Using Structural Equation Modeling (SEM) to Explore the Complex Relationship between Playing Position and Leadership in DI Women's Basketball



ABSTRACT

This presentation proposes a study of the relationship between playing position and leadership position for athletes and coaches involved in NCAA Division I women's basketball. Expanding upon the theories associated with positional segregation ("stacking") and leadership recruitment research, the structural equation modeling (SEM) technique is suggested as a method to develop constructs and investigate relationships.

As a precursor to a future dissertation study, this presentation describes the development of the proposed model and its constructs. The influence of playing position on leadership is investigated through the direct and indirect effects of personal background, career development, and team context.

Background

Two popular and longstanding traditions in sport research are positional segregation and leadership recruitment. Both areas of research seek to investigate the distribution of sport participants in different playing positions. Positional segregation (also known as "stacking") research looks at the proportions of racial/ethnic representation of athletes in playing positions based upon the position's relative degree of centrality. In a similar fashion, leadership recruitment research evaluates the representation of formerly held playing positions amongst coaches, administrators, and executives of sport organizations, once again with degree of centrality as the underlying measure.

Early scholars who conducted stacking research proposed that discriminatory practices resulted in minority players being overrepresented in non-central/marginal playing positions, while White players were overrepresented in central positions. Given that the central positions were credited with being ones associated with intelligence, leadership, and responsibility, the disproportionate representation proved problematic. The unspecified link between race/ethnicity and position centrality on one side, and leadership recruitment and position centrality on the other, underlies the importance of examining the playing field to see if access to coaching positions in DI women's basketball is, in fact, openly accessible to all.

THEORETICAL FRAMEWORK

- H. M. Blalock (1962): The author related propositions about occupational segregation to discrimination in professional baseball. He concluded that the integration of Blacks was successful in professional baseball because their presence in peripheral playing positions posed little threat to White players.
- Oscar Grusky (1963): The author proposed a theory of formal structure to explain why managers in professional baseball were more likely to have played in central positions than in peripheral positions. The tenants of his theory suggested that the rate of interaction averaged by players in the various positions in baseball influenced the development of skills deemed necessary for promotion into management. The two classifications of positions that Grusky proposed (high vs. low interactors) were determined by the spatial location, the nature of the task, and the rate of interaction with other players and managers that each playing position experienced.
- In 1970, John W. Loy and Joseph F. Elvogue combined the propositions of Blalock and Grusky to present the theory of centrality. The authors explained centrality as a concept defining "how close a member is to the 'center' of the group's interaction network," (p. 6). Testing their hypothesis that centrality and racial segregation in sport were positively related, the authors applied centrality to both professional baseball and football. Their findings revealed that Black athletes were overrepresented in non-central positions, and that White athletes were overrepresented in central positions, supporting the initial hypothesis.
- In 1973, Harry Edwards coined the term "stacking" to reference the research tradition investigating racial/ethnic representation in central and non-central playing positions in sport. Research into this phenomenon has continued to date, most famously with the evaluation of the "Black Quarterback" phenomenon in football.

Motivation

In conjunction with the presentation of evidence of stacking at all levels of sport, scholars have attempted to provide theories to explain the occurrences of disproportionate representation. Suggested explanatory theories have been classified in the following categories:

- Biological (Eitzen & Furst, 1988; Entine, 2000)
- Sociological (Byrd & Utsler, 2007; Daddario & Wigley, 2008)
- Psychological (Curtis & Loy, 1978; McPherson, 1975)
- Economic (Coakley, 2007; Lavoie, 1989)
- Role Modeling (Chappell & Karageorghis, 2001)
- Outcome Control (Edwards, 1973; McPherson, 1975)
- Uncertainty (Lavoie & Leonard, 1994)

Ultimately, no single explanation is able to account for the patterns of positional segregation that occur in sports. The potential of a structural equation model that could investigate the combined influence of multiple explanatory theories is a valuable addition to the current state of stacking research.

Little research has been done on the relationship of position centrality with race and leadership recruitment in women's sport. The void in this area provides ample opportunity for a researcher to add insight into our understanding about the effect of centrality in this realm. The opportunities are especially promising for researchers who propose a novel method of analysis which will bring forth new information about the stacking and leadership recruitment phenomena in women's sport (Birrell, 1989).

Methods

This presentation focuses on a portion of a larger study addressing the lack of research on positional segregation and leadership recruitment in women's sport. The topic of interest for this session is a simplified explanation of the theoretical development of a testable structural equation model.

What is SEM?

Structural Equation Modeling (SEM) is a powerful analysis method "that estimates the strength of all the hypothesized relationships between variables in a theoretical model," (Maruyama, 1997 p.4).

Why use SEM?

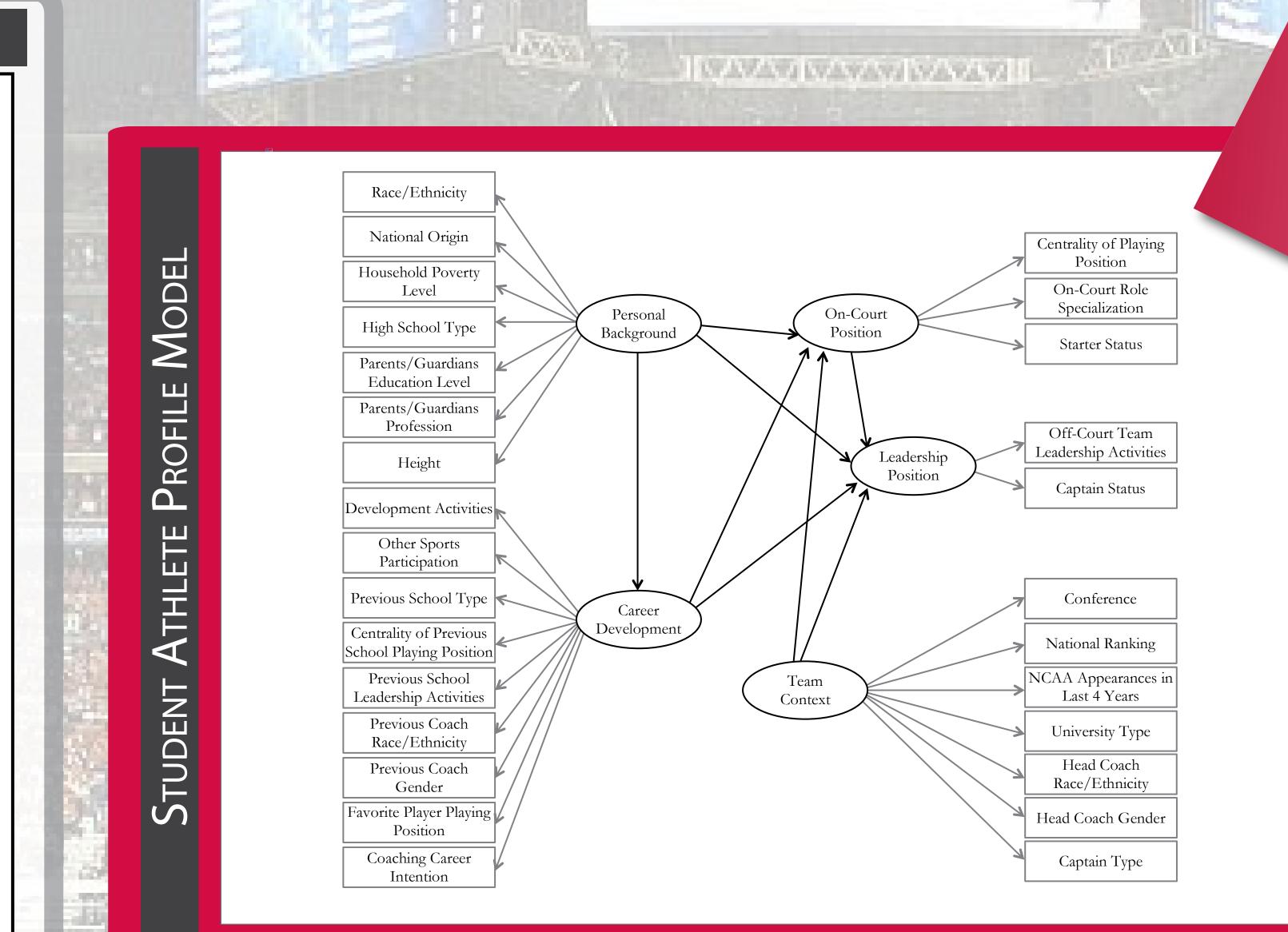
The attractiveness of Structural Equation Modeling (SEM) as an analysis technique for this research stems from its ability to analyze complex relationships. SEM allows for researchers to investigate multiple variables and relationships, including both direct and indirect effect paths, mediating variables, and—in the case of experimental research—cause and effect relationships. These advantages are valuable for research, as investigated phenomena seldom have only one predictive or influencing variable interacting at any one instance. This is especially the case for research in the social and behavioral sciences (Pedhazur, 1997).

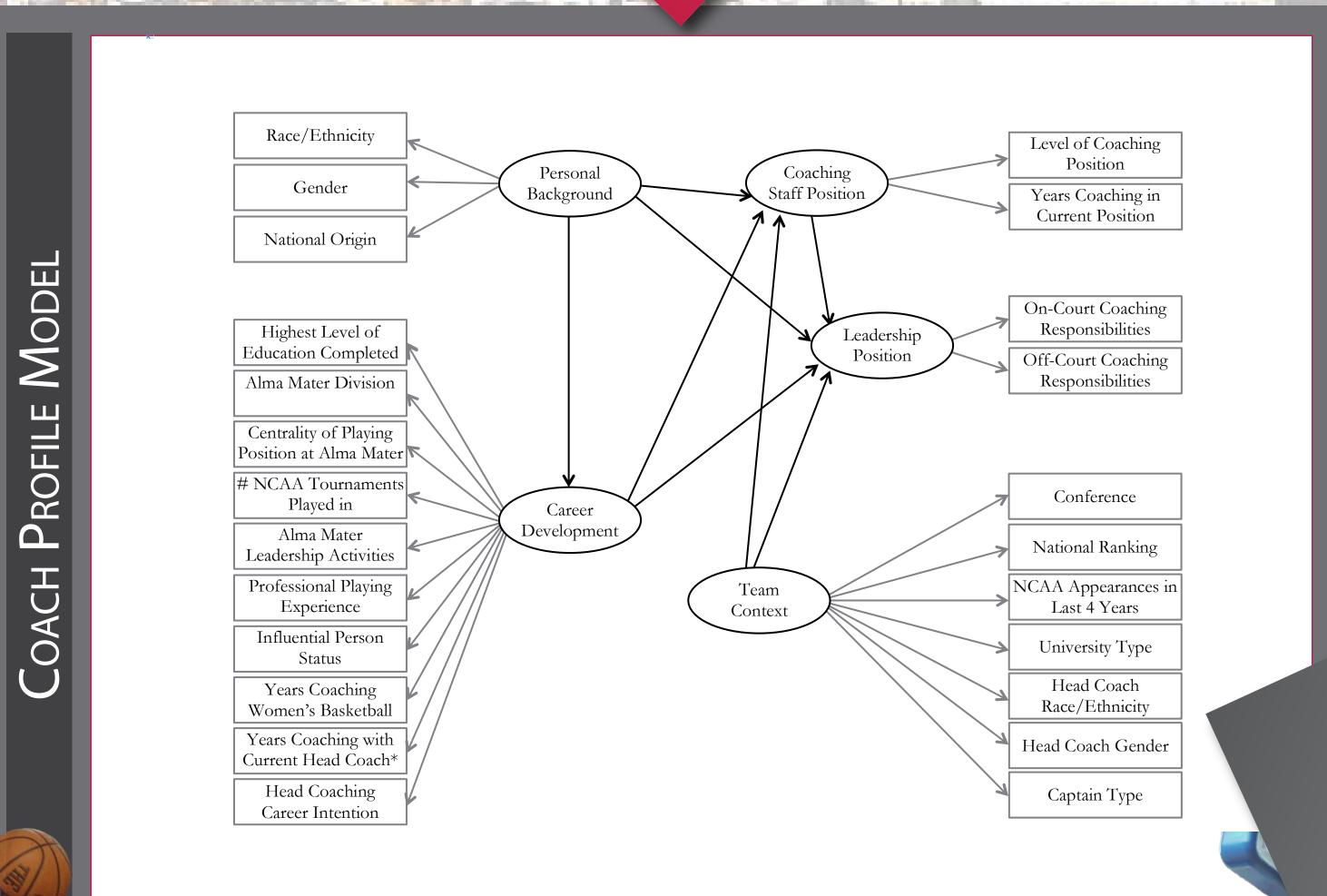
The Six Steps for Conducting SEM Analyses

- 1. Model Specification: hypothesize relationships
- a. Measurement Model: relationships between measures and constructs
- b. Structural Model: relationships between latent variables
- 2. Identification: find parsimonious summary of relationships
- 3. Data Preparation and Screening
- 4. Estimation: determine the value of parameters
- 5. Model Fit and Interpretation: evaluate the goodness of fit of the hypothesized model in comparison to the observed associations
- 6. Model Modification: respecify as needed to find the best fitting model

(Weston & Gore, 2006)

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DEVELOPMENT OF THE MODELS

Development of the Constructs for the Student-Athlete Population Model

Personal Background

The personal background construct describes a set of factors that are uncontrollable by the participant, but which are hypothesized to impact the model. One such factor, race/ethnicity, is derived from positional segregation research, based on Loy and McElvogue's (1970) employment of centrality theory in sport.

ii. Career Development

The factors making up the career development construct of the student-athlete model are gathered on the premise that together they give information about the activities the athlete participated in before obtaining their current role on the team. Medoff's (1976) economic theory—which suggests that stacking patterns are revealed in positions that have additional costs associated with training, equipment, and development—is one that informs this construct.

iii. Team Context

Elements associated with the ranking, region, and past success of the university's basketball program have an influence on the recruitment and integration of players the team setting. The consideration of regional influence on racial integration revisits the work done in Berghorn, Yetman, and Hanna's 1988 study.

iv. Playing Position

As one of the two outcome variables (along with Leadership Position), the factor set included in this construct consists of measures of participant's current status and activity.

v. Leadership Position

With this construct, I seek to expound upon current stacking research, which focuses investigations on the status of playing position, by also evaluating the status of formal (on-court) and informal (off-court) leadership positions. The findings of Melnick and Loy (1996) are important to note for this construct, as they reveal that high skill level is associated with the motivation for selecting athletes as leaders at the collegiate level of competition.

Development of the Constructs for the Coach Population Model

- Personal Background
- The factors making up the personal background construct for the coach group are very similar to those used in the student-athlete model. The addition of the factor for gender replaces the indicators of socioeconomic status in the other model.
- ii. Career Development

The factor set used to measure the career development construct for the coach population differs from that of the other model with the inclusion of coaching development specific activities. An important study informing the development of this construct is Agyemang and DeLorme's 2010 investigation into the underrepresentation of Black head coaches in football. Also of note, Stangl and Kane (1991) investigated homologous reproduction theory to explain gender effects in the coaching ranks of women's sports.

iii. Team Context 😂 😂 😂 🈂

The 2010 study by Day and McDonald used social network theory to investigate the effect of social capital through evidence of homophilic and heterogeneous associations. Their research supports the inclusion of team context factors for both models.

iv. Coaching Staff Position

For the coach population, coaching staff position is the construct of interest instead of playing position. Rimer's 1996 study presents cause for concern in the representation of coaches in different levels on the staff, as his results revealed that Blacks, Hispanics, and Whites were hired as MLB managers on the basis of different attributes.

v. Leadership Position

Borland and Bruening (2010) found in their qualitative investigation of the underrepresentation of Black women as head coaches that lack of support and networks were key influencing factors. The leadership position construct includes measures that will speak to these and similar elements that mediate women in gaining access to career mobility in the coaching realm.

Next Steps - Finishing the Models

- 1. Create survey instrument for the collection of measures.
- 2. Conduct confirmatory factor analysis with data from measures to confirm and complete factor sets for the proposed constructs (multicollinearity issues may call for the removal of some items).
- 3. Create scales for each of the latent constructs based on the combined information given from the observable measures.

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