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Exploring Substitutability Within College Sports Through Hierarchical Choice Processes

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Understanding how spectators make decisions among the multiplicity of sport alternatives is important to the development of marketing strategies. In this study, a hierarchical choice framework was adopted to help illuminate the *process* in which individuals deal with sport substitution decisions within one university setting. In a forced-choice experiment, 419 college students were presented with existing sport offerings and asked, under constraint-free conditions, to make attendance choices with and without the most preferred alternative available. By observing students' choices, the choice process was inferred based on the degree of switching that occurred between the two scenarios and tested whether it followed a hierarchical scheme. Results supported a "tree" structure for attendance choices, in which students consider the specific sport before considering the alternatives within the sport. Thus, under the conditions tested substitution was more likely to occur between alternatives of the same sport than either between different sports with the same sex of participants or proportionally across all alternatives.

For the past 30 years, athletic departments have been adding and eliminating sport programs as a response to many changes in socioeconomic and legal conditions, including changes in NCAA rules, the increasing pressures of Title IX, and decreasing financial support from institutions (Howard & Crompton, 2005). While the additions and deletions of programs may be more a function of changes in the legal environment as opposed to being driven by market revenue balance, the question of how to create more revenue and increase market penetration to a portfolio of several sports is a critical one. When, for example, a sport does well financially (say, men's basketball) and a sport of the same type (women's basketball) does not, the questions become whether any substitution ("cannibalization") effect exists between the two sports and, if it does, then how can this substitution effect be leveraged to generate more revenue. Essentially, there is an increasing need to understand how attendance can shift from one program to another, which is invaluable to athletic directors seeking to find revenue solutions for the mix of sport programs required to be offered.

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Consider, for example, the situation of an intercollegiate athletic department that offers several men's and women's sport programs, with many of those sports potentially competing for the same pool of spectators. An immediate question related to substitution that arises is: Do different sport programs offered by one university compete for the same consumers? In addition, consider a situation where an athletic department is contemplating the introduction of a new sport program. What would happen to existing sport programs with the introduction of a new one? Would the new program draw spectators from existing ones? If a women's sport program is introduced, will it compete for consumers within the same sport (e.g., against the men's program) or another women's program? The same questions apply if, instead of introducing a new program, a program is eliminated or changes are made to the marketing of the programs.

To answer these questions, a better understanding of how consumers deal with the multiplicy of sport alternatives in a choice situation is necessary. Some studies (Baade & Tiehen, 1990; Baimbridge, Cameron, & Dawson, 1995; Ferreira & Bravo, 2007; Schofield, 1983; Zhang, Smith, Pease, & Jambor, 1997) have examined competition (for spectators) among sport alternatives as a predictor of attendance. Research findings suggest that the availability of multiple sport attractions in the same area has a significant negative impact on professional sport attendance or gate revenue (Baimbridge et al., 1995; Schofield, 1983; Zhang et al., 1997). However, other studies (Baade & Tiehen, 1990; Ferreira & Bravo, 2007) suggest that competition may actually have a neutral or positive impact on attendance as a result of loyalty for particular teams and local rivalries, which explains why different teams may coexist in the same location. Although these studies indicate that competition for spectators exists within sports, they do not provide much insight into how consumers make choices as a result of changes in social or managerial conditions.

Although not directly addressing questions regarding substitutability within sports, a stream of research on sport spectators does provide some insights into potential ways consumers may consider different sport as substitutes. For example, research on fan motives suggests that sport attraction motives vary by specific sport or sport type (James & Ross, 2004; Robinson & Trail, 2005; Wann, Scharader, & Wilson, 1999). Thus, it potentially supports a structure of competiton more based on the specific sport or sport type. If their most preferred sport alternative is no longer available, then it is conceivable that consumers may switch to an alternative of the same specific sport (e.g., from men's basketball to women's basketball) or within the same sport type (e.g., from one team sport to another team sport). On the other hand, studies that have compared fans at men's sports versus fans at women's sports (Fink, Trail, & Anderson, 2002; James & Ridinger, 2002; Kahle, Duncan, Dalakas, & Aiken, 2001; Ridinger & Funk, 2006) suggest that women's sports may be more alike and distinct from men's sports. Thus, sports that share the same characteristic regarding sex of participants may be considered as plausible substitutes. If their most preferred sport is no longer available, consumers may switch to another sport alternative with the same sex of participants (e.g., switch from men's basketball to men's baseball).

Although the aforementioned studies have suggested some ways in which sports may compete with one another, they have not directly focused on the choice process associated with product substitutability. In this study, a hierarchical choice

framework is adopted to help illuminate the *process* in which individuals deal with sport substitution decisions within one university setting. The analyses was conducted by observing consumer choices and switching patterns that result from a given change in program offering. Then, following a hierarchical choice framework (Kannan & Wright, 1991; Urban, Johnson, & Hauser, 1984), different forms of substitution were tested to identify the most plausible structure that conformed with the observed choices.

Substitutability Research

Although substitutability research has not yet caught the attention of sport management scholars, it has gained a substantial amount of attention in leisure research over the past 25 years (Baumgartner & Heberlein, 1981; Bergstrom & Cordell, 1991; Brunson & Shelby, 1993; Cordell, 1976; Iso-Ahola, 1986; Manfredo & Anderson, 1987; Shelby & Vaske, 1991; Vaske, Donnelly, & Shelby, 1990; Vaske, Donnelly, & Tweed, 1983). Brunson and Shelby (1993) have defined *recreation substitutability* as "the interchangeability of recreation experiences such that acceptably equivalent outcomes can be achieved by varying one or more of the following: the timing of the experience, the means of gaining access, the setting, and the activity" (p. 69). One important objective of substitutability research is to understand how individuals make choices among leisure activities as a result of changes in social or managerial conditions, which is important to the formulation of marketing strategies.

In marketing, substitutability research has been commonly referred to as a consumer-based market structure analysis (Day, Shocker, & Srivastava, 1979; Elrod et al., 2002). Market structure analysis is closely related to the foundations of recreation substitutability as defined earlier. As is the central tenet of recreation substitutability (Iso-Ahola, 1986), consumer-based market structure analysis aims at explaining the nature of competition between products, and it departs from the typical market structure in economics to focus on market-driven consumer responses (Elrod et al., 2002). However, market structure analysis tends to be more focused on analysis within a defined product or service category (in our case, college sports) as opposed to across product categories (e.g., professional versus college sports) or classes (different entertainment alternatives). Over the years, many methods have been developed and many applications have been made in both recreation (Brunson & Shelby, 1993) and marketing research (Day et al., 1979; Elrod et al., 2002).

Substitutability Within Sport Alternatives

Although not directly addressing substitutability, research on sport spectators acknowledges the multiplicity of sport choices that consumers face. Through a socialization process (Eitzen & Sage, 1993), individuals are introduced to many sports throughout their lifetime. Consistent with many previous models, the psychological continuum model proposed by Funk and James (2002) posits that individuals go through a stage of evaluating multiple alternatives as they move from a stage of awareness, where they have been introduced to a sport or team, to reach a stage of attraction, where a decision of the most preferred sport or team has been

made. Although the model also describes higher levels of psychological connections with a sport or team that can be developed over time, it is important to highlight that the escalating path of the model to higher levels may never be reached, and can actually reverse to lower levels due to life constraints. Thus, according to the model, individuals may change the degree of importance they attach to a particular sport and teams and potentially increase the importance they attach to other sports and teams due to situational and environmental influences. It is also important to note that although individuals may reach a stage where they prefer a particular sport or team, it is also possible that individuals develop preferences for a second or third sport or team. The acknowledgment of Brazil as everyone's second favorite soccer team is a well-known example of this (Sanghera, 2006). One may have a favorite sport but also be attracted to another sport.

In addition, sport spectators may face situations that directly evoke a switching behavior. For example, the performance of a team may influence those commonly denoted as "fair weather fans" to switch to more successful teams. Furthermore, there are situations in which the most preferred sport is simply not available. In the context of collegiate sports, for instance, the introduction or discontinuance of a sport program, scheduling conflicts between sports, and away-games may all impact the availability of a favorite sport.

When discussing substitutability, however, it is important to discuss the mechanisms that underlie a switching behavior. The discussion now turns to the frameworks that serve as the theoretical basis to examine substitutability in sports.

Product Category Knowledge Structures

When situations that foster a switching behavior from a favorite sport occur, consumers must search for or have knowledge of plausible alternatives for a substitution to take place. As discussed in the consumer psychology literature, consumers generally form schema-like knowledge structures about products/brands (Cohen & Basu, 1987). These product category knowledge structures are composed of products/objects that are similar in many important aspects (e.g., attributes/features, benefits). These structures allow us to process information more efficiently, such as identifying, classifying, and differentiating product alternatives.

Embedded in theories of category knowledge structure (Murphy & Medin, 1985), the construct of product similarity is an important mechanism that operates in the formation of product category knowledge. Similar (dissimilar) products are essentially those that share common (distinctive) features (Tversky, 1977). As Keller (1993) posits, brands will most likely share some associations with other brands, which can help establish category membership. Thus, different sports can share associations that can vary in degree of strength and favorability (although they can also be distinctive in many aspects). For example, at a very abstract level of association, it can be conjecture that all sports potentially can provide, to a certain degree, symbolic benefits such as fan identification and peer group acceptance, as well as symbolic benefits such as escape, nostalgia, and pride in place (Gladden & Funk, 2002). At a more concrete level of association, college and professional basketball share the same core characteristics related to the game of basketball (e.g., form, rules, skills).

A product category can also be characterized by a concept known as prototypicality. Prototypical products are those that share features or resemble the family of category members (Rosh & Mervis, 1975). Prototypical products share attributes or benefits that are essential to all products or brands in the category (Keller, 1993), whereas a particular product or brand may be considered as an "exemplar" of the category (Cohen & Basu, 1987). For example, consumers may expect minor league baseball games (as a distinct product category) to offer lower prices and many more opportunities to be closer to action than professional baseball games, and possibly consider a successful minor league team as an exemplar of the category.

Keller (1993) also suggests that the associations between brands and their respective product category are reciprocal. That is, as brands share associations with the product category, some product category associations may become linked to the brand. Following the same example given, if a consumer perceives minor league baseball games to be of low quality, he or she may think alike regarding a particular minor league team.

Sport Category Knowledge Structures

A brief review of the literature on sport spectators provides some insights into potential ways consumers may categorize different sport offerings and how this categorization may operate in a substitution situation. One categorization is related to specific sports or type of sports. In this categorization, each sport can be considered as its own category (e.g., basketball), offering different levels of play, including amateur (college or high school) and professional events, as well as men's and women's events. For example, consumers may consider a men's soccer team and a women's soccer team to be in the same sport-specific category (soccer) and to be more alike because of the shared associations related to the sport of soccer overall. In addition, sports can also potentially be categorized into type or group of sports, such as individual sports (e.g., swimming, track and field) or team sports (e.g., basketball, soccer). In this categorization, consumers may perceive swimming and track and field to be more alike because of the shared characteristics related to individual sports. The categorization of specific sport or sport type will be referred to here as a sport-based structure.

In a sport-based structure, spectators would be expected to substitute a specific sport or sport type for another within the same specific sport or of the same type. Therefore, switching would occur more frequently within the specific sport or sport type (from men's hockey to women's hockey, for example) as opposed to either between sports with the same sex of participants (from men's hockey to men's basketball) or proportionally across all sport events.

One argument for this sport-based substitution structure is that sports of the same type share the same core characteristics, including the game form, rules, and skills (Mullin, Hardy, & Sutton, 2000). Therefore, individuals involved with a sport, say basketball fans, may find events that offer the same perceived core characteristics as substitutes when one is not available. College men's and women's basketball or professional men's and women's basketball are examples of sports that can be perceived as sharing the same core characteristics (basketball). Research has revealed that consumers' perceptions of different types of sports based on the nature of the physical activity can influence sport attendance deci-

sions (Armstrong, 2001) and that core attributes were important and differentiated sports like basketball and hockey (Ferreira & Armstrong, 2004). Furthermore, research focused on fan motives has also suggested that while there are factors that cut across different sports such as the entertainment provided by sports in general, there are also specific ones that can differentiate sports (James & Ross, 2004). This argument of a sport-based structure is consistent with recreation research that has considered the activity as the basis for substitution (e.g., Shelby & Vaske, 1991).

Sports partitioned into categories such as team versus individual sports and aggressive versus nonaggressive sports have also been suggested in the literature. Wann, Scharader, and Wilson (1999) found that preferences for individual and team sports differ by individuals' attendance motives. Their results revealed that individuals with a preference for watching individual sports (e.g., gymnastics) reported higher levels of aesthetic motivation than those with a preference for team sports (e.g., soccer). Individuals with a preference for team sports had higher scores for the eustress and escape motives. Their results also revealed that individuals with a preference for a nonaggressive sport reported higher levels of aesthetic motivation and lower levels of economic motive (the motive that involves gambling as a reason to follow sport events) than those with a preference for an aggressive sport.

A second argument for a sport-based structure is that sports of same type may share similar usage and user imagery (Keller, 1993). User imagery relates to the image individuals form about an event based on the characteristics of the spectators. An example of user imagery is the image we might have of extreme sports being associated with young people. Usage imagery relates to the time and place of the event, such as basketball as a winter event. This argument is similar to what Brunson and Shelby (1993) refer to as the timing of the experience and the setting. It is conceivable to think that individuals hold similar usage images of men's and women's basketball, for instance, as the two share a similar calendar and, often, the same venue.

The images that individuals form of specific sports may also contribute to their psychological attachment to the sport overall (Funk & James, 2001). Funk and James (2001) conceptualize *psychological attachment* as "the extent to which certain mental associations linked to a sport or team are intrinsically important" (p. 132). Following this contention, individuals highly identified with a specific sport overall may be more likely to choose alternatives of the same sport when the most preferred alternative is not available. Consider, for example, spectators who are highly identified with soccer. Enthusiasts who are "into soccer" might be more likely to watch or attend different soccer events (e.g., men's and women's soccer, English Premiere League, Italian League, etc.) than watch or attend a basketball event. Consequently, these enthusiasts may love the sport as well as the many aspects that make "their" sport unique, such as the game strategy and form.

An alternate way of categorizing sports suggested in the literature is by the sex of the participants. This categorization implies that sports played by men are a distinct group from sports played by women. Therefore, sports played by the same sex are considered to be more alike because of the shared associations related to the sex of the participants (e.g., men's basketball and men's hockey). This categorization will be referred here as a sex-based structure.

In a sex-based structure, switching would occur more frequently within sports that share the same sex of participants (e.g., from men's hockey to men's basketball) as opposed to proportionally or across sport types. This structure is based on the premise that difference exists in the manner in which factors influence consumers' attendance at men's and women's sport events (Fink et al., 2002; James & Ridinger, 2002; Kahle et al., 2001; Ridinger & Funk, 2006). Many studies have examined spectators of women's sports (Antonelli, 1994; Armstrong, 1999; Funk, Mahony, & Ridinger, 2002; Kerstetter & Kovich, 1997). However, studies that have particularly compared fans at men's sports versus fans at women's sports have identified differences in perceptions of aesthetic appeal of the sport (James & Ridinger, 2002), environmental factors such as promotions, family, friends, and ticket pricing (Fink et al., 2002), behavioral factors such as wearing team apparel, purchasing merchandising, and loyalty (Fink et al., 2002), social values (Kahle et al., 2001), and motivational factors such as family/friends, socialization, support of women's sport opportunities, and the presence of a role model (Ridinger & Funk, 2006). Therefore, women's (men's) sports may be considered similar to other women's (men's) sports on many factors related to the sport or event. For example, cause-related marketing as it relates to support of women's programs as a "cause" (Ridinger & Funk, 2006) can support a sex-based switching pattern. This suggests that individuals who want to support women's sports may be more likely to switch between two women's sports than between the women's and men's versions of the same sport.

Hierarchical Choice Framework

The underlying framework of many switching models is based on information processing theory of product choice (Bettman; 1971; Tversky & Sattath, 1979). Early work by Bettman (1971) and Tversky and Sattath (1979) describe a simplification decision process, which consumers may follow to make choices from a multitude of products offered in the marketplace. These processes are often described by a hierarchical scheme whereby individuals partition choice alternatives sequentially until a subgroup of alternatives (considered as substitutes) is reached (Rao & Sabavala, 1981). In reality, this hierarchical choice process adopted by a consumer is not directly observable. However, by observing the choices of a group of consumers, it is possible to infer the choice process based on the degree of switching that occurs under a hierarchical scheme.

It is important to note that the product category knowledge structures held in memory are likely to influence the hierarchical decision process by facilitating the classification and differentiation of alternative products. The associations that are shared among products can form the basis for similarity judgments that, in turn, may facilitate the partition of choice alternatives into subgroups considered as substitutes.

The partition of the alternatives into subgroups is also consistent with theoretical and empirical analyses of probabilistic choice. Choice is generally considered probabilistic because there is a degree of uncertainty associated with many unobserved factors that influence choice. Due to probabilistic nature of individual choice behavior, random utility theory (McFadden, 1974a; Thurstone, 1927) pos-

tulates that utility (a latent or unobserved preference scale or attitude toward products) is composed of a deterministic component, which is related to the product (attributes), and an error term to account for sources of uncertainty such as situational influences. In a given choice situation, individuals are assumed to choose (with a certain probability) an alternative that provides the greatest utility from the set of alternatives.

Nevertheless, one important aspect of choice behavior is the structure of decision making (McFadden, 1974b). In many circumstances, individuals may face many decisions involving many dimensions of choice alternatives. In such situations, they are more likely to follow a "tree" decision structure. Choice of sport alternatives, for example, may involve many decisions such as first choosing whether to attend a sport event, then of what sport, and finally of what level or type. One particular choice model, namely the nested-logit model, assumes a tree-like structure that closely reflects this hierarchical choice process. This model is explained in more detail in the Methods section.

Many studies have adopted aggregate hierarchical models to study substitution. Examples of hierarchical models that appear in the marketing and recreation literature, among others, include studies by Kannan and Wright (1991), Kumar and Sashi (1989), Rao and Sabavala (1981), Siderelis and Moore (1998), and Urban et al. (1984). In a seminal paper, Urban et al. (1984) examined the competitive structure of the coffee market. In the study, they particularly tested four alternative competitive structures and found that consumers tended to choose coffee primarily based on their attributes (e.g., ground coffee vs. instant coffee) rather than based on their brands (e.g., Folgers vs. Nescafe), when products are consumed (e.g., morning or afternoon), or who consumed them (e.g., heavy versus light users). In the study, consumers were much more likely, for example, to switch from one brand of ground coffee to another brand of ground coffee than to any instant coffee. These results suggest, for example, that a company looking for expansion would perform better strategically by introducing new products in different markets as defined by these attributes, one ground coffee and one instant coffee, than by introducing multiple brands for same coffee market (e.g., multiple brands of instant coffee).

In another example, Siderelis and Moore (1998) used a nested-logit model to examine recreation choice behavior. They have examined site choices boat owners made in 17 different lake regions over different occasions. The model assumed that boat owners first decide on the number of site trips to take per season and then decide on how to allocate the number of trips across substitute lake sites. In respect to substitutability between lakes, the results supported a hierarchical scheme based on the regional location of lake sites. Substitution was much more frequent between lakes within the same region than across different regions.

Hierarchical Structures for Sport Alternatives

The degree to which this hierarchical choice process applies to sport attendance choices has not been determined. In fact, despite research on factors that influence sport event attendance (Baade & Tiehen, 1990; Becker & Suls, 1983; Branvold, Pan, & Gabert, 1997; Carmichael, Millington, & Simmons, 1999; Hansen & Gauthier, 1989; Marcum & Greestein, 1985; McDonald & Rascher, 2000; Schofield,

1983; Zhang et al., 1997) or consumers' decisions to attend a professional game (Zhang, Pease, Hui, & Michaud, 1995), very little work has been done on the decision-making process in which sport consumers engage in making choices among multiple sport alternatives. The hierarchical choice framework offers an approach to study the decision-making process by directly observing the choices sport consumers make and inferring whether a hierarchical choice process is plausible. It is important to note that many of the models used to test the hierarchical choice process as will be discussed do not necessarily or literarily test whether an individual consumer engaged in a sequential decision process. Instead, they test whether the consumers on the aggregate make choices conforming to a hierarchical clustering of products.

According to the hierarchical choice framework, potential consumers of many sport events are assumed to simplify the choice alternatives by grouping sports hierarchically on the basis of their similarities or other influences (e.g., social influence) and choose from a small group of alternatives within the category in which they are most interested. Therefore, when the most preferred sport is not available, individuals are assumed to be selecting a sport from a small group of alternatives they consider similar or plausible substitutes.

A summary of the two hypothesized forms of substitution reviewed earlier is presented next: one based on the type of sport (sport-based structure) and the other based on the sex of its participants (sex-based structure). A null hypothesis is the one with no substitution, which provides a baseline explanation for switching choices among sport alternatives.

No Substitution Structure. The fact that sport events may share some characteristics does not absolutely imply substitution. In fact, similar activities may not be substitutable if they do not provide the same experience (Baumgartner & Heberlein, 1981). Activities that are similar in form may differ in respect to the elements of the experience such as the importance individuals attribute to the goal of the activity, social interaction, and social support (Baumgartner & Heberlein, 1981). Therefore, no identifiable substitution structure can be a plausible result when examining sport choices.

Sport-Based Structure. In a sport-based structure, spectators would be expected to substitute events of the same specific sport or type when their preferred alternative is no longer available. Switching would occur more frequently within the same sport (from men's hockey to women's hockey, for example), as opposed to either between sports with the same sex of participants (from men's hockey to men's basketball) or proportionally across all sport events. Figure 1a illustrates a "sport-based structure." The tree consists of two branches, labeled "Basketball" and "Hockey," and each of the branches contains two subbranches for the two alternatives.

Sex-Based Structure. A sex-based structure relates to the sex of event participants as the basis for substitution. In this structure, switching would occur more frequently within sports that share the same sex of participants (e.g., from men's hockey to men's basketball) as opposed to proportionally or across sport types (see Figure 1b).

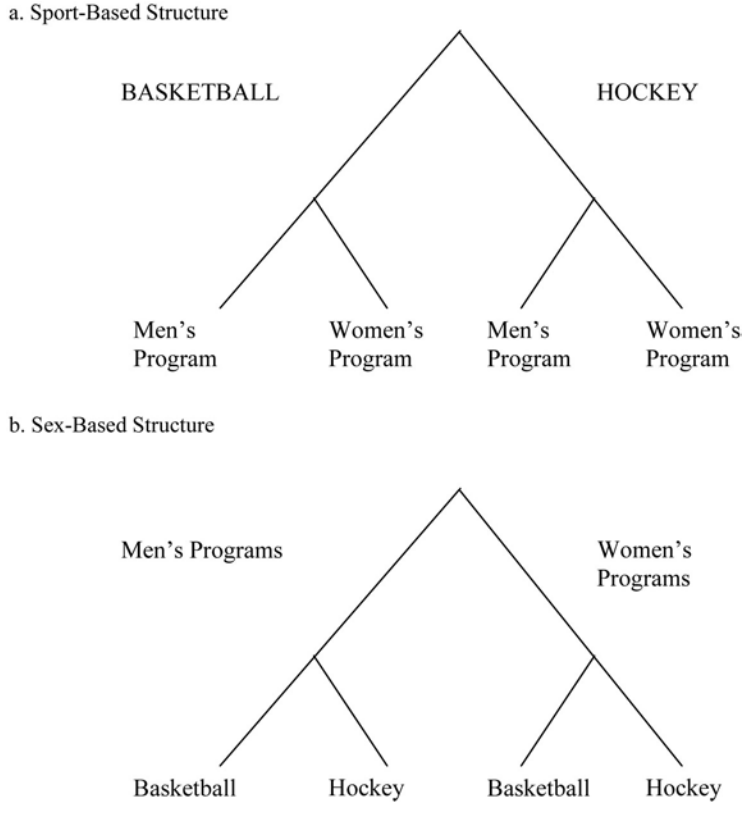

Figure 1 — Decision trees for selected sport events based on sex and type of sport.

Method

Sampling Procedures and Sport Setting

Intercollegiate athletics is an interesting setting to study substitutability because they offer arguably competing sport events within the same setting and location. This study focused particularly on only one segment of college sports consumers, students, for three reasons. First, in market structure analysis, many approaches assume that consumers are homogeneous regarding choice processes. By focusing on the college student segment, the analysis ensures more homogeneity in the assessment of sport preference. Second, because intercollegiate athletic events are a part of students' lives on campus, we would expect college students to be one of the primary targets for many sports, especially those sports that are less popular. Although different schools implement different student ticket policies, the focus of this study will be on schools that charge admissions for most of the events either as individual tickets and/or as season passes for all events. Finally, students

are a genuinely important segment, as they will often be the targets of many future marketing efforts such as donor programs.

To explore substitution patterns within college sport events, a sample of undergraduate students who were enrolled in sport and health-related classes at a large university in the southwestern U.S. was selected. At this particular university, physical activity classes are mandatory for all undergraduate students of the university. Therefore, the program provided a cross-sectional frame of more than 8,000 students who participate in these classes each semester. According to the director of the program, enrollment in these classes represents all majors and students of different status (e.g., freshmen, sophomore, junior, seniors, and graduate students) of the university.

There were a total of 93 unique types of classes, with an average of four sections each, offered by the program in the semester the study was conducted (a total of 377 classes). Assuming that each type of physical activity class and different sections may attract different types of students (e.g., bowling vs. soccer; morning vs. evening), a two-stage cluster sampling procedure was used in attempt to sample from unique types of classes and to avoid sampling from many sections of the same class. The sampling procedure proceeded by first selecting a random sample of 50 unique types of classes of the total of 93 unique types of classes, followed by a random sample of one section within each type of class. All instructors of the classes selected were asked to invite their students to participate in an online survey.

Instructors were first contacted by the director of program, who announced the survey via e-mail asking for a voluntary cooperation. Subsequently, a letter, including usernames and passwords for all students, was sent to the instructors' mailboxes. During the second and third weeks following the initial invitation, the instructors received two additional reminder letters regarding the survey. As a result, 33 (66%) of the 50 classes selected for the study participated in the study. Of the 891 students enrolled in these 33 classes, 419 (47%) students completed the online survey.

The demographic characteristics of the sample are displayed in Table 1. The sample statistics for age, ethnicity, and status were not statistically different than the profile of undergraduate students enrolled at the university during the semester the study was conducted. However, the data skewed toward females compared with the university undergraduate population. In addition, because the activity classes from which the sample was drawn are only mandatory to undergraduates, graduate/professional students were not well represented in the data (only six students, 1.4% of the sample, were graduate students).

In regard to season ticket–purchasing behavior, the majority of the participants (50%) were season ticket holders of the all sports season pass, which granted access to all sporting events offered by the university at a total cost of $247.50 at the time the study was conducted. For the remaining participants, 25% were holders of the football-only pass at a cost of $187.50. Only 25% of the students did not hold any type of pass. For those students who do not hold any pass, they can only attend any sporting event by purchasing individual tickets for a particular sport of their interest.

Table 1 Demographic Characteristics

	Sample (*N* = 419)	University (undergraduate)	Chi-square	df	*p*
Age					
<18	0.0%	0.0%			
18–21	54.3%	55.9%			
22–25	42.4%	40.7%			
26–30	2.1%	2.3%			
31–39	1.0%	0.7%			
40+	0.2%	0.3%			
			1.127	5	0.952
Ethnicity					
Caucasian/White Non-Hispanic	77.3%	80.4%			
African-American/ Black	2.4%	2.7%			
Hispanic	11.8%	11.1%			
Asian	4.6%	3.6%			
Other	3.9%	2.3%			
			6.327	4	0.176
Gender					
Male	35.9%	51.0%			
Female	64.1%	49.1%			
			37.844	1	<.001
Status[a]					
Lower (Freshman + Sophomore)	42.8%	40.1%			
Upper (Junior + Seniors)	55.6%	59.9%			
			1.924	1	0.165

[a]6 respondents (1.4%) were graduate students and were not included in the comparison between the sample and the university population of undergraduates.

Instrumentation

The online instrument included two parts related to the study: (1) a forced-choice switching matrix and (2) demographic characteristics of the sample. Following the literature on market structure analysis, where it is argued that the researcher must specify the competitive set to consider (see Day et al., 1979; Elrod et al., 2002; Manfred & Anderson, 1987), *all* sports events offered in the spring semester were included as choice alternatives in the questionnaire. These sports were men's and women's track and field, men's and women's tennis, softball, baseball, and men's and women's basketball.

Forced-Choice Switching Matrix. Based on Urban et al. (1984), a forced-choice switching matrix was used to obtain choice behavior. This data collection method is particularly attractive not only because of the ease in data collection but also because it is specifically designed to observe the patterns of switching between products before a change is made (e.g., discontinuing a sport program). Moreover, as the literature on stated preference (Louviere, 1988; Louviere, Hensher, & Swait, 2000) and other related references (Marder, 1997) have shown, choices made in a survey can mirror choices made in real life given that the conditions related to the amount of information, the competitive set, and the accessibility are kept the same in the survey as in real life. This contention was relatively true for our study since all alternatives to college sports offered by the university were included in the study. However, it is recognized that this set was purposively selected because the objective of the study was to examine competition within college sports, not among other sport or entertainment alternatives. In addition, choices in the survey were obtained under constraint-free conditions as explained later (e.g., free tickets, no weather or work/study conflicts, etc.). For validation purposes, the choices of college sports in the survey were compared with actual attendance data of sport teams. This validation is explained later in more detail.

In the survey, participants were first asked to indicate what sport event among men's and women's track and field, men's and women's tennis, softball, baseball, and men's and women's basketball they would choose if two free tickets to any of the alternatives were available to them. Two free tickets were used for two reasons: (1) to elicit choices based on their underlying preferences associated with the event without financial constraints and (2) to acknowledge that individuals rarely attend events alone. Participants were also asked to assume that constraint factors such as weather, season, schoolwork, etc., would not inhibit their attendance to any of these events.

After responding to the first choice question, participants were asked to indicate only their second choice if their first choice was not available. Note that for the second choice set, respondents were asked to consider that the most preferred product was no longer available. As a result, each respondent made two choices: one with and one without the most preferred sport available. The individuals' responses were aggregated to form a forced-switching contingency table from which competitive structures can be tested.

It is important to note that in a forced-choice exercise, a "no-choice" option was purposively not offered to respondents. Current research suggests that when a "no-choice" option is included, its selection can be related to (1) decision difficulty (Dhar & Simonson, 2003), where individuals prefer not to make a choice by selecting none of the alternatives, and (2) the utility of a "no-choice" exceeding the utility of the available alternatives (Huber & Pinnell, 1994). An example of the latter would be an individual who would find a "no-choice" option more attractive than any of the given sport options. In this study, since the choices were simple and constraint- free (e.g., free tickets, no weather or work/study conflicts, etc.), neither of these explanations really justified the inclusion of a "none" option.

A pretest with a limited set of sports (four sports total) within a different university and a smaller sample was first conducted to assess the appropriateness of the questionnaire and method and to provide an initial direction of substitution patterns. As part of a larger study, a sample of 89 undergraduate students who

were enrolled in sport and health-related classes within the School of Physical Activity and Educational Services at a large university in the Midwest was selected. On average, sample participants have attended at least one event of each of the sport alternatives included in the study. The responses from the pretest indicated that the questionnaire was appropriate and well understood by the sample participants. Overall comments and feedback were in general positive.

Testing Hierarchical Structures. Two selected partitioning approaches were used to examine hierarchical structures of sport competition: (1) a forced-choice switching approach (Urban et al., 1984) and (2) a nested-logit model (Kannan & Wright, 1991). Two tests were necessary to show convergence validity as different methods differ slightly in defining and operationalizing market structures. In addition, by using different methods, the strengths of a particular method can complement the weaknesses of the other to arrive at a more robust conclusion (see, for example, Kalwani, Kannan, & Lim, 1995, who used a similar approach). As in Kalwani et al. (1995), confirmatory approaches to market partitioning, forced-choice switching and nested-logit models, were used to test the market structures identified in the literature review.

The forced-choice switching approach consisted of testing hypotheses by comparing "actual" switching probabilities under the hypotheses versus the "expected" switching probabilities based on the observed choices. According to Urban et al. (1984), a market structure is "defined by a series of submarkets, if, when a product is deleted from a submarket, its former consumers are more likely to buy again in that submarket than would be predicted by market shares" (p. 88). In sports, market shares can be viewed as the sport teams' share of attendance across competing sport events. According to the definition just given, if a sport team attracts fans from other sports in proportion to their shares of attendance, then the market is considered to be unstructured. However, if a team draws more than what would be expected from market shares, then the market is said to be partitioned. Urban et al. (1984) have proposed a one-tail *Z*-test, shown in the Appendix, to test hypotheses. The no structure hypothesis should be rejected in favor of the alternative hypotheses if the one-tail *Z*-value exceeds the critical value of 1.645 at the alpha level of .05. The *Z*-tests can be applied to each sport separately or to the entire data set across all sports.

Another method, which allows a more direct comparison of model fit between alternate structures, is to specify a nested-logit model according to a hypothesis and test it for fit against the multinomial conditional logit model as a baseline (Kannan & Wright, 1991). The multinomial logit model has an inherently restrictive assumption of proportional substitution between choice alternatives. Under a multinomial logit model, if a sport is removed from the choice set, all sports are estimated to gain shares proportionally to their own initial shares. This property, which is referred to as independent and irrelevant alternatives (IIA), simply states that adding another alternative or changing the characteristics of a third alternative does not affect the relative odds between two alternatives considered (Louviere, Henshere, & Swait, 2000). Therefore, if the multinomial logit model holds for a particular data set, the market is considered to be unstructured (Kannan & Wright, 1991).

On the other hand, the nested-logit model extends the multinomial logit model by capturing the correlations or similarities that exist among the product

options (using a hierarchical framework). Unlike the multinomial logit model, the nested-logit model clusters products into hierarchical "nests" in such a way that products in a nest are more similar than products across nests. These correlations among alternatives are represented in a model by adding one additional parameter, namely the inclusive value, that represents the correlation among products within each nest of a hierarchy. This inclusive value (IV) must be within a 0–1 range to be consistent with the model underlying the theory of utility maximization (more switching occurs within nests than between nests). The closer the parameter is to 0, the greater is the similarity or substitution between product alternatives within a nest. If the parameter equals 1, the model is equivalent to the multinomial logit (unstructured market). If the parameter is higher than 1, then the model is not consistent with a nested model (this means more switching occurs between nests than within nests). Details of the model are displayed in the Appendix.

To fit the baseline multinomial logit, the categorical variable, which indicates what choices respondents made among the sport alternatives, was used as the dependent variable and regressed onto dummy sport-specific constants as independent variables. These sport-specific constants indicate the overall utility associated with each sport in contrast to one sport held as the base. The nested-logit model was estimated by relaxing the multinomial logit with only the sport-specific constants by adding the IV parameters according to a hypothesis. For the sex-based hypotheses, for example, two additional correlation parameters (one for men's sports and one for women's sports) were added to baseline logit model. Four additional correlation parameters (one for each of the four sports) were added to the baseline logit model to test the sport-based structure.

Model adequacy was determined by (1) examining whether the nested-logit models contained IV parameters between the theoretical region of 0–1 for each hypothesis tested (sport-based and sex-based structures) and (2) comparing measures of fit between the nested and the multinomial logit using the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). These latter measures indicate goodness-of-fit by taking into account the number of parameters of each model, thereby avoiding model overfitting. Better models will have lower AIC and BIC values (Leeflang, Wittink, Wedel, & Naert, 2000).

External Validity

The forced-choice tasks as they relate to the university's sport offerings used in the study were intended to be similar to the actual college sport choices students face in their real lives at the respective university. Therefore, the choices students made in the survey should correspond well to their aggregated real attendance data of the sports in the study. Although real attendance data for students only were not possible to obtain, validity measures were approximated by using a Pearson correlation coefficient between the first choice shares indicated in the survey and the actual share of attendance for each sport during the season. The actual shares of attendance were derived by taking the percentage of the average number of attendees per game for each sport during the season divided by the average number of attendees per game across all sports for the season. The average attendance per game was deemed more appropriate than the total attendance because it standardizes attendance by total games since sports do differ in the total number

of games played in a season. This information was readily available from the athletic departments' Web sites.

Results

Results from the forced-choice switching matrix are shown in Table 2. The original probabilities indicate the proportion of respondents who selected each alternative as a result from the first choice question. Men's basketball and baseball were the most preferred sport teams (51% and 34% of first choices, respectively). In Table 2, the probabilities with the most preferred alternative removed are the results of the second choice question. Once men's basketball was no longer available, the highest increase in probability was observed with women's basketball (substitution within the same sport), which increased by 975% (from 1% to 10%). When baseball was no longer available, the probability of softball increased by 200% (within the same sport). When women's basketball team was removed, only the share for the men's basketball team increased. The probability switches for tennis also showed higher increases between sex counterparts within each sport than between sports within same sex. Softball and women's track and field were the only two sports that showed evidence for sex-based switching. When women's track and field team was not available, the shares for softball, women's tennis, and women's basketball increased (15%, 10%, and 25%, respectively). When softball was not available, women's basketball increased by 25% versus a smaller 4% increase for baseball. A very similar switching pattern can be observed after the data are dissected by sex of the survey respondents. Overall, the data seem to suggest a differential pattern of substitution more indicative of a sport-based structure across the sports examined with the exception of women's track and field and softball.

Using the Urban et al.'s (1984) approach and the nested-logit models, it was possible to examine four alternative structures for the data: a sex-based structure, a sport-based structure for specific sports, a sport-based structure for individual/team sport types, and a no-structure hypothesis. The results of the tests are shown in Figure 2. In Figure 2, the *Z*-tests described by Urban et al. (1984) for each sport using the entire sample and by sex of respondents are presented under each alternative structure. The overall aggregated *Z*-values are also presented under each structure, along with the results from the nested-logit models.

For the sport-based hypothesis, as Figure 2c shows, the *Z*-values for each sport exceeded the critical value of 1.645 at alpha level of .05 ($4.80 \leq Z \leq 74.04$, all $p < .001$). The aggregated *Z*-test when considering all sports combined was also significant under the sport-based structure ($Z = 17.39$, $p < .001$). This indicates that, when the most preferred sport alternative was no longer available, individuals were more likely to switch to the same sport type than expected as predicted by their choice shares.

The *Z*-values under the sport-based structure for individual/team sport types shown in Figure 2b also exceeded the critical value for each sport ($2.21 \leq Z \leq 55.89$, all $p < .001$). The aggregate solution across all sports under the sport-based structure for individual/team sport types was also significant ($Z = 5.14$, $p < .001$). Therefore, the individual/team structure was also a plausible solution according to

Table 2 Change in Shares With Preferred Alternative Removed

a. Change in Shares - Overall (*N*=419)

	Shares (Proportional Change)—OVERALL								
		With Preferred Alternative Removed							
	Original	**WTF**	**MTF**	**B**	**S**	**WT**	**MT**	**MB**	**WB**
Women's Track and Field	0.02		**0.02 (+0.43)**	**0.02 (+0.29)**	0.02 (+0.00)	0.02 (+0.00)	0.02 (+0.14)	0.02 (+0.43)	0.02 (+0.00)
Men's Track and Field	0.03	0.03 (+0.09)		0.03 (+0.09)	0.03 (+0.00)	0.03 (+0.00)	0.03 (+0.18)	0.05 (+0.82)	0.03 (+0.00)
Baseball	0.34	0.34 (+0.01)	0.34 (+0.01)		0.35 (+0.04)	0.35 (+0.04)	0.34 (+0.01)	0.67 (+0.97)	0.34 (+0.00)
Softball	0.03	*0.04 (+0.15)*	0.03 (+0.08)	**0.09 (+2.00)**		0.03 (+0.00)	0.03 (+0.08)	0.05 (+0.69)	0.03 (+0.00)
Women's Tennis	0.02	*0.03 (+0.10)*	0.03 (+0.10)	0.03 (+0.40)	0.03 (+0.10)		0.05 (+1.00)	0.05 (+0.90)	0.02 (+0.00)
Men's Tennis	0.04	0.04 (+0.00)	0.05 (+0.12)	0.06 (+0.53)	0.04 (+0.00)	**0.05 (+0.18)**		0.06 (+0.47)	0.04 (+0.00)
Men's Basketball	0.51	0.52 (+0.00)	0.52 (+0.01)	0.74 (+0.44)	0.53 (+0.02)	0.52 (+0.01)	0.52 (+0.00)		**0.52 (+0.02)**
Women's Basketball	0.01	*0.01 (+0.25)*	0.01 (+0.00)	0.02 (+1.25)	*0.01 (+0.25)*	0.01 (+0.00)	0.01 (+0.00)	**0.10 (+9.75)**	

(continued)

Table 2 *(continued)*

b. Change in Shares - Females (*N*=269)

	Shares (Proportional Change)—FEMALES								
	With Preferred Alternative Removed								
	Original	**WTF**	**MTF**	**B**	**S**	**WT**	**MT**	**MB**	**WB**
Women's Track and Field	0.02		**0.03 (+0.33)**	0.03 (+0.33)	0.02 (+0.00)	0.02 (+0.00)	0.03 (+0.17)	0.03 (+0.33)	0.02 (+0.00)
Men's Track and Field	0.03	0.03 (+0.14)		0.03 (+0.14)	0.03 (+0.00)	0.03 (+0.00)	0.03 (+0.14)	0.04 (+0.57)	0.03 (+0.00)
Baseball	0.39	0.39 (+0.01)	0.39 (+0.01)		0.41 (+0.05)	0.39 (+0.01)	0.39 (+0.00)	0.67 (+0.74)	0.39 (+0.00)
Softball	0.04	*0.05 (+0.17)*	0.05 (+0.08)	**0.12 (+1.58)**		0.04 (+0.00)	0.05 (+0.08)	0.06 (+0.42)	0.04 (+0.00)
Women's Tennis	0.02	*0.03 (+0.17)*	0.03 (+0.17)	0.03 (+0.5)	*0.03 (+0.17)*		**0.04 (+1.00)**	0.04 (+0.83)	0.02 (+0.00)
Men's Tennis	0.03	0.03 (+0.00)	0.04 (+0.11)	0.05 (+0.44)	0.03 (+0.00)	**0.04 (+0.33)**		0.04 (+0.33)	0.03 (+0.00)
Men's Basketball	0.46	0.46 (+0.01)	0.46 (+0.01)	0.73 (+0.59)	0.48 (+0.04)	0.47 (+0.02)	0.46 (+0.00)		**0.46 (+0.01)**
Women's Basketball	0.00	0.00 (+0.00)	0.00 (+0.00)	0.01 (+2.00)	*0.01 (+1.00)*	0.00 (+0.00)	0.00 (+0.00)	**0.11 (+28)**	

(continued)

Table 2 *(continued)*

c. Change in Shares - Males (*N*=269)

	Shares (Proportional Change)—MALES								
		With Preferred Alternative Removed							
	Original	**WTF**	**MTF**	**B**	**S**	**WT**	**MT**	**MB**	**WB**
Women's Track and Field	0.01		**0.01 (+1.00)**	0.01 (+0.00)	0.01 (+0.00)	0.01 (+0.00)	0.01 (+0.00)	0.01 (+1.00)	0.01 (+0.00)
Men's Track and Field	0.03	0.03 (+0.09)		0.03 (+0.00)	0.03 (+0.00)	0.03 (+0.00)	0.03 (+0.25)	0.06 (+1.25)	0.03 (+0.00)
Baseball	0.25	0.25 (+0.00)	0.26 (+0.03)		**0.26 (+0.03)**	0.28 (+0.11)	0.27 (+0.05)	0.66 (+1.61)	0.25 (+0.00)
Softball	0.01	0.01 (+0.00)	0.01 (+0.00)	**0.05 (+7.00)**		0.01 (+0.00)	0.01 (+0.00)	0.03 (+4.00)	0.01 (+0.00)
Women's Tennis	0.03	0.03 (+0.00)	0.03 (+0.00)	0.03 (+0.25)	0.03 (+0.00)		**0.05 (+1.00)**	0.05 (+1.00)	0.03 (+0.00)
Men's Tennis	0.05	0.05 (+0.00)	0.06 (+0.13)	0.09 (+0.63)	0.05 (+0.00)	**0.05 (+0.00)**		0.09 (+0.63)	0.05 (+0.00)
Men's Basketball	0.61	0.61 (+0.00)	0.61 (+0.01)	0.75 (+0.24)	0.61 (+0.00)	0.61 (+0.00)	0.61 (+0.01)		**0.63 (+0.03)**
Women's Basketball	0.02	*0.03 (+0.33)*	0.02 (+0.00)	0.04 (+1.00)	0.02 (+0.00)	0.02 (+0.00)	0.02 (+0.00)	**0.09 (+3.67)**	

Note. WTF = women's track and field, MTF = men's track and field, B = baseball, S = softball, WT = women's tennis, MT = men's tennis, MB = men's basketball, and WB = women's basketball.

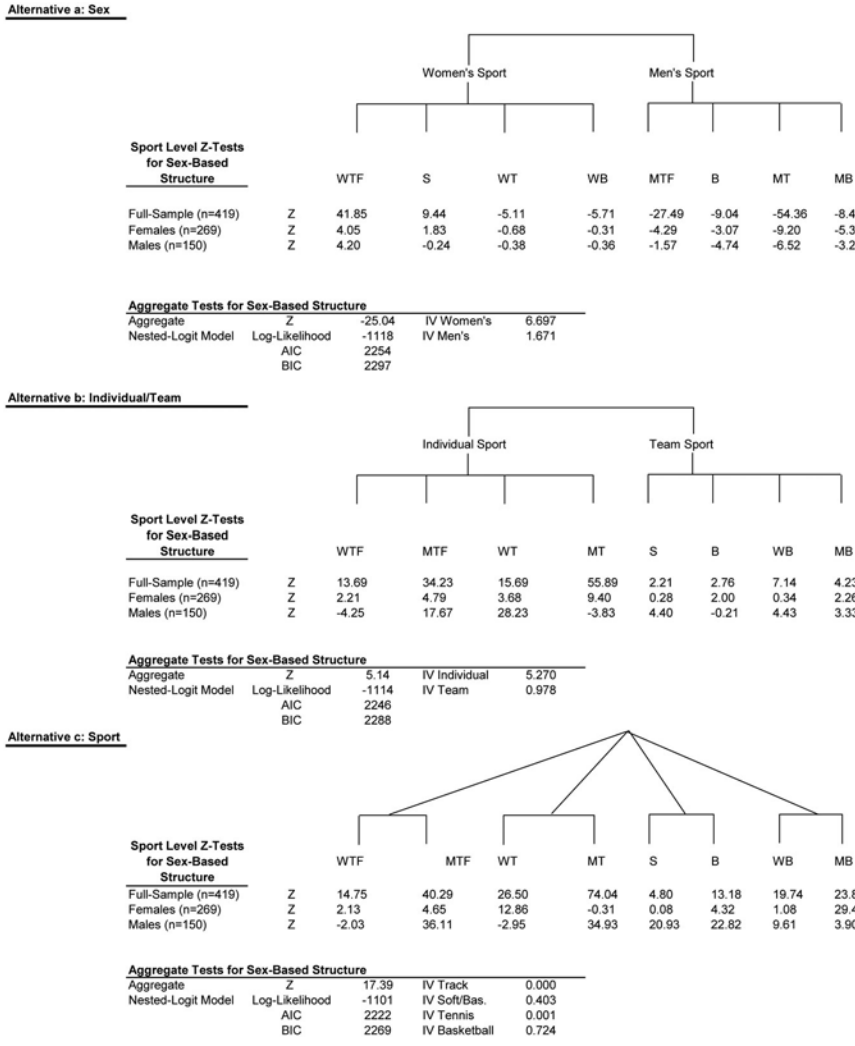

Figure 2 — Hypotheses testing for alternate sport structure.

Urban et al.'s (1984) approach. Conversely, the *Z*-values under the sex-based structure were mostly negative, exceeding the critical value for only two individual sports: softball ($Z = 9.44$, $p < .001$) and women's track and field ($Z = 41.85$, $p < .001$). The aggregate results across all sports for a sex-based structure were not significant ($Z = –25.04$, $p = ns$). Therefore, these results rejected the null hypothesis of no structure in favor of either a sport-based structure for specific sports or for individual/team sport types, but not in favor of a sex-based structure. The conclusions were very similar when the data were split by sex of survey respondents.

Because two structures were retained as possible structures based on the forced-choice switching approach, the identification of the "best" overall representation of competition relied on the results of the nested-logit models. These results are also displayed in Figures 2a, 2b, and 2c, under each alternative structure. The models were fitted using the entire data set and compared using the log-likelihood and two penalized fit measures, AIC and BIC. As shown in Figures 2a, 2b, and 2c, the sport-based structure was the best-fitting model across the alternatives (lowest AIC and BIC values). Furthermore, the sport-based model was the only model with accepted values for the IV parameters, ranging from 0 to 1.

Validation of Choice Tasks

The shares for each sport based on the first choices were compared with the actual share of attendance for each sport during the season. Men's and women's track and field were excluded from this comparison because attendance records were not readily available. The results are displayed in Table 3. The Pearson correlation between actual and sample shares was .89 (r^2 = .80). It is important to recognize that this estimation procedure serves as an approximation to testing external validity since a comparison was made with actual aggregated attendance data that do not represent only students. However, the correlation does show that the students' first choices captured the aggregated ordering of preference existent in the real marketplace.

Discussion

By using a hierarchical choice framework, the objective of this study was to help illuminate the *process* in which individuals deal with sport substitution decisions within one university setting. Based on the aggregated results, decision structures based on specific sports or sport types did conform to the observed choices, while decision structures based on the sex of participants did not. Furthermore, the results from the nested-logit model suggested a better fit for the sport-based structure based on specific sports compared with a structure for individual/teams.

Table 3 Comparison Between Actual Attendance Shares and First Choice Sample Shares

	Average home game attendance	Actual share	First choice sample shares
Women's basketball	3,598	20%	1%
Men's basketball	8,133	45%	51%
Softball	969	5%	3%
Baseball	4,447	25%	34%
Men's tennis	429	2%	4%
Women's tennis	449	2%	2%
Total	18,025		
Pearson *r* (actual vs. sample)	0.894		

Therefore, there is evidence that under the conditions tested (forced choices under constraint-free conditions), competition within specific sports or sports of the same type was stronger than within sports that share the same sex of participants. This evidence was robust even when respondents' sex was taken into account.

The results of this study particularly enhance our understanding of sport consumer behavior by suggesting a hierarchical *process* in which individuals deal with the multiplicity of collegiate sport alternatives. The results support a tree decision structure for attendance choices, where students tended to think of the specific sport overall first before they consider alternatives of the same sport (by sex of participants). Although previous studies of sport attendance suggest that the multiplicity of sport and other entertainment alternatives have a negative influence on sport events (Baimbridge et al., 1995; Schofield, 1983; Zhang et al., 1997), according to the results of this study, at least for context of college sports and the conditions tested in the study, this negative impact may be stronger for alternatives of the same sport. In addition, in contrast to some suggestions found in the literature (Fink et al., 2002; James & Ridinger, 2002; Kahle et al., 2001; Ridinger & Funk, 2006), the aggregate results did not support women's sports as a category on their own.

The stronger association related to specific sports or sport types can be explained by the psychological connections individuals may form with the sport overall (Funk & James, 2001). If an individual is "into a sport," then it seems plausible that other alternatives of the same sport will become attractive to this individual, especially when the most preferred is not available. Moreover, according to the psychological continuum model (Funk & James, 2001), the escalating path of the model to higher levels of connections to a sport can actually reverse to lower levels due to life constraints. Thus, given a change in program offering, individuals may change the degree of importance they may attach to their preferred alternative and potentially increase the importance they attach to other alternatives. This sport-based structure also corroborates with previous studies that identified the nature of the physical activity, and core attributes such as popularity and degree of physical contact differentiate and influence sport attendance decisions (Armstrong, 2001; Ferreira & Armstrong, 2004).

Furthermore, it is also possible to conjecture that, in addition to core characteristics, the similarity among specific sport teams could have also been solidified by the user and usage imagery formed by teams' shared crowd, venues, and schedule (Keller, 1993). If, for example, a similar crowd frequents two different events of the same sport, they may share the same user imagery (e.g., fun, loud) that can form the basis of a similarity judgment.

It is also important to note that the identification of a sport-based structure as the "best" overall representation of the switching data does not necessarily indicate that individuals may not follow a sex-based structure, because they may actually do for specific sports. It simply indicates that a sport-based structure was more prevalent than a sex-based structure at the aggregate level (across sports) for the conditions examined in the study (e.g., a "constraint-free forced-choice" scenario). Although the aggregate results did not support it, a sex-based structure was found to be significant for softball among female respondents and women's track and field among both males and female respondents. Therefore, for two of eight sport programs examined, the results by sport program do provide some support for the uniqueness of women's sports (Ridinger & Funk, 2006).

Managerial Implications

One implication of these findings is that policy changes may have differential impacts on how demand may shift between sport programs. Sport managers can benefit from understanding these differential impacts by designing different marketing programs that will address the various needs existent in the market. In this research, men's and women's events of the same sport were found to compete more strongly with one another. This finding suggests that any change in policy for one of the men's sports (say, providing incentives to increase the preference for men's basketball) would directly impact the probability of the women's sport counterpart (some switching may occur from men's basketball to women's basketball). Therefore, returning to our initial question regarding new sport program launches, the results of this study suggest that it would be preferable to introduce a new sport altogether as opposed to a new program (men's or women's) for a sport that is already offered by the athletic program. This strategy would show the least risk of cannibalization between sport programs and with the best potential to tap into new consumers.

An understanding of the structure of competition has implications for many other marketing strategies, not just product launches (Urban et al., 1984). One important outcome of the analysis is the identification of the competitors most likely to be affected and/or respond given changes in marketing policies. If men's and women's events of the same sport are identified to compete more strongly with one another according to a sport-based structure, then changes to advertising, promotion, scheduling, and other policies of one women's (men's) sport program may potentially have a more differential impact on the men's (women's) program of the same sport than on other sport programs. Therefore, an increase in probability of choice for a particular women's (men's) sport due to a game-day promotion event, for example, may be more likely to differentially impact the men's (women's) counterpart than other sports offered by the university.

One question that emanates from these implications is whether the university should make a special effort to promote a nonrevenue sport. In his book, VanderZwaag (1998) argues that, to promote a nonrevenue sport, universities should consider the potential for the development of the nonrevenue sport and its likelihood of success. As the potential and likelihood of success increase, the greater effort a department should make to promote the nonrevenue sport. In addition, he also raises competition (for spectators/revenues) between the nonrevenue sport and other sport programs as an important consideration regarding the decision whether to promote a nonrevenue sport.

Nevertheless, even more critical to program launches is to find revenue solutions for the mix of sport programs required to be offered. Given that the findings of the study indicate that sports of the same type tend to compete more strongly with one another under the conditions tested, one solution could be to minimize the inherent competition by leveraging the synergies between competing sport programs. Many Division I schools do schedule men's and women's programs

back to back as a strategy to leverage synergies between programs. For example, Texas A&M University used this strategy for men's and women's basketball 2006 season game openers (Byrne, 2006, ¶ 20). It is important to note, however, that double-header games are not new strategies in college sport. For example, in 1973, the women's basketball club of the University of South Carolina (USC) played for the first time in the Carolina Coliseum with two games preceeding the men's games. The double-header games were so successful with the fans, coupled with the competitiveness of the USC team, that the USC Athletics Department embraced the women's club team as a varsity program in the following year ("South Carolina women's basketball history," 2007, ¶ 5). As these examples illustrate, taking a complementary rather than a competitive approach might indeed help each individual program by potentially eliminating some costs and generating additional revenue.

Limitations and Future Research

Some shortcomings to the present investigation are important to highlight. First, this investigation focused on college students as one of the targets for college sport events. It is recognized that other segments such as faculty, staff, alumni, and community members also are important to fully understand the nature of competition between college sport events. Therefore, future studies should attempt to extend this work to other segments of college sport events. This study was also limited to situations where students were forced to make a choice under constraint-free conditions. Future studies should explore the potential impact of a no-choice option as well as the influence on leisure constraints (Jackson, Crawford, & Godbey, 1993) on choice of sport events and substitutability. Moreover, this investigation was limited to the examination of competition among college sport events, without consideration of other professional sports, other entertainment alternatives, or the alternatives of televised games. This was purposively done to better understand the structure within a sport event category. However, as we start to gain a better understanding of the structure of competition within sports, it is also crucial to expand this knowledge and expand the boundaries. Very little is known regarding the nature of this competition within the broad entertainment sector. Further investigations should also explore the role of sport-related attributes, especially the core characteristics of the sport, and the notion of psychological attachment in substitutability.

Notwithstanding the limitations of this investigation, the findings presented herein were noteworthy and provided an initial step into a better understanding of how sport events may compete for consumers. Therefore, it is hoped that this investigation will foster more interest to the study of market structure and extend our knowledge of how sport events as well as other sport products and services compete for consumers in the marketplace.

Appendix

Substitutability Measures and Tests Used

The Forced-Switching Approach

Urban et al. (1984) have proposed the following one-tail *Z*-test to test the hypotheses:

$$z = \frac{(p - p')}{\sqrt{[p'(1 - p')/N]}} \tag{2}$$

where p is the actual proportion of subjects who switched to another activity under the hypothesized structure (e.g., men's basketball to women's basketball in a sex-based structure), p' is the predicted proportion of subjects who switched to another activity as predicted by market share (no market structure), and N is the number of respondents.

Nested-Logit Structure. The nested-logit probability can be expressed as the product of two probabilities: the probability that one of the nests m is chosen (upper model) and the probability that the alternative j within nest m is chosen (lower model):

$$P_{jm} = P_{j/m} P_m \tag{4}$$

where $P_{j/m}$ is the conditional probability of choosing alternative j given that a nest m is chosen, and P_m is the marginal probability of choosing a nest m. Both marginal and conditional probabilities take the form of logits:

$$P_m = \frac{e^{V_m + I_m}}{\sum_{l=1}^{K} e^{V_l + I_l}} \tag{5}$$

$$P_{j/m} = \frac{e^{\lambda_m V_{j/m}}}{\sum_{i \in M} e^{\lambda_m V_{i/m}}} \tag{6}$$

$$I_m = 1/\lambda_m \ln \sum_{i \in M} e^{\lambda_m V_{i/m}} \tag{7}$$

The logit formulation in equation (5) results from a model for a choice among nests (e.g., sport type in Figure 1a: basketball vs. hockey). It includes a quantity called I_m, often referred to as the inclusive value (IV) or expected maximum utility, which serves as a link between the upper and lower models. The IV corresponds to the expected utility that the decision maker receives from the choice of nests. The coefficient associated with the IV parameter indicates the degree of similarity between sport alternatives within a nest. This similarity is reflected by a correlation among unobserved factors within each nest (Louviere, Henshere, & Swait, 2000).The parameter must be within a 0–1 range to be consistent with the utility maximization. The closer the parameter is to 0, the greater is the similarity

or substitution between product alternatives within a nest. If the parameter equals 1, the model is equivalent to the MNL (unstructured market). If the parameter is higher than 1, then the model is not consistent with a nested model (i.e., more switching occurs between nests than within nests).

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