CHAPTER 3. DESIGN AND METHODOLOGY

Chapter 3 discusses the design of this study as well as the methodology employed in the analysis of the research questions. The chapter begins with an overview of the research questions that guided this study and continues with an analysis of the database used. Also in the chapter is a description of the statistical model used and the methodology employed. The chapter concludes with a description of the limitations of this study.

In his analysis of extracurricular activity involvement, Becker (1992) noted both tangible and intangible gains for participants that ranged from cultural advancement to improvement in earnings and portability in the workplace. The cost is simply the time spent on these investments, and those individuals studying the theory of human capital in recent years have related this to the field of education.

Very few studies, however, have been conducted that have demonstrated any relationship between the development of human capital and participation in interscholastic athletics and activities. Most studies have focused on the present value of athletic and activity participation in such tangible areas as grade point average and dropout rate, along with intangible assets such as “basic emotional, cognitive, and physical skills” (Hansen et al., 2003, p. 27).

Barron et al. (2000) pointed to human capital and one perception that athletics took away from the overall education of young people. They noted that:

> the time devoted to athletics does not result in the acquisition of less human capital and lower subsequent wages, as would be the case if the only role for athletic participation is as a signal of those who place a high value on the consumption of athletics. (p. 420)

Research Questions and Hypotheses

The purpose of this study was to investigate the relationship between interscholastic participation in extracurricular activities and two areas of future value: postsecondary educational attainment and future wage earnings. Limited research exists in this area and, with the challenges of student achievement and funding in schools, the issue of the value of student participation is relevant.

This purpose, the investigation of the relationship between participation in extracurricular activities and postsecondary educational attainment and future wage earnings was pursued by analyzing the NELS:88 following the fourth data collection wave that was conducted in the year 2000 and by using sections of data collected throughout the study. The group studied in NELS:88 is best defined as the high school class of 1992. The study examined whether participation in extracurricular activities, defined in this study as participation in high school athletics and/or the performing arts at the student's high school, had an influence on a student's postsecondary educational attainment or on a student's future earnings.

There were two primary research questions for this study. These questions were: (a) does a relationship exist between high school student participation in interscholastic activities and postsecondary educational attainment, and (b) does a relationship exist between high school student participation in interscholastic activities and future wage earnings. In the case of each question, the hypothesis was that significant relationships do exist between participation in interscholastic activities and future educational attainment and future wage earnings.

Research Design

Understanding the theory of human capital and its basic notion that "the earnings of more educated people are almost always well above average" (Becker, n.d.) is critical to the study of future earnings and educational attainment. In other words, the more education a person has, the greater his or her future earnings will be and the more likely he or she will be to attain a higher level of education. The assumption made herein is simply that participation in athletics and activities in a secondary school setting is educational and, thus, an investment in human capital.

Using the theoretical context that interscholastic activities are inherently educational, this study examines the relationship between that interscholastic experience and the future earnings of the individuals who participated in an activity in high school, as well as between the interscholastic experience and educational attainment or the level of education an individual achieves.

The initial task in investigating whether a significant relationship existed between interscholastic participation and future value was to identify an appropriate source of individual-level data that helped answer the research questions. The second task was to identify the proper statistical model. The next section describes both the data used and the statistical model employed in this study.

Data

A review of both available datasets and data that could be created led to the selection of the NELS:88 as an appropriate database for this study. According to the National Center for Education Statistics (NCES), NELS:88 is a "nationally representative sample" (2002, p. 2) of individuals first surveyed in eighth grade in the year 1988. The study tracked their

progress through a series of four follow-ups conducted in 1990, 1992, 1994, and 2000. This study was conducted by the NCES in the Department of Education, the primary federal entity for collecting and analyzing data related to education.

The NCES (2002) designed this survey with the intent of collecting data over time in a cohort study format to measure: (a) the effectiveness of high school; (b) the transitions between eighth grade, high school, and the workplace; and (c) changes in the operation of education over time. The actual survey work was conducted by the National Opinion Research Center (NORC) at the University of Chicago (base year through the third follow-up) and the Research Triangle Institute (RTI) in North Carolina (fourth follow-up) (p. 5).

In 1988, the surveyed individuals were in the eighth grade. “Students, two teachers, parents, and one school administrator completed extensive interviews regarding academic achievement, academic participation, academic motivation, and demographic data” (Smith, 2006, p. 214) in the initial data collection phase. In this initial phase, there were 1,052 schools studies and questionnaires were given to nearly 25,000 students. In the first follow-up, fewer students participated, and the interviews again included teachers, parents, and administrators. Beyond the first follow-up, only the students were interviewed, and additional data were collected about them through official documents such as high school and college transcripts. At this time, the study featured a “clustered, stratified national probability sample of 1,052 public and private 8th-grade schools” (NCES, 2002, p. 6).

NELS:88 “enables researchers to conduct analyses on three levels: crosswave (by following a single group of individuals as they develop over time), cross-sectional (at a single point in time), and cross-cohort (by comparing NELS:88 findings to those of HS&B

and NLS-72)" (NCES, 2002, p. 10). The base year (1988) featured data collection through interviews with students, parents, school administrators, teachers, and with cognitive tests. The only other year that was as exhaustive was the second follow-up in 1992 when students were nearing completion or had completed high school. In this follow-up, transcript analysis was also conducted. In the fourth and final follow-up, only the students were interviewed and transcript reviews were performed.

In the base year, a two-stage probability design was used to select a nationally representative sample of eighth grade schools and students. A pool of 1,057 schools cooperated. From those 1,057 eligible schools, 698 participated (NCES, 2002, p. 12). A random selection of eighth grade students at these schools yielded a total number of 24,599 individual participants, all of which were second-term eighth grade students in 1988 (NCES, 2002, p. 6).

The base-year design consisted of four components: (a) surveys and tests of students; (b) surveys of parents; (c) surveys of school administrators; and (d) surveys of teachers. In these surveys, general demographic information was collected along with information on a range of topics that dealt with future aspirations, schools attitudes, and social aspects. Testing was conducted in four subject areas: reading, mathematics, science, and social studies. The parent and teacher surveys focused on individual students as well as general characteristics about the school. The administrator survey completed by principals focused on the school climate.

The second wave of data collection (the first follow-up) was completed in 1990 when the majority of students would have been in the tenth grade year of high school, two years after the initiation of the project. During this phase, an additional set of tenth grade

students was added to the initial group of participants to account for individual student losses due to movement or a lack of academic promotion (NCES, 2002, p. 13). This first follow-up featured surveys similar to the initial round with the exception of the parent survey, which was not repeated in this round of collection. In addition, achievement tests were administered to participating students. Initially, 21,474 students who were in the eighth grade in 1988 were selected for participation in the first follow-up. A "freshened" sample of 855 students who were considered eligible by virtue of their current enrollment in the tenth grade - yet were not in the base year time frame - was added to the study to account for losses due to movement or a lack of advancement to the 10^{th} grade. The information necessary to generate a degree of consistency with those studied in the base year and the first follow-up was collected from the 855 additional students.

The second follow-up was conducted in 1992 near the completion of high school or four years beyond the eighth grade for most students. In this follow-up, each student was interviewed and additional data were collected from data such as high school transcripts relating to student's academic progress. This follow-up featured all of the components (with only one teacher survey opposed to two) of the base year study along with a review of the student's high school transcript. A similar sample "freshening" took place in the second follow-up, featuring 279 students who were enrolled in neither the eighth grade in the base year study nor the tenth grade in 1990. The final sample size for 1992 was 20,923 students (NCES, 2002, p. 14).

The third follow-up was conducted in 1994 and was designed to measure the ongoing progress of students in the cohort as they advanced beyond high school. While earlier data collection took the form of face-to-face surveys and interviews, the data were

collected in this wave via computer-assisted phone interviews and field follow-ups. In all, 15,875 individuals were studied in the third follow-up.

In the fourth and final follow-up in 2000, interviews of 12,144 members of the three previous cohorts were conducted. The mean age of the individuals at this time - six years after the most recent follow-up (1994) - was 26, which led to greater information about postsecondary education and employment. This follow-up took place in 2000, six years after the third follow-up and 12 years after the initial cohort was studied, and was conducted with computer-aided telephone interviews and transcript evaluations. This follow-up was designed to collect data pertaining to the change students' lives beyond high school, into the workforce, and postsecondary education. In all, 15,237 individuals were sampled, yielding 12,144 members from the previous three follow-ups and the base year study.

Combined with the National Longitudinal Study of the high school class of 1972 (NLS-72), High School and Beyond (HS&B), and the Educational Longitudinal Study of 2002, NELS:88 was designed to describe the educational experiences of students over the course of four successive decades beginning in the 1970s. Each study "provides bases for further understanding the correlates of educational success in the United States" (NCES, 2002, p. 10).

While NELS:88 is clearly a longitudinal cohort study, the analysis in this study in this case can best be described as ex-post facto research, taking the variables developed in the NELS:88 data set and simply studying their relationships (Alsbury, 2001). Because of the longitudinal nature of NELS:88, it proved to be a unique source of data because it accounted for the experiences of students while still in high school as well as accounting for

post-high school graduation activities. Best and Kahn (1998) noted that “ex-post facto research is widely and appropriately used, particularly in the behavioral sciences” (p. 138). Lord (1973) indicated that ex-post facto research was appropriate and powerful when the control of a single, independent variable would be highly unrealistic, which would be the case in most educational settings. Best and Kahn also stated that “descriptive research methods deal with the relationship between unmanipulated variables. Because the events of conditions have already occurred, the researcher merely selects the relevant variables for an analysis of their relationships” (p. 129).

The NELS:88 database was selected for this study because the variables were consistent with the purpose of the study. NELS:88 contained data on a large number of students across a wide variance of populations, mixing both public and nonpublic schools along with students of a variety of demographic categories. NELS:88 was designed to describe the educational experience, not just at any one point in time but through time. Because NELS:88 examined the activities of students during their high school experience and their success in terms of postsecondary educational and wage attainment, the data contained in NELS:88 served as an adequate measure for the research questions in this study. The specific variables selected from NELS:88 for this study are described both in the Methodology section of this chapter and in Appendix B.

Statistical Model

In addition to the selection of an appropriate source of data for this study, the implementation of a statistical model was critical. The intent of this study was to analyze the individual-level relationships between interscholastic participation and future educational and wage attainment. Four different modes of analysis were used in this study: (a) bivariate

linear regression, (b) multiple regression, (c) the correlation between participation in activities and future earnings, and (d) the correlation between participation in activities and educational attainment.

Bivariate linear regression was used to study participation in activities that an individual reported in relation to their future earnings and educational attainment. This model was selected due to the fact that the only analysis desired was the direct, singular relationship between activities, measured in different singular and combined format, in which an individual participates and future earnings and educational attainment, not accounting for additional variables. In this model, participation was measured as a scale variable indicating the total number of activities in which an individual participated during high school. Future earnings was measured as a scale variable, while educational attainment was measured as an ordinal variable.

Multiple regression was used to study other variables beyond just participation activities, measured in different singular and combined format, in which an individual participates reported in relation to their future earnings and educational attainment. The variable indicating the number of activities in which an individual participated during high school, the scale variable indicating total family income, and the ordinal variable indicating parent education level were all used as independent variables. The dependent variable future earnings was measured as a scale variable while educational attainment was measured as an ordinal variable. Analysis was conducted using the number of activities participated in combined with total family income, the number of activities participated in combined with parent education level, and the number of activities participated in combined with both total family income and parent education level as independent variable combinations.

A Somer's d coefficient was calculated to assess the relationship between participation (defined in this model as an ordinal variable with qualities of participant or nonparticipant) and future earnings (measured as an ordinal variable). A similar analysis was conducted within a series of different variable combinations indicating different levels of participation. Somer's d was used in this analysis due to the nature of the ordinal variables selected for analysis.

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These procedures permitted a full analysis of the variables influencing future wage earnings and educational attainment as related to participation in extracurricular activities. This analysis went beyond a simple singular study of the relationship by accounting for other variables in such a relationship.

Methodology

This study limited the possible number of variables and analyses to focus on the primary and secondary research questions. At the individual-level, the focus remained on participation in interscholastic activities and on future educational attainment and wage earnings. Further demographic variables to include student gender and race data, family socio-economic status, parental marital status and parent educational level while the student was in high school were analyzed to add richness to the study.

Selection of the Sample

The initial NELS:88 survey focused on a "clustered, stratified national probability sample of 1,052 public and private 8th-grade schools" (NCES, 2002, p. 6), featuring nearly 25,000 students. No more than 24 students were selected from any one school. The sample used for this study came from the fourth and final follow-up conducted in the year 2000, where interviews of 12,144 members of the three previous cohorts were conducted. The mean age of the individuals at this time, six years after the most recent follow-up (1994), was 26. In most cases, the individuals would have been eight years removed from high school and, in all cases, 12 years removed from the eighth grade. This sample was selected primarily because of its connection to the educational attainment and wage attainment of the individuals at this point in time.

Variable Selection

A series of variables were used in this study and came from the base year and each of the four follow-ups of the NELS:88, collected in 1988, 1990, 1992, 1994, and 2000. The independent variables consisted of different variables from the NELS:88 data set that centered on participation. These variables were used both independently (participation in a team sport [baseball, basketball, football, soccer, swimming, other], participation in an individual sport [cross-country, gymnastics, golf, tennis, track, wrestling], participation in cheerleading, participation on pom-pom/drill team, participation in school band/orchestra, and participation in a school play/musical) as a sum of varying levels of different participation and as one joint variable to indicate overall participation in any activity. In addition, participation variables were examined in both the first and second follow-ups (1990 and 1992). This differed from the work of Lleras (2008), who used the NELS:88 data

set to study educational attainment and future earnings, yet only examined participation data collected in 1990. In addition, the variables of total family income and parent educational level were used in this analysis.

The dependent variables used in this study relate to future earnings and educational attainment. Future earnings were analyzed using data from the fourth follow-up in NELS:88, collected in 2000, including the current earnings rate of the individual measured in 2000 and the income of the respondent in the years of 1997, 1998, and 1999. Educational attainment was reflected in a variable defined in 2000, the fourth follow-up of NELS:88, as the highest postsecondary education degree attained. This differed from the work of Troutman and Dufur who focused only on females and bachelor's degree attainment in their study using NELS:88.

Data Analysis

Data analysis in this study was guided by the theory of human capital, in this case demonstrated by participation as it related to the variables of future earnings and educational attainment. Data analysis was conducted using a bivariate linear regression problem, a multiple regression problem, a Pearson product-moment correlation, and a calculation of Spearman's rho.

A bivariate linear regression model was estimated for each dependent variable: future earnings and educational attainment. The three assumptions outlined in the work of Green and Salkind (2005), necessary for regression results to be valid are: (a) a normal distribution in the population of the dependent variable for each level of the independent variable, (b) constant population variance of the error of estimation of the dependent variable for different values of the independent variable, and (c) the fact that all observations

are independent of each other and constitute a random sample of the population (p. 275). Each assumption was met in this study of the NELS:88 data set. This calculation of a bivariate linear regression problem related an independent variable (predictor) and a dependent variable (criterion) for each individual and demonstrated how well values of the independent variable predicted values of the dependent variable in each instance. The level of statistical significance for this study was .05.

In linear regression, what is known about one variable is used to make predictions about other variables, and "a less frequent but equally plausible use is to test hypotheses" (Keppel & Zedeck, 1989, p. 58). As Green and Salkind (2005) highlighted, bivariate linear regression computes the following equation that relates the predicted Y scores ($\hat{Y}$) to X scores. The equation includes a slope weight for the independent variable and an additive constant:

$$\hat{Y} = B_{slope}X + B_{constant}$$

$\hat{Y}$ represents the dependent variable, which in this case relates to either future earnings or educational attainment. X refers to the independent variable, participation. B_{slope} is the slope and $B_{constant}$ is the y intercept. The computation completed assessed how accurately values of Y (future earnings or educational attainment) are predicted by the linear equation.

A multiple regression model was estimated for each dependent variable: future earnings and educational attainment. The same three assumptions outlined by Green and Salkind (2005) (p.286) were met in this study of the NELS:88 data sets in the population, and (b) the variables represent a random sample of the population and are independent of other scores of the same variables (p. 286). Each assumption was met in this study of the

NELS:88 data set. The multiple regression model measured how well the independent variables predicted the dependent variable in each instance. The level of significance for this study was .05.

As Green and Salkind (2005) highlighted, with multiple linear regression, each individual has scores on multiple independent variables and on a dependent variable (p. 283). In this case, with two predictors, the linear equation is:

$$\hat{Y} = B_1X_1 + B_2X_2 + B_{constant}$$

$\hat{Y}$ represents the dependent variable, which in this case relates to either future earnings or educational attainment. X_1 refers to the independent variable, participation, in each case and X_2 is either total family income or parent education level. $B_1$and B_1 are the slope weights for each variable and $B_{constant}$ the y intercept. The model assessed how accurately the future earnings or educational attainment was predicted by the linear relationship involving each independent variable combination.

Somer's d is an asymmetric measure of association between two variables which are ordinal in nature (Newson, n.d.). In the first set of calculations, the dependent variable, future earnings, was an ordinal variable, while the independent variable indicating participation was also ordinal. In the second instance, the dependent variable, educational attainment, was ordinal. The independent variable was ordinal, indicating participation.

These statistical methods are employed to test null hypotheses about relationships between variables. Best (1981) noted that:

> a null hypothesis states there is no significant difference or relationship between two or more parameters. It concerns a judgment as to whether apparent differences or

> relationships are true differences or relationships or whether they merely result from sampling error. (p. 270)

Best and Kahn (1998) pointed out that:

> most hypotheses are the opposite of the null hypothesis. In such a case, if the researcher rejects the null hypothesis, they accepted the research hypothesis, concluding that the magnitude of the observed variable relationship is probably too great to attribute to sampling error. (p. 12)

Two types of analytical error can occur. Type I error is best defined as the rejection of a null hypothesis when it is really true (Best & Kahn, 1998, p. 393). As Adler and Clark (2003) stated, "when the chances are greater than 5 in 100, or 'p>.05,' social scientists generally decline to take the risk of inferring that a relationship exists in a larger population" (p. 477). For this study, a significance level was established as p<.05, which increased Type I error but limited the likelihood of committing a Type II error, or not rejecting the null hypothesis when it is really false (Best & Kahn, p. 393).

Data analysis was completed using the Statistical Package for the Social Sciences (SPSS). This analysis was completed following the tagging of all relevant variables in the Electronic Codebook that accompanied NELS:88. This created a file from which the data set could be created for this study. Findings from the SPSS analyses are reported in Chapter 4.

Limitations of the Study

This study is limited by the fact that it studied only one cohort of students in the United States. While the NELS:88 data set is a "nationally representative sample" (NCES, 2002, p. 2) of individuals first surveyed in eighth grade in the year 1988, it is only a sample of those students in that particular year. For other eighth grade cohorts, since that time, the

environmental factors impacting both participation in interscholastic activities and the opportunities for postsecondary education and wage earnings have changed. These factors include an explosion in the number of activities offered and an increased importance placed upon participation by varied stakeholders, leading to a participation explosion. A study conducted at the conclusion of the 2006–2007 school year by the NFHS found that participation in high school athletics for that same school year rose by over 183,000 students to an all-time high of 7,342,910 students, a proportional increase of 2.49% over the previous year ("High school sports," 2008, p. 53). The study itself is also limited as the number of students in 1988 participating in the study was nearly 25,000, while in 2000, only about 12,000 responded, thus limiting the sample size.

This study is also limited by the fact that it stopped in 2000. Considering that the mean age of the respondents studied in 2000 was only 26, further detail could be gleaned respective to wage earnings after that year. Welch (2000) examined different wage rates and found that the weekly wage for both males and females reached its apex after 20 years of work experience (p. 445). At age 26 in the year 2000, the average individual with a bachelor's degree would only have been in the workforce for approximately four years, far from the peak of wage earnings. While one could assume that wage earnings would be in direct, positive proportion to experience and age, as is indicated in the graphical interpretations provided by Welch, this could be refuted over time. Further consider that *Forbes* magazine noted that the nine top-paying jobs in America all were in the field of medicine and required advanced degrees (Maidment, 2008). Most advanced degrees take 8 to 10 years to complete and based upon that, it is important to note that those in highest

paying jobs would not be in the workforce at age 26. In other words, the greater the range in years from eighth grade, the wider the earnings range.

The study also is limited by participants and their responses to the survey question relating to participation in extracurricular activities. The degree of participation, both in terms of level or time, cannot be gleaned by the participants' survey response, and only reflects participation in grades 10 and 12. We thus, are unable to gauge whether a certain level of participation in terms of participation duration (one year, four years) or participation level (varsity, junior varsity) impacts future endeavors.

The NELS:88 dataset limits this study in four different areas. These are the exclusion of subsets of the student population, internal inconsistency, missing values, and a lack of context from schools.

The first of these areas relates to the exclusion of subsets of the population. The National Opinion Research Center at the University of Chicago released a study after the initial data collection in 1998 that outlined the fact that Hispanic and Asian student samples were limited because the test and survey instruments were written in English only (Ingels, Rizzo, Rasinksi, 1989). Furthermore, students with disabilities were also not included in the population because "tests would be unsuitable and persons having physical or emotional problems that would make participation in the survey unduly difficult or unwise" (Ingels, Rizzo, Rasinksi, 1989, p. 5). This exclusion limits the data in terms of examining some subsets of the student population in any analysis.

The second such limitation in NELS:88 deals with internal inconsistency. Throughout the surveys, there are questions that are considered "additive" (Stull, Morse-Kelly, Rigsby, 1995, p. 17). There are questions that require the participant to consider

different areas of their school experience and indicate time spent on each area. One example relative to this study relates to selecting activities. It would be possible for a 9th grade student to participate in four activities, a 10th grade student to participate in four different activities, and so on. In all, a student could participate in 16-24 activities in his or her high school career, never committing to one or more. Thus, any cumulative study of the number of activities a student participated in throughout high school could be limited.

There are two main issues related to this particular study with respect to missing values. First, Stull, Morse-Kelly, and Rigsby (1995) examined missing values and found them to be "not a random phenomenon" (p. 15). The group indicated that the majority of cases with missing values were typically male, and a large proportion of the cases were from African-American and Latino populations (1995). This had the potential to limit some data related to males and different ethnic groups, thus potentially limiting results. Second, there are different kinds of missing answers. There are answers that relayed the message that the school did not have a particular program and others which relayed the message that the student just did not care to answer the question, both omissions were treated the same in NELS:88 (Stull, Morse-Kelly, Rigsby, 1995). In this case, because a school lacked a baseball team could have been treated the same as an individual baseball players simply not identifying himself as a participant, limiting the dataset and the results.

Another limitation of this study dealing specifically with NELS:88 was the lack of context related to schools. Stull, Morse-Kelly, Rigsby (1995) indicated that no school district information was provided with the dataset. This limited this study specifically because of a lack of understanding relative to the offerings given a student. With information related to school finances or community expectations as each related to

extracurricular offerings, further analysis could have been completed on the impact of participation both in the present and future. In addition, such information would have provided a greater understanding as to why or why not more or fewer students participated at one school opposed to another.

Summary

Chapter 3 began with a statement of the research questions that guided this study. The chapter then presented a detailed description of the selected data set and a general description of the research design and methodologies used throughout the study. The limitations of the study also were reviewed. Chapter 4 presents an in-depth analysis of the data and a description of the methods used to analyze these data. Chapter 5 reviews the implications of the findings from the statistical analysis and outlines recommendations for future research and practice.