

Hierarchical Linear Modeling in Sport Management: Using Multilevel Determinants of Spectator Satisfaction as an Example

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In social science, data structures are often hierarchical (Raudenbush & Bryk, 2002). In education, students are hierarchically grouped in classes, schools, and school districts. A data set may consist of student-level, school-level, and school-district-level variables which may influence students' academic achievement. Using traditional linear analysis to examine the effects of these variables on student academic achievement, researchers have to choose one of the three levels as unit of analysis, and aggregate or disaggregate variables at other levels. However, aggregating a lower level variable to higher level will lose all of the within-group information which may account for the majority of the variance in the dependent variable. Disaggregating a higher level variable to lower level will violate the assumption of independence of observation, which is basic for classic statistical techniques (Raudenbush & Bryk, 2002).

Both aggregating and disaggregating are not ideal methods to analyze hierarchical data. Sport often uses hierarchical data, too. For example, in spectator sport, spectators are grouped in games. Spectator satisfaction is influenced by spectator-level variables (e.g., demographics, perception of quality of the game, fan identification) and game-level variables (e.g., game result, sport type, sport gender, sport level). Examining the effects of spectator-level variables and game-level variables on spectator satisfaction with traditional linear analysis may be problematic, because (a) using only spectators as the unit of analysis (disaggregating game-level variables) will violate the assumption of independence of observation, and (b) using only the game as the unit of analysis (aggregating spectator-level variables) will lose all of the within-game information. The purpose of this presentation is to discuss the application of Hierarchical Linear Modeling (HLM) in sport management by using multilevel determinants of spectator satisfaction as an example. For clarity, only one variable will be used for each level - service quality for spectator-level, and win/lose for game-level. Service quality and win/lose have been identified as important determinants of spectator satisfaction (Cronin et al., 2000; Greenwell et al., 2002; Lapidus & Schibrowsky, 1996; Madrigal, 1995; Theodorakis et al., 2001; Tsujiet al., 2007; Van Leeuwen et al., 2002; Wakefield & Blodgett, 1996; Wann et al., 1994; Wann & Schrader, 1997; Zillmann et al., 1979).

The positive effect of service quality on spectator satisfaction is well-known and generally accepted, but how win/lose influences spectator satisfaction is still unclear (Van Leeuwen et al., 2002). Because studies on service quality and win/lose usually used different units of analysis, no study has put these two variables together to examine their relative importance to spectator satisfaction. Further, no study has proven whether win/lose damages or enhances the impact of service quality on spectator satisfaction. For example, the positive impact of high service quality on spectator satisfaction may be damaged by a losing game, or the negative impact of poor service quality on spectator satisfaction may be ignored by a winning game. In the spectator satisfaction example, HLM can partition the total variance of spectator satisfaction into within-game variance and between-game variance. Researchers can then simultaneously use spectator-level and games-level variables to examine (a) the effect of spectator-level variables (e.g., perception of service quality, demographics, fan identification) on the within-game variance, (b) the effect of game-level variables (e.g., win/lose, sport type, sport gender, sport level) on the between-game variance, and (c) the cross-level effect of the spectator-level and game-level variables on spectator satisfaction.

Compared with traditional linear model analysis, HLM can answer several questions which traditional linear model analysis could not, such as (a) how much variance of spectator satisfaction exists at spectator-level and game-level, (b) how much variance of spectator satisfaction could be explained by service quality and win/lose respectively, and (c) whether and to what extent win-lose damages/enhances the relationship between service quality and spectator satisfaction. By answering these questions, the relationships among service quality, win/lose, and spectator satisfaction will be much clearer, and sport managers and team owners may be more confident in decision making. Detailed methodology (e.g., sample, variables, data analysis), explanation of possible results, explanation of past study (Todd, Crook, & Barilla, 2005), potential topics which may apply HLM, and suggestions for future research will be discussed.