in 1996; Connelly, Brown, & Knuth, 1997, p. 30). Examining bass anglers separately from other angler groups is also appropriate since significant differences in motivations have been found in anglers based on target species (Fedler & Ditton, 1994). To obtain a comprehensive understanding of the elements influencing bass fishing participation, facilitators, constraints, motivations, and demographics are incorporated into one research framework.

2.0 Constraints, facilitators, and motivations

Constraints are defined as factors that influence leisure preferences and/or intervene between preferences and participation (Crawford & Godbey, 1987; Henderson, Stalnaker, & Taylor, 1988). Crawford and Godbey (1987) proposed three basic types of constraints: structural (i.e., constraints that intervene between leisure preferences and participation such as limited access or a lack of equipment); intrapersonal (i.e., constraints imposed by a person on him/herself which interact with leisure preferences); and interpersonal (i.e., constraints imposed on a person by other individuals or society). Constraints identified in fishing-related studies include fisheries management and regulations (Ritter, Ditton, & Riechers, 1992), poor health, lack of a fishing mate, lack of time due to work or education, childcare obligations, lack of equipment, expenses associated with fishing (Aas, 1995), interest in other recreational activities (Duda et al., 1999), lack of opportunity, lack of commitment or interest, and lack of support from family and friends (Kuehn, Dawson, & Hoffman, 2006).

In contrast to constraints is the concept of "facilitators" — "factors perceived by individuals to enable or promote the formation of leisure preferences and encourage participation" (Raymore, 2002). While constraints create barriers to leisure preferences and/or limit recreational participation, facilitators create a situation that enables participation. Elements such as opportunity, time, and economics can be considered as both facilitators and constraints, depending on the situation of an individual. For example, Bryan (1977) suggests that the amount of time anglers spend fishing is likely related to the amount of time their jobs allow. Thus, working few hours per week could be a facilitator while working many could be a constraint.

Motivations have been defined in the literature as the "cognitive forces that drive people to achieve particular goal states" (Decker, Brown, & Siemer, 2001, p.47). Siemer, Brown, and Decker (1989) identified four main motivations for salmonid fishing: affiliation (fishing to spend time with family and/or friends), relaxation/escape, achievement (fishing for the challenge and to improve skills), and nature appreciation. Kuehn, Dawson, and Hoffman (2006) identified additional motivations such as enjoyment (enjoying the excitement and experience of fishing) and nurture (passing on skills and knowledge to other anglers).

In order to incorporate motivations, constraints, and facilitators in our study, we utilized three theoretical frameworks. First, the wildlife-related recreation involvement model (Decker, Brown, Driver, & Brown, 1987) proposes that goals influence internal and external factors that in turn influence the decision to perform a behavior and the behavior itself. Two domains are identified in the model: a psychological domain that includes goals and internal influences (e.g., an individual's beliefs and abilities), and a social domain that includes external influences (e.g., the expectations of others). These two domains provide a framework for the motivations and constraints/facilitators proposed for this study. Second, the hierarchical leisure constraints model (Crawford, Jackson, & Godbey, 1991) suggests that both constraints and motivations influence leisure preferences and participation. The model includes interpersonal, intrapersonal, and structural constraints, but does not include specific types of motivations (e.g., internal versus external) or facilitators (Raymore, 2002). Third, the ecological approach to understanding influences on participation proposed by Raymore (2002), expands the three types of constraints (i.e., structural, interpersonal, intrapersonal; Crawford, Jackson, & Godbey, 1987) to include facilitators.

Demographic and experiential variables are also included in our framework because they have been shown to influence wildlife-related recreation. For example, Sali, Kuehn, and Zhang (2008) found that age and marital status influenced female birdwatching participation, while education influenced male participation. Location of residence with regard to proximity to recreational access and type of setting (e.g., urban versus rural; Duda et al., 1999; Jackson & Henderson, 1995; Ritter, Ditton, & Riechers, 1992), the absence/presence of children (Jackson & Scott, 1999), personal recreational experience (Williams, Schreyer, & Knopf, 1990), and race/ethnicity (Barnett, 2006) have also been identified as influencing leisure participation. The study framework incorporating motivations, constraints and facilitators, and demographic and experiential characteristics used is described in further detail in Kuehn, Luzadis, & Brincka (2013).

3.0 Methods

A survey of property owners within the seven Lake Ontario counties in New York State (i.e., Jefferson, Oswego, Cayuga, Wayne, Monroe, Orleans, Niagara) was conducted in fall, 2009. A random sample of 7,000 property owners (1,000 from each county) was compiled from online property tax records. A modified Tailored Design Method (Dillman, 2000) was used for the survey, and the questionnaire was made available to respondents both by mail and through the internet (Survey Monkey).

The survey instrument included questions on demographics (age, gender, presence/absence of children, years of education, income, location of residence (i.e., rural, suburban/small city, medium city, large city; Connelly, Brown, and Knuth, 1997), number of adults and adult anglers in the household, proximity of residence to Lake Ontario); experiential variables (i.e., if the respondent fishes with a child, fish species respondent prefers to catch); and constraints/facilitators and motivations for fishing. Statements related to motivations utilized a five-point agreement scale (i.e., -2 = strongly disagree, -1 = disagree, 0 = neutral, 1 = agree, 2 = strongly agree) to identify the importance of the statements to the respondents' fishing participation. For constraint/facilitator statements, respondents were asked: "How important are the following in either limiting or enabling your participation in fishing?" A five-point scale was used: -2 = greatly limits participation, -1 = limits participation, 0 = neither limits nor enables participation, 1 = enables participation, 2 = greatly enables participation.

A qualifying question of "Have you or another member of your household participated in fishing at least once between 2005 and 2009?" was used to identify households containing an angler; an adult angler within the household was asked to complete the questionnaire. Bass anglers were identified by asking "Which fish species do you prefer to catch in the Lake Ontario region?" For participation (i.e., the dependent variable), respondents were asked to write in the number of fishing trips taken each year between 2005 and 2009. These values were averaged together and (due to observed digit preference) categorized as follows: 0 = less than 2.0 trips per year; 1 = 2.1 to 5.0 trips per year; 2 = 5.1 to 10 trips; 3 = 10.1 to 20.0; 4 = 20.1 or more.

Following the full survey, a short, one-page survey was sent to all non-respondents to identify any non-response bias. Descriptive statistics for bass anglers were calculated in SPSS. The reliability of motivation, constraint, and facilitator factors was checked using Cronbach's alpha; an alpha of 0.70 or greater was used to identify factors suitable for further analysis (Hair, et al.,

1998). Confirmatory factor analyses (conducted separately for motivations and constraints/facilitators) were used to validate the variable composition of the factors shown in Tables 1, 2, and 3. Good fit in the confirmatory factor analysis (CFA) was determined by a Comparative Fit Index (CFI) of "close to 0.95" (Byrne, 2006, p. 97), and a Root Mean Square Error of Approximation (RMSEA) of 0.05 or less (Byrne, 2006, p. 100). Summated rating scales were calculated by averaging the variables comprising each factor (Hair, Anderson, Tatham, & Black, 1998). These scales (i.e., factor means) were used in a stepwise regression analysis; significant relationships between participation in bass fishing (dependent variable) and motivations, constraints/facilitators, and demographic/experiential characteristics (independent variables) were identified ($p \leq 0.05$).

4.0 Results

4.1 Response and non-response

Of the 7,000 questionnaires mailed to Lake Ontario households, 1,303 were completed and returned by 723 anglers and 504 non-anglers; 76 respondents did not wish to participate. Following the removal of undeliverable addresses and non-Lake-Ontario property owners, the qualified sample totaled 5,580 households, resulting in a response rate of 23%. Of the 681 anglers who completed the full questionnaire (42 of the 723 anglers who returned the questionnaire completed only the household questions on the first page), 103 were smallmouth and 62 were largemouth bass anglers. Comparisons between smallmouth and largemouth anglers revealed no significant differences in Lake Ontario fishing participation, age, level of income, location of residence, years of education, or hours of free time per week, indicating that combining these two types of anglers into one general bass angler group is suitable. Comparisons between respondents to the non-response survey ($n = 608$) and to the full survey ($n = 681$) found no significant differences in number of Lake Ontario fishing trips, age, income, and location of residence ($p \leq 0.05$).

4.2 Respondent demographics

The average bass-fishing respondent was 57 years old and had a high school diploma plus three additional years of post-high school education. Most (91%) were male. Forty-seven percent had a household income of between $51,000 and $100,000. Most (69%) resided in a rural area; 19% resided in a medium-sized city or suburbs, and 12% in a large city.

4.3 Confirmatory factor analysis

Two confirmatory factor analyses (one for motivations and one for constraints/facilitators) were carried out using EQS version 6.1 software (Multivariate Software, Inc.). The factor means and Cronbach's alphas for all confirmed factors are shown in Tables 1, 2, and 3.

The factor analysis for motivations achieved adequate fit (CFI = 0.919, RMSEA =0.05). The factor analysis for constraints/facilitators also achieved adequate fit (CFI = 0.896, RMSEA = 0.048). Variables loading on multiple factors were removed during the analysis to enable the calculation of summated rating scales for use in the regression analysis (see Tables 2 and 3).

Table 1
Motivations[a] of Responding Bass Anglers

Motivation	Statements used on questionnaire	Variable mean	Factor mean (alpha)
Nature appreciation	• To relax.	1.33	1.34 (0.879)
	• To be surrounded by nature.	1.35	
	• Because I appreciate the beauty of nature.	1.29	
	• Because I enjoy spending time in nature.	1.38	
Affiliation	• To spend time with family and/or friends.	1.28	1.20 (0.845)
	• To share the fishing experience with friends and/or relatives.	1.13	
	• Because I expect to enjoy my time with friends and/or family.	1.19	
Personal achievement	• For the challenge of catching fish.	1.37	0.99 (0.831)
	• To learn new fishing skills and techniques.	0.80	
	• To try different fishing techniques, equipment, tackle, and/or bait.	0.80	
Nurture	• To share my knowledge of fishing with friends and/or relatives.	0.69	0.72 (0.916)
	• To pass on my family fishing traditions to others.	0.81	
	• Because I like to teach others (i.e., adults/children) how to fish.	0.55	
	• Because passing my knowledge on to younger generations is important to me.	0.82	
Escape	• For the solitude of fishing alone.	0.35	0.59 (0.801)
	• For peace and quiet.	0.84	
	• To escape from daily obligations (work, errands, etc.).	0.57	
Satisfaction with catch	• Because I am satisfied with the number of fish I normally catch.	0.34	0.48 (0.880)
	• Because I am satisfied with the quality of the fishing experience I normally have.	0.63	
Success at catching fish	• To catch large fish, even if I only catch one.	0.62	0.43 (0.722)
	• To catch numerous fish, even if they are small.	0.22	
	• To catch my favorite species of fish only.	-0.04	
	• To be successful at catching fish.	0.87	
	• Because I expect to catch fish.	0.46	
Competition	• To compete with other anglers over who catches the biggest or the most fish.	-0.81	-0.92 (0.881)
	• To compete in fishing events such as derbies, tournaments, and competitions.	-1.01	
	• For the achievement of participating in a fishing derby or tournament.	-0.94	

[a] Motivations were based on the following scale: -2 = strongly disagree, -1 = disagree, 0 = neutral, 1 = agree, 2 = strongly agree.

Table 2
Facilitators[a] as Determined by Factor/Variable Means of Respondents

Category	Factor	Statements used on questionnaire	Variable mean	Factor Mean (alpha)
Structural	Good weather	• Good weather conditions.	0.94	na
	Access and equipment	• My ability to easily travel to fishing locations.	0.49	0.61
		• The availability of fishing equipment.	0.62	(0.883)
		• The proximity of my home to fishing locations.	0.71	
	Health and well-being	• My health.	0.32	0.32
		• My physical abilities.	0.33	(0.894)
		• My age-related abilities.	0.27	
		• My thoughts about the safety of myself or my family while fishing.	0.35	
		• My level of energy remaining after completing my daily obligations.[b]		
Intrapersonal	Past experience	• Having fished or not fished as a child.	0.89	0.88
		• Having fished or not fished as a teenager.	0.88	(0.894)
	Level of knowledge	• My knowledge of fishing techniques.	0.73	0.62
		• My knowledge of boat access and/or shoreline fishing sites on Lake Ontario, its embayments, or tributaries.	0.66	(0.844)
		• My knowledge of the Lake Ontario fishery in general.	0.45	
		• Handling fish and/or bait.	0.51	
		• My fishing skills and abilities.	0.78	
	Level of interest	• My level of interest in participating in fishing.	0.93	0.53
		• My level of interest in other recreational activities besides fishing.	0.09	(0.765)
		• My level of interest in learning more fishing techniques.	0.56	
	Level of commitment	• My dedication to the sport of fishing.	0.63	0.42
		• My involvement in fishing organizations, events, and/or programs.	0.14	(0.822)
		• The focus of fishing in my life.	0.48	
Interpersonal	Social support	• Being encouraged to fish by friends and relatives throughout my life.	0.80	0.69
		• Having friends (who are the same age as me) support my involvement in fishing.	0.60	(0.779)
		• Having at least one relative or friend who encouraged me to fish.	0.68	
		• Being able to fish with someone who can teach me new fishing techniques.[b]		
		• Being able to find a fishing partner.[b]		

[a] Constraints/facilitators were based on the following scale: -2 = greatly limits participation, -1 = limits, 0 = neutral, 1 = enables, 2 = greatly enables participation.
[b] Variable removed during confirmatory factor analysis.

Two variables ("poor weather" and "good weather") were treated as separate variables (rather than grouping them into a factor) to prevent them from either cancelling each other out in a factor, or (if one was reverse coded) from obfuscating the potential importance of both good and poor weather conditions for fishing; these variables were not included in the factor analysis.

Table 3
Constraints[a] as Determined by Factor/Variable Means of Respondents

Category	Factors	Statements used on questionnaire	Variable mean	Factor mean (alpha)
Structural	Poor weather	• Poor weather conditions.	-0.79	na
	Time	• Family obligations (e.g., caring for children or other relatives).	-0.42	-0.55 (0.831)
		• Time spent maintaining my household (e.g., cleaning, cooking, shopping, repairs).	-0.65	
		• Time spent working in a paid job.	-0.62	
		• The amount of free time I have.	-0.52	
	Economic costs	• The cost of paying for a fishing license.	-0.18	-0.14 (0.815)
		• The cost of travelling to a fishing location (e.g., fuel costs).	-0.22	
		• The cost of purchasing bait and tackle.	-0.07	
		• The cost of purchasing fishing equipment (e.g., rods & reels).	-0.10	
Intrapersonal	Perceptions of environment	• My thoughts about contaminant levels in Lake Ontario fish.	-0.40	-0.30 (0.876)
		• My thoughts about Lake Ontario's water quality.	-0.26	
		• My thoughts about Lake Ontario's water levels.	-0.18	
		• My thoughts about the health of the Lake Ontario environment in general.	-0.18	
		• My thoughts about eating fish from Lake Ontario.	-0.47	
		• My thoughts about diseases in Lake Ontario fish.[b]		
		• My thoughts about the quality of the Lake Ontario fishery.[b]		

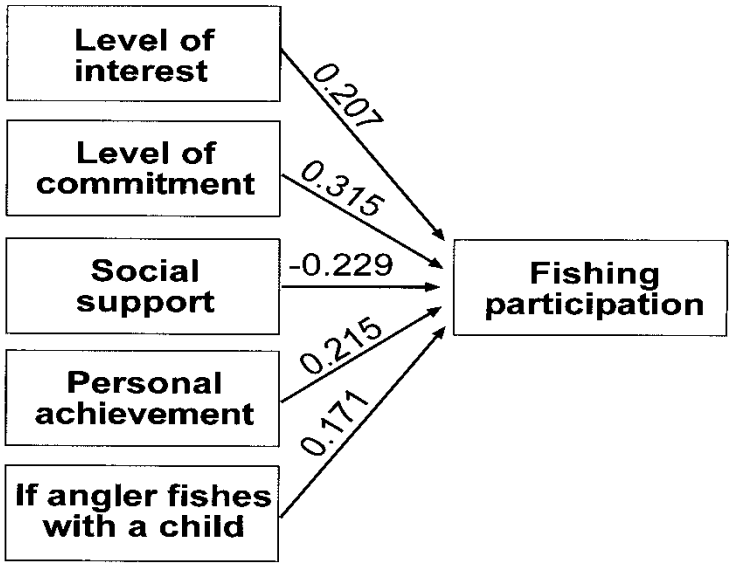
[a] Constraints/facilitators were based on the following scale: -2 = greatly limits participation, -1 = limits, 0 = neutral, 1 = enables, 2 = greatly enables participation.
[b] Variable removed during confirmatory factor analysis.

4.4 Regression analysis

Five factors/variables were identified as significantly related to perceived level of participation (Figure 1) through a stepwise regression. Moderately strong and positive relationships were identified between level of commitment (perceived as a facilitator by the average respondent)

and participation (Beta = 0.315), personal achievement (motivation) and participation (0.215), and level of interest (perceived as a facilitator by the average respondent) and participation (0.207; Figure 1). A moderate but negative relationship was identified between social support (perceived as a facilitator) and participation (Beta = -0.229). Finally, a slight, positive relationship was identified between whether the respondent fishes with a child or not (experiential variable), and participation (Beta = 0.171).

*Figure 1***.** Regression Model for Responding Resident Bass Anglers



5.0 Discussion and conclusion

The objective of this study was to provide a comprehensive understanding of the elements influencing participation in bass fishing by incorporating facilitators, constraints, motivations, and demographic/experiential variables into one research framework. Results indicate that bass fishing participation is directly influenced by one motivation (personal achievement), three facilitators (level of commitment, level of interest, social support), and one experiential variable (if the angler fishes with a child or not). Results also indicate that facilitators may have a greater influence on the average respondent's participation than do constraints, since all significant constraints/facilitators were perceived to be facilitators by the average respondent. As Raymore (2002) suggested, including facilitators in leisure research is useful for recognizing and understanding the full range of respondent experiences related to leisure participation. It is important to note, however, that a negative relationship was identified between social support and participation. This finding indicates that truly avid bass anglers may be less dependent on the support of family and friends for their participation than are less avid anglers.

These results have important implications for fisheries managers interested in encouraging bass fishing among residents. Although not all factors can be influenced by managers (e.g., number of adult anglers in a household), organizing educational programs that help improve fishing skills and encourage anglers to fish with their children (e.g., derbies for families) could improve adult angler participation in the long term. Promotional efforts to increase resident interest in bass fishing may also encourage more participation in the future.

There are certain limitations of this study that need to be considered. First, this study utilizes property tax records instead of fishing license receipts for sampling. While property tax records are likely to include anglers who do not purchase licenses, anglers residing in apartments are excluded, potentially influencing demographics such as income and age. Although the ages of respondents ranged from 18 to 85, the mean age was 57; it is likely that our results are representative of older bass anglers. Second, the results are representative of Lake Ontario resident bass anglers only; anglers from other locations and with other species preferences are likely to have different motivations, facilitators, and constraints. Third, equivalent sampling of counties (used in order to enable comparisons of data by county tourism promotion agencies) may have caused over-representation of anglers from rural counties. The results of this study may be more likely to represent rural anglers than those from urban environments. Finally, this study was conducted in 2009 at a low point in the U.S. economy; data concerning economic constraints might have been influenced by this timing.

In conclusion, this study identified significant relationships among motivations, facilitators, experiential characteristics, and bass fishing participation. Participation in bass fishing by Lake Ontario residents appears to be more influenced by what enables the participation than by what constrains it. Further research is needed to see how this approach to exploring the constraints, facilitators, motivations, and demographics related to leisure participation can be adapted to other situations.

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