

A DISCRIMINANT ANALYSIS OF SOCIAL AND PSYCHOLOGICAL FACTORS INFLUENCING FISHING PARTICIPATION

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Abstract

Lake Ontario, one of North America's Great Lakes, provides coastal residents of New York State with a sportfishery integral to both local traditions and the economy. Recent and projected declines in the number of state residents fishing Lake Ontario have generated concerns among fishery managers and business owners. In order to identify management and marketing strategies that can be used to increase fishing participation, an understanding of the influence of social and psychological factors on participation during childhood, adolescence, and adulthood is needed. Examination of both existing angler market groups (e.g., males) and market groups with growth potential (e.g., females) could provide further insight into increasing participation. This study identifies the social and psychological factors that influenced fishing participation for a sample of 1,050 Lake Ontario anglers (i.e., 525 males and 525 females). A mail survey, based on the elements included in a wildlife recreation involvement model by Decker et al. (1987), was conducted in 2001. Discriminant analysis was used to quantify the influence of these elements on fishing participation for males and females during childhood, adolescence, and adulthood. Elements identified as strongly influencing fishing participation for both males and females were opportunity, perceived ability, and fishing-related customs during childhood; affiliation, opportunity, and commitment during adolescence; and affiliation and commitment during adulthood. Based on study results, management and marketing strategies for increasing fishing participation were developed.

1.0 Introduction

Fishing is one of the most popular recreational activities in New York State, bringing in an estimated \$3.6 billion in direct and indirect angler impacts from both freshwater and marine fishing in 1999 (TechLaw Inc.

2001). While projected total participation in recreational fishing statewide is anticipated to increase between 1996 and 2005, the number of anglers in the 18- to 44-year-old age class is expected to decrease by an estimated 7.9 percent or 32,049 anglers due to population shifts (Connelly et al. 1999). This decrease in the number of anglers in this age group indicates that by 2025, decreases in older angler age groups will occur as well. Concerns about this projected decrease have been raised by fisheries managers and promoters in New York's Lake Ontario region. Strategies for offsetting this decline are necessary to prevent negative economic impacts and to maintain the cultural importance of fishing as a tradition along New York's Lake Ontario coastline.

Developing marketing and management strategies for offsetting fishing participation by targeting specific angler market groups (e.g., females anglers) may be an effective mechanism for increasing angler participation in the future. Because of the low percentage of anglers in New York State who are female (12% in 1996; Connelly et al. 1997), this market group in particular has potential for expansion. In addition, strategies for maintaining current levels of participation by existing market groups (e.g., male anglers) also need to be identified. However, in order to successfully develop these strategies, the factors that influence fishing participation for these market groups need to be studied.

Decker and others (1987) developed a wildlife-related recreation involvement model that identifies the goals and motivations that influence wildlife-related recreation involvement. Three goals are identified in the model: affiliation, achievement, and appreciation. Motivational elements include support of family and friends, expectations of family and friends, customs (i.e., traditions), values associated with the activity, opportunity, perceived ability, and commitment. The model suggests that involvement in recreational activities changes through time and follows several stages (i.e., process initiation, interest satiation, trial involvement, continued involvement, and involvement maturation). Application of this model to fishing, specifically, could be

useful in identifying the concepts that influence angler participation.

Although the model by Decker and others (1987) identifies stages of involvement in wildlife-related recreation, many studies indicate that individuals may be socialized into recreational activities such as fishing. Mannell and Kleiber (1997) describe “socialization into leisure” as the process by which children “acquire the motives, attitudes, values, and skills that affect their leisure choices, behavior and experiences throughout their lives.” Several studies indicate that children who experience recreational activities with their parents are more likely to participate in these same activities as adults (Hendee 1970; Sofranko and Nolan 1972; Yoesting and Burkhead 1973; Siemer et al. 1989a). As individuals age, the elements influencing their fishing participation are likely to change as involvement becomes more closely linked to the amount of leisure time available. According to Duda and others (1999), anglers indicated that the lack of time they had available for fishing was due to work obligations (69% of responding anglers), family obligations (22%), education-related activities (13%), and other recreational activities or hobbies (9%).

The influence of social and psychological factors related to gender socialization are also likely to be important to participation. Kane (1990) suggests that the leisure socialization process of children is likely influenced by gender roles. While the leisure socialization of male children often focuses on “competence, mastery, and independence, female leisure socialization fosters dependency, restrictive exploration, and limited physical play” (Block 1982). Shaw et al. (1995) found that male adolescents spent significantly more time than female adolescents in sports and other physical activities. In addition, Culp (1998), in her analysis of adolescent females and outdoor recreation, found that adolescent females perceived many barriers to their participation in outdoor recreation activities. Duda et al. (1999) indicates that many females are not fully initiated into fishing until adulthood, causing them to either drop-out of the sport or fish less often than men.

The social and psychological concepts associated with the process of socialization into fishing need to be studied

to identify long-term solutions to increasing fishing participation. In order to identify these concepts, this study examines fishing participation by males and females during childhood, adolescence, and adulthood, up to age 44. The hypotheses to be studied are that specific social and psychological concepts (i.e., opportunity, support from friends and family, expectations from friends and family, value of fishing, perceived fishing ability, customs, commitment, affiliation, achievement, and resource appreciation; adapted from Decker et al. 1987) influence fishing participation for both males and females during childhood, adolescence, and adulthood (i.e., each life stage was studied as a separate hypothesis). Discriminant analyses were used to identify the influence of these factors on the fishing socialization of male and female anglers. Because an equal number of males and females are sampled for this study (in order to enable comparisons between male and female anglers), the actual proportions of female and male anglers that fish in the eastern Lake Ontario region are not represented by the sample. Recall biases may exist since anglers were asked to recall their fishing involvement during adolescence and childhood.

2.0 Methods

2.1 Mail survey design

In the fall of 2000, a random sample of 1050 anglers (525 males and 525 females) was collected from New York State Department of Environmental Conservation fishing license stubs for the 1999 calendar year for Oswego, Jefferson, and Wayne counties along eastern Lake Ontario. Individuals who satisfied all three of the following criteria were included in the sample: (1) gender (i.e., an equivalent number of males and females were selected); (2) age (i.e., individuals were between the ages of 18 and 44 in the 2000 calendar year); and (3) state of residence (i.e., individuals were residents of New York State at the time of their license purchase). An equivalent number of males and females were included in the sample to ensure an adequate number of women in the survey and, thus, enable gender comparisons.

The survey questionnaire included questions on angler demographics, levels of fishing participation, and the social and psychological concepts influencing angler participation during the life stages of childhood (ages

birth to 12; Erikson 1963), adolescence (ages 13 to 17; Erikson 1963), and adulthood (ages 18 to 44; based on the 18- to 44-year-old age class projected to decline by Connelly et al. 1999). Survey questions regarding the social and psychological concepts influencing participation were based on the goals and motivations identified in a wildlife recreation involvement model by Decker and others (1987). Three goals were identified in the model and defined in relation to fishing involvement for the purposes of this study as follows:

- *Affiliation*—The angler's purpose for fishing is to spend time with others.
- *Achievement*—The angler's purpose for fishing is to improve his or her fishing expertise and/or to catch fish of a particular species or size.
- *Appreciation* (henceforth called *resource appreciation*)—The angler's purpose for fishing is to experience and appreciate the natural environment.

Motivational elements identified in the fishing participation model were defined in relation to fishing involvement as follows:

- *Expectations*—The expectations, as perceived by anglers, of friends and relatives concerning the angler's fishing involvement.
- *Support*—The level of support that anglers perceive they receive for their fishing involvement from family and friends.
- *Customs*—The level of importance of fishing to the angler's family traditions and activities.
- *Value of fishing*—The recreational value of fishing to anglers based on the enjoyment that they derive from the sport.
- *Opportunity*—The physical access anglers have to fishing equipment, fishing locations, and free time for fishing.
- *Perceived ability*—The perceptions of anglers concerning their fishing skills and ability to fish.
- *Commitment*—The extent to which anglers are dedicated to fishing.

All questions were short answer, requiring the respondent to check off his or her response, write in a number (e.g.,

age, average number of times fished per year), or use a seven-point Likert scale to respond. The Likert-scale questions were directed at obtaining information on the motivations and goals influencing fishing participation. Respondents were asked to circle the number corresponding with their level of agreement (on a scale from -3 (strong disagreement) to 0 (neutral) to 3 (strong agreement)) to different statements related to these goals and motivations.

Level of participation questions were included for childhood, adolescence, and adulthood, and based on the frequency distributions of responses and three angler participation categories identified by Duda and others (1999): infrequent anglers (i.e., those who fished at least once in one to two of the past 5 years), sporadic anglers (i.e., those who fished at least once in three to four of the past five years), and avid anglers (i.e., those who fished at least once a year). To account for life stages during which respondents did not fish, a "no participation" category was created. Seven levels of participation were identified for each life stage: 0 - no participation; 1 - infrequent (i.e., respondents fished every other year or less); 2 - sporadic (i.e., respondents fished almost every year); 3 - annual-low (i.e., respondents fished on average between 1 and 5 times per year); 4 - annual-medium (i.e., respondents fished on average between 5.1 and 10 times per year); 5 - annual-high (i.e., respondents fished on average between 10.1 and 20 times per year); and 6 - annual-highest (i.e., respondents fished on average over 20 times per year).

2.2 Mail survey implementation

Surveys were mailed to the sample of anglers in January and February of 2001 using a modified Total Design Method (Dillman 1978). The first and third mailings included a cover letter and a copy of the survey; the second and fourth mailings were reminder postcards. An interval of ten days was set between each mailing. In order to identify the existence of non-response bias, a short mail survey was sent by certified mail to 50 non-responding anglers. Follow-up telephone calls were used to contact individuals who did not respond to this mailing. In addition, the dates of return of the long angler surveys were recorded for each respondent in order to identify if response biases were related to participation categories.

2.3 Data analysis

Data from the surveys was entered into SPSS for analysis. Mean levels of angler participation for 25 non-respondents (out of the 50 sampled) and all respondents were compared using a two-independent-sample t-test. Significant differences at $\alpha = 0.05$ were identified. Correlations were calculated between the return dates of surveys and respondents' participation levels to identify potential response biases related to participation.

Likert-scaled variables were grouped into factors representing the motivational and goal elements identified by Decker and others (1987) and adapted for the purposes of this study. The mean value for each group of variables was calculated to generate the value of each factor for respondents. Six discriminant analyses were conducted to identify the influence of these factors (independent variables) on level of participation (dependent variable) at each life stage and for both genders. Individuals who did not fish during specific life stages were not included in the discriminant analyses for those life stages. Eigenvalues were used to identify the amount of variation explained by each significant discriminant function. Wilks' Lambda was used to identify the discriminating ability of discriminant functions (Hair et al. 1998). Potency values, calculated from eigenvalues and discriminant loadings, were used to identify the relative importance of each independent factor to the dependent variable for each life stage (Hair et al. 1998). For the purposes of this study, potency values greater than or equal to 0.200 were considered to have a notable influence on the level of participation. In addition, the percentage of respondents classified correctly according to each discriminant analysis was examined. Percentages greater than 16.7% were considered to be higher than if respondents were grouped by chance alone. The percentage of cross-validated respondents classified correctly using the "leave one out" approach (i.e., each case in the analysis is classified by the discriminant function derived from all cases except for the case being tested) was also identified. The percent of respondents classified correctly was then compared to the percent of cross-validated respondents classified correctly. Differences between these two percentages were noted.

3.0 Results

3.1 Non-response and response bias analyses

Two-independent-sample t-test comparisons between survey respondents and the 25 non-respondents revealed a significant difference ($p \leq 0.05$) between the adult mean levels of participation for respondents (mean participation level = 3.90) and non-respondents (2.88). These data indicate that the mean participation level for the population of anglers residing within the eastern Lake Ontario counties may be lower than that of the sample used in this study. However, because this study examines the influence of social and psychological concepts on continued participation, the sample is likely to provide results that enable greater insight into the concepts influencing higher levels of participation. Correlations used to identify response bias revealed no significant relationships between respondents' age and participation level ($r = 0.010$), and the date the questionnaire was returned and respondents' participation level ($r = -0.080$).

3.2 Demographics

A breakdown of respondents by their demographic characteristics is included in Table 1. The analysis of demographic variables indicates that the sample is largely representative of married Caucasian anglers residing in rural areas and small cities. The homogeneity of this sample is important for increasing the discriminating ability of the discriminant analyses.

3.3 Factors influencing fishing participation during childhood

One function was identified as significant in each of the discriminant analyses conducted for female and male respondents during childhood. A moderate amount of variation is explained in both analyses as shown by moderate eigenvalues. Wilks' Lambda is also moderate for both analyses, indicating a moderate amount of differentiation between participation level groups. The percent of female respondents classified correctly with the discriminant function is 50.5 percent while the percent of males is 48.5 percent (Table 2). These percentages are higher than what would be expected due to chance alone. The percent of cross-validated respondents classified correctly is 22.3 percent for females and 33.1 percent for males. While neither of these percentages is high, both are higher than would be expected due to chance

Table 1.—Demographics of study respondents.

Demographic characteristics	Percentage/Mean
Gender	
Females	51%
Males	49%
Age	Range 18 to 44 Mean 33 yrs.
Education	Mean 13.7 yrs.
Household	
Respondent lives with spouse/significant other and with/without children	78%
Respondents lives with parent(s)/other relatives	8
Respondent lives alone	7
Respondent is a single parent living with/without children	4
Respondent lives in college dorm or with friends	3%
Children	
Respondent has children	66%
Respondent does not have children	34%
Race	
Caucasian	91%
African American	1
Native American	6
Other	2%
Location of residence	
Rural areas or villages under 5,000 in population	61%
Small cities or suburbs between 5,000 and 24,999 in population	22
Medium cities between 25,000 and 99,999 in population	12
Large cities over 100,000 in population	5%

alone. Factors having moderate to high potency values for both genders are perceived ability, opportunity, and custom (i.e., tradition). In addition to these factors, support of family and friends influenced participation by female respondents. For males, the value of fishing was found to be important in determining the level of fishing participation.

3.4 Factors influencing fishing participation during adolescence

One function was identified as significant in the discriminant analyses for female and male respondents during adolescence. A moderate-to-high amount of variation is explained in both analyses as shown by eigenvalues of 0.747 for females and 0.891 for males. Wilks' Lambda is moderate for both analyses, indicating a moderate amount of differentiation between participation levels. The percent of female respondents classified

correctly is 44.9 percent, while the percent of males is 57.9 percent (Table 2). The percent of cross-validated respondents classified correctly is 27.1 percent for females and 42.9 percent for males. Although these percentages are higher than would be expected due to chance alone, the percentage for females is not high. Using potency values, the factors found to influence fishing participation in both males and females during adolescence were affiliation, opportunity, and commitment. In addition, the fishing participation of females was influenced by the support of friends and family, and customs. Male adolescent fishing participation was also influenced by the value of fishing and perceived ability.

3.5 Factors influencing fishing participation during adulthood

Two discriminant functions were identified as significant in the analyses of both female and male respondents. A

Table 2.—Results from the discriminant analyses of level of fishing participation (dependent variable) and social and psychological factors (independent variables) for females and males. Values greater than 0.200 are in bold.

Factor	Female potency values			Male potency values		
	Childhood	Adolescence	Adulthood	Childhood	Adolescence	Adulthood
Affiliation	0.086	0.354	0.458	0.107	0.218	0.240
Resource appreciation	0.000	0.068	0.018	0.021	0.012	0.050
Achievement	0.011	0.020	0.011	0.017	0.006	0.017
Opportunity	0.549	0.243	0.036	0.362	0.457	0.149
Support	0.236	0.317	0.150	0.115	0.142	0.115
Expectations	0.040	0.112	0.181	0.122	0.194	0.387
Custom	0.207	0.252	0.129	0.210	0.108	0.117
Perceived ability	0.384	0.172	0.034	0.726	0.383	0.363
Commitment	0.073	0.415	0.385	0.158	0.231	0.368
Value of fishing	0.069	0.057	0.052	0.236	0.367	0.180
N	103	107	129	130	126	131
Percent of respondents classified correctly	50.5%	44.9%	55.0%	48.5%	57.9%	55.7%
Percent of cross-validated respondents correctly classified	22.3%	27.1%	31.0%	33.1%	42.9%	39.7%

high amount of variation is explained in both analyses as shown by cumulative eigenvalues of 1.098 for females and 1.584 for males. Wilks' Lambda is low for the first function for female respondents and moderate for the second, indicating a high and a moderate amount of differentiation, respectively, between participation level groups. Wilks' Lambda is low for the first function of male respondents indicating a high degree of differentiation between groups, and moderate for the second function (indicating moderate differentiation). The percent of female respondents classified correctly is 55.0 percent while the percent of males is 55.70 percent (Table 2), both higher than due to chance alone. The percent of cross-validated respondents classified correctly is 31.00 percent for females and 39.70 percent for males, both higher than would be expected due to chance alone. Using potency values, the factors with the greatest influence on fishing participation for both genders are affiliation and commitment; participation by male respondents is also strongly influenced by the expectations of family and friends and perceived ability.

3.6 Summarized results by gender

Comparison of potency values between discriminant analyses provides an indication of the changes in the influence of factors on participation level between childhood, adolescence, and adulthood for both genders. For example, perceived ability for both females and males appears to decline in influence on participation between childhood and adulthood (Table 2). Opportunity likewise seems to decline for females while, for males, it appears to increase during adolescence and then decline in adulthood. Support and custom appear to most influence female participation during childhood and adolescence. Custom most influences male participation during childhood, while support has a slight to negligible influence on male participation during all life stages. While the influence of the value of fishing on female participation during all life stages is slight to negligible, the value of fishing does appear to influence male participation during all life stages. Expectations most influence male participation during adolescence and adulthood, but only slightly influence female adult

participation. Affiliation and commitment most influence both male and female participation during adolescence and adulthood.

4.0 Discussion

The results of the discriminant analyses indicate that many of the goal and motivational elements adapted from Decker and others (1987) influence fishing participation, and that the influence of these elements on participation changes throughout the course of an individual's life. For example, during childhood, opportunity, custom, and perceived ability were identified as the most important factors (based on their relatively high potency values; Table 2), influencing participation by both males and females. The relationship between opportunity and participation seems clear: the greater the opportunity a child has to fish, the more frequently the child will fish. As children participate more frequently, their skills at fishing are likely to improve, increasing their perceived ability. If children perceive their fishing abilities to be high, they will be more likely to enjoy the sport of fishing and to want to participate. Custom may encourage increased participation by acting as a type of tradition-based expectation (e.g., my father's father fished, my father fished, so I fish). Families may expect their children to identify with traditional activities such as fishing and to uphold that heritage by continuing to fish. For female respondents, support also influenced fishing participation during childhood. The support of family and friends may be particularly important in increasing participation among female children because female children may be either less interested in fishing alone or not permitted to fish by themselves (a significantly lower proportion of female respondents (27%) than male respondents (48%) fished by themselves as children ($p \leq 0.05$; Kuehn 2003)). For male respondents, the value of fishing as a sport was an important influence during childhood. The enjoyment males derive from the sporting aspects of fishing at this stage in their lives likely motivates them to seek out additional fishing experiences, thus increasing participation. This search for new fishing experiences may also explain why male respondents fished for a greater diversity of fish species than females during childhood (i.e., males fished for an average of 4.58 species during childhood while females fished for an average of 3.35 species, $p \leq 0.05$; Kuehn 2003). Female

respondents, who had a low potency value for the value of fishing, may instead be motivated by other aspects of fishing such as spending time with their family or participating in other recreational activities during fishing trips (e.g., camping).

During adolescence, the factors found to influence participation greatly in both male and female respondents were opportunity, commitment, and affiliation. Opportunity during adolescence, as discussed for childhood, directly influences how often an individual is able to fish. The more frequently individuals are able to participate in fishing, the more likely that their commitment to fishing will increase. The identification of affiliation as an important influence on adolescent participation but not on childhood participation indicates that during adolescence, anglers may begin to actively seek out others with whom they can fish. The participation of female respondents in particular was influenced to a greater extent by affiliation than was the participation of males. Since a much lower percentage of females than males fish in New York State, female participation may be more closely linked to their ability to find a fishing partner. The strong influence of the support of family and friends on female fishing participation during adolescence further indicates that social connections are an important component of fishing to females. Male participation during adolescence may be less influenced by the support of others, a concept supported by the fact that a significantly larger percentage of males than females fish by themselves (Kuehn 2003). Although perceived ability had only a slight influence on the fishing participation of female respondents during adolescence, it influenced male participation greatly, as shown by the high potency value for perceived ability for males. In addition, the strong influence of the value of fishing on participation by males indicates that males may be more focused on the sporting aspects of fishing and the development of fishing skills during adolescence than are females.

During adulthood, the two factors influencing fishing participation for both males and females were affiliation and commitment. Affiliation remains a greater influence on female fishing participation than on male participation, indicating that the social support systems

related to fishing that female anglers develop during childhood and adolescence continue into adulthood. In contrast, the participation of adult male respondents was strongly influenced by perceived ability, a factor that barely influenced female participation (as indicated by a potency value of 0.034). These data suggest that female participation may be most influenced by the social aspects of fishing, while male participation is most influenced by both the social and sporting aspects of fishing. It seems likely that the importance of these social and sport-related aspects of fishing to both males and females leads to a strong commitment to the sport.

5.0 Management Recommendations

The elements included in the fishing participation model adapted from Decker and others (1987) appear to work well in identifying potential influences on fishing participation. In order to identify management recommendations for this model as a whole, the influence of each individual element on fishing participation needs to be considered. Knowledge of these elements can be used to identify how to increase fishing participation at each life stage. During childhood, when opportunity and perceived ability strongly influence fishing participation for both males and females, strategies to increase access to fishing (i.e., both to equipment and location) and focus on skill development need to be implemented (e.g., creating new access areas or promoting existing ones). Making fishing equipment available to children through fishing equipment loaner programs at parks, campgrounds, and other areas frequented by children could also boost participation in the sport. Because of the importance of skill development on childhood fishing participation, parents should be encouraged to bring their children fishing at locations that enable their children to easily catch fish (e.g., panfishing ponds). Skill development could also be enhanced through the inclusion of outdoor/fishing skill development courses in school curriculums, and by including or enhancing fishing skill development activities in youth organizations. The importance of support by friends and family for female children indicates that strategies for increasing participation by children need to focus on parental fishing involvement as well. Educating parents about how their support affects their children's fishing participation could be useful for encouraging parents to

take their children fishing more often. Creating family fishing events could be an effective strategy for increasing family fishing opportunities.

During adolescence, when affiliation and opportunity were identified as strongly influencing fishing participation in respondents, programs designed to increase fishing participation should provide social interaction as well as increased fishing opportunities. Because only an estimated 120 percent of anglers in New York State were females in 1996 (Connelly et al. 1997), adolescent females in particular may have difficulty finding peers with whom they can fish. Efforts to organize outdoor activity groups and social events such as fishing derbies and teen retreat weekends may help maintain female fishing involvement during this life stage and may be equally effective for males. Including fishing and other outdoor skills as part of physical education curriculums in schools can also be useful as maintaining fishing participation during adolescence.

During adulthood, the social linkages both males and females developed related to fishing during adolescence continue to influence their participation, as shown by the large influence of affiliation on adult participation. With less time available for recreational activities because of work and family obligations, many male and female adults seek recreational activities in which they can participate with family and friends. Promoting fishing as a social activity can be effective at attracting these individuals. Holding fishing activities that encourage social interaction such as family festivals that include fishing events can help increase participation by both adults and children.

6.0 Conclusion

The hypotheses studied are that specific social and psychological concepts influence the level of fishing participation for both males and females during childhood, adolescence, and adulthood. The results indicate that most of the factors studied influenced the level of fishing participation during at least one life stage, and that the influence of each factor changed with life stage and differed by gender. Thus, in order to truly understand fishing involvement, one must consider how individuals of both genders are socialized into fishing

during each life stage. If increasing the number of female anglers is a priority for fisheries managers and promoters, then strategies need to be taken which focus on the highly social nature of female fishing activity. Likewise, to increase male fishing participation, strategies that focus both on the sporting and social aspects of fishing need to be identified. Recognizing and promoting the importance of fishing as a tradition can also increase the awareness of individuals about the heritage-based importance of fishing.

7.0 Citations

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